

Oregon Coastal Salmon Restoration Initiative

The Oregon Plan

[v. 1]

Submitted to
National Marine Fisheries Service
March 1997



160 State Capitol
Salem, Oregon
*An effort on behalf of the citizens
and salmon of Oregon*

Elements of the OCSRI Conservation Plan

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Foreword: *A pledge*

The *heart* of the Conservation Plan is its commitment. Commitments only have meaning if they are sincere as proven over time by faithful conduct. I hope, for our sake and for our children's sake, that society will live up to this pledge.

—Jay W. Nicholas
principal writer/
plan coordinator
March 7, 1997

*We, the people of Oregon,
promise to do our best
to understand and respect
the needs of salmon, and
to make meaningful commitments
in the way we conduct our lives,
in the hope that salmon
and people
will survive and flourish,
together,
long into the future.*

Acknowledgments

The Oregon Plan represents the work of many people who dedicated themselves to this effort. Jim Martin led the effort as project manager and Jay Nicholas served as the principal writer and plan coordinator. So many people helped develop the Plan that no list would be complete, nor would any acknowledgment express full gratitude for their efforts. These people focused their energy toward a common goal of improving one aspect of the quality of life that Oregon provides — the health of coastal salmon populations. The efforts of all are greatly appreciated.

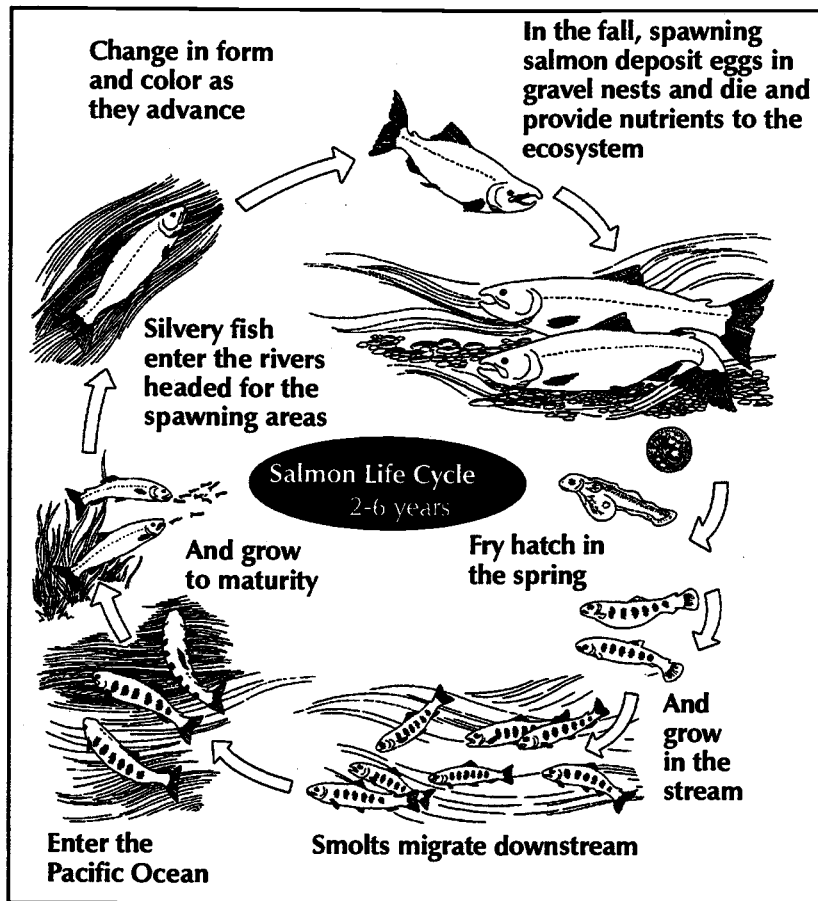
To all who helped, in whatever capacity, thank you.

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Rosemary Davis	Kim MacColl	George Robisson	

Finally, when the time arrived to put all the words down on paper, check and double-check the details, and make things look as presentable as possible given the available time and budget, a few individuals devoted their personal time and energy in an exceptional manner.

Weston Becker	Kathy Helm	Ted Lorenson
Charlotte Haynes	Bonnie King	Kelly Moore

"Now the real work begins."



Salmon Life Cycle

The salmon life cycle illustrates how these fish depend on a variety of healthy habitat for their survival. Oregon salmon range from the headwaters of coastal streams all the way to the Pacific Ocean — crossing man-made boundaries and natural obstacles. The Conservation Plan aims to provide ways for Oregonians to restore and protect the valuable habitat necessary to sustain healthy salmon runs.

The Oregon Plan

An Overview

Oregon's conservation plan is designed to restore salmon to a level at which they can once again be a part of people's lives. The emphasis is on coho salmon in coastal river basins. However, it is a model that will expand to include all salmon and trout throughout the state. While the Plan focuses on the needs of salmon, it will conserve and restore crucial elements of natural systems that support fish, wildlife and people. No other state has ever attempted such a comprehensive program.

The Plan consists of four essential elements:

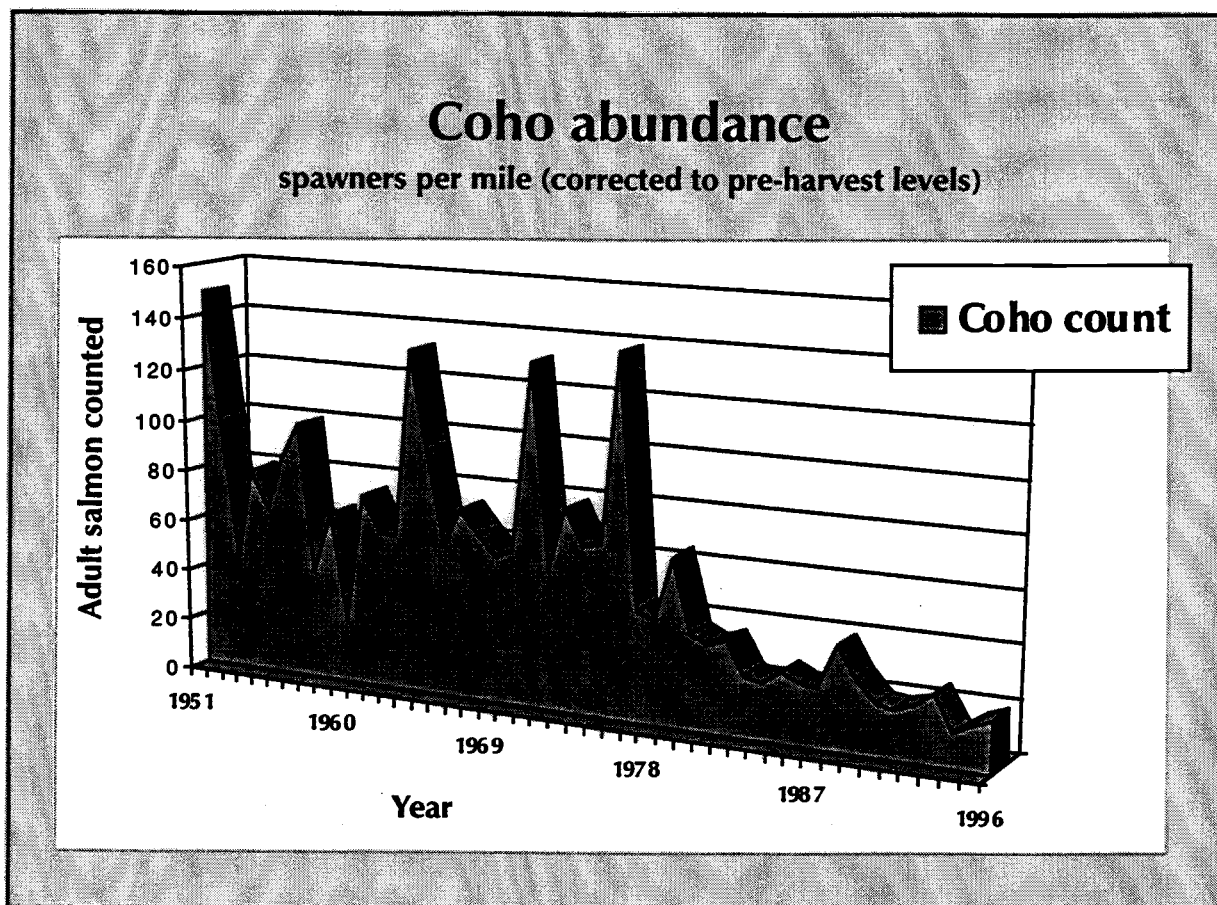
Coordinated agency programs: Many state and federal agencies administer laws, policies, and management programs that have an impact on salmon. These agencies are responsible for fishery harvest management, production of hatchery fish, water quality, water quantity, and a wide variety of habitat protection, alteration, and restoration activities. Previously, agencies conducted business independently. Salmon, whose life cycle crosses the jurisdictional boundaries of all of these agencies, suffered. Salmon suffered because they were affected by the actions of all the agencies, but no single agency was responsible for comprehensive, life-cycle management. Under this plan, all government agencies that impact salmon are accountable for coordinated programs in a manner that is consistent with conservation and restoration efforts.

Community-based action: Government, alone, cannot conserve and restore salmon across the landscape. The Plan recognizes that actions to conserve and restore salmon must be worked out by communities and landowners, with local knowledge of problems and ownership in solutions. Watershed councils, soil and water conservation districts, and other grassroots efforts are vehicles for getting the work done. Government programs will provide regulatory and technical support to these efforts, but the bulk of the work to conserve and restore watersheds will be done by local people. Education is a fundamental part of community-based action. People must understand the needs of salmon in order to make informed decisions about how to make changes to their way of life that will accommodate the needs of the fish.

Monitoring: The monitoring program combines an annual appraisal of work accomplished and results achieved. Workplans will be used to determine whether agencies meet their goals as promised. Biological and physical sampling will be conducted to determine whether salmon habitats and populations respond as expected to conservation and restoration efforts.

Appropriate corrective measures: The Plan includes an explicit process for learning from experience, discussing alternative approaches, and making changes to current programs. The Plan emphasizes improving compliance with existing environmental laws rather than arbitrarily establishing new protective laws. Compliance will be achieved through a combination of education and prioritized enforcement of laws that are expected to yield the greatest benefits for salmon.

In summary, the Oregon Plan involves the following: (1) coordination of effort by all parties, (2) development of action plans with relevance and ownership at the local level, (3) monitoring progress, and (4) making appropriate corrective changes in the future.



Declining Populations

Oregon's Conservation Plan recognizes an historic decline in coastal coho populations. The Plan is designed to reverse the decline and return salmon, once again, to healthy levels.

Chapter 1: *Appraisal of the OCSRI Conservation Plan*

If placed in a logical order, a chapter discussing the overall adequacy of this Conservation Plan should be at the end of the document. Instead, it is placed at the beginning because of its importance and because it might be overlooked at the end of nearly 2000 pages.

Oregon's Conservation Plan Will Evolve

The strength of the Conservation Plan lies in an explicit recognition that it will need to adapt, evolve, and improve, based on information obtained from monitoring, independent scientific review, and the people who will use the Plan to guide work on the land and in the streams. The written document, therefore, celebrates a beginning—a turning point in the way Oregonians manage the landscape that supports people and fish.

Over 600 pages of critical review comments on the OCSRI Conservation Plan have been received (*see* Chapter 2). Assessing the overall adequacy of the Conservation Plan is a difficult task.

Oregon asserts that no scientific protocol exists to clearly define how all the elements of the Conservation Plan might be evaluated in order to assess its overall adequacy. Thus, evaluation of the Conservation Plan's adequacy largely relies on the professional judgment of reviewers.

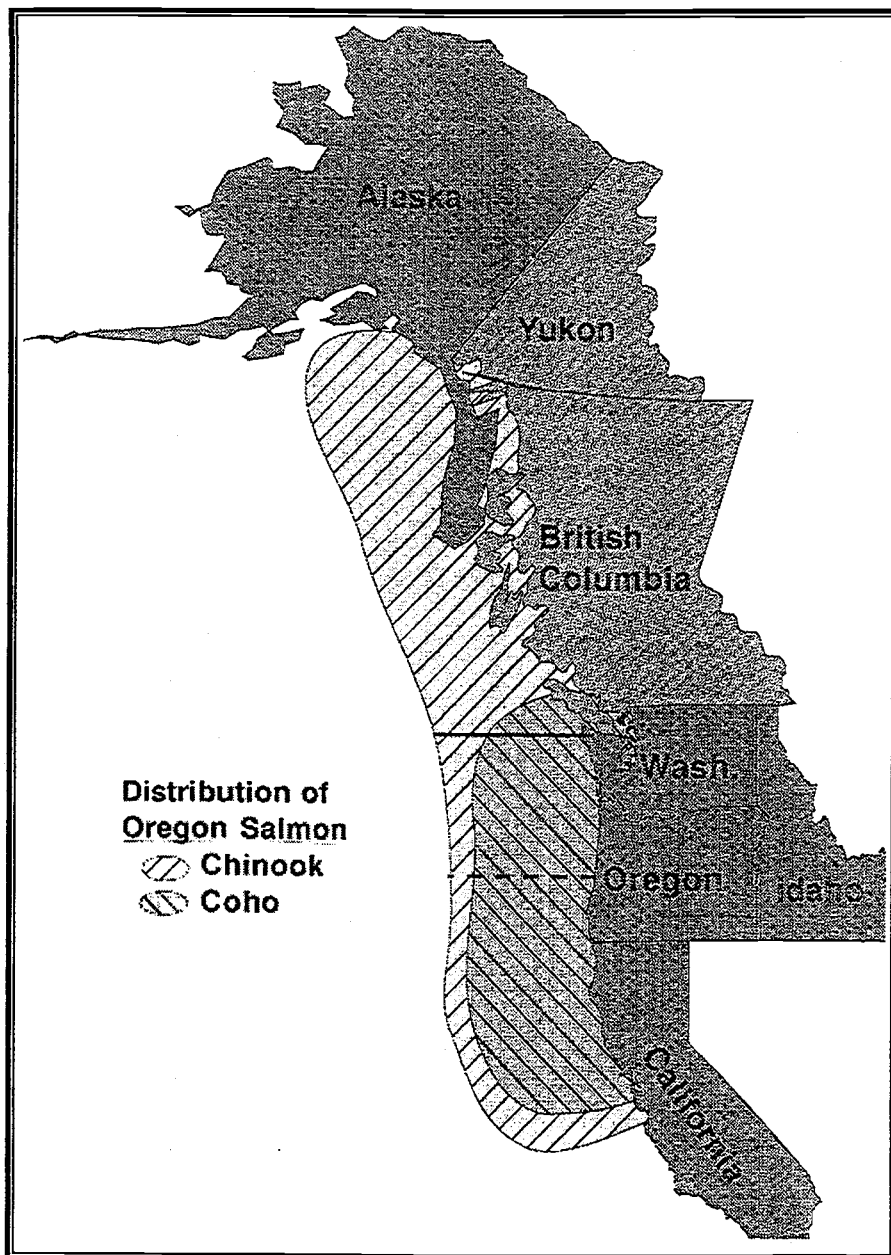
The premise of the OCSRI is that factors for decline are, and will continue to be, identified in a watershed, and that solutions to addressing those factors will be implemented through a local context involving watershed councils, soil and water conservation districts, the OSU Cooperative Extension Service, landowners, local governments, conservation groups, and other grassroots stakeholders. Evaluation of the adequacy of individual elements, as well as the entire Plan, should theoretically be done on a watershed-by-watershed, basin-by-basin, and ESU-by-ESU basis.

It is the judgment of the state that the Conservation Plan is sufficient, with a high degree of certainty, to achieve recovery of anadromous salmonids (particularly coho) in coastal river basins, especially the northern ESU. This judgment is based on the following main considerations:

- 1. Several sources of information suggest that, although coastal coho populations are not currently at desired levels, they remain sufficiently resilient to recover.***

Coho salmon are present today in three essentially distinct brood-year lines in most coastal river basins, i.e., they have been extirpated from perhaps only the smallest basins in the northern ESU.

The overall number of coho returning to spawn in the northern ESU has exhibited a general increasing trend since 1990, currently numbering over 60,000 fish, while overall production (fishery mortality plus escapement) has not exhibited a trend.



Salmon Migration

Salmon use vast areas of ocean during their rearing cycle. When they return to Oregon's rivers and streams, they require healthy and abundant habitat for spawning and freshwater rearing.

The low contemporary production levels of coho in the northern ESU are consistent with a quantitative population dynamic model that predicts poor production potential during periods of adverse oceanographic conditions for coho salmon.

2. Major factors for decline are being actively addressed by existing programs.

Fishery mortality, identified as a major factor for decline for Oregon coastal coho, is now thought to have been excessive over two decades and probably was a major contributor to the decline of coho in the ESUs. Fishery harvest mortality is now being constrained to less than 15 percent, and future increases in fishery mortality are restricted and will be contingent on achieving increased escapement and demonstrating improved ocean survival.

Hatchery programs, identified as another factor for decline of coho in the ESUs, have been modified considerably by reducing the number of hatchery fish released, as well as reducing the number of release locations and minimizing the use of off-station releases and stock transfers.

Altered riparian and instream habitat, also identified as a major factor for decline, should stabilize or improve over time as a result of the many commitments made — as part of the OCSRI — by agencies and landowners.

The Northwest Forest Plan is expected to substantially improve watershed health and salmon production on federal land and in downstream areas. The aquatic conservation strategy and the commitment to monitoring provide a cornerstone to the OCSRI.

3. The Conservation Plan includes rationale and information to facilitate prioritization of conservation and restoration efforts.

Draft core area maps are a fundamental element in prioritization of efforts, but these maps do not dictate priorities. Rather, they provide biological information that is useful in decision making.

4. Explicit objectives and timelines are stated in the Conservation Plan.

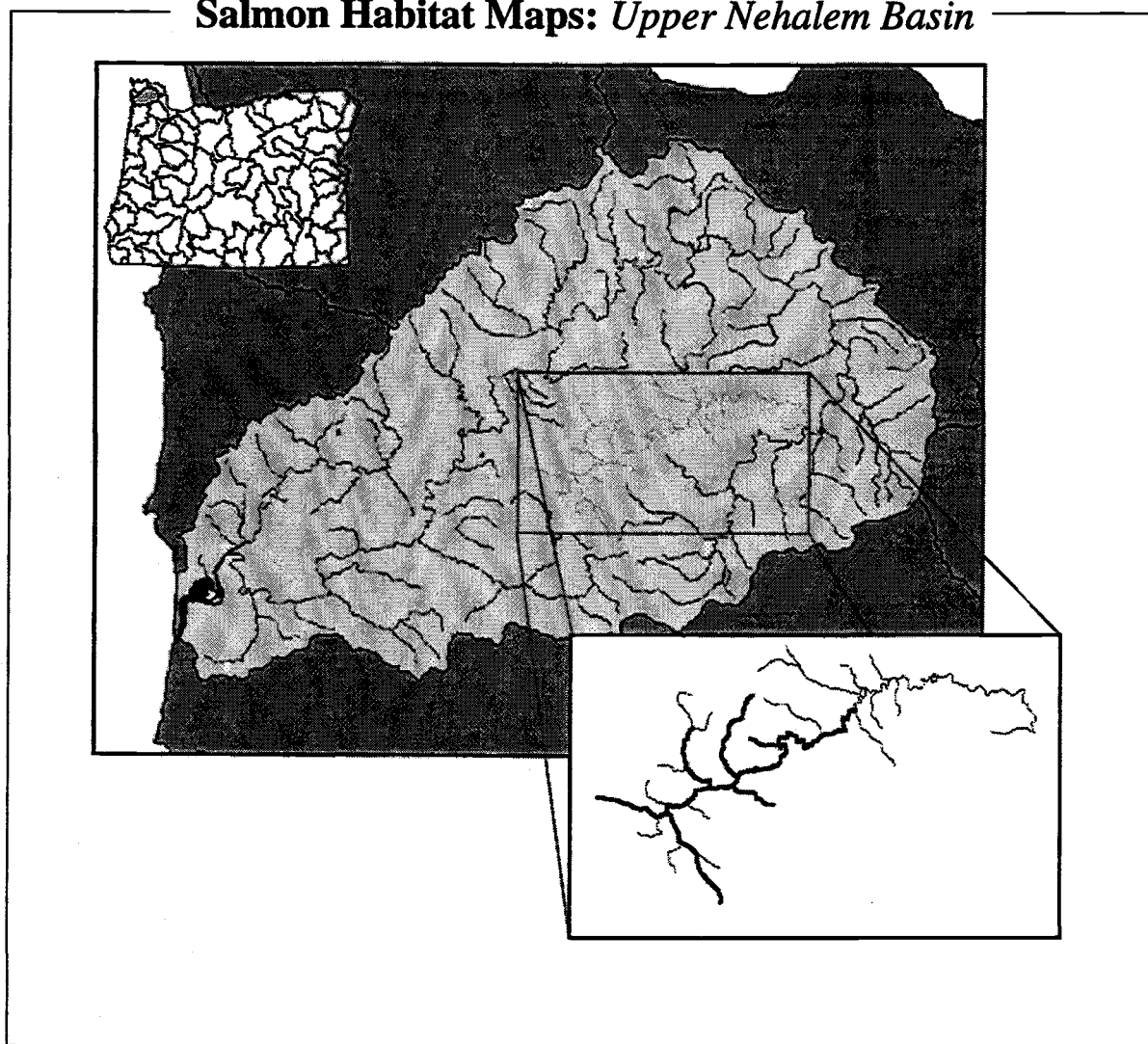
To the greatest extent possible, quantitative objectives have been established along with timelines for achievement.

These objectives have been designed to address identified factors for decline and are linked to measures that are expected to achieve progress towards achieving the objectives. In instances where quantitative objectives have not been established, processes are proposed to establish such objectives in the future.

5. A comprehensive monitoring program is in place.

The monitoring program includes a coordinated effort of state and federal agencies, watershed councils, soil and water conservation districts, industrial landowners, and other stakeholders.

Salmon Habitat Maps: *Upper Nehalem Basin*



Salmon Habitat

Salmon need healthy stream habitat for spawning and rearing. Oregon's Conservation Plan uses local knowledge and basin-by-basin mapping to identify and monitor areas most crucial to salmon. This helps to prioritize our conservation and restoration efforts.

The program being developed through the OCSRI will inform resource managers and the public whether the hoped-for benefits of individual and collective elements of the Plan are achieving the desired effect: restoring coastal salmon, steelhead, and trout populations to healthy conditions.

As currently implemented, the monitoring program's greatest strengths include assessing coho population trends, freshwater habitat characteristics, and water quality parameters.

The monitoring program is designed to facilitate ongoing improvement.

6. *The Plan provides a high level of certainty that identified measures and actions will be implemented.*

Efforts have been made to cite appropriate statutory authority or administrative rules that guide agency programs.

Detailed workplans have been prepared by state and federal agencies and watershed councils. These workplans will allow the National Marine Fisheries Service and others to determine whether the promised work is being accomplished.

A strategy to improve compliance with existing environmental protection laws has been implemented. The strategy includes obtaining data on rates of compliance with environmental protection laws, educating citizens, and prioritizing enforcement activities.

Many programs that support the Conservation Plan are implemented at this time under current funding. Additional funds have been requested from the Oregon Legislature.

7. *The Plan is founded on an active and ongoing integration and coordination of all government agencies and stakeholders.*

The Salmon Strategy Team (SST) will provide leadership to state agencies and will be accountable for implementing the Conservation Plan.

The OCSRI Implementation Team will respond to direction from the SST and will improve integration of state agency programs.

The Pacific Salmon Coordinating Committee will facilitate participation in the OCSRI by federal agencies. Individual federal agencies are responsible for integrating their activities in a manner consistent with the Conservation Plan.

State and federal agencies will provide technical and staff support for watershed councils and other stakeholder groups to conduct watershed assessments and devise remediation action plans.

8. *The Plan includes an explicit process to evaluate progress, resolve institutional barriers, and make future changes to the manner in which the Plan is implemented.*

An independent scientific assessment team will be established. This team will interact with the Implementation Team on a routine, ongoing basis to evaluate the effectiveness of the Conservation Plan, make recommendations for change, and provide an "external" evaluation of progress.

The Oregon Approach


In contrast to many endangered species recovery plans that rely primarily on regulatory approaches, this plan represents a new way of restoring natural systems... the "Oregon Approach." This approach meshes scientifically sound actions with local watershed-based public support. It relies on teamwork among the various levels of government and is dependent on monitoring and accountability for results. Strong enforcement of existing laws and regulations are a foundation upon which voluntary and cooperative actions can be built. We believe that this is the only approach—one that will generate the support and commitment across all sectors, from landowners and industry to government agencies—to restore salmon and their natural systems. This plan will require an unprecedented level of cooperation and coordination among local, state, and federal agencies. It represents the commitment of all Oregonians to the fish, the watersheds, and our children.

Four Key Elements

- Investments in Local Solutions
- Private/Public Partnerships
- Science-Based Watershed Management
- Implementation of Existing Laws

The assessment team will provide objective evaluations of the Plan's strengths and weaknesses and will make recommendations for future changes in the Plan to improve its performance.

An adaptive management workgroup will be established. This group will work with the Salmon Strategy Team, the Pacific Salmon Coordinating Committee, the Implementation Team, and the Independent Scientific Assessment Team, proposing testable hypotheses, evaluating results of the monitoring program, and recommending changes in the Conservation Plan.

As noted in Chapter 5, this is not the first salmon restoration effort in Oregon. Time will tell whether this Conservation Plan delivers on its promise. 

Chapter 2

Guide to the Oregon Coastal Salmon Restoration Initiative

Restoration of Oregon's anadromous fish resources presents many challenges, the biggest perhaps being to discover how people and salmon can coexist in the future. This challenge has no clear endpoint, no time when "success" can be declared forever. Some measure of success, however, may be reached if Oregon achieves a fundamental shift toward resource management philosophies and practices that support conservation and restoration of landscape and ecosystem processes more favorable to salmon. After all, a basic tenet of the Oregon Coastal Salmon Restoration Initiative (OCSRI) is that all Oregon citizens share responsibility for the changes to the landscape and ecosystem processes that have hurt salmon and, likewise, share responsibility for restoration. Salmon are recognized as an integral part of Oregon's cultural identity. For the long-term, the challenge is to negotiate societal decisions that address the complex, conflicting issues of human population growth and competition for natural resources. This must be done in a manner that meets the needs of both salmon and people.

Mission Statement

The mission of the Oregon Coastal Salmon Restoration Initiative is to restore our coastal salmon populations and fisheries to productive and sustainable levels that will provide substantial environmental, cultural, and economic benefits.

The key tenets of the Oregon Coastal Salmon Restoration Initiative are: 1) an ecosystem approach that requires a systematic consideration of the full range of attributes of aquatic health, 2) a focus on reversing factors for decline and meeting objectives that address those factors, 3) use of adaptive management and a comprehensive monitoring strategy, and 4) involving citizens and constituent groups into the restoration process.

In moving away from a largely programmatic approach to natural resource management, Oregon is rapidly moving toward a geographically targeted, resource-based approach. This is in light of the growing recognition that *ecosystems can best be maintained through a holistic management approach*. The intent of the OCSRI is to conserve and restore functional elements of ecosystems that support fish, wildlife, and people.

The success of this effort will depend on sustaining *strong and lasting local-state-federal partnerships*. As we move away from the traditional "agency by agency" approach to solving resource management problems, we move toward inclusive and integrated planning and implementation at the watershed level.

The state natural resource agencies support the development of management strategies that recognize the entire range of potentially limiting factors--such as streamflows, riparian conditions, stream morphology, habitat diversity, and water quality. It is not work on any single factor that will protect salmon and their habitats, but rather conjunctive, interagency action based on identified limiting factors. In concert, agencies and local partners will design the appropriate

remedies to protect and restore all attributes of aquatic health in coastal river basins. State natural resource agencies recognize that in order to be effective, this integrated approach must be well planned and focused on implementation. Locally based solutions will be strengthened, supported and monitored by state agency programs.

Oregon has a strong foundation for conservation of natural resources guided by existing statutes, administrative rules, and policies. Many of the actions recommended in this plan build on existing state programs. For example the Senate Bill 1010 program, a state program to address water quality problems on agricultural lands, is a key ingredient of the plan. Other examples include the Oregon Forest Practices Act and state laws governing water appropriations.

This section of the OCSRI Plan touches on many aspects of Oregon's effort to restore coastal populations of salmon and steelhead. Topics include the following:

- I. Reason for this Report***
- II. Where can the OCSRI be Found?***
- III. Revision of the Conservation Plan: What's New?***
- IV. Leadership and Infrastructure: Keys to Plan Development***
- V. Major Science-Based Components of the OCSRI***
 - Monitoring program
 - Independent Scientific Assessment Team
- Key Scientific Underpinnings of the OCSRI***
 - Conceptual foundation
 - Historic perspective of coho abundance
 - Expectations for coastal coho
 - Life history and habitat requirements of coho
 - Sources of risk to coastal coho ESUs
- VI. Partnerships for Action***
- VII. Obstacles to Success***
- VIII. Contributors to the Review Process***
- IX. Next Steps: What to Expect***
- X. Description of the Plan Chapters***

Oregon's Plan will be submitted to the National Marine Fisheries Service (NMFS), which is currently considering whether to list two groups of Oregon coastal coho salmon as threatened species under the Federal Endangered Species Act. NMFS may determine that Oregon's plan is sufficient to achieve recovery of the species, thus making formal listing unnecessary. Although the initial emphasis of the Plan is on coho, this effort is intended to do far more than recover coho salmon. The goal of the OCSRI is to restore Oregon's coastal salmon and trout populations to a productive condition that will revive and maintain their cultural, recreational and economic roles in people's lives.

I. Reason for this Report

This report would not be needed if salmon and trout populations in Oregon were healthy today. Native populations of salmon, steelhead, and cutthroat have declined, some dramatically, in Oregon during the century and a half since the region has been exposed to industrial-scale development. Many populations of salmon, steelhead, and trout are extinct today; other populations are at risk of extinction, and relatively few are in a condition that may be considered healthy.

Oregon's Coastal Salmon Restoration Initiative (OCSRI) is an unprecedented effort to turn the tide on the salmon's decline. No single action by government or Oregon citizens will restore salmon and trout to a viable role in Oregon's culture and economy, but a cooperative effort, sustained over time, may succeed. This document presents the essential elements of a planning and action process that has been in progress since October 1995. The intent of this report is to describe progress to date and to list activities that are either underway or needed to restore the vitality of salmon and trout populations in Oregon coastal river basins.

The National Marine Fisheries Service (NMFS), which is currently considering a recommendation to list two groups of coho salmon in Oregon as *threatened* under the Federal Endangered Species Act, could arrive at a variety of conclusions regarding the listing. Oregon is hoping to retain state authority over management of Oregon's natural resources. The goal of OCSRI is not merely to prevent the extinction of coho salmon in the coastal region, but to restore populations of salmon, steelhead, and cutthroat trout to levels that are considered *healthy*.

Two of the evolutionarily significant units (ESUs) of coho salmon proposed for listing under the Federal Endangered Species Act occur wholly or partly in Oregon.

- The Northern Oregon Coast ESU. This ESU includes all coastal populations from the mouth of the Columbia to Cape Blanco, including the Umpqua Basin. This ESU consists of three groupings of populations that are classified by ODFW as Gene Conservation Groups (GCGs).
- The Southern Oregon and Northern California ESU. This ESU includes all coastal populations in Oregon south of Cape Blanco to the California border, including the Rogue Basin. ODFW has identified only one GCG of coho salmon in the Oregon portion of this

ESU. The ESU also includes coho populations in northern California, including the Klamath and Smith basins.

II. Where Can the OCSRI be Found?

The OCSRI Plan consists of 17 chapters and six appendices. Most of the main chapters will be placed on a web page on the Internet (<http://www.governor.state.or.us/governor.html>). Copies of the Plan and the appendices will be available for review at the following locations:

- Tillamook Library, 210 Ivy Avenue, Tillamook
- Hatfield Marine Science Center, 2030 Marine Science Drive, Newport
- Coos Bay Library, 525 Anderson, Coos Bay
- Oregon Dept. of Fish and Wildlife SW Region Office, 4192 N. Umpqua Hwy Roseburg
- The Nature of Oregon Information Center, 800 NE Oregon, Suite 177, Portland
- Rogue Valley Council of Governments, 155 South 2nd St, Central Point
- Oregon State Library, Reference on 2nd floor, Capitol Mall, Salem
- Astoria Public Library, 450 Tenth St, Astoria
- Siuslaw Public Library, 1460 9th St, Florence
- Reedsport Branch Library, 395 Winchester Ave, Reedsport
- Curry Public Library, 330 Colvin St, Gold Beach
- Chetco Community Public Library, 405 Alder St, Brookings
- Jackson County Library Services, 413 W. Main St, Medford

III. Revision of the Conservation Plan: What's New?

The August 1996 Draft Conservation Plan received critical review by NMFS staff and a diverse representation of individuals and groups (a list of reviewers is provided near the end of this section). To date, over 600 pages of comments, suggestions and questions on the draft OCSRI Plan have been received. An effort was made to make all of these comments broadly available by placing them on the Internet (the address is <http://www.governor.state.or.us/governor.html>). Many of these review comments were useful and provided a basis for revisions to the Conservation Plan. A second draft of the Conservation Plan was delivered to the Oregon Legislature and stakeholders on February 24, 1997. Although time was short, a review of this draft by Legislators, constituents and NMFS technical staff provided additional constructive suggestions for improving the Plan that were incorporated into the final document.

To the greatest extent possible, this document reflects the constructive critical review that has been received. State agencies have prepared general responses to reviewers' questions and concerns, and these may be obtained by communicating directly with the respective agency. As noted repeatedly throughout this document, one of the great strengths of the Conservation Plan is an explicit recognition that it will continually be reevaluated and improved as necessary.

This revision of the Conservation Plan includes the following significant improvements.

- A chapter on the history of restoration efforts in Oregon was added to the Plan.
- A *Conceptual Foundation* of the Conservation Plan was included.
- A proposal to establish an *Independent Scientific Assessment Team* will be implemented.
- Considerable revision was made to a population dynamics model for coastal coho. This model provides a technical basis for fishery adjustment proposals and a projected rebuilding schedule for spawning populations.
- Fishery harvest adjustment criteria were changed to provide greater escapement to the central Oregon coast before fishery mortality could be increased from the 15% to the 20% level.
- The monitoring program proposal has been improved and provides a solid foundation to determine effectiveness. Linkage between monitoring results and management action is more explicit.
- The strategy to improve compliance with environmental protection laws was strengthened.
- Considerable work was done to improve the outreach and education strategy of the Plan.
- The role and reliability of watershed councils, in concert with soil and water conservation districts and the OSU Cooperative Extension Service was strengthened and clarified.
- State agency measures were strengthened and are explicitly linked to factors for decline and objectives designed to address those factors.
- Substantial measures have been provided by federal agencies. More are expected to be developed in the near future.
- Workplans have been submitted by state and federal agencies to facilitate implementation monitoring and clarify commitment.
- Measures have been identified to provide a higher level of risk-reduction to core areas.
- A detailed assessment and action plan has been prepared to conserve and restore anadromous salmonids in the Rogue basin.
- Evaluations of city and county actions were identified and implications were summarized.
- Contributions by Ports to the Conservation Plan were identified.
- A process and schedule for revising Core Area Maps with the assistance of technical experts and stakeholders were established.

IV. Leadership and Infrastructure: Keys to Plan Development

Leadership for the OCSRI originated with Governor John Kitzhaber. The Governor announced the planning effort to conserve and restore Oregon's coastal salmon and steelhead in October of 1995. One of his first steps was to establish a team approach for developing an action plan that would lead to restoring the health of coastal salmon and trout populations. The following key teams were formed early on: 1) A Salmon Strategy Team which revolves around the directors of key state agencies meeting with the Governor bi-weekly. 2) An Outreach and Education Team was directed to work with key agency stakeholders, ask for their advice, and present ideas for their comment. 3) A Science Team was established to work on technical issues. 4) An Agency

Planning & Implementation Team was formed to coordinate many aspects of the development of the conservation plan. These teams are outlined briefly below.

Salmon Strategy Team (SST)

Members of this team include the following:

- Department of Agriculture Director
- Economic Development Department Director
- Department of Environmental Quality Director
- Fish and Wildlife Department Director
- Department of Forestry Director
- Department of Land Conservation and Development Director
- Division of State Lands Director
- Department of Transportation Director
- Water Resources Department Director
- AOC/LOC and Ports representatives
- NMFS representative
- Pacific Salmon Coordinating Committee representative
- Oregon Progress Board representative
- Conservation Plan Implementation Team Leader
- Legislative Oversight Committee member

In the routine work sessions of the SST and the Governor, members report progress implementing the Conservation Plan and resolve interagency obstacles. This team provides leadership and guidance on the overall direction of the conservation planning effort.

Outreach and Education Team

This team consists of public affairs representatives of the following entities:

- Governor's Natural Resources Office
- Oregon Coastal Zone Management Association
- Oregon Forest Resource Institute
- State Marine Board
- Oregon State University Extension Service and Sea Grant
- Rogue Valley Council of Governments
- Department of Agriculture
- Department of Environmental Quality
- Department of Fish and Wildlife
- Department of Forestry
- Department of Economic Development
- Parks and Recreation Department
- Water Resources Department

Federal partners attended meetings on an ad hoc basis. This team provides a variety of support to the OCSRI including handling of public meeting and media strategy, newsletters and OCSRI updates, special events, and portions of OCSRI Plan production.

Science Team

Scientists with expertise in matters related to salmon were invited to join the OCSRI. As a group, these scientists are referred to as the OCSRI Science Team. The team began work in March 1996, expanding from 16 to 20 people (13 on a primary team and 7 on a secondary team). The team includes representatives from the following state and federal agencies:

- Department of Fish and Wildlife
- Department of Environmental Quality
- Department of Forestry
- Department of Agriculture
- Oregon State University
- National Marine Fisheries Service
- National Biological Survey
- Environmental Protection Agency

The major focus of the Science Team was coho salmon, but efforts will shift to include issues related to steelhead, chinook and chum in 1997. Science Team members will work on new assignments in the future as the need arises and are expected to provide analyses and data that may be requested by an independent scientific assessment team that will be appointed to evaluate progress of the Conservation Plan. Major issues currently being addressed by science team members include the following: sustainability modeling; mapping core areas for coho, chum, chinook, and steelhead; and monitoring

Agency Planning & Implementation Team

This team meets bi-weekly to develop work assignments, receive direction, discuss progress and seek solutions to problems. Individuals on the team have responsibility for leading (along with agency Directors) the OCSRI effort for their respective agencies. This team has a wide range of duties--from developing agency management measures and annual workplans to participating in development of monitoring protocols.

The Agency Planning & Implementation Team consists of the following members:

- Department of Agriculture (ODA), Phil Ward
- Department of Environmental Quality (DEQ), Mike Downs
- Department of Fish and Wildlife (ODFW), Bruce Schmidt
- Department of Forestry (DOF), Ted Lorensen
- Department of Geology and Mineral Industries (DOGAMI), Dennis Olmstead
- Department of Land Conservation and Development (DLCD), Jeff Weber
- Department of Transportation (ODOT), Sue Chase

- Division of State Lands (DSL), Jenifer Robison
- Economic Development Department (OEDD), Kevin Smith
- Parks and Recreation Department (OPRD), Nan Evans
- Progress Board (OPB), Deirdre Molander
- State Marine Board (SMB), Wayne Shuyler
- State Police (OSP), Capt. Lindsay Ball
- Water Resources Department (WRD), Geoff Huntington

Maintaining momentum in Oregon's Coastal Salmon Restoration Initiative hinges on continued leadership of state agencies with potentially conflicting missions and competing constituencies, as well as on continued leadership from the Governor and the Legislature.

The OCSRI Plan has been developed in an open environment that has actively solicited, considered, and incorporated suggestions from all affected and responsible parties. State agencies have worked cooperatively with stakeholders and constituents; conservation organizations have been asked to submit recommendations; agencies have been asked to consider recommendations in two recent scientific analyses of the salmon crisis; NMFS staff have critiqued an initial management measures package submitted by state agencies; and federal management partners have been asked to join in the effort.

V. Major Science-Based Components of the OSCRI

Monitoring Program

The monitoring program revolves around biological and physical sampling conducted to determine if salmon habitats and populations are responding as expected to conservation and restoration efforts. Monitoring is integral to the refinement and verification of staged targets and biological objectives and will aid in improving the efficiency and effectiveness of management measures and investments.

Ecological status and trends data will be provided by the monitoring strategy and will allow decision makers to assess objectively whether or not the State's ecological resources are responding positively, negatively, or not at all to the recovery program. Decisions can then be made on where changes in objectives and agency management measures or other areas are needed. Using the comprehensive monitoring strategy, the State will monitor to see that the factors for decline are being halted and reversed, and that the State's comprehensive recovery strategy is producing the desired results. The OCSRI monitoring group will track the overall accountability of the plan, and will measure changes in salmon populations and in the environmental conditions necessary to support salmon populations. The monitoring program is described in more detail in Chapter 16.

Voluntary public participation in the monitoring program is a key element to the success of these efforts. Involvement in monitoring will provide important educational benefits to those who come

forward. Participants such as landowners, educators, students and conservation groups will be more interested in the results of the OCSRI if they have participated in the monitoring.

Independent Scientific Assessment Team

An independent team of 4-5 scientists with recognized expertise in salmonid ecology, habitat requirements, artificial propagation and management will be established to help the OCSRI partners base restoration efforts on the most sound science available. The team will provide an independent audit each year on the strengths and weaknesses of the OCSRI. They will focus on the adaptive process of compiling new information and results generated in part from the monitoring program. The assessment team will provide additional accountability to the Conservation Plan. The work of this team is described in more detail in Chapter 13.

Key Scientific Underpinnings of the OCSRI

Conceptual Foundation

Chapter 6 of the Conservation Plan provides the conceptual foundation for the OCSRI--the *basis* for the Plans problem definitions, strategies and specific activities. The three primary elements of the foundation providing the scientific basis and giving direction to salmon management and restoration activities are outlined below.

- 1) Restoration of salmonids in Oregon's coastal rivers must address the entire natural and cultural ecosystem, which encompasses the continuum of freshwater, estuarine, and ocean habitats where salmonid fishes complete their life histories. This consideration includes human development as well as natural habitats.
- 2) Sustained salmonid productivity requires a network of complex and interconnected habitats, which are created, altered and maintained by natural physical processes in freshwater, the estuary and the ocean. These diverse and high-quality habitats, which have been extensively degraded by human activities, are crucial for salmonid spawning, rearing, migration, maintenance of food webs and predator avoidance. Ocean conditions, which are variable, are important in determining the overall patterns of productivity of salmon populations.
- 3) Life history diversity, genetic diversity and metapopulation organization are ways salmonids adapt to their complex and connected habitats. These factors contribute to the ability of salmonids to cope with environmental variation that is typical of freshwater and marine environments.

Adoption of the explicit conceptual foundation is an important first step. The theories, assumptions and principles need further elaboration and their relevance to Oregon's coastal streams has to be described. In addition, measures within the plan will have to be reviewed and revised where necessary to ensure consistency with the conceptual foundation. The last two steps

cannot be completed before the deadline for this version of the OCSRI Plan. Those important tasks will be assigned to the independent science team as part of their first annual audit of the program.

Historic Perspective of Coho Abundance

Near the turn of the century, coastal coho salmon were harvested principally by gill-net fleets that fished in coastal estuaries and the lower reaches of coastal rivers. Based on records of canned coho salmon from these fisheries, an average of 500,000 adult coho salmon were landed annually during the 1890s. Assuming these fisheries harvested 40 percent of the run, coastal coho salmon north of Cape Blanco numbered about 1.25 million adults annually around the turn of the century. While other assumptions may be made regarding methods of estimating turn of the century coho abundance of Oregon coastal coho, it is clear that returns in some years exceeded a million fish.

From the turn of the century through the 1930s, annual abundance of coho salmon averaged about 900,000. By the 1940s and 1950s, however, annual production had declined to half that level. During recent years, annual production of wild coho in Oregon coastal basins has been dramatically less, around 50,000 to 80,000 fish under adverse ocean conditions.

Expectations for Coastal Coho Salmon

A habitat-based life cycle model has been developed to evaluate the productive capacity and sustainability of Oregon coastal coho salmon. Predictions of productive capacity offer an idea of the magnitude of improvement that might be achieved if the OCSRI is successful. Details of this assessment are contained in Appendix III and Chapter 14. Population modeling indicates that productive capacity, proportion of habitat in which populations are sustainable, and spawning escapement needs vary in direct proportion to cyclic changes in productivity of the ocean environment.

Based on the current habitat-based model, production of coho at full seeding might range from a little under 200,000 adults under adverse ocean conditions to a little over 400,000 adults under favorable ocean conditions. These predictions will undoubtedly be revised in the future, especially as data from the proposed OCSRI monitoring program is incorporated into the model.

Life History and Habitat Requirements of Coho Salmon (*Oncorhynchus kisutch*)

Coho salmon have been considered the most important commercially caught salmonid in Oregon, and until recently, were usually the most common salmonid in most coastal streams. Compared with other anadromous salmonids in Oregon, coho salmon have a very simple life history, with populations primarily on a 3-year cycle.

Adult coho salmon are distinguished from other Pacific salmon species by the presence of small black spots on their backs and the upper lobe of their tails. Adult coho salmon typically mature at 4-12 pounds. Juvenile coho salmon are identified by long, narrow, widely-spaced parr marks and the long white leading edge of the anal fin.

Oregon lies near the southern boundary of the range of coho salmon in North America, which extends from Point Hope, Alaska to Monterey Bay, California. Within Oregon, coho salmon are found in the Columbia River and coastal streams. The Oregon Department of Fish and Wildlife has provisionally identified 94 populations of wild coho salmon on the Oregon Coast.

While wild coho salmon occur in most coastal basins, the most important producers occur from the Coquille River north, including: Nehalem River, Tillamook Bay tributaries, Nestucca River, Siletz River, Alsea River, Siuslaw River, Umpqua River, Coos River, Yaquina River and the Coquille River. The Rogue River is the only main producer of the Oregon portion of the southern ESU, south of Cape Blanco.

In addition, three lake basins on the central coast are important producers of coho salmon: Siltcoos Lake, Tahkenitich Lake and Tenmile Lakes. Although coho salmon production in these lake basins has drastically declined since the introduction of warmwater fishes, spawning survey counts indicate that these systems are still perhaps the most productive coho salmon habitat on the Oregon Coast.

Adult coho salmon migrate into fresh water in the fall to spawn. Spawning of wild coho salmon usually occurs from mid-November through February. Adult spawning coho salmon are typically 3 years old, and they are often accompanied by 2-year-old jacks (precocious males) from the next brood. Spawning occurs primarily in small tributaries located throughout coastal basins. The parents normally exhibit strong homing to their natal stream. The female digs a nest (redd) in the gravel and lays her eggs, which are immediately fertilized by accompanying adult males or jacks. The eggs are covered by digging and displacing gravel from the upstream edge of the nest. Each female lays about 2,500 eggs. The adults die soon after spawning.

The eggs hatch in about 35-50 days, depending upon water temperature (warm temperature speeds hatching). The alevins remain in the gravel two to three weeks until the yolk is absorbed and emerge as fry to actively feed in the spring. Juvenile coho salmon spend one summer and one winter in fresh water. The following spring, approximately one year after emergence, they undergo physiological changes that allow them to survive in sea water. They then migrate to the ocean as silvery smolts about four or five inches in length.

The smolts undergo rapid growth in the ocean, reaching about 15-20 inches by fall. Little is known of the ocean migrations of coho salmon from Oregon coastal streams. However based on what is known, it appears migrations are mostly limited to coastal waters. Initial ocean migration appears to be to the north of their natal stream. After the first summer in the ocean, a small proportion of the males attain sexual maturity and return to spawn as jacks.

Migration patterns during the fall and winter are unknown. Those fish remaining at sea grow little during winter but feed voraciously during the next spring and summer, growing to about 23-33 inches in length. During this second summer in the ocean, a percentage of these maturing adults is vulnerable to capture in ocean troll and recreational fisheries, usually to the south of their natal stream. The survivors return to their home streams or neighboring streams where they spawn and die to complete the life cycle.

Habitat Requirements

Spawning and rearing of juvenile coho salmon generally take place in small low gradient (generally <3 percent) tributary streams, although rearing may also take place in lakes where available. For spawning, coho salmon require clean gravel, ranging in size from a pea to an orange; for rearing they require cool water temperatures (53-58 Fahrenheit preferred, with 68 maximum). Fry emerge from February to early June and occupy backwater pools and the stream margins. During summer, coho prefer pools in small streams, whereas during winter, they prefer off-channel alcoves, beaver ponds, and dam pools with complex. Complexity, primarily in the form of large and small wood, is an important element of productive coho salmon streams. Little is known about residence time or habitat use of estuaries during seaward migration, although it is usually assumed that coho salmon spend only a short time in the estuary before entering the ocean.

Sources of Risk to the Oregon Coastal Coho

Salmon have declined to a small fraction of their historic abundance in Oregon because of a number of human activities. Society recognizes the immediate crisis: too few salmon. This crisis, however, is merely a symptom of many circumstances acting over a broad scale of space and time to reduce salmon production. These circumstances include human activities and natural processes like the following:

- Fishing
- Urbanization
- Farming, grazing and other agricultural activities
- Logging
- Road building
- Hatchery operations
- Splash-damming in coastal streams
- Requirements to remove woody debris from streams
- Gravel mining from streambeds
- Withdrawing water from streams
- Damming streams
- Discharging waste water into streams
- Natural processes such as cyclic variation in oceanic productivity

Activities and processes that, individually and collectively, contributed to the decline of salmon populations are often referred to as risk agents. Customarily, these risk agents are discussed in categories related to their underlying cause: harvest management, hatchery management, habitat management, and a fourth category of miscellaneous processes referred to as other risk agents.

- Harvest risk agents include all management activities pertinent to control of fishing-related mortality, including: ocean fisheries, in-river fisheries, direct harvest effects, indirect fishery effects and effects on adults and juveniles.

- *Hatchery risk agents* include all management activities pertinent to use of artificial propagation, including decisions related to: broodstocks used, numbers stocked, locations where fish will be stocked, expansions or reductions in stocking programs, and criteria for smolt sizes.
- *Habitat management risk agents* include all management activities that influence the nature of freshwater landscapes in a way that will affect fish, including efforts to: conserve and improve the productive capacities of freshwater environments for salmonids, provide passage at culverts and dams, and screen withdrawals and diversions.
- *Other risk agents* include the relative productivity of the ocean environment, predation by marine mammals and birds, and floods, drought, and similar events that alter the habitats that support salmon.

Additional discussion of risk agent identification and assessment for Oregon coho salmon is included in Chapter 3.

VI. Partnerships for Action

The effort to restore Oregon's salmon will only be successful if it represents grassroots involvement, ownership and commitment. It is essential to build *all* stakeholders into the recovery effort: soil and water conservation districts, the Oregon State University Cooperative Extension Service, watershed councils, local governments, landowners, industries, and citizens. Local stakeholders will be responsible for developing and implementing locally-based measures to restore salmon habitat, while the state agencies will help facilitate, guide and support local actions.

Salmon restoration and healthy streams are causes that people can rally around. State agencies recognize that success will happen on the ground as a result of hundreds of individual actions that are guided by a unified local-state-federal voice. Federal agencies will continue to implement programs on federal lands--such as the Northwest Forest Plan. There is no question that the Oregon Approach will require partnerships that will set a new standard for coordination and cooperation on natural resource management problems. There is also no question that a success in this effort will move us beyond species-by-species attempts at recovery, and begin to turn our watersheds to their fully functional condition. A non-regulatory environment is critical to maintaining the positive momentum.

VII. Obstacles to Success of the Plan

As with any undertaking of this magnitude, there are many potential obstacles to success. Some are fundamental and easily recognizable while others are less obvious. The purpose of this section

is to briefly highlight some of these obstacles and to emphasize that the OCSRI Plan is not based on unrealistic optimism.

Funding

Money for personnel and projects will be required to do some of the work needed to restore the vitality of Oregon's salmon and trout populations. However, there are many serious issues competing for these resources: education, crime, transportation, and social services, to name just a few. Salmon will not get all the state or federal money that may be needed, nor will all of these other just causes. The challenge of OCSRI is to make the most effective use of public and private funds that are available.

Institutional Barriers

Many state, federal and local governments are responsible for managing natural resources that are critical to the health of salmon populations. Each of these entities serves a slightly different set of constituents or stakeholders. Each of these constituencies may have a different view of the desirable role of salmon in Oregon's future. These management agencies have a long tradition of not communicating or cooperating well enough with respect to conserving salmon. Time, public support, and continued leadership will be needed to erode these institutional barriers.

Support and Funding for the Monitoring Program

The OCSRI Plan includes a detailed proposal for a comprehensive, multi-disciplinary, multi-agency monitoring program. Such a program has great merit and has been talked about for years, but has never been established and funded. This monitoring program is crucial to Oregon's ability to conserve and restore salmon and trout populations. The challenge is to overcome traditional institutional and agency barriers, secure funding for an effective monitoring program, and implement the program under clear leadership.

Public Expectations for a Quick-Fix

The "salmon crisis" in Oregon was over a century in the making. It will not be resolved quickly nor without cost. Many people may expect that blame should be assigned, simple solutions proposed and quick resolutions achieved. Given this expectation, the public may become discouraged or apathetic when faced with the complex nature of the problem and the magnitude of the effort needed for its resolution. OCSRI's challenge is to develop education and outreach programs explaining the interconnections between humans and natural resources that we and salmon depend on, and to foster a reasonable sense of optimism that success can be achieved in the long term.

Chapter 5 describes the historical context of salmon restoration and discusses reasons that previous efforts failed, including an unjustified faith in technological solutions and an overly optimistic outlook for success.

An Adverse Ocean Environment

Science agrees on one issue that was once wrongly taken for granted. The ocean off the Oregon coast is extremely variable with respect to its suitability for coho salmon. Natural cyclic highs and lows in ocean productivity off Oregon are a crucial factor underlying the potential for coho

recovery in Oregon. No one knows whether a cycle of relatively good ocean conditions will resume soon, the current adverse conditions will continue for a period, or whether conditions in the near future will get worse than in the recent decade. The challenge of the OCSRI is to make improvements to the freshwater and estuarine habitats that support salmon so that these populations can persist until more favorable ocean conditions return.

Possible Unintended Consequences of Listing

A listing of coho in Oregon under the federal Endangered Species Act could result in unintended consequences. For example, a listing may discourage voluntary participation in restoration efforts.

VIII. Contributors to the Review Process

Invited Reviewers from Oregon State University:

- College of Ag Sciences, Dept. of Rangeland Resources - Mike Borman
- College of Liberal Arts - Assoc. Dean William G. Robbins
- College of Oceanic and Atmospheric Sciences - W.G. Pearcy, Professor Emeritus
- College of Oceanic and Atmospheric Sciences - Jim Good, Professor
- Coos County Extension - Paul Heikkila, Agent
- Curry County Extension - Derek Godwin, Watershed Management
- Oregon State University Forest Engineering Dept. - Paul W. Adams
- Oregon State University Sea Grant Extension - Pat Corcoran
- Oregon State University Sea Grant Extension - Jim Waldvogel
- Oregon State University Dept. of Fisheries & Wildlife - Stan Gregory
- Oregon State University Dept. of Fisheries & Wildlife - Bruce Mate

Invited Reviewers from the American Fisheries Society:

- | | | | |
|----------------|-----------------|------------------|----------------|
| Dan Bottom | Rich Carmichael | Jeffrey J. Dose | J.L. Ebersole |
| Phil Howell | Bob Hughes | Chuck Huntington | Steve Johnson |
| Russell lande | W.J. Liss | R.K. Nawa | W.J. Overholtz |
| Kirk Schroeder | Gordon Reeves | Grant Thompson | |

Other Invited Reviewers:

- | | | | |
|-----------------|---------------------|--------------------|----------------|
| Jim Anderson | Donald W. Chapman | Chris A. Frissell | James Karr |
| Jim Lichatowich | David R. Montgomery | Katherine W. Myers | Bruce Suzumoto |

Federal Agency Reviews:

- BLM - Elaine Y. Zelinski
- NOAA/NMFS - William Stelle, Jr.
- EPA Region 10 - Chuck Clarke, Regional Administrator
- USFWS - Russell D. Petersen, Acting Oregon State Office Supervisor

Industry Reviews:

- Oregon Forest Industries Council - Dave Bowden, Chairman of The Board
- S.P. Cramer & Associates, Inc., Fisheries Consultants - Steven P. Cramer
- Sun Studs, Inc., Sun Veneer Division - Rick Sohn, Lands Manager
- Georgia-Pacific Corp. - Blair A. Holman, Group Manager, Lands Management
- Georgia-Pacific Corp. - Joseph A. Matejka, Resource Manager

Pacific Coast Federation of Fisherman's Association - Glen Spain, NW Regional Director
Association of Oregon Loggers Inc. - Rex Storm, Forest Policy Analyst
The Port of Brookings Harbor, Oregon - Russ Crabtree, Port Manager
City of Ashland, Office of Mayor - Catherine Golden, Mayor
Oregon Troll Fishing Industry - John Wilson
Coos County Board of Commissioners - Gordon Ross

Conservation Organization Reviews:

Environmental Defense Fund - Rodney M. Fujita, Ph.D
Oregon Trout - Geoff Pampush, Executive Director
The Nature Conservancy - Dick Vander Schaaf, Public Lands Coordinator
Assoc. of NW Steelheaders - Gary Benson, Dennis VavRosky
WaterWatch - Jeff Curtis, Executive Director
Fish Refuge Working Group - Guido R. Rahr, Shauna M. Whidden
Siskiyou Project - Barbara Ullian
Umpqua Watersheds, Inc. - Francis Eatherington
National Wildlife Federation - Peter M.K. Frost, Counsel
The Pacific Rivers Council - David Bayles, Mary Scurlock
Salmon For All - Steve Fick, President
Umpqua Valley Audubon Society - Diana Wales, Vice-President
Pacific Fishery Management Council - Robert C. Fletcher, Chairman
Friends of The Nestucca - Les Helgeson, President
Sierra Club, Oregon Chapter - Jean Shaffer
Port of Gold Beach - Ron Armstrong, Port Manager
The Siuslaw Institute of Watershed Arts and Science, Inc. - Johnny Sundstrom
National Audubon Society - Paul Engelmeier, NW Policy Analyst
Mid-Coast Watersheds Council - Fran Recht, Chair

IX. Next Steps: What to Expect

Development and implementation of the OCSRI Plan only marks the beginning of a process to conserve and restore salmon and trout populations in Oregon. The OCSRI Plan must be a dynamic process that is modified and improved as new information becomes available. Tactically speaking, the focus of the Plan needs to be expanded to provide more detail for steelhead, cutthroat trout, chum salmon and chinook salmon. Finally, the work of the OCSRI should be expanded, as feasible and appropriate, to encompass the entire state.

Many of the immediate steps required for the OCSRI to be successful are evident:

- The leadership and coordination that has brought the Plan to its current state of implementation must be continued.
- Active participation by the Oregon Legislature that has been developing in recent months must be strengthened and maintained.
- An independent scientific assessment team must be appointed and established.
- Watershed councils, soil and water conservation districts, and other grassroots organizations must receive adequate support and technical assistance.

- State and federal agencies that have made great strides in overcoming traditional territorial conflicts must continue to coordinate, communicate, and improve efficiency in shared missions.
- Funding must be secured from appropriate state and federal sources to support conservation and restoration efforts.
- Economic and social incentives must be developed to support the Conservation Plan.
- Compliance with existing environmental laws must be improved.
- Public outreach and education programs must improve the public's understanding of the effect of habitat alteration on salmon.
- Proposed monitoring programs must be implemented.
- Delivery of information from the monitoring program to grassroots level must be improved.
- Hundreds of commitments by government, watershed councils, conservation organizations, industries, and private landowners must be verified and carried out.
- The Conservation Plan must be constantly reevaluated and modified as necessary to ensure that the mission is achieved.

X. Description of Chapters of the Conservation Plan

Chapter 1: *Appraisal of the Revised Conservation Plan*

This section discusses the rationale for Oregon's assertion that the Conservation Plan is sufficient to recover coastal coho salmon, based on eight major considerations. The state concludes that the plan is sufficient to achieve recovery of anadromous salmonids (with a present focus on coho) in coastal river basins, especially in the northern ESU.

Chapter 2: *Guide to the Oregon Coastal Salmon Restoration Initiative Plan*

This section contains an overview of the entire OCSRI and includes a brief description of each chapter of the Conservation Plan.

Chapter 3: *Risk Agents Responsible for the Decline of Oregon Coastal Coho*

This section describes the natural processes and human activities responsible for the decline of Oregon coastal coho from their historic levels of abundance.

Chapter 4: *Essential Elements of a Conservation Plan*

This section acknowledges and clarifies Oregon's concurrence with guidance provided by the National Marine Fisheries Service (NMFS) regarding development of a conservation Plan.

Chapter 5: *Pacific Salmon Restoration: An Historical Perspective*

This section provides an historical perspective on Pacific salmon restoration. It begins with the first recommendations for salmon restoration made in the 1875 report from the U.S. Fish Commissioner and proceeds to highlight eight major subsequent salmon restoration plans. Most importantly, this section notes some of the reasons that previous restoration efforts failed.

Chapter 6: *Conceptual Foundation for the OCSRI*

This section documents the conceptual foundation for the OCSRI--the theories, principles and assumptions that provide the scientific basis for and give direction to salmon management and restoration activities. This piece will provide a scientific basis for the plan to be reviewed, evaluated and modified over time.

Chapter 7: *Goals and Strategies*

This section presents the revised goals and strategies of the Conservation Plan.

Chapter 8: *Outreach and Education*

This section includes a description of group outreach and education efforts as well as specific actions by some agencies. This chapter emphasizes educational objectives, lists materials already developed and outlines some proposed options for continued effective outreach.

Chapter 9: *Strategy to Improve Compliance with Environmental Laws*

This section discusses the role of the Oregon State Police in the OCSRI. It covers three main concepts: (1) Fish and Wildlife Enforcement Division role in habitat and environmental law, (2) Organizational approach to habitat/environmental compliance, and (3) Inclusion of federal agencies and watershed councils into interagency compliance action plans.

Chapter 10: *Funding and Possible Economic Incentives*

This section outlines the state funding package in the Governor's 1997-99 recommended budget--both the Governor's Natural Resources Investment Budget and the Current Service Level Budgets and Policy Option Packages. It also gives a brief description of federal funding opportunities and presents some possibilities to develop economic incentives to support the Conservation Plan.

Chapter 11: *Changes in Management Related to Risk Agents*

This chapter provides an overview of significant changes to management programs in Oregon that should have the effect of reducing risk to coastal coho populations. Changes are described in harvest management, hatchery production management and habitat management.

Chapter 12: *Accountability and Coordination of Effort Among Contributors*

This section describes the organizational structure that will provide leadership to the OCSRI and facilitate coordination of government natural resource management programs with grassroots conservation and restoration efforts.

Chapter 13: *Independent Scientific Assessment of the Plan*

A proposal that outlines the basic structure and function of an assessment team--a well recognized group of experts in salmonid ecology. This intends to provide an additional accountability mechanism to the plan through independent scientific review.

TECHNICAL ELEMENTS THAT SUPPORT THE CONSERVATION PLAN

Chapter 14: *Oregon Coastal Coho Salmon: Production Potential, Recent Trends, and Prospects for the Future*

This section summarizes new information about the population dynamics of coho salmon, describes recent estimates of coho salmon production and spawner populations, and predicts future prospects for production and escarpment levels.

Chapter 15: *Provisional Core Area Maps and Process for Revision*

This section provides an abstract list of provisionally identified Core Areas and describes a process and timetable for revising these maps.

Chapter 16: *Monitoring Program*

This chapter describes the framework for a collaborative monitoring program. It includes objectives, major components, and a list of fifteen distinct tasks ranging from monitoring habitat, fish abundance, and ocean productivity levels, to establishing an adaptive management work groups, and cumulative effects/watershed assessment teams.

MEASURES THAT SUPPORT IMPLEMENTATION

Chapter 17A: *Watershed Councils*

This includes a comprehensive look at the infrastructure of watershed councils in Oregon. It discusses the Governor's Watershed Enhancement Board, technical advisory committees, funding mechanisms, relationships with soil and water conservation districts, and provides examples of watershed council missions and objectives.

Chapter 17B: *State Agency Measures: Context, Rationale, and Objectives*

State agencies' contributions are described in this chapter. This section discusses factors for decline, objectives, and agency management measures that fall under four major issue areas: 1) water quality 2) physical habitat 3) water quantity, fish passage and fish screening, and (4) fish management.

Chapter 17C: *State Agency Workplans*

This section provides the plans and timelines for implementing actions and measures under existing authority and budgets. It also details the proposed actions that would be provided by additional funding for the OCSRI.

Chapter 17D: *Federal Agency Workplans*

This chapter presents the commitments, actions and contributions of twelve federal agencies to the CSRI. They assist through oversight, enforcement, resource management and technical assistance.

Chapter 17E: *Actions to Reduce Risk to Core Areas*

This section identifies eight key actions/measures that have been either prioritized toward or are specifically directed at reducing risk to habitat within core areas.

Chapter 17F: *Southwest Oregon Salmon Restoration Initiative*

The southwest initiative combines local and state agency efforts to foster salmon recovery throughout the south coast region. It is prepared in conjunction with the statewide restoration initiative, but attempts to outline specific steps toward salmon recovery in southwest Oregon. This is a comprehensive study that includes a number of factors unique to the southwest region under a strategy that parallels the OCSRI Conservation Plan.

Chapter 17G: *Evaluation of City and County Actions*

The League of Oregon Cities and Association of Oregon Counties have provided a detailed evaluation of how existing programs and efforts by cities and counties are contributing to the restoration initiative. This includes a discussion of the types and extent of actions being taken by city and county governments that are likely to protect and restore coastal salmon habitat.

Chapter 17H: *Oregon Ports Measures*

This section describes how Oregon ports can mesh their management goals with those of the Coastal Salmon Restoration Initiative. It provides a list of actions that ports can take to enhance the success of the restoration efforts.

Chapter 17I: *Oregon Land Use Program*

This section describes the basic foundation for land use planning in Oregon.

Chapter 17J: *Habitat Restoration Guides*

Describes the process that identifies potential stream habitat enhancement projects in coastal basins based on analysis of channel morphology and habitat data. Starting as a cooperative project between ODFW and the Oregon Wildlife Heritage Foundation, the production of Restoration Guides has led to funding of several biologists and implementation of over 60 projects to date. Over 400 additional projects and potential project reaches have been identified and cooperative efforts are underway to implement this work.

Chapter 17K: *Summary of Statutes and Administrative Rules*

This section lists and very briefly describes laws and rules that provide fundamental authority and support for state agencies' efforts to conserve Oregon's natural resources.

APPENDICES

Appendix I: *Discussion Issue Papers*

Fourteen papers that discuss specific salmon restoration-related issues that fall under the major topics: policy, cumulative effects, physical habitat, water quantity, water quality, and fishery management. These papers were developed as a starting point for discussions between state agencies and NMFS and were intended to clarify significant areas of disagreement or uncertainty.

Appendix II: *Monitoring Program Documentation*

This section provides documentation of a process that has been used to obtain critical review of the program by a broad array of participating groups and stakeholders affected by the monitoring program. It also documents contributions and commitments of participating federal agencies.

Appendix III: *Population Dynamics Model*

This section provides a detailed description of the habitat-based coho life cycle model that is referred to in the Conservation Plan. The model is still undergoing technical review and will undoubtedly be revised in the future as more information becomes available from the monitoring program.

Appendix IV: *Core Area Mapping Documentation*

This section contains documentation of the basis for provisional identification of core areas for coho, chum, chinook, and steelhead. It also contains 8 1/2 x 11" maps of the core areas.

Appendix V: *Southwest Oregon CSRI Documentation*

This section contains materials referred to in Chapter 17F.

Appendix VI: *Watershed Council Documentation*

This section contains materials referenced in Chapter 17A.

Chapter 3

Risk Agents Responsible for the Decline of Oregon Coastal Coho Salmon

Introduction

Salmon have declined to a small fraction of their historic abundance in Oregon. Society recognizes the immediate crisis, namely, too few salmon. This crisis is actually a symptom of many factors acting over a broad scale of space and time to reduce salmon production, including but not limited to:

- Fishing
- Urbanization
- Farming, grazing, and other related agricultural activities
- Logging
- Road building
- Hatchery operations
- Splash-damming in coastal streams
- Mining gravel from streambeds
- Withdrawing water from streams
- Damming streams
- Historic efforts to remove wood from streams
- Natural cyclic variation in weather and ocean productivity

Risk Agents

Risk agents consist of natural processes or human activities that place sustainability of salmon at risk. Fishing, artificial propagation, alteration of spawning and rearing habitats, and introduction of exotic species are examples of risk agents related to human activities.

Some risk agents are natural and would exist if humans were not present in the region. Natural risk agents include short- and long-term variation in freshwater, estuarine, and oceanic environments. Examples include short-term droughts, freezing, and floods, as well as long-term trends of cooling, warming, low rainfall, high rainfall, and high or low oceanic productivity. Volcanic eruptions, earthquakes, landslides, fire, ice ages, and the like, are also natural risk agents that have and will affect the sustainability of salmon populations and species.

Other risk agents are largely related to the activities of people. These risk agents have often been categorized as related to fishing (harvest), artificial propagation (hatcheries), and landscape alteration (habitat). Dams and hydropower structures may be considered a subset of habitat alteration.

The harvest risk agent category includes all activities related to fishing, including direct and indirect effects on any life stage in freshwater or the ocean. Salmon are a commodity that has been exploited by various fishing methods in the Pacific Northwest for well over a century. The problems of over exploiting less productive stocks and species in mixed-stock fisheries and of selectively fishing populations and species have been widely recognized but poorly resolved by society. Mortality associated directly and indirectly with fishing can eliminate populations, reduce numbers within populations, alter or eliminate life history patterns, reduce fitness, and mask population trends. All of these effects may adversely affect the sustainability of wild salmon populations and should be evaluated in an assessment of extinction risk.

The hatchery risk agent category includes all genetic and ecological interactions related to the use of artificial propagation. Many parameters may be useful in evaluating whether hatcheries are adversely affecting sustainability of wild populations, including numbers and sizes of fish stocked, species stocked, release locations, evidence of residualism, genetic characteristics, disease history, homing fidelity to a recapture facility, occurrence of hatchery fish in natural spawning populations, and so on.

The habitat risk agent category includes all activities that alter the nature of freshwater and estuarine landscapes in a way that affects sustainability of wild salmon. This is the most complex risk-factor category, because salmon use watersheds from the headwaters to the coast at some time throughout their life cycle.

For restoration to be effective, it is important to identify the effect of risk agents on the populations. These effects are sometimes referred to as *factors for decline* that are the result of risk agents. The factors for decline are responsible for causing population declines or impeding recovery. Separate status reviews for Oregon coho salmon previously prepared by NMFS and ODFW discussed risk agents and factors for decline for coastal coho; part of this discussion is taken from these previous works. The purpose of this section is to provide a brief discussion of the major risk agents that have been identified for Oregon coastal coho salmon. Factors for decline are described in Chapter 17.

General Impacts of Harvest

Harvest rates can, both directly and indirectly, influence extinction risk. Harvest mortality can directly affect spawner numbers and trends. Harvest in mixed stock fisheries managed for optimal production of more abundant stocks will overexploit the less productive stocks contributing to the fishery. This can diminish both the range and the genetic diversity of the species as a whole. Harvest can also produce strong selective pressure for smaller size at maturity which can compromise the species' adaptive ability by reducing numbers of eggs and by influencing spawning habitat selection. In responding to changes in abundance, trends in harvest rates can also mask trends in stock productivity. By masking trends in productivity, harvest can affect the perception of risk resulting from other factors, and thus delay response to other threats to the survival of the species.

Impact of Harvest on Oregon Coho

Coho salmon from both of the Oregon coastal ESUs are harvested in mixed stock ocean fisheries and in terminal recreational fisheries. Fishery-related mortality on Oregon coastal coho salmon has probably been in the 70-80 percent range from the 1950s through the early 1980s. These rates are higher than rates considered sustainable, based on Oregon's Coho Salmon Management Plan. Productivity of coastal populations, as measured by recruits per spawner, has been declining since the mid-1970s.

Although habitat degradation and declines in ocean productivity have contributed to a decline in productivity, harvest has also played a major role in declines in coho production. In hindsight, harvest rates that Oregon coastal coho were exposed to over the last two decades were excessive, especially considering the adverse ocean conditions that were limiting productivity during the same period. Harvest management traditionally has attempted to maximize sustainable yield in mixed stock fisheries, and in some years, exceeded harvest rate targets thought to be sustainable for smaller groups of populations. As a consequence, it is likely that less productive and smaller populations have been reduced to levels where loss of genetic diversity is a concern. Although data do not clearly demonstrate outright extirpation of small populations or range reductions, these phenomena may be masked by a low, natural level of straying by wild and hatchery populations nearby.

General Impacts of Artificial Propagation

Artificial propagation may affect wild salmonid populations in a number of ways. For example, occurrence of hatchery fish in spawning populations of wild fish may mask declines in natural populations, making it difficult to detect changes in abundance and to determine whether the wild fish are self-sustaining. Also, artificial propagation presents the potential for genetic and ecological risks to natural populations that may affect their productivity. Stock transfers that result in interbreeding of hatchery and natural fish (or hatchery programs that lead to high levels of straying) can cause loss of fitness in local populations and loss of diversity among populations.

Impacts of Recent Hatchery Programs on Oregon Coho

Actual impacts of hatchery programs on wild coho populations in the Oregon coastal region have not been assessed. It is common, however, to assess other aspects of hatchery management programs and also to consider these populations as surrogates that permit inference of potential impact on wild populations. Features that provide a basis for evaluating the potential level of impact include:

- Numbers and sizes of fish released
- Release locations
- Stock transfers
- Occurrence of stray hatchery fish in natural spawning populations

Hatchery production of coho salmon in the Oregon portion of the ESU that is shared with California has been at a relatively low level and has only occurred in recent years. In the California portion of this ESU, larger numbers of hatchery coho are released, more transfers occur between hatcheries, and some hatchery coho have been imported from sources outside the ESU.

The vast majority of hatchery coho production in the southern Oregon ESU occurs at one Rogue River hatchery and was developed from native fish in the mid-1970s.

Data are not available to establish the proportion of hatchery fish that are present in spawning areas with wild coho in the southern Oregon portion of the ESU, although some marked hatchery coho have been detected at non-parent hatcheries and in non-native basins.

Hatchery production of coho salmon in the northern Oregon ESU has been at a higher level and of extended duration. ODFW hatchery programs in this region typically released 3 to 6 million smolts and 1 to 4 million coho fry annually during the 1980s. Private hatcheries in this region released variable numbers of coho during the 1980s that approached 20 million annually. Transfers of coho salmon between ODFW hatcheries typically used stocks from within the area. In contrast, private hatcheries in this region imported Puget Sound stocks, which were later mixed with Oregon coastal stocks. Private hatcheries are not presently in operation. Since the 1970s, outplants of coho salmon into Oregon coastal rivers using stocks from outside the Oregon coast have been rare.

Recoveries of marked fish and detection of distinct scale patterns provided clear evidence of straying by private hatchery coho, both within and between basins, when they were operating. Several locations have been noted where hatchery coho are known or expected to be common, including the North Nehalem, Trask, Salmon, and Siletz Rivers. At face value, scale data are a basis for concern regarding the possibility that significant proportions of several naturally spawning populations are actually composed of hatchery coho. Some marked hatchery fish have been detected in natural spawning areas, but recoveries have been at a level insufficient to confirm or refute the scale analysis data. Hatchery coho appear to be relatively rare in some basins, notably the lake systems and populations in the southern portion of the northern Oregon coast ESU.

In the future, the proportion of stray coho among natural spawning populations will be more clearly established by sampling in spawning areas because all hatchery fish will be marked.

Importance of Habitat

Coho salmon evolved in freshwater ecosystems that were historically characterized by flood plains, braided channels, and off-channel areas—all of which contained considerable structural complexity, such as large wood debris and debris jams. Human activities have simplified and degraded freshwater habitats utilized by anadromous salmonids in Oregon and throughout the Pacific Northwest. These activities include timber harvest, mining, water withdrawals, stream cleaning, livestock grazing, road construction, stream channelization, dredging and other

navigation improvements on rivers, diking and filling of wetlands, waste disposal, gravel removal, farming, urbanization, and splash dam logging.

Habitat reduction and degradation probably have reduced the resiliency of coho salmon to withstand natural variability in biological and physical factors, such as low spawner abundance, severe hydrologic events (high or low flows), and variability in ocean productivity. Habitats that have been altered by human activities are more likely to suffer degradation from disturbance events such as severe winter storms. For example, the frequency and magnitude of debris torrents increases with activities such as logging and road building. While debris torrents are recognized as potential sources of woody debris that may ultimately be beneficial to salmon production, such events may have a disastrous effect on salmon production in the short term.

Although some habitat functions can be readily restored through habitat improvement projects, other functions (e.g., production and recruitment of large woody debris into streams or transportation of fine sediments out of spawning gravels) may require decades or centuries to recover. Also, instream habitat restoration work can only be conducted in a relatively small proportion of watersheds. A considerable lag time may be expected between initiation of some corrective actions and restoration of significantly improved habitat function.

Impact of Contemporary Habitat Conditions on Oregon Coho

Degradation of coho freshwater habitats along the Oregon coast is extensive. All human activities have contributed to habitat changes. Contemporary habitats in coastal river basins are usually characterized by a combination of the following features:

- Stream channels generally lack complexity.
- Insufficient large wood is present in stream channels.
- Off-channel, wetland and slough habitat is uncommon.
- Water temperatures are higher in some areas because riparian vegetation has been reduced.
- Summer flows are lower in some areas because less water is retained in upriver areas and water is withdrawn from streams.

Winter habitat is thought to be a primary factor limiting coho salmon production in many coastal Oregon watersheds. In localized stream reaches, subbasins, and watersheds, however, other habitat features may be dominant limiting factors to coho production.

Other Risk Agents Contributing to the Decline of Oregon Coho

Natural risk agents that are also thought to contribute to the decline of Oregon coho include ocean conditions and predation by birds and marine mammals.

Ocean Conditions

Cyclic variation in the ocean environment is thought to be a major determinant of stock size and productivity of Oregon coastal coho. Climate conditions are known to have changed recently in the Pacific Northwest, and Pacific salmon stocks have been affected by changes in ocean

production that occurred during the 1970s. Climate factors affecting ocean conditions are large-scale processes that also affect terrestrial and freshwater environments. Logically, climate factors that affect the productivity of the ocean environment may have simultaneous effects on the productivity of the freshwater and estuarine environment. These climate conditions are thought to be cyclic in nature, but it is not possible to accurately predict whether conditions will return to more favorable conditions in the near future. Changes in ocean productivity since 1976 are thought to be a major determinant of the recent decline in coho return ratios.

Predation by Birds and Marine Mammals

Birds and marine mammals eat salmon. The magnitude of this predation on regional coho production remains a matter of intense debate. Scientific studies and recent reviews of Pacific Northwest salmon by the National Research Council in the Botkin Report have tended to assert that predation by coastal bird and marine mammal populations, except in unusual, isolated locations, is not a major, underlying cause of the decline in coho or other regional salmonid populations. Based on the comments received at Oregon coastal county fairs in 1996 and public comment on the August 1996 draft of the Conservation Plan, however, many people believe that seals and sea lions, and to a lesser degree, cormorants, are primarily responsible for the decline in Oregon's coho populations.

The Issue of Seals and Seal Lions as Predators

Seals and sea lions (pinnipeds) are predatory animals that depend almost exclusively on fish for their diet. As such, pinnipeds have long been viewed as competitors of humans for marine fish resources. For most of the first part of this century, seals and sea lions were hunted and killed as part of bounty programs in an attempt to keep these animals out of coastal bays and rivers, and to reduce their numbers overall. Although bounty programs were based on the idea that reducing pinniped numbers would result in increased fish populations, no scientific data proved this assumption.

In 1972, the federal government passed the Marine Mammal Protection Act (MMPA), which removed all management authority for pinnipeds from the states and vested it with the National Marine Fisheries Service (NMFS). Increases in pinniped numbers in the Pacific Northwest over the past 20 years have raised new concerns about the potential impacts of seal and sea lion predation on depleted fish resources. The concern for pinniped predation is more significant when fish populations are depressed and/or when estuary habitat has been simplified. If a localized situation exists where fish numbers are abnormally low, barriers to fish migration exist, and local predator numbers are high, then predation by seals and sea lions may have a significant adverse effect on individual salmonid populations.

NMFS will work with Oregon and other states to address the issue of growing pinniped populations and their potential effects on depressed salmonid stocks in the Pacific Northwest. Currently, Oregon is working with California and Washington, as well as NMFS, to identify areas with potentially significant impacts of pinniped predation on salmonids. NMFS has expressed a concern about potential effects of growing pinniped populations on depressed salmon populations in the Pacific Northwest. In specific areas, pinniped predation could be hindering the rebuilding

of salmon populations. Additional research is necessary to determine the extent of actual impacts on salmonid populations. Where predation is determined to be a significant problem, management actions consistent with the ESA and MMPA can be taken to reduce salmon mortality. NMFS will seek funding to assess pinniped interactions with salmon populations at critical sites and initiate appropriate management actions to minimize predation where assessments indicate such action is needed.

Interactions Among Risk Agents

Many human activities and natural processes, individually, can cause a decrease in salmon populations, in the productive capacity of populations, and in the productive capacity of their supporting habitats. Interactions of risk agents can compound these effects. The Oregon coho situation presents an example of interactions among risk agents. A period of high ocean productivity stimulated an expansion of coho fisheries and hatchery programs during the 1960s. When the oceanic productivity declined after the mid 1970s, hatchery programs were maintained at high levels and fishery harvest rates remained at levels that, in hindsight, were greater than the coho populations could sustain. The harvest rates alone were capable of causing a decline in coho populations similar to what has been observed in the last two decades. The actual effects are not known for (1) recent alterations in the productivity of freshwater habitat, (2) interactions with hatchery fish, and (3) predation by marine mammals on the production of Oregon coastal coho.

Chapter 4

Essential Elements of a Conservation Plan

Introduction

Development of this Conservation Plan, based primarily on state and local government and grassroots efforts, has been assisted in various ways by the National Marine Fisheries Service (NMFS). One aspect of this assistance is a document prepared by NMFS describing essential elements of a conservation plan relative to Endangered Species Act (ESA) determinations.

The purpose of this chapter is to summarize Oregon's interpretation of the NMFS document and to present a general sense of how the OCSRI Plan responds. Outlined in the NMFS document are the nine critical elements of a conservation plan. These are highlighted in this chapter, along with a discussion of the manner in which the OCSRI Plan addresses each element.

Nine Critical Elements of a Conservation Plan

1. Identify the major factors that have contributed to the decline in the ESUs.
2. Establish priorities for action.
3. Establish objectives and timelines for recovering populations.
4. Establish criteria and standards to measure progress toward objectives.
5. Adopt measures (actions) needed to achieve the explicit objectives.
6. Provide high levels of certainty that actions will be implemented.
7. Establish a comprehensive monitoring program.
8. Integrate activities and projects to recover salmon populations and their habitat.
9. Utilize adaptive management in the recovery process.

Element 1 - Identify, at appropriate scales, the major factors that have contributed to the decline in the ESUs.

As noted in other sections of this document, a variety of human activities and natural processes have contributed to the decline of anadromous salmonids in Oregon. Prominent among these are activities related to the management of harvest, hatcheries, and habitat. In some geographic regions, hydropower is also considered a general risk category. In Oregon, however, large dams are not common in coastal basins, so hydropower is not considered a broad risk category for Oregon coastal coho. In the OCSRI Plan, dams are considered under the habitat factor. Poor environmental conditions for coho salmon in the ocean off Oregon for the last two decades have contributed to recent declines in coho.

While recognizing that many factors have contributed to the decline of coho in Oregon coastal rivers, no scientific analysis has been conducted that is capable of assigning proportional responsibility for the decline in coho populations to specific factors. In all likelihood, such an analysis is impossible. Clearly, however, if too many fish are harvested, too few will survive to spawn and populations will decline. There will also be a population decline if spawning and

rearing habitats or migratory routes are degraded by land-use practices. If hatchery practices cause hatchery fish to have deleterious genetic or ecological interactions with wild fish, the populations will decline. And, if the ocean rearing environment is unfavorable to survival of coho salmon, production will decline, even if all other factors remain favorable.

Previous risk factor analyses by both ODFW and NMFS have acknowledged the likelihood that all of these factors have played a role in the decline of Oregon coastal coho. Direct evidence has been presented which indicates that harvest rates of wild coho were much higher than intended by management plans and, further, that even the intended harvest rates would have caused coho populations to decline under adverse ocean conditions. Data have been sufficient to demonstrate that freshwater rearing environments have been significantly altered from historic conditions and from conditions that are optimum for the species. The current adverse effect of the ocean environment has been well documented and appears to be consistent with large-scale climate and oceanic cyclic events. Data on the occurrence of hatchery coho in natural spawning populations, the numbers and sizes of hatchery fish released, and transfers of fish out of native basins are sufficient to establish significant concerns regarding the effects that these practices may have had on wild populations.

The OCSRI Plan proposes remedial actions coastwide that are expected to address all of the major risk agent categories and improve survival of coho salmon at all life stages. While recognition of the general activities that have contributed to the decline of coastal coho is useful, it does not immediately lead to a detailed restoration prescription.

The OCSRI Plan is based on an assumption that factors limiting production in individual basins must be identified on the watershed level and corrected at that same level. To this end, factors for decline have been identified and are discussed generally in Chapter 17B (State Agency Measures). Efforts will be made through the OCSRI to identify factors for decline for individual basins and design remedial actions. An understanding that over-wintering habitat limits coho production coastwide is not particularly useful in the context of a specific watershed where degraded riparian habitats have contributed to summer water temperatures that are too warm for coho. Similarly, watersheds that experience unacceptably high sediment loads may not benefit very much from projects that simply add large wood to stream channels. Ultimately, limiting factors must be identified and addressed watershed-by-watershed. This is the process that the OCSRI Plan expects to occur within the context of the watershed councils, soil and water conservation districts, and other grassroots organizations.

Element 2 - Establish priorities for action.

With increasing emphasis on management of anadromous fish at the population, rather than the species level, and considering the hundreds of populations distributed throughout Oregon, decision makers must often choose to focus management attention on some populations at the expense of others. While many populations are legitimate candidates for restoration, limited resources are available. This situation forces choices to be made, which means that some activities related to restoration will be conducted while others will not.

The habitat that supports coho populations varies considerably, as do the characteristics of the populations. For example, individual populations are supported by habitats that range from large to small basins, from well protected and stable to poorly protected and unstable, and from an ideal rearing environment to a marginally tolerable rearing environment. Some populations may be capable of supporting fisheries, but some are depressed to extremely low abundance levels.

The Conservation Plan does not establish a priority list of major basins that will be emphasized in coho restoration efforts. Instead, priorities will be established in relation to a variety of factors, as described here.

Since the OCSRI Plan seeks to make improvements in all basins in the coastal area through active grassroots efforts, some level of effort to conserve and restore coho will occur simultaneously coastwide. Within each basin, efforts will be prioritized, first, to secure core areas for anadromous fish, and second, to improve habitat and populations in suitable recovery areas nearby.

Core area maps will serve as a starting point of consideration to focus efforts for state and federal management actions and voluntary landowner contributions. For example:

- Oregon State Police and agency enforcement of existing environmental laws can be focused in relation to core areas and species in most need of improvement within a specific basin.
- Culvert repair and replacement will be scheduled first in relation to core areas.
- Roads that pose a risk to core areas will be addressed first.
- Screening of irrigation diversions in core areas and key migratory routes downstream of core areas can be given highest priority for funding.
- Instream and upslope land management can be scrutinized closely in relation to possible effects on core areas.

Allocation of resources to conservation and restoration will also be prioritized in relation to availability of resources. For example, the Oregon Department of Agriculture (ODA) has been asked to focus implementation of SB 1010 in three basins: Tillamook, Umpqua, and Rogue. This emphasis is based on the resources of ODA in these basins and the potential for changes in agricultural practices in these basins to benefit coho and other anadromous salmonids. Similarly, the Oregon Department of Forestry has been asked to focus resources on the Tillamook State Forest because of the extensive state forest holdings in this area, the high anadromous fishery values in the region, and the impending harvest of substantial amounts of timber there. These are just a few examples of how the OCSRI Plan addresses prioritization of conservation and restoration efforts for coho and other anadromous species.

A general approach to prioritizing conservation and restoration decisions in Oregon has been based on staff work by ODFW and a prioritization process described in a document often referred to as the *Bradbury Prioritization Process*. The approach is based on evaluating the status of populations and habitat, and considers such factors as population size, biological characteristics, fishery value, limiting habitat, improvement potential, and availability of resources.

A prioritization process to guide development of the OCSRI Plan must:

- Be useful in a real-time frame.
- Be adaptable for use by a decision group.
- Be suitable to make comparisons within species, between species, or within broad or restricted geographic regions.
- Allow for consideration of complex and anecdotal data and allow judgments by technical experts.
- Provide a source of information to compare and contrast populations and basins.
- Be applicable to a variety of purposes other than setting priority for restoration investment (e.g., decisions regarding habitat protection sanctuaries, priorities for implementing Wild Fish Policy, guidance for STEP activities, and identification of priority research or inventory needs).

Coastal Basins that Stand Out

Based on previous assessments, five coastal basins (Nehalem, Tillamook, Siletz, North Umpqua, and Rogue) stand out on the basis of species richness, high biological value, and high social value of the salmon and steelhead populations they support.

- The *Nehalem*, for example, supports populations of fall and summer chinook, coho, winter steelhead, and chum. This is a large basin that supports populations of several species that may be genetically distinct from other coastal populations.
- The *Tillamook* Basin (Miami, Kilchis, Wilson, Trask, and Tillamook) supports a similar species array as the Nehalem, including the most robust Oregon chum salmon populations and very large coastal fall chinook populations. While coho populations are currently very low in the Tillamook Basin, significant potential is thought to exist to restore these populations.
- The *Siletz* is a relatively small basin, but it stands out from other similar basins because it supports populations of spring and fall chinook, coho, winter and summer steelhead, and chum.
- The *North Umpqua* Basin stands out primarily because of the presence of relatively large populations of wild spring chinook and summer and winter steelhead. Sea-run cutthroat in this basin are at very low population levels and have recently been declared endangered by NMFS.
- The *Rogue* Basin stands out because of its biological characteristics and large populations of wild spring and fall chinook and summer and winter steelhead.

This list is provided as an example to demonstrate that the OCSRI intends to consider priorities for coho conservation and restoration within a broader context that includes all anadromous species.

Element 3 - Establish explicit objectives and timelines for correcting factors for decline and achieving desired population characteristics.

The OCSRI Plan recognizes the need to establish quantitative objectives for populations and risk factors, including timelines for correcting limiting factors. Several approaches to providing this information have been used. Descriptions of management measures prepared by state agencies should describe quantitative aspects of desired conditions that the measure will achieve. For example, escapement goals or harvest management measures should describe quantitative objectives; hatchery management measures should describe numbers and locations of coho releases. Quantitative objectives for many habitat features have been provided in Chapter 17B. Many of these will need to be revised in the future because baseline conditions have not been established for all basins; also, considerable variation exists within and among basins.

Several basic concepts have provided guidance for development of the OCSRI Plan. These include:

- Conserve and restore natural watershed processes that create habitat characteristics favorable to salmonids, addressing management of contiguous landscapes.
- Conserve habitats required by salmonids during all life stages.
- Conserve a well-dispersed network of high quality refugia to serve as centers of population expansion.
- Conserve connectivity between high-quality habitats to allow for reinvasion and population expansion, recognizing that migration corridors are essential to adults and juveniles.
- Conserve genetic structures and diversity within and among populations, gene conservation groups, and ESUs.

Element 4 - Establish quantifiable criteria and standards by which progress toward each objective will be measured.

The OCSRI Plan includes a proposal for a comprehensive monitoring program that would permit assessment of progress toward conservation and restoration goals for coho and other anadromous salmonids in Oregon coastal basins (see Science Team Attachment). This is an extremely ambitious proposal that will be capable of detecting population increases and decreases of coho within gene conservation groups. The proposal includes the need to refine the monitoring program in the future to make it more sensitive to other species as well. This monitoring program will provide data needed to establish baseline conditions and evaluate progress toward rebuilding.

The OCSRI has proposed a series of population benchmarks and interim indicators that may be used to evaluate trends in populations and their supporting habitat. These benchmarks and indicators will be reviewed by scientists and managers before agreement is reached regarding which will provide a formal basis for tracking progress.

Element 5 - Adopt measures (actions) needed to achieve the explicit objectives.

Identification of management measures designed to assist conservation and restoration of salmonids is central to the OCSRI Plan. This draft contains management measures submitted by state and federal agencies, watershed councils, and local county and city governments (see Chapter 17A-D and 17G).

Element 6 - Establish a comprehensive monitoring program, including methods to measure whether objectives are being met and to detect population declines and increases in each ESU.

A coordinated monitoring program is considered an essential element of efforts to conserve and restore coho salmon populations. The strength of the Conservation Plan hinges on the management measures that are designed to assist the populations, as well as the management program that will be used to evaluate actual performance of the populations and the habitat that supports them.

The monitoring program is:

- Comprehensive
- Capable of detecting increases or declines in coho and their supporting habitat
- Sensitive at ESU and Gene Conservation Group (GCG) levels
- Capable of tracking implementation of proposed measures
- Capable of tracking achievement of habitat, harvest and hatchery objectives
- A proposed framework to facilitate integration of management entities
- A foundation for active adaptive management

A comprehensive, interdisciplinary, interagency monitoring program has been discussed before, but discussions have never resulted in an on-the-ground program. Continued future implementation of this monitoring program depends on: agreement on responsibility for accomplishing distinct monitoring elements, establishment of a leadership structure to supervise synthesis and reporting of results, and funding for the program's elements.

Details on sample sites, criteria, methods, frequencies, and other aspects of sampling plans have not been determined for all elements of the proposed program. The monitoring program is designed to evolve and gradually expand in scope and intensity over a period of years.

Element 7 - Provide high levels of certainty that the identified measures and actions will be implemented.

The Conservation Plan recognizes the need for accountability. Consequently, state and federal agencies were asked to provide the following information in a matrix form that described each proposed management measure.

- Is the action currently in place or proposed?
- Is the action voluntary or regulatory, or does it involve agency policy, guidelines, or memoranda of understanding?
- If the measure is regulatory, is the law likely to be enforced?
- What is the legal authority or policy citation, if any, for the measure?
- Are there obstacles to implementation (e.g., lack of funding, social resistance, etc.)?
- Are new funds required for implementation of this measure?
- Is this measure in Phase 1 or Phase 2?
- What criteria may be used to monitor implementation of this measure (e.g., number of land use plans approved, number of management plans written, actual changes in environmental conditions or fish populations)?

State and federal agencies have produced written workplans to facilitate accountability for all measures that are included in the Plan.

Element 8 - Integrate federal, state, tribal, local, corporate, and non-governmental activities and projects that are designed to recover salmon populations and the habitats upon which they depend.

The watershed council process is Oregon's approach to integrate conservation and restoration efforts of all parties. Additional detail about the watershed council process and the Governor's Watershed Enhancement Board in relation to the OCSRI Plan is provided in Chapter 17A. In Oregon, watershed councils, soil and water conservation districts, and other grassroots organizations and entities will enlist the assistance of state and federal agencies, as well as local cooperators, such as For The Sake Of Salmon and the National Resources Conservation Service.

One objective of the watershed council concept is to develop assessments of limiting factors within each basin and subbasin, and to develop cooperative conservation and restoration action plans based on the biological needs of the various species that are the target of the restoration effort. A major premise of the watershed council process is that all government, tribal, corporate, and private interests in the basin will be included in the decision making and problem solving aspects of the action plans that are developed.

Element 9 - Utilize an adaptive management approach that actively shapes management actions to generate needed information.

The monitoring program will establish an adaptive management team that will provide leadership and continuity of active adaptive management principles, supported by a comprehensive monitoring program. This action is based in part on the premise that many management actions will proceed without being certain of their outcome. The proposed approach involves the following:

- Establishing a cooperative management team organized at the bioregional level.
- Having a membership that includes managers, scientists, and stakeholder representatives.

- Identifying questions and protocols for answering them.
- Designing an adaptive strategy.
- Incorporating feedback loops to adapt measures.
- Relying on the scientific method to test results of actions taken.

Chapter 5

Pacific Salmon Restoration: An Historical Perspective

The salmon crisis is profoundly historical. It is a product of a long sequence of assumptions and decisions made by humans. It is important to accept that fact and learn from the historical roots of the crisis rather than avoid or ignore them. In the 130 years that salmon management and utilization have been dominated by Euroamericans, dozens of plans and programs to restore salmon have been prepared, making Pacific salmon, on paper at least, the most restored species group in the world. However, those plans, for all their good intentions, failed to halt the salmon's depletion and slide toward extinction. That is why there is a salmon crisis today and that is why the Oregon Coastal Salmon Restoration Initiative (OCSRI) came into existence. We can and must learn more from past salmon restoration efforts than the obvious fact that they did not halt the salmon's decline.

The Value of Historical Analysis

Historical analysis is not a favorite pursuit of salmon managers (Lichatowich 1996), but salmon management and restoration would benefit from an occasional examination of their roots. It should be obvious that the assumptions used as the basis for salmon management need critical evaluation. The region can no longer pursue the status quo and expect to achieve salmon restoration objectives (Williams et al. 1996). However, breaking with the status quo will require a different approach based on better assumptions and a new understanding of the natural-cultural ecosystems that function in Oregon's coastal watersheds. Robert Bunting (1997) has aptly described the role of history in achieving that understanding:

That new understanding will not emerge without a thorough understanding of the region's history, for the past is never past. Unless the people of the Northwest envision a historically informed future, they face the prospect of losing the environment that has so fundamentally shaped what it has meant to be a Pacific northwesterner.

Historical analysis is also important because ecosystems and their associated management institutions are products of their histories. The geological and erosional histories of the landscape and river channels, the evolutionary history of the biota in the watershed, and the history of human economies and cultures. Those histories establish the trajectory of an ecosystem's development. They determine the system's present state and the range of possibilities for future change and development. An understanding of those trajectories is important to the development of rational management programs and restoration expectations.

In this section, several past restoration plans are reviewed. At the end of the section, a general summary of the reasons why those plans failed is presented. The analysis is not intended to be complete, but it is sufficient to illustrate the importance of history and to point out some of its salient lessons. Additional historical analysis will be needed as the OCSRI is implemented.

Report from the U.S. Fish Commissioner – 1875

The first recommendations for salmon restoration are nearly as old as the commercial fishery. With the introduction of canning technology to the Columbia River in 1866, the commercial fishery for salmon intensified. Within nine years the economic value of the new industry had grown tenfold. Businessmen and political leaders wanted to ensure the long-term success of the new industry, so they petitioned the U.S. Fish Commission for advice. In 1875, in response to a request from the Oregon Legislature, Spencer Baird, the U.S. Fish Commissioner, identified three threats to salmon industry on the Columbia River: excessive fishing, dams, and altered habitat.

It is important to note that the same basic problems have persisted for 120 years and that having knowledge of what would threaten the salmon was not enough to prevent depletion and extinction. A major reason for the failure to act effectively to neutralize those threats is found in the second part of Baird's report. Baird concluded it was better to spend \$15,000 or \$20,000 to make salmon so plentiful through artificial propagation that protective regulations would be unnecessary (Baird 1875). He reached this conclusion just three years after the first hatchery for Pacific salmon was opened on the Sacramento River, or less time than it takes an average chinook salmon to complete its four-year life cycle.

Ninety years later, hatcheries began making meaningful contributions to the fishery (CBFWA 1989), but by then, the region had bet the natural productivity of its rivers on the promise of artificial propagation and, as a result, a large part of that productivity had been destroyed. The false assumption that we could circumvent natural ecological processes by using hatcheries prevented managers from effectively using their knowledge about the causes of salmon depletion.

While Baird's optimism and confidence in hatcheries was premature, the initial objectives of the federal artificial propagation program were reasonable and could have led to improved salmon restoration programs in future decades.

The U.S. Fish Commission's artificial propagation program had two objectives:

- 1) To arrive at a thorough knowledge of the life history from beginning to end of every species of economic value, the histories of the animals, and the plants on which they feed or upon which their food is nourished, the histories of their enemies and friends, and the friends and foes of their enemies and friends, as well as the currents, temperatures, and other physical phenomena of the waters in relation to migration, reproduction and growth.
- 2) To apply this knowledge in such a practical manner that every form of fish shall be at least as thoroughly under control as now the salmon, the shad, the alewife, the carp and the whitefish. (Goode 1884 p. 1162)

The first objective recognized the need to understand the biology and ecology of the propagated fish throughout their life cycle and in relation to the physical and biological environment. If the first objective had been implemented, the commission would have discovered that the second objective was overly optimistic at least for the anadromous Pacific salmon.¹ Although the U.S. Fish Commission did undertake extensive studies of marine fishes on the Atlantic Coast (Allard 1978), on the west coast the first objective received little attention. For example, in 1879 Livingston Stone asked the U.S. Fish Commission to assign a trained biologist to the salmon hatchery on the Sacramento River.

A biologist could have started work on Objective 1, but the request was turned down. Had Stone's request been granted it might have established a precedent and created a different approach and direction in the hatchery program and, quite possibly, our knowledge of the salmon and their status might have been very different than they are today (Hedgpeth 1941).

The region embraced Baird's recommendation with great enthusiasm and very little critical evaluation. That pattern has persisted to the present, although some hatchery programs are now being evaluated. The following illustrates the early attitude towards artificial propagation:

There can be no doubt in the mind of anyone who has studied the question, that the future prosperity of our salmon fisheries depend largely upon artificial propagation... I am convinced that not more than 10 percent of the ova spawned in the open streams are hatched, owing principally to spawn-eating fish that prey on them... while from artificial propagation 90 percent are successfully hatched. What more need be said in favor of fish culture? (Oregon State Fish and Game Protector 1896 p. 33)

International Pacific Salmon Investigation Federation – 1925

Within a few years before and after the turn of the century (1882-1915), the major salmon fisheries in Oregon, Washington and California had reached and passed their peak (Table 1). By the late 1920s, it was recognized that declining salmon abundance was a regional problem. Salmon managers decided to meet and work out solutions to their common problems. On March 16 to 17, 1925, the Washington State Fisheries Board hosted a meeting of salmon managers from the Dominion of Canada, the Province of British Columbia, the United States Government, and the states of Alaska, California, Oregon and Washington.

¹ This does not mean that control of production is impossible. Net pens and captive brood technology have achieved a high level of control over production. However, it has not been possible for technology to control production and still maintain the abundance of salmon present in the late 1800s or even the mid-1900s.

The purpose of the meeting was to establish a process to facilitate the exchange and coordination of information among regional research and management institutions, provide a forum for discussing mutual problems and increase the efficiency of efforts to perpetuate and restore the Pacific salmon fisheries. The executives of management institutions realized:

...that present efforts to preserve the salmon fisheries, whether through regulation of fishing, hatchery operations, or other means, are without any adequate basis of accurate knowledge of the underlying facts; and further, that the efforts to get at such facts, as conducted in the past have been scattered, unorganized, and therefore less effective than they should be. ... it was admitted by all, that efforts at conservation are merely groping in the dark. (IPSIF 1925 p. 5)

Table 1. The year that salmon harvests peaked at various locations in the Pacific Northwest (Source: Cobb 1930)

<u>Location</u>	<u>Year</u>
Sacramento River	1882
Columbia River	1895
Coastal Oregon	1911
Grays Harbor	1911
Klamath River	1912
Puget Sound	1913
Coastal Washington	1915

The meeting discussed major problems facing salmon managers: control of fishing beyond the three mile limit, the need for uniform statistics on the salmon fishery, and the need for comprehensive information on the biology and life history of salmon. Willis Rich told the Federation that their efforts needed to be organized and directed by a program comprised of two parts. One part focused on immediate objectives and specific short-term projects.

The short-term projects should be flexible enough to change from time to time. Rich also identified the need to define a broad program of longer-term duration that would provide a framework upon which the short-term projects could be hung. He pointed out the watershed should be the basic management unit for Pacific salmon (IPSIF 1925). The organization apparently ceased to exist after 1929.

In the mid-1970s, the Fishery Conservation and Management Act allowed the region to bring the coastal fishery under control, and fishery statistics to be routinely collected. Studies of the salmon's life history, other than the work of Rich and a few others, received little attention until recently. With the general adoption of an ecosystem perspective for salmon management, biologists are rediscovering the watershed as the basic management unit.

Oregon State Game Commission Ten Year Wildlife Program – 1931²

In 1931, the Oregon State Game Commission launched a 10-year program to put game and fish management on a solid business and scientific footing. The objective was to increase the abundance of wildlife in Oregon so it approached the saturation point. Hunting and fishing in Oregon would surpass all other states. At the end of the 10-year period, the economic benefit from sportsmen and tourists was expected to reach \$100 million annually.

The program was based on 14 working policies:

- 1) Annually increasing hatchery production of game fish, striving for liberation of fish of legal size.
- 2) Annually increasing production of game birds at game farms and development of additional species.
- 3) More effective stocking of lands and waters on the basis of practical fact findings to determine their carrying capacity for fish and game.
- 4) [Increase the] supply of natural food for fish, birds and mammals in the wild state.
- 5) Fair allocation, on a statewide basis, of fish and game produced.
- 6) Scientific study of all conditions affecting wildlife to determine the basis for production and stocking fields and waters and regulation of seasons and bag limits.
- 7) An aggressive campaign to protect the waters of the state of fish life, including stream pollution control, construction of fish ladders, screening of irrigation and power canals, and removal of obstructions.
- 8) Effective administration of game refuges.
- 9) Improvement in predatory animal control.
- 10) Better game law enforcement.
- 11) Broad educational program on conservation and accurate information service.
- 12) Reorganization of game department; affixing responsibilities and reducing overhead.
- 13) Sound financial budget and itemized expense control.
- 14) Cooperation with sportsmen's groups and civic and governmental agencies on all phases of the program.

The plan's approach to fisheries relied heavily on artificial propagation and scientific study to support more efficient use of hatcheries. Three basic themes are evident in the policies. Two of those themes – simplification and control of production through hatcheries – had their roots in Spencer Baird's 1875 report. Economic efficiency was the third theme which was consistent with the Progressive's view of conservation in the early decades of the 20th century. The 10-year plan emphasized cooperative work with local communities and claimed that 15,000 citizens were actively engaged in the plan's interpretation. The need to engage local communities in salmon restoration has been revived in the OCSRI Plan.

² This summary of the Ten Year Plan is based on the first progress report (October 1931 - September 1932) by the Oregon State Game Commission.

The distribution of the plan's \$400,000 budget reveals the priorities (Table 2).

Table 2. Distribution of 10-Year Plan Budget.

<u>Distribution</u>	<u>Percentage</u>
Game fish production and liberation	36.0
Game law enforcement	35.0
Game bird production and liberation	13.0
General supervision	3.0
Cost accounting	3.0
Screens and fishways	3.0
Predatory animal control	2.0
Education	2.0
Game law expense	1.2
Research	1.0
Commission	0.8

It is obvious that research, habitat protection, and education were much lower priorities than artificial propagation.

The Oregon State Planning Board - 1938

In 1938, Oregon Governor Charles Martin asked the Oregon State Planning Board (OSPB) to review the commercial salmon fishery and determine the need to regulate or possibly terminate the use of specific types of fishing gear. The OSPB expanded that directive and made general recommendations for salmon restoration and management in the Columbia Basin. The Planning Board recognized that salmon management was fragmented among too many state and federal agencies, and there was an immediate need for coordinated management to effectively regulate the fishery and preserve the spawning grounds.

The Board recommended that the legislatures in the states of Oregon, Washington and Idaho enact an interstate compact that would establish a joint Columbia River Fisheries Commission with ex-officio participation by the federal fisheries agencies. The new fisheries commission would regulate the total catch to achieve adequate escapement, set the seasons, prescribe the types of fishing gear, and direct the needed scientific investigations. Proposed research included the effect of pollution on salmon production; improvement in fish cultural operations, a study of the effects of heavy exploitation of the sardine and other food fishes of the salmon; and a study of the need to set aside tributaries to be preserved as salmon refuges (OSPB 1938). The major recommendation of the OSPB, the establishment of a coordinated fisheries commission, was never implemented. The recommendation for salmon refuges has recently been revived (Williams et al. 1996).

Columbia River Fisheries Interim Investigation Committee – 1943

Three years after the OSPB completed its report, the Washington State Senate recognized that the 1918 compact with the State of Oregon was not preventing depletion of the salmon. The Senate established a Columbia River Fisheries Interim Investigation Committee (CRFIIC) and instructed it to determine the status of the Columbia River fishery and make recommendations for legislation. The Washington committee was directed to work with similar committees in Idaho and Oregon. The committee concluded there were three major causes for the decline of salmon and steelhead in the Columbia Basin (CRFIIC 1943):

Overfishing

The spring run of chinook salmon was depleted compared with 1883, but the committee believed the remaining spring run was adequately protected (in 1941). The summer run was being harvested at the 90 percent rate, which was excessive. The CRFIIC felt a 15-day closed season was adequate to protect the fall chinook run. Idaho harvested salmon on their spawning grounds and some arrangement had to be made to trade a larger steelhead escapement to Idaho for protection of the spawning chinook salmon.

Habitat

The foremost problem was the loss of available spawning area above Bonneville Dam. In its survey of the basin, the CRFIIC found only one stream not heavily impacted by irrigation withdrawals and uncladdered dams; that subbasin was the Salmon River in Idaho. They noted, however, that the Salmon River had habitat problems created by a dam blocking sockeye migration into Redfish Lakes and from mining pollution and irrigation in some tributaries. The major production areas for summer and fall run chinook salmon were the remaining undammed mainstem areas of the Columbia and Snake rivers.

Institutional Problems

The CRFIIC agreed with the Oregon State Planning Board that institutional fragmentation led to a lack of effective control over the fishery. Habitat protection laws were administered by four agencies and hatcheries were supervised by three agencies. The committee concluded that, "We are hopelessly defeated in obtaining any solution to the Columbia River fisheries unless we simplify our administration over the resource." (CRFIIC 1943 p. 7)

The CRFIIC and the OSPB recognized a similar problem – fragmented responsibility and authority – and made a similar recommendation, namely, the establishment of a tri-state fisheries commission with an independent staff to manage all aspects of the salmon fishery. As indicated above, this recommendation was never implemented.

Lower Columbia River Fisheries Development Program – 1946

In the mid-1940s, the fisheries agencies faced the prospects of massive development of the hydroelectric potential of the Columbia Basin. To protect the salmon fishery, they devised a plan to mitigate the impacts of the proposed development – the Lower Columbia River Fisheries Development Program (LCRFDP) (Laythe 1948).

The LCRFDP was a cooperative program including the states of Oregon and Washington and the U.S. Fish and Wildlife Service (USFWS). It had a planned life of 10 years, but it has continued for the past 45 years and it can be considered the grandfather of the current efforts to mitigate for the effects of the hydropower system [e.g., the Northwest Power Planning Council's (NPPC) Fish and Wildlife Program]. As the title suggests, the program's objective was to concentrate salmon production in the lower Columbia River below the proposed McNary Dam. At the time, biologists believed that hydroelectric development in the mid- and upper Columbia and Snake Rivers would eliminate or drastically reduce salmon production in the Columbia watershed above McNary Dam.

The LCRFDP had six parts:

- 1) Remove obstructions to salmon migration in tributaries to the lower Columbia River.
- 2) Clean up pollution in major tributaries like the Willamette River.
- 3) Screen water diversions to prevent the loss of juveniles in irrigation ditches, and construct fishways over impassable barriers in the tributaries of the lower Columbia River.
- 4) Transplant salmon stocks from above McNary Dam to the lower river.
- 5) Expand the hatchery program by remodeling existing hatcheries or building new facilities.
- 6) Create salmon refuges by setting aside most of the tributaries below McNary Dam exclusively for the maintenance of salmon and steelhead runs (Laythe 1948).

The hatchery program was one of six parts of the LCRFDP, but within a few years it was the dominant part. In the third year of the program (1951), hatcheries and habitat consumed 49 and 5 percent, respectively, of the budget (USFWS 1951). By 1986, 79 percent of the budget was expended on hatchery operation and maintenance and 10 percent on screens and habitat (Delarm et al. 1989). Although salmon sanctuary legislation passed the Washington Legislature, a similar bill was defeated in Oregon Legislature killing that part of the LCRFDP.

By the late 1930s and early 1940s, research into the salmon's life history, biology and artificial propagation was giving biologists a different perspective on salmon management and restoration. Once the home stream theory was proven, it became generally recognized that salmon species were composed of local populations adapted to the environment of their home stream (Rich 1939; Craig 1935). Biologists were becoming skeptical of hatchery effectiveness (Cobb 1930) and viewed hatcheries as an impediment to effective conservation programs (Rich 1941). In spite of these new understandings, salmon managers did not modify their tradition of relying almost exclusively on hatcheries, and artificial propagation was emphasized in the LCRFDP. Strong tradition and institutional barriers, rather than current science, shaped the LCRFDP's priorities.

Pacific Salmon Rehabilitation Conference – 1961

In 1961, Governor William Egan of Alaska convened a conference to discuss the decline of Pacific salmon throughout the Northwest, review research and management techniques, and search for ways to develop a coordinated, coastwide program [Alaska Department of Fish and Game (ADFG) 1961]. Generally, the problems identified by the conference attendees were similar to the problems identified in the earlier conferences; consistent with massive hydroelectric development, the growing problems associated with dams were emphasized. The need to investigate the genetics of salmon populations and the importance of individual populations in management were other areas of concern identified in the Governor's Conference.³

The conference differed from the Oregon State Planning Board and the Washington State Senate in an important area. The need for closer coordination was recognized as a high priority by the 1961 conference, but the participants rejected establishment of a super agency or salmon management council as a solution to institutional fragmentation. By 1961, salmon management was becoming highly politicized with the net effect that fragmentation of salmon management among institutions was becoming entrenched. To illustrate the problem, consider this observation made at the conference:

It was disquieting that there was little argument or discussion among the scientists present, as there might have been had they been free of controls. Each spoke as a representative in one way, or the other, of his organization, as though departmental 'policies' were involved in anything they might say. No antagonism or differences of opinion appeared even if present. This is not a healthy or normal state as far as scientists are concerned, because it is in diversity and originality of ideas that there exists opportunity for improvement or change, so badly needed in fisheries biology. It was most apparent that organizational controls dominated. The conference brought out clearly that conservatism, the deadly sameness of the methods and results inherent in this close organizational control. (ADFG 1961 Report of the Evaluating Committee p. 14)

Comprehensive Plan for Production and Management of Oregon's Anadromous Salmon and Trout. Part I. General Considerations and Part II Coho Salmon Plan – 1982

In 1976, ocean conditions underwent significant change (Ebbesmeyer et al. 1991), which proved to be unfavorable to survival and production of coho salmon from Oregon's coastal stream and the Columbia River (Nickelson 1986). Coho harvest declined significantly in 1977 and has remained below the 1965-1976 period of favorable ocean conditions. After several years of depressed production, Oregon developed and released a comprehensive plan for production and management of Oregon's coho salmon (ODFW 1982).

³ The importance of individual populations was known since the 1930s, however, the conference gave it new emphasis.

The Oregon coho plan reflects the growth in research and systematic collection of fishery statistics initiated in the 1940s. The availability of extensive databases and research information shows in the plan's extensive analysis of the factors contributing to the coho salmon's decline, description of life history, and the use of production models. A unique feature of the coho plan was its framework (Part I), which describes broad objectives, constraints and guidelines, and underlying theories and assumptions. The Oregon coho plan was one of the first to include a broad framework, but it was 56 years after Rich identified the need.

The coho plan's ten management policies (Table 3) reflect an emphasis on harvest and hatchery production (Policies 1-4 and 10) similar to the 1931 plan. However, the policies also show a definite shift into new concepts and values. Natural production was recognized as an important element in the production system (Policy 5). The importance of locally adapted stocks was recognized (Policies 8 and 9). The shift did not go as far as a recognition of the importance of an ecosystem perspective although all salmon habitats in the freshwater, estuary and ocean are considered. The plan's approach was consistent with fisheries science at the time.

Three years after the plan's adoption, ODFW published a detailed progress report. No further progress reports were issued. The plan had two major short comings: a basic assumption that ocean conditions would change causing improved coho survival and inadequate public involvement (Personal communication, Harry Wagner, Retired Chief of Fisheries, ODFW, February 16, 1997).

Table 3. Coho Salmon Management Policies (Source: ODFW 1982)

- 1) Traditional fisheries will be maintained, but not necessarily in historical character.
- 2) Fisheries will be managed to obtain optimum yield from the resources, including quantity and value of food produced, fishing opportunity, and other social and aesthetic benefits.
- 3) The coho resource will be allocated based on escapement requirements, legal constraints, established user group shares, and other socioeconomic criteria.
- 4) When attempting to rehabilitate natural production, the agency will give equal consideration to harvest management, habitat improvement and protection, and the use of some form of artificial propagation.
- 5) Coastal streams will be primarily managed to maximize natural production, and Columbia River tributaries will be primarily managed for hatchery production.
- 6) Available aquatic habitat will be managed to optimize fish production.
- 7) Hatchery production must increase adult abundance to be accepted as a viable management program.
- 8) Enhancement, rehabilitation, and supplementation of natural production must utilize only coho believed to be genetically compatible with existing regionally defined stocks.
- 9) Hatchery and wild stocks will be managed considering the need for genetic diversity.
- 10) An incidental harvest of a depressed stock can be allowed in a fishery targeted on a healthy stock.

The eight plans reviewed above do not constitute a complete list of the salmon restoration plans in the Pacific Northwest. There are at least another dozen plans or programs for the Columbia River alone. In addition, Oregon has developed several basin management plans and statewide species plans. A review of those plans is beyond the scope of this preliminary study, but such a review would benefit the implementation of the OCSRI Plan.

Why Did Past Salmon Restoration Plans Fail?

Past restoration plans failed to halt the decline of salmon in Oregon's coastal streams, which means that the OCSRI Plan will have to break with tradition if it is to be successful. There is much more at stake today. Many populations in Oregon's coastal streams are on the verge of extinction. Without some tangible improvement in their condition, salmon may be lost to the present and all future generations of Oregonians. In addition, the natural resiliency that historically characterized the ecosystems and salmon populations has been greatly diminished, making a small margin of error for the OCSRI Plan.

Why did past plans fail to achieve their intended results? A first cut at a list of those reasons is given below. That list should be considered preliminary; it is not the product of exhaustive analysis, but rather a starting point for future, more definitive analyses. The list is a yardstick against which the current plan can be judged and a set of guidelines for future revisions of the plan.

Preliminary List of Shortcomings of Past Plans

Past plans considered the salmon largely independent of the ecosystem and ecological processes of the watershed, estuary and ocean. That perspective was facilitated by an emphasis on harvest and artificial propagation.

- 1) Past plans considered the salmon largely independent of the ecosystem and ecological processes of the watershed, estuary and ocean. That perspective was facilitated by an emphasis on harvest and artificial propagation.
- 2) The implementing agency generally did not report progress, problems and successes on a regular schedule. This is an indirect indication that the plan did not remain a priority within the responsible agency.
- 3) Institutional barriers were ignored even when they were not specifically identified. Plan development often failed to consider the structure and limitations of the organization that had to implement the plan.
- 4) With the exception of the 1982 Oregon Coho Plan, the restoration plans lacked explicit conceptual foundations. The implied conceptual foundations were largely based on untested assumptions from the 19th century.

The plans lacked clear commitment and support from political leaders. Public involvement was often minimal.

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Chapter 6

Conceptual Foundation

What is it?

The conceptual foundation is composed of the theories, principles, and assumptions that provide the scientific basis for and give direction to salmon management and restoration activities. It determines how information is interpreted, what problems (limitations on production) are identified, and the range of appropriate solutions (Lichatowich et al. 1996). The conceptual foundation is a powerful element in salmon restoration plans (Williams et al. 1996).

All restoration plans are based on such a conceptual foundation, which is the basis for the plan's problem definition, strategies and specific activities. Unfortunately, few plans explicitly describe or present their conceptual foundation. Consequently, the scientific basis for those plans cannot be reviewed, debated, and evaluated. Oregon's 1982 Coho Plan (ODFW 1982) is one of the few restoration programs that did include a conceptual foundation.

With the clarity of 15 years of hindsight, it is possible to see the shortcomings of that first attempt to explicitly define a conceptual foundation for a salmon restoration plan. The 1982 Coho Plan emphasized single species management independent of the ecosystem and its productive processes. Artificial propagation received a strong emphasis. The value of natural production and the need to recognize and conserve the stock structure was a departure from traditional approaches and reflected a shift in thinking that is still in progress.

The 1982 Coho Plan still contained strong remnants of the century-old belief that technology could circumvent natural ecological processes and sustain fisheries. A conceptual foundation that relies on the use of technology, such as hatcheries, as a substitute for healthy ecosystems has two readily identifiable characteristics or outcomes: (1) unfounded optimism, and (2) the impossibility of failure.

Unfounded Optimism

Salmon managers in the Pacific Northwest embraced hatchery technology with great enthusiasm and very little critical evaluation. That pattern has persisted from 1875 to the present, although some hatchery programs are now being evaluated. The following excerpts illustrate the continuous optimism towards artificial propagation:

By the successful system of hatcheries the states of Oregon and Washington now maintain on the Columbia River, the permanency of the fishing industry of this state, in the Columbia River district is assured for all time to come; for it has been fully demonstrated the last two years that the art of artificial propagation has solved the problem of restocking the river with this most important product of our state's commerce. ... I believe that with the system of hatcheries now maintained in the state, not only the present supply of fish can always be

maintained, but with each succeeding year will come an increase. (Pacific Coast Fisheries 1903 p. 5)

...this improved method has now passed the experimental stage, and...the Columbia River as a salmon producer has 'come back.' By following the present system, and adding to the capacity of our hatcheries, thereby increasing the output of young fish, there is no reason to doubt but that the annual pack can in time be built up to greater numbers than ever before known in the history of the industry... (OFGC 1919 p. 16).

It is imperative, therefore, that some means be adopted to counteract the depletions arising from this source (habitat degradation); but the most important reason for the artificial propagation is the fact that the natural method is extremely wasteful, which is not true of the artificial method. (Smith 1919)

In my opinion, if the salmon runs of this state are to be maintained and increased, it is going to be necessary to constantly construct new hatcheries. The much greater effectiveness of hatchery operations, as compared with natural propagation, has in my judgment been so effectively proven as to no longer permit discussions among those who are acquainted with the situation. (WSFG 1921)

Hatcheries have played a major role in maintaining and enhancing runs of anadromous salmonids in the lower Columbia River, and can provide the means of rebuilding future runs in the upper Columbia and Snake River systems to the levels that existed before the dams. (Ayerst 1977 p. 84)

We believe that if things proceed as they are now, combining the traveling screens and placing them in operation on schedule, expanding the transportation effort on schedule, and adding the spillway deflectors at the dams to reduce the nitrogen concentrations, we can restore the adult steelhead trout runs to their former levels within two to three years. After the Snake River Mitigation Plan is approved by Congress, it seems possible that we can establish adult runs of both steelhead trout and salmon in far greater numbers than existed before. (Ebel 1977 p. 39)

Impossibility of Failure

Technology, with its enthusiastic supporters, never fails to achieve its mission. If expectations are not realized, the fault is not in the fundamental assumptions or methodology. The lack of success is attributed to a failure to implement enough technology (e.g., to fund enough hatcheries). The escalating costs of salmon restoration in the Columbia River with no signs of improvement is a classic illustration of this phenomena. Mitigation for the hydroelectric system started in 1946 with a budget of \$2 million per year. The Northwest Power Planning Council's program alone has

reached \$450 million annually with no signs of success. The hatchery program in the Columbia Basin has increased three-fold in the last 25 years and is about to undertake another major escalation.

OCSRI's Conceptual Foundation

Background

Salmon management and restoration must continually contend with uncertainty associated with our lack of knowledge of the salmon's life history and ecology, natural fluctuations in productivity, and the evolution of ecosystems due to natural and human induced changes. However, there is one aspect of salmon management that is relatively certain: the failure of the status quo to reverse the depletion of salmon and bring about meaningful restoration.

Effective salmon restoration programs have a fundamental requirement: they must work in concert with the salmon's strengths. The failure of half a century of restoration programs, especially those that emphasized artificial propagation, can be traced to practices that worked against the salmon's biological strengths. Salmon restoration has often tried to circumvent or eliminate the need for habitat. Hatcheries were, and still are, perceived as a substitute for healthy watersheds; hatcheries also fostered the idea that rivers need only be channels to the sea for artificially-propagated salmon, rather than complex healthy ecosystems. The mass transfer of salmon from one river to another through hatchery programs weakened the relationship between the salmon and their native habitat, broke down reproductive isolation, and destroyed the salmon's natural economy and productivity. Hatcheries did not destroy habitat or overfish the salmon, but they offered an alternative to protection and regulation. It was an alternative that failed and so must share part of the responsibility for the current crisis.

Forests, rangeland, rivers, and salmon have the internal capacity to recover from major disturbances. They have been doing so for thousands, if not millions, of years. The principal role for people in the recovery of Pacific salmon is to not interfere in the natural recovery process, but to control their own behavior in a way that lets natural recovery take place. In other words, there is a strong need for the practice of stewardship that encourages the natural healing process. There are specific things we can do to assist salmon in their recovery, but what we do must work with the strengths of the salmon.

It is important to recognize that salmon productivity will change over periods of several decades due to natural fluctuations in climate or ocean productivity. Management and restoration programs must recognize those changes in real time and make appropriate adjustments. For example, when ocean productivities enter a period of depression, harvest has to be adjusted quickly to avoid deepening the production trough. During a natural low in productivity, when carrying capacities are reduced, it may be counterproductive to attempt to compensate by increasing the output of hatchery fish.

Habitat is critical. No sustained recovery of salmon is possible without healthy habitat. The recovery of salmon habitat is tied to the recovery of whole watersheds. Site-specific fixes (e.g., log weirs, artificial spawning beds, or other artificial stream reconstructions), which may be useful in the short term, cannot compensate for a failure of watershed-level stewardship.

Salmon stocks are chronically over-harvested. However, current harvest regulations do not consider the number of salmon carcasses needed to maintain the fertility of the stream, nor do they consider the need to conserve the gene pools of individual salmon stocks. Failing to take stream fertility and genetics into account probably means that overharvest has been greater than once believed.

Hatcheries have been the primary tool used by managers to replace natural production lost due to habitat degradation or overharvest. Artificial propagation failed to meet those objectives, and it is now known that hatcheries contributed to the decline of natural production. One important way hatcheries contributed to the decline of wild stocks was the overharvest of wild salmon in fisheries targeting aggregates of hatchery and wild populations. In the future, hatcheries will play an important role in recovery and management programs. However, to identify that role will require a thorough audit and evaluation of the program and a strong commitment to adaptive management.

The Conceptual Foundation

To signal a change from the status quo, the OCSRI Plan has adopted the conceptual foundation described in Williams et al. (1996) with few modifications. That conceptual foundation is composed of three primary elements:

- 1) Restoration of salmonids in Oregon's coastal rivers must address the entire natural and cultural ecosystem, which encompasses the continuum of freshwater, estuarine, and ocean habitats where salmonid fishes complete their life histories. This consideration includes human development, as well as natural habitats.
- 2) Sustained salmonid productivity requires a network of complex and interconnected habitats, which are created, altered and maintained by natural physical processes in freshwater, the estuary, and the ocean. These diverse and high-quality habitats, which have been extensively degraded by human activities, are crucial for salmonid spawning, rearing, migration, maintenance of food webs, and predator avoidance. Ocean conditions, which are variable, are important in determining the overall patterns of productivity of salmon populations.
- 3) Life history diversity, genetic diversity, and metapopulation organization are ways salmonids adapt to their complex and connected habitats. These factors contribute to the ability of salmonids to cope with environmental variation that is typical of freshwater and marine environments.

Adoption of the explicit conceptual foundation is an important first step. The theories, assumptions, and principles need further elaboration; also, their relevance to Oregon's coastal streams has to be described. In addition, the plan's measures will have to be reviewed and revised where necessary to ensure consistency with the conceptual foundation. The last two steps cannot be completed before the deadline for this version of the OCSRI Plan. Those important tasks will be assigned to the independent science team as part of their first annual audit of the program.

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Chapter 7 Goals and Strategies

The term goal is used here as a general description of a desired outcome or condition that Oregon wishes to achieve through the OCSRI Plan. The term *strategy* is used here to describe a methodology or process that will be used to achieve a specific goal. A number of goals have been identified by the OCSRI, and related strategies have been identified to support achievement of each of these goals. The goal and strategy descriptions presented here reflect revisions that are based on critical review of the August 1996 Draft Plan. Additional revisions may occur in the future, based on new knowledge or new perspectives. At present, however, these statements provide a reasonable representation of the overall vision of the Oregon Coastal Salmon Restoration Initiative. These goals and strategies will be reviewed in the future to ensure consistency with the Conceptual Foundation of the Conservation Plan.

All of the goals listed here are considered essential to achieving the mission of Oregon's Coastal Salmon Restoration Initiative.

It is the mission of the Oregon Coastal Salmon Restoration Initiative to restore our coastal salmon populations and fisheries to productive and sustainable levels that will provide substantial environmental, cultural, and economic benefits.

GOAL 1

An infrastructure will exist to provide long-term continuity in leadership, direction, and oversight of salmon restoration.

- *Strategy 1.a* - Establish accountability and responsibility for implementing OCSRI through a specific position in state government.
- *Strategy 1.b* - Establish and maintain an active process to overcome institutional barriers to restoration and improve communication and coordination with the Legislature, local governments, ports, state and federal agencies, watershed councils, soil and water conservation districts, Oregon universities, industries, and conservation organizations.

GOAL 2

Opportunities will exist for a wide range of natural resource uses that are consistent with salmon restoration.

- *Strategy 2.a* - Recognize salmon as an integral part of Oregon's cultural identity.
- *Strategy 2.b* - Restore anadromous salmonid populations to levels that are biologically sustainable.
- *Strategy 2.c* - Maintain traditional economic, recreational, and cultural uses of natural resources (including salmon) if they are consistent with achieving restoration of salmon populations, although not necessarily in historic allocation proportions.
- *Strategy 2.d* - Explore new uses of natural resources that are consistent with restoration.

GOAL 3

Achievement of overall OCSRI goals will be based to the greatest extent on existing laws and environmental protections, rather than new ones.

- *Strategy 3.a* - Employ prioritized compliance monitoring, educational programs, and enforcement efforts strategically designed to improve compliance with existing laws and environmental protections crucial to restoration.
- *Strategy 3.b* - Actively encourage and support voluntary actions that will assist achievement of restoration goals.
- *Strategy 3.c* - Develop proposals for a variety of compensation and incentive programs to support achievement of restoration goals.
- *Strategy 3.d* - Develop proposals for a package of any new or modified laws or environmental protection rules that may be needed to achieve overall goals of OCSRI to support achievement of restoration goals.

GOAL 4

An adequate funding base will be established and maintained to support the OCSRI.

- *Strategy 4.a* - Seek appropriate shifts within existing state and federal agency budget priorities to support OCSRI.
- *Strategy 4.b* - Where appropriate, seek new sources of state and federal funding to support OCSRI.
- *Strategy 4.c* - Monitor agencies to ensure that restoration actions and resources are prioritized, and reduce duplication of effort.
- *Strategy 4.d* - Promote adaptive management of natural resources, including salmon.

GOAL 5

Oregon's expectations for sustainability of interrelated natural resources will more accurately reflect a scientific understanding of the physical and biological constraints of the ecosystem.

- *Strategy 5.a* - Establish an infrastructure to assure responsibility and accountability for maintaining momentum of public outreach and education efforts through coordination of state and federal agencies responsible for natural resource management.
- *Strategy 5.b* - Develop active outreach and education programs to inform the public regarding the habitat needs of salmon and actions that may be taken to help restore salmon.

GOAL 6

Sufficient freshwater and estuarine habitat will be available to support healthy populations of anadromous salmonids throughout coastal river basins.

- *Strategy 6.a* - Identify areas currently supporting relatively high densities of spawning and rearing by anadromous salmonids (i.e., core areas).
- *Strategy 6.b* - Evaluate the condition and role of core areas when making decisions regarding priority of habitat protection and restoration.
- *Strategy 6.c* - Prioritize application of available resources in basins or geographic regions based on assessment of local conditions.
- *Strategy 6.d* - Identify stream reaches and sub-basins where restoration efforts are most likely to be effective and focus restoration efforts in these areas.
- *Strategy 6.e* Management actions will be conducted in a manner consistent with recognition of the roles of natural and cyclic variation in oceanic and weather conditions, variation in underlying geology, and diversity in biological communities.

GOAL 7

Populations of salmonids in coastal river basins will achieve levels of natural production consistent with overall restoration goals.

- *Strategy 7.a* - Manage harvest and fishery-related mortality to achieve numbers and distribution of spawners consistent with management objectives.
- *Strategy 7.b* - Manage hatchery populations consistent with Natural Production, Gene Conservation, and Wild Fish policies (ODFW).
- *Strategy 7.c* - Restore ecological role of salmon in coastal ecosystems in a manner and to an extent consistent with restoration goals.

GOAL 8

A science-based system will support evaluation of progress of the OCSRI Conservation Plan and will provide a basis for making appropriate future changes to management programs.

- *Strategy 8.a* - Establish an infrastructure to support a comprehensive monitoring program.
- *Strategy 8.b* - Establish a comprehensive, interdisciplinary, interagency environmental monitoring program to monitor implementation of proposed actions and measure achievement of environmental objectives.
- *Strategy 8.c* - Establish appropriate environmental benchmarks that will represent successful achievement of OCSRI goals and identify appropriate interim indicators that will track progress toward overall goals.
- *Strategy 8.d* - Establish "adaptive management" working group to frame environmental management questions, identify practical alternatives for answering these questions, and suggest need for appropriate changes in resource management practices.
- *Strategy 8.e* - Establish an Independent Scientific Review Group that will evaluate the OCSRI on a routine, ongoing basis. This group will make recommendations to the Governor and the Legislature, Oregon agency boards and commissions, the OCSRI Implementation Team, and NMFS. In addition, the Group will establish a routine working relationship with the Implementation and Monitoring teams, and may direct some work by the teams towards analyses that are needed to evaluate or improve the efficacy of the Conservation Plan.

Chapter 8 Outreach and Education

Note: Part I (the first 8 pages) of this chapter is based on material provided in the August 1996 Draft Conservation Plan. The remainder of the chapter is an update on outreach and education activities between August 1996 and March 1997.

Part I

Introduction

The Oregon Coastal Salmon Restoration Initiative (OCSRI) and its participants recognize the important role that outreach and education plays in the effort to successfully complete our mission. While outreach and education are difficult to measure and may not have an immediate and direct effect on salmon, they have been an integral part of both the state's short-term and long-term restoration strategy.

This section will describe earlier efforts at outreach and education, current efforts, and future plans for both the short- and long term. Recognizing that restoration efforts will be part of a lengthy process, it is important to note that one intent of the initiative is for outreach and education to continue long after the Conservation Plan is submitted to the National Marine Fisheries Service.

Implementation of the OCSRI Plan requires consistent educational efforts to change Oregonians' views on what reasonably can be expected in the future with the state's natural resource base, which includes salmon. All Oregonians, especially those who live within the habitat of coho salmon, need to know the extent and urgency of the problem with coho populations and what role they might play in offering a solution. Only through a proactive outreach effort utilizing the best educational tools available can an entire societal attitude on natural resource issues be changed. OCSRI's outreach and education efforts are designed to ensure that the welfare of fish is part of the equation as people address natural resource issues and, in fact, as people live their daily lives.

Among the OCSRI's principal goals are several that require direct involvement of local Oregonians; many of the practical solutions and measures are grass roots in nature. To foster that involvement, it has been and continues to be critical that the state reach out to these populations and bring them into the process to give them ownership in the OCSRI Plan.

Without the involvement of the public, the salmon most likely will not return. The state cannot succeed in the restoration effort alone. It needs the support of the public. Outreach efforts are important and effective ways of including the public.

Outreach Team

To accomplish both short-term and long-term goals, an Outreach Team has been established consisting of public affairs representatives from the following entities:

- Governor's Natural Resources Office
- Oregon Coastal Zone Management Association
- Oregon Department of Agriculture
- Oregon Department of Environmental Quality
- Oregon Department of Fish and Wildlife
- Oregon Department of Forestry
- Oregon Economic Development Department
- Oregon Forest Resources Institute
- Oregon State Parks and Recreation Department
- Oregon State Marine Board
- Oregon State University Extension and Sea Grant
- Oregon Water Resources Department
- Rogue Council of Governments

The Outreach Team has enlisted various federal partners on an ad hoc basis, including staff from the U.S. Fish and Wildlife Service, Bureau of Land Management, U.S. Forest Service, and Environmental Protection Agency.

The Outreach Team has been meeting bi-weekly since January 1996 and will continue to meet on that basis in the foreseeable future. The team has used small working groups to better facilitate completion of specific projects. Those groups include:

- Public Meetings and Media Strategy
- Identification of Opinion Leaders in Local Communities
- Newsletters and Initiative Updates
- Special Events
- Executive Summary Development of OCSRI Plan
- Involvement of Governor and State Agency Directors

Other small working groups will form and disband as needs are identified during bi-weekly Outreach Team meetings and the work of existing groups is completed.

While individual agencies have adopted their own outreach measures consistent with OCSRI, the Outreach Team is tackling those issues and efforts common to all agencies.

Identification of Stakeholders

One of the immediate needs and first accomplishments of the Outreach Team was to identify those stakeholders (organizations and various publics) who are most critical for

involvement in OCSRI efforts. The matrix developed by participating state agencies has identified more than 170 organizations of varied interests that required initial contact and explanation of the restoration initiative, as well as continued communication as the process evolves. The matrix outlines the appropriate lead state agency in those outreach and communication efforts.

This matrix will serve as a database of interested parties that should continue to be informed. In addition, the matrix could also assist state outreach and education efforts by passing along information to affiliated members. Additional groups and organizations are expected to be added as restoration efforts continue.

Agency Sharing of Resources

Because the Outreach Team involves several state and federal agencies, the opportunity to share and combine resources is a strong benefit to education efforts. To date, the Outreach Team has compiled a list of publications and educational materials available to all interested parties. Those materials range from information specific to landowners, to educational brochures that can be used for schools. The Outreach Team is committed to maintaining and updating the resource list as appropriate.

Educational displays to be used at fairs and other public events are also utilizing the combined resources of participating agencies.

Individual Outreach Efforts of State Agencies

All participating state agencies have developed and implemented outreach and education efforts targeting specific constituents as part of each agency's workplan. The following gives a brief summary and examples of individual agency outreach efforts:

Oregon Department of Agriculture

- Briefed reporters from *Capital Press* (statewide agricultural weekly) and *Oregonian* newspapers on OCSRI and specific aspects relating to the agriculture industry.
- Published and distributed brochure on SB 1010, one of ODA's key measures for improving habitat in water quality limited areas.
- Provided individual briefings with key agriculture groups including the State Board of Agriculture.
- Published various news releases relating to OCSRI efforts (including Hire-the-Fisher Program), which resulted in media coverage of specific habitat restoration projects.

Oregon Department of Geology and Mineral Industries

- Alerted all mine operators in coastal watersheds of OCSRI and discussed fish-friendly reclamation methods.
- Briefed and notified a variety of interests about DOGAMI efforts with OCSRI.

Oregon Division of State Lands

- Provided specific briefings on OCSRI to various boards, commissions, related partner agencies, and DSL stakeholders.
- Is developing information packets for watershed councils.
- Is updating its public education materials on removal-fill projects.

Oregon Forest Resources Institute

- Through an interagency agreement with ODFW, inventoried fish habitat enhancement projects on private industrial forest land.
- Sponsored a media tour of various fish habitat projects.
- Published a special edition of *Evergreen* magazine featuring forest stream fish habitat enhancement projects around the state.
- Aired an educational TV spot on forest stream fish habitat statewide for three weeks.
- Is co-sponsoring several forums and conferences on salmon survival and habitat.

Oregon Department of Transportation

- Published two articles describing the initiative and ODOT's role in *Transcript*, the agency newsletter; also has plans to publish additional articles describing the agency action items.
- Held two rounds of stakeholder and public meetings. (Held a total of 17 meetings to garner input on transportation authority impacts and solutions.)
- Developed and distributed a video about transportation authority impacts on watershed health to all coastal county roadmasters, ODOT district and construction offices, regional offices, and environmental staff.
- Conducted an eight-session training program (introducing the standard culvert design guidelines) for ODOT designers, maintenance, construction, and project development staff.

Oregon Water Resources Department

- Sent Water Resource Commission letters to water users, interest groups, project coordinators, local officials, and business owners informing them, and asking for their support, of OCSRI.
- Prepared and distributed two-page leaflet on OCSRI and the role WRD is playing to ensure its success.
- Prepared habitat restoration brochure.
- Prepared brochures for livestock management about riparian areas and "fish friendly" development.
- Opened three new offices in coastal locations to enhance local service, including OCSRI efforts.

Materials Already Developed

As mentioned above, individual agencies have developed and created various outreach materials specific to their own constituents. Meanwhile, the Outreach Team collectively has developed materials that have been distributed to local outlets. They include:

- Coastal Salmon Restoration Initiative Informational Flyer (outlining the background, mission, and goals of OCSRI).
- Fish-Friendly Flood Recovery Flyer (outlining ways landowners can recover from flood damage that are beneficial, or at least not harmful, to fish).
- A "how-to" flyer for landowners that offers specific tips on what they can do on their own property to assist in salmon habitat restoration.
- A periodic newsletter summarizing OCSRI developments for distribution to all interested parties.

The above publications have enhanced our early efforts to acquaint the public with the problem and some practical solutions on a short-term basis. It is the intent of the Outreach Team to continue developing materials as issues and priorities are identified.

Outreach and Education Displays

The Outreach Team contracted the services of an exhibit coordinator to design and implement a portable, self-contained salmon education display for use at county fairs, festivals, and other public events. This display offers easy-to-understand principles of the restoration effort and features some practical solutions for affected parties through an interactive process. The display is an example of interagency cooperation as many of its contents are the result of a pooling of resources from various agencies.

In 1996, the display appeared at Lincoln, Curry, Clatsop, Tillamook, and Lane County fairs and the Oregon State Fair. The booth was well attended and alerted the Outreach Team as to the lack of understanding and awareness of factors affecting salmonid decline along the coast. Many visitors attribute the coastal salmon decline solely to marine mammals. The feedback received at the county fair display has been valuable to the Outreach Team in determining what types of information and which groups should receive a high priority for future efforts.

It is hoped the display will be a permanent outreach and education tool in future years.

Public Meetings and Technical Assistance

The Outreach Team planned and organized a series of public informational meetings, which were sponsored by county commissioners, in September 1996 to target key groups and interested individuals in the following locations: Astoria, Tillamook, Newport, Coos Bay, Grants Pass, Gold Beach, Roseburg, and Portland. The meetings included a presentation of the draft OCSRI Plan and allowed time for public comment. Special

briefings were provided to the sponsoring county commissions. Also, an executive summary of the plan was distributed to interested parties two weeks prior to the meetings. Visits with local newspaper editorial boards were used to heighten interest in the public meetings.

The Outreach Team is organizing follow-up efforts by offering technical workshops, staffed by qualified instructors, to provide practical suggestions and/or project ideas for fish-friendly management to landowners and other interested people. Besides helping to maintain momentum for the OCSRI Plan, these follow-up technical workshops will indicate the initiative's sincerity in continuing educational efforts well after a plan is submitted to NMFS.

Bringing in New Partners

The Outreach Team is organized to bring in new partners as the need arises. Utilizing the skills and experience of federal and local agencies and other organizations allows the team to expand its views and capabilities. As an example, early discussions with the Oregon Department of Education have taken place with the goal of working salmon restoration into K-12 curricula in Oregon. It is hoped that the Outreach Team can align educational opportunities for students with appropriate activities and venues that will teach the long-term values of salmon restoration.

On a more grassroots level, most of the existing watershed councils have already employed various outreach projects of their own including publications, tours of restoration projects, and conservation presentations to classrooms. Watershed councils will continue to identify education/outreach opportunities as they arise.

The comprehensive and inclusive outreach and education effort extends to private groups. The Salmon Watch Program and the proposed Oregon Heritage Stocks Program are examples of conservation organizations getting involved. Descriptions of these programs are provided in the Education and Outreach Attachment.

Media Strategies and Opportunities

The Outreach Team will continue to utilize media as a tool in providing information and gaining attention for salmon restoration efforts. To date, print and electronic media have been kept closely informed of OCSRI efforts and have been invited to attend demonstration projects. The publicity gained by media attention has placed a spotlight on salmon restoration and highlighted successes.

Budgets for Outreach

To accomplish effective outreach and education, appropriate funding has been identified in agency base budgets and the Governor's Healthy Streams Investment budget. Specific requests for funding are also expected to be made to federal and private entities.

Highlight Success and Track Progress

Outreach efforts must include publicizing actions and measures (e.g., on-the-ground projects implemented by local landowners) that are deemed successful and can be used as an example to others. This can be accomplished by dedicating a day each year to celebrate accomplishments in the salmon restoration effort, as well as observing the status of the restoration effort in terms of fish populations--in essence, an annual report card of our efforts. This dedicated day will publicly keep the initiative alive and serve as a mechanism for encouraging progress and diligence. The annual "Salmon Restoration Day" could include a State of the Salmon speech by the Governor and the publication of an annual report. The Outreach Team will take an active role in planning and implementing this effort.

Summary of Specifically Identified Actions and Measures

The following list of measures have been identified by the Outreach Team as establishing the framework for long-term outreach and education efforts:

- Make OCSRI a standing agenda item for the State Natural Resource Public Affairs Group (NRPAG) quarterly meetings. (Most members of NRPAG are also members of OCSRI Outreach.)
- Plan for Outreach Team to assist with periodic publications, as needed, and to possibly include: status reports, wise water use guidelines, a salmon life-cycle poster, and various inserts that could be used in regular agency mailings.
- Deliver information electronically through agency web pages and an OCSRI web page.
- Maintain an educational/informational products and events inventory, and make the inventory available to all interested parties.
- Network with federal outreach counterparts to identify joint venture opportunities.
- Develop and maintain a standard OCSRI presentation, including video/slides that can be used by all interested parties.
- Offer watershed council support in the form of identifying designated agency outreach liaisons and involve councils in leadership and group process training.
- Organize an educators' fair that offers demonstrations and/or information regarding OCSRI on an annual basis.

The above measures will be modified as the Outreach Team continues to meet in the future.

Conclusion

Through the efforts of the OCSRI Outreach Team, a framework has been established to continually address the needs and strategies of outreach and education. The Outreach Team is committed to a long-term involvement with local and federal partnerships. It is expected that actions and measures will be added, deleted, and/or modified as the Outreach Team continues to meet. While our framework allows for flexibility, there is assurance that outreach and education will be a permanent and integral component of the state's plan for coho salmon restoration.

Part II
Outreach and Education
Progress Between August 1996 and March 1997

Update

The OCSRI Outreach Team has made a great deal of progress since the August 1996 draft plan. This addendum is an accounting of the progress that has been made in the past six months and can be favorably compared to the original chapter. The addendum reflects the transition the OCSRI Outreach and Education efforts have made from simply providing information to developing education outreach plans and implementation strategies.

The addendum is organized to follow the same format as the original chapter, including the use of the same headings.

Outreach Team

The makeup of the Outreach Team has expanded to include more diverse interests, groups, and skills. In addition to the agencies listed in the original chapter, the Outreach Team now has full time representation from the following:

- Oregon Department of Education
- U.S. Fish and Wildlife Service (USFWS)
- USDA- Natural Resources Conservation Service (NRCS)
- For Sake of Salmon
- Oregon Trout (Salmon Watch Program)
- David Heil & Associates (an educational consultant group for non-profit agencies)

The Outreach Team continues to meet bi-weekly and often serves as a facilitator to identify partners, audiences, and resources associated with salmon outreach and education.

Identification of Stakeholders

The Outreach Team, utilizing the opportunity of reaching more than 200 attendees at a February two-day workshop on salmon/watershed education co-hosted by Oregon State University, conducted a survey asking respondents to identify all audiences that should be targeted for salmon education. Our intention was to identify audiences OCSRI was not reaching. Fourteen major audience categories were identified:

1. Landowners
2. Conservation Groups
3. Local Government
4. State and Federal Government

5. Civic Groups
6. Education
7. Seniors
8. Youth Groups
9. Media
10. Recreation
11. Business
12. Cultural
13. Religious
14. Others

Under each major audience category, specific audience groups were identified. In all, 110 target audience groups were identified in the exercise. Workshop attendees also helped to identify front-line communicators (groups and/or organizations) for each of these audiences. Combined with the previously established Outreach Team stakeholder matrix, we have begun to determine gaps in the delivery of salmon and watershed information and education. This information will be useful as work plans are developed to reach all identified audiences (see appendix for Identified Target Audiences and Gaps).

State Agencies' Individual Outreach Efforts

In addition to the summaries and examples listed in the original chapter, outreach efforts of three public agencies should be noted:

Oregon Department of Fish and Wildlife

- Developed a web site focusing on OCSRI efforts.
- Featured OCSRI and related fish management efforts in numerous agency news publications including features in *Oregon Wildlife* magazine.
- Developed numerous information leaflets and other publications for educators, legislators, interest groups and local groups regarding salmon-related issues.
- Develop and deliver salmon and watershed based curriculum for educators K-12, including "Stream Scene," "Fish Eggs to Fry," "Project Wild," and "Project Wet."
- Conduct annual Watershed Education Workshops for educators to earn credit and learn to apply Stream Scene and other science-based curriculum.
- Work with local field staff to act as community liaisons to communicate salmon issues and needs and promote voluntary involvement in restoration projects.
- Develop community monitoring and restoration sites through the STEP Program.
- Participate on watershed councils as technical advisors.

Oregon Department of Education

- Promote school improvement efforts that enhance science and math standards.
- Developed a Certificate of Advanced Mastery-Natural Resource Systems Endorsement Area of Study.
- Support school-based youth organizations involved with natural resource instruction (Associated Oregon Forestry Clubs and FFA).
- Support grants related to technology infusion into student watershed-related instruction.

Oregon Water Resources Department

- Introduced revised and enhanced online computer services for public access to maps showing water rights locations and instream rights on specified areas of streams or basins. Information such as water availability, streamflows, and water rights information are also available via online services. Water use requests will be made available using Internet services by May 1997.
- Produced an educational brochure for livestock management in riparian areas and use of off-stream water supplies.

Oregon State University Extension

- Extension Sea Grant agents on Oregon's South Coast have developed work-training programs for displaced timber workers and displaced commercial salmon fishers (adopted across the state). The programs focus on watershed and salmon restoration. Also, Extension Sea Grant agents have developed youth corps programs for assistance in watershed and salmon restoration projects.
- OSU's Extension Service is conducting workshops and demonstration trials statewide that will help livestock producers set pasture management goals that include preserving water quality. The program will assist in the implementation of management-intensive grazing coupled with restoration and management of riparian areas.
- OSU Extension Service's 4-H Youth Development program has developed three efforts linked to salmon recovery intended to reach young Oregonians and adult leaders to generate stewardship: The "Give Water a Hand" program; "Ridges to Rivers Watershed Exploration," and "4-H Wetland Wonders."
- OSU faculty have developed a broad variety of salmon restoration-related educational materials including printed publications, books, periodicals, videos, stories for print, and electronic mass media that target landowners, people in natural resource industries, K-12 students involved in outside-the-classroom educational programs, community leaders, public resource managers, urban dwellers, and many other Oregonians.
- OSU Forestry Extension develops curricula to support community members who provide volunteer educational support to local decision making, much of it related to watershed management. More than 200 such Master Woodland Managers contribute the equivalent of three full-time positions to this informal education annually.

Materials Already Developed

The Outreach Team assisted in marketing the original OCSRI Draft Plan by coordinating distribution at 110 public sites throughout the coast and affected regions. Copies of the plan were placed at public locations including libraries, city halls, extension offices, soil and water conservation district offices, watershed council offices, and ODFW district offices. The Outreach Team also placed an electronic version of the Plan on the Governor's web site. A news release informing the public of the availability of the plan was written by the Outreach Team and distributed to statewide media.

The Outreach Team produced an Executive Summary of the OCSRI Draft Plan in September and distributed it widely to interested parties. Hard copies were made available at eight OCSRI community briefings in September and October. Copies were mailed to an extensive list of interested parties. An electronic version was also placed on the Governor's web site with links to other agency web sites.

The Outreach Team reviewed public comments on the OCSRI Draft Plan and assisted in preparing written replies to those comments. The team also produced a brochure consisting of the most common questions and answers that resulted from the community briefings. The brochure was distributed to every attendee of the briefings, as well as other interested parties. A major concern in public comments on the plan was the need for a more significant Outreach and Education Chapter. The team has responded by upgrading this chapter with substantial measures taken or planned since the completion of the original chapter.

Two other major recent accomplishments of note:

- *Compendium of Salmon and Watershed Education*

The Outreach Team has developed a compendium of salmon/watershed education efforts in Oregon to date, which is a comprehensive list of resources, programs, and activity. This compendium was completed in February 1997 as the result of a massive survey of salmon educators (individuals, groups, agencies, and organizations). The survey has resulted in information that will be processed into a directory (consisting of name, address, phone/fax numbers, e-mail address, areas served, products available, mission statements). The directory is planned to be available in both hard copy and electronic form by June 1997.

The survey indicated a high percentage of respondents having access to the world wide web. The creation of a website to act as a clearinghouse for salmon education information (including the directory) could prove to be successful. The survey also asked respondents a series of questions identifying needs/barriers and successes/failures. The Outreach Team and others will be able to use the information to help develop strategies for salmon and watershed outreach and education activities.

Recognizing that not all salmon education entities responded to the survey and that new groups/organizations/individuals will be getting involved in OCSRI efforts, the Outreach Team will continue to update the compendium.

(A copy of the updated compendium and a summary of the survey results can be found in the appendix.)

- Salmon/Watershed Education Workshop

The Outreach Team assisted in the planning, coordination, and implementation of a two-day workshop on salmon/watershed education in February 1997 at Oregon State University sponsored by OSU Extension Service. The workshop was co-hosted by the Governor's Office, Bureau of Land Management, Oregon Department of Agriculture, Oregon Department of Fish and Wildlife, Oregon Department of Forestry, Oregon Department of Land Conservation and Development, Oregon Division of State Lands, Oregon Economic Development Department and the Oregon Forest Resources Institute.

The purpose of the workshop was to identify ways to effectively deliver educational and outreach programs on salmon and watershed restoration. The workshop was a successful attempt to develop a coordinated system that makes available to citizens current information about salmon, habitat restoration, and related topics. The workshop was also designed to develop a process to assess educational needs and design new programs.

Nearly 200 educators, extension specialists, and representatives of public/private agencies and watershed councils attended the workshop. Participants were able to share information and ideas during the workshop. As part of the event, the Outreach Team presented the compendium of salmon education (see Compendium Survey Results in appendix), which began to identify specific needs and gaps in salmon and watershed education.

Workshop participants worked in focus group sessions to identify needs and mechanisms to deliver services. Key strategy areas that were developed include:

- There is a need to establish a "clearinghouse" service where a variety of audiences can access a comprehensive database of information regarding salmon/watershed education materials/services/programs.
- Existing quality curricula must be broadly distributed and communicated. Successful curricula should be used as a model for new efforts.
- Training materials and programs must include the development of how-to guides and workshops to teach the application of curricula and on-site demonstration projects. This should not be limited to educators, but include a variety of

audiences including landowners, local government officials, and watershed councils.

- Getting citizens interested in salmon and watershed restoration efforts should emphasize facilitating peer-to-peer relationships/projects, developing incentive programs such as Master Gardener programs and developing more on-site demonstration and monitoring sites. Involvement includes celebrating successes and rewarding and recognizing efforts.
- Delivering services to the local level and involving citizens in salmon and watershed restoration efforts should be facilitated at the local level. Existing communication networks or hubs include field offices of ODFW, Extension, and SWCDs.

Funding was the common thread and barrier to salmon and watershed restoration. This is especially true for education efforts which are not traditionally viewed as priority actions. In lieu of new funding, existing funds should be evaluated for their effectiveness and appropriateness as education programs and services are developed. These materials will seek to meet the goals and objectives of the OCSRI Plan.

Future meetings of the workshop participants are scheduled. Those meetings will result in the formation of work groups that will design and implement action plans to deliver products associated with these major strategy areas. Those work groups will reflect the diversity of participants attending the February workshop, including representatives of government, education, conservation groups, and watershed councils. The Outreach Team will continue to be involved and will complete the compendium so that a final directory can be delivered in both hard copy and electronic form.

Outreach and Education Displays

As mentioned in the original Outreach Chapter, an exhibit coordinator (David Heil & Associates) was contracted to design and implement a coastal salmon education display for late summer/early fall of 1996. The OCSRI Fair Exhibit Booth Project was a multi-agency project with involvement from the OCZMA, ODA, ODOT, GWEB, ODFW, ODF, OSUES, ODPR, ODSL, OEDD, watershed councils, and soil and water conservation districts.

- The OCSRI fair booth served as a highly visible dynamic platform that both educated the public to the threats facing Oregon's native coastal salmon, and provided a mechanism for surveying attitudes, beliefs, and values of Oregon's coastal residents pertaining to native salmon. The high profile nature of the booth coupled with its interactive hands-on displays made it one of the most heavily visited booths at each fair. It won first place awards at both the Clatsop County Fair and the Tillamook County Fair.

- An estimated 77,400 people attended the booth. 1,118 surveys were gathered.
- The OCSRI booth revealed that great strides need to be taken in the realm of public education if people are to understand and appreciate problems facing Oregon's fish. Further, it was very apparent that people care about salmon and want to get involved and we need to form an accessible avenue for citizen participation in the restoration of Oregon's native salmon.

Plans for a similar traveling display for Summer 1997 are now underway (see Display Booth Report in appendix).

Public Meetings and Technical Assistance

In September and October, the Outreach Team organized and conducted eight community briefings in cities on the Oregon coast and in basins affected by the salmon crisis. Members of the governor's staff provided an overview of the draft restoration plan and fielded specific questions from attendees. They explained the general decline in salmon populations, then listed major components of the draft plan and how they would affect local citizens and require grassroots involvement. Additionally, agency directors and staff were on hand to answer specific or technical questions from the audience.

The Outreach Team gathered questionnaires from attendees and mailed a written response with answers to the "most frequently asked questions" to all 575 citizens who attended. Specially researched and written responses were prepared for detailed questions. The briefings allowed interested citizens, local officials, and interest groups an opportunity to meet with agency leaders and staff who were directly involved in the drafting of the restoration plan.

Local leaders were personally invited to attend the workshops, and news releases were sent to local media to promote the briefings. More than 540 letters were mailed from the Governor's Office encouraging citizen attendance and informing Oregonians of the importance of these presentations.

Bringing in New Partners

The OCSRI Outreach and Education effort has gathered tremendous momentum and participation in the past few months as new groups and individuals become aware of the needs and opportunities. The Salmon and Watershed Education Workshop gathered more than 200 interested individuals associated with salmon/watershed education representing dozens of groups and agencies. The workshop has bonded those groups in a commitment to continue working on identified needs, mechanisms, and products related to salmon outreach and education. Another meeting planned for March 1997 is expected to produce ongoing work groups and a steering committee to oversee the completion of specific tasks. The Outreach Team will continue to be a part of those efforts and will be an integral member of any established steering committee.

The workshop specifically identified the need to involve local government, OSU Extension Service, small landowner groups, and local soil and water conservation districts as key partners in the salmon and watershed education effort.

The Outreach Team plans on working to identify and involve other key education partners in the next several months, specifically those who can provide reach to K-12, community colleges, and other institutions of higher education.

Media Strategies and Opportunities

As a prelude to last fall's OCSRI community briefings, a series of editorial board visits were arranged and implemented by the Outreach Team, generating several favorable editorials on coho salmon restoration. The editorials helped generate strong interest and attendance in the community briefings, which themselves were well attended by local media. News releases alerted media to the briefings, as well as the issue in general.

As part of the OSU Salmon and Watershed Opportunities Workshop, print and television media attended the final session, which featured Governor Kitzhaber. Efforts to alert and involve the media have contributed to keeping the need for salmon outreach and education at the forefront in the minds of many Oregonians.

Media will continue to play a central role as the Outreach Team markets the final version of the OCSRI Plan over the next couple of months, recognizing that many Oregonians receive information on such topics primarily through the media.

Specific Identified Actions and Measures (Summary)

In addition to actions identified in the original chapter, there are plans for the following:

- A follow-up Salmon and Watershed Education Workshop is planned for mid-March 1977 to assemble work groups for completing specific tasks identified in the original workshop. Those include education mechanisms such as a clearinghouse for information, curriculum development, training, communication, and funding. A steering committee consisting of broad representation will oversee the follow-up workshop.
- The Outreach Team will update the compendium of salmon education efforts and plans on issuing a directory in hard copy and electronic form by June for all Oregonians to use.
- The Outreach Team will continue completing and analyzing the Target Audience Survey to list front-line communicators to the 110 target audiences identified in the survey. We will also attempt to locate gaps and needs for reaching each of those audiences.

- The Outreach Team is developing a marketing plan for the final OCSRI Plan for the months of March and April. This will include a new round of editorial board visits, news releases, special events, and at least one more public information meeting.
- The Outreach Team will continue meeting on a bi-weekly basis to implement the needs identified by the OCSRI Implementation Team and others as assistance is requested.

Conclusion

We believe this addendum to the OCSRI Outreach and Education Chapter demonstrates our willingness and ability to plan and complete several important short-term measures, as well as the planning for long-term measures that will further Oregonians' understanding of the coho salmon crisis. Although several specific action plans are still needed and yet to be identified, the first steps have been taken to build a broad-based partnership of diverse groups and interests that will lead to a coordinated and comprehensive outreach and education program.

Chapter 9

Strategy for Improving Compliance with Environmental Protection Laws

Note: Part I (the first 14 pages) of this chapter is identical to material provided in the August 1996 Draft Conservation Plan. The remainder of the chapter is an enhanced strategy to improve compliance with environmental protection laws that are relevant to the conservation Plan.

Part I

The Roles of State Agencies and the Oregon State Police in Improving Compliance with Environmental Protection Laws

Introduction

A goal of the OCSRI is to improve compliance with existing environmental laws, which is viewed as an essential element needed to conserve and restore salmon. The purpose of this section is to explain the importance of enforcement to protecting and enhancing natural resource values, and to describe how the various agencies enforce environmental laws to protect resources under their management.

Potential Contributions and Obstacles

Enforcement brings accountability to management measures and goals. Many of the natural resource agencies are attempting to gain compliance from their constituents with regulatory techniques and are reluctant to engage the services of a law enforcement agency to raise the level of accountability. The prospect of raising the level of accountability seems remote when people involved in habitat alteration do not face the possibility of significant sanctions for not complying with laws and regulations. Civil penalties are sometimes viewed as a cost of doing business.

Enforcement of Existing Laws, Rules and Regulations

Several reasons exist for enforcing existing laws, rules, and regulations in support of the efforts to restore coastal salmon stocks. Some are listed below:

- Enforcement of fishery harvest laws and rules is directed to conserve and protect fishery stocks. Fish populations that are depressed are the greatest beneficiaries of enforcement protection.
- There is great potential to protect and enhance the habitats critical to survival of coastal salmon stocks using the existing and various laws and regulations that give the agencies regulatory authority over the components of environmental conditions affecting anadromous fish at the different stages of their life cycle.

- Natural resource law enforcement is an essential component to management strategies. While education will produce compliance among most individuals, even in the absence of sanctions, some individuals would be more motivated by greed than good stewardship and acts of non-compliance would result.
- If current laws and regulations were enforced as they are written and compliance sought under authority of the current laws and regulations, many positive and wide ranging actions could be accomplished that would enhance the habitat conditions required by the fish stocks and provide needed protection to the fish and their habitat.

Prioritizing Enforcement Activities

With the limited resources available for enforcement, it is essential that the effort be focused to gain the most results in restoring salmon. Some needs recognized in respect to prioritizing enforcement are listed below:

- Consultation is needed among resource agency managers to prioritize the most critical and useful measures that can be applied to protect the most endangered stocks. Consultation will then select the most effective enforcement application to maximize results.
- The entire restoration process for coastal salmon will require a prioritization mechanism to identify those areas and fish stocks in need of immediate action to prevent their loss.
- Prioritization will also identify those measures that will produce the greatest results, and likewise, which of these enforcement measures can achieve the greatest result where the benefits are most needed.

Agency Positions Regarding the Role of Enforcement in Support of Oregon's CSRI

Background

Members of the Planning Team were asked to consider their agency's potential enforcement role of environmental laws in supporting achievement of OCSRI goals. Specifically, they were asked to prepare written responses indicating that their respective state agency had considered the possible role of enforcement of existing laws and also describing changes, if any, that might be warranted in their approach to compliance enforcement activities. Responses received to date are reproduced in this section.

Response on Enforcement Role From The Department of Agriculture

In general, the department prefers to handle enforcement issues internally to maintain credibility with stakeholders and peace of mind within the agricultural community. The Oregon Department of Agriculture does not, for the most part, seek law enforcement support from the Oregon State Police for fulfilling its mission and/or assisting with its normal enforcement efforts. ODA appreciates the availability of enforcement support from the OSP, and has utilized their assistance in a limited number of cases in the past where ODA staff were denied private property access when conducting investigation activities.

Oregon State Police support may likely be requested to give assistance during a difficulty ODA investigation, particularly where an uncooperative landowner has denied ODA access to their property. The OSP has always responded to requests for support when the safety of public officials (e.g., state employees) was in question. The ODA's most frequent use of Oregon State Police has been when we believed a hostile landowner was capable of posing a serious threat to department personnel.

ODA may also request OSP support in cases where an investigation has turned criminal (e.g., landowners falsifying records), or where flagrant water quality violations have caused imminent danger to public health and safety (e.g., certain pesticide application violations or field burning activities).

Response on Enforcement Role From The Department of Environmental Quality

The following program summary outlines the approach of the Department of Environmental Quality to enforcement of current statutory authorities.

Water quality permitting activities are based on regulations (Oregon Administrative Rules, Division 45) and constitute the major implementing element in the water quality program. Approximately 3,000 water quality permits are enforced in Oregon, including state (WPCF) and federal (NPDES) permits. NPDES permits are required for sources that discharge wastewater to

surface waters of the state. Oregon has been delegated NPDES permit issuance authority by EPA. State WPCF permits are issued to sources that do not discharge to surface waters.

The process of issuing water quality permits and monitoring permit compliance is relatively straightforward. A permit application and applicable fee must be submitted to the program for new permits, permit renewals and permit modifications. A permit and public notice are drafted and mailed to the applicant. The applicant has two weeks to review and make comments on draft documents. After the applicant has reviewed the draft permits, a public notice is circulated by mail to a broad mailing list. A public hearing may be held at the discretion of the Director. A hearing is normally held only if the proposed new permit covers a major new discharge, or if there is considerable controversy surrounding the proposed permit. Then, 30 days following the public notice (or after a public hearing), the permit is finalized and issued. EPA reviews major source permits during the public participation period.

The permitting process involves other major elements of the water quality program. A field inspection may be conducted prior to permit issuance. Mixing zone surveys may be undertaken to provide input to establishing permit conditions. The effluent limits in the Statewide Water Quality Management Plan are utilized in the permit conditions for new and expanded sources. Discharge monitoring reports, sewer system evaluation surveys, sludge management and pretreatment programs, and other indications of source performance and compliance are evaluated. Comments from the applicant or the public may also be utilized. Permit requirements may vary but generally include: conditions, effluent limitations, monitoring, and reporting requirements (discharge monitoring reports and spill response).

Permit compliance assurance is an ongoing permit activity. Periodic inspections are made of all permitted sources with individual permits at least once each year. Additional inspections are made on sources found in noncompliance and sources experiencing operation problems. Priorities are based on:

- Toxicity of pollutant
- Quantity of pollutant
- Potential impact or location sensitivity
- Compliance history
- DEQ's best judgment

Where permit violations are found, the ODEQ does follow-up with appropriate enforcement action.

ODEQ rules contain an enforcement policy and civil penalty procedure, with violation classifications based on risk of harm to public health or the environment. The classification of the violation, its magnitude, and other factors are considered to arrive at an appropriate enforcement action against the violator, which may include a civil penalty. The enforcement policy uses a civil penalty matrix to establish penalty amounts.

While agreeing that the success of OCSRI Plan hinges in part on all participating agencies having a full complement of regulatory and non-regulatory tools, ODEQ also sees need for the will and the dedicated resources to apply them.

From the regulatory standpoint, the ODEQ has both administrative civil penalty authority and criminal enforcement powers. Our records show that we have not been reluctant to use either of these tools, and further we are prepared to use them in support of the OCSRI. Although we have several hundred field staff across the state, we agree that this initiative will require all affected agencies to work more closely to not only share our eyes and ears, but to share our respective (and diverse) areas of expertise. For example, where DEQ may detect stream contamination by water sampling, the department may not be able to immediately identify the source. By communicating with the local OSP Fish and Game officer or the local ODFW biologist (who may have more intimate knowledge of the stream), DEQ may be able to more quickly identify a contamination source.

With its current resources, ODEQ will need to develop a prioritization mechanism for focusing on those areas of immediate concern. We expect that the success we would have on a selected high priority stream would serve as a model to be applied in other areas; this approach would be the most efficient and effective use of our limited resources.

It is also our opinion that in building across-agency teams to implement the OCSRI, some training is necessary to educate the participants about the roles, responsibilities, and authorities of the various agencies and, too, how to establish working relationships, set direction and make timely decisions. DEQ is prepared to participate and contribute to such training.

Response on Enforcement Role From Oregon Department of Fish and Wildlife

Enforcement is a key component of assuring compliance with laws and rules established to protect fish and wildlife and their habitats. Within the areas of authority for ODFW (primarily harvest regulation and distribution of animals), we rely on Oregon State Police to carry out the needed enforcement. Formal planning for coordinating enforcement is conducted annually, and a Coordinated Enforcement Plan is prepared. It is through this process that needs for additional enforcement effort are identified.

Since OSP is a cooperator with ODFW in the Coastal Salmon Restoration Initiative, and is already our partner for enforcement and familiar with our needs, we are relying on OSP to submit the enforcement needs relating to ODFW's areas of responsibility

While additional enforcement capability is needed, it is also important to note that a significant enforcement effort is already in place to address compliance with the laws and rules relating to controlling harvest and use of fish and wildlife. Coastal salmon would benefit from increased levels of enforcement on harvest, but greater impacts could be obtained by increasing the enforcement on rules where there presently is only a low level of enforcement, such as environmental and land use regulations. These, however, are outside the scope of ODFW responsibility.

Response on Enforcement Role from Department of Forestry

The ODF implements its programs through a balanced program of rules, education, technology transfer, and enforcement. Compliance is first achieved through education, pre-operation planning, and effective communication. For operations within 100 feet of most streams, or carrying a potential risk of material entering a stream, written plans are used as one planning and communication tool. Approved written plans are enforceable documents.

Ongoing random inspections of forest operations are provided, using a priority system based on the potential for resource damage. Core areas identified in the OCSRI Plan will become a new basis for setting inspection priorities.

Enforcement of the Oregon Forest Practices Act occurs through the efforts of 54 Forest Practices Foresters (FPFs). Requests for "Stewardship Foresters" and administrative support have been added to ODF's budget proposal to provide additional program response in both education and inspection programs. Between 15,000 and 20,000 onsite inspections of operations are made annually.

Violation complaints are given high priority, with inspection occurring within 48 hours. It is ODF's policy to undertake enforcement when there is noncompliance of a rule that has resulted in some type of damage. If damage has not yet occurred, the operator is given written direction to come into compliance. If the operator complies and avoids damage, a citation may be avoided.

Enforcement action always includes an enforceable order to cease further violation. Enforceable orders to repair damage are issued whenever damage can be reduced or prevented. When citations are issued, ODF can choose either civil penalties or criminal prosecution, with civil penalties being the primary mechanism. Failure to comply with an order to cease further violation or to repair damage results in a minimum civil penalty of \$2,500; the order is still pursued as well. All penalties carry a potential maximum of \$5,000 per violation.

The ODF cooperates with OSP in taking enforcement action when the situation requires their professional expertise. However, the department has been actively enforcing the Forest Practices Act for 25 years and has trained professionals to administer both the technical forestry and enforcement aspects of the program. Since ODF's relationship with landowners in administering the forestry program is successful, relying in part on the department's enforcement policies and attitudes, ODF does not anticipate directing enforcement towards OSP efforts. Both agencies will continue to cooperate on reporting activities of concern to each other and sharing appropriate training.

Response on Enforcement Role From The Department of Geology and Mineral Industries

Our program relating to the OCSRI Plan is our Mined Land Reclamation Program (MLR). The enforcement hinge pin of the program is a strong field presence by expert staff to prevent violations before they occur. For fiscal year 1995-96, we completed 725 inspections. Violations

identified during an inspection are noticed to the operator in an inspection report and notice of violation. Mine closure orders are issued if the site is not brought into compliance within 30 days. The program issued 78 closure orders for 1995-96. Sites that don't comply with the conditions of the closure orders may be issued a notice of abandonment, and a demand may be put on the financial security for MLR to use to complete reclamation and close the site. Of the 725 sites inspected in FY 95-96, 23 sites were issued abandonment notices. The vast majority of these then complied with the conditions of the closure order. Additional methods at our disposal, although rarely used, are civil and criminal penalties.

The use of OSP for enforcement may be a negative for our program due to the lack of familiarity of OSP with mining, which could lead to confusion on the part of the enforcer and the enforcee. The strong authoritative presence of the OSP would be overkill for our program. Where a threat to personnel safety is a concern, we use the local sheriff's office to accompany staff.

Response on Enforcement Role From The Department of Land Conservation and Development

The DLCD's statutory responsibility and authority are to oversee the development and implementation of comprehensive land use plans by local governments. Every jurisdiction in the state has developed a comprehensive plan according to the requirements of Statewide Planning goals, which are spelled out in Oregon Administrative rules. The Land Conservation and Development Commission has acknowledged all of the plans as being in compliance with the goals. Once plans are acknowledged to comply with the goals, the Department monitors certain local government decisions to ensure that the plans continue to comply with the goals. The normal mechanism for monitoring implementation is 1) by reviewing amendments to local plans, and 2) by reviewing local permits to place dwellings on farm and forest lands. Local jurisdictions are required to report all plan amendments and all farm/forest dwelling decisions to the Department.

The DLCD may institute enforcement action against a jurisdiction where it has evidence the jurisdiction routinely violates their plan. DLCD does not anticipate increased monitoring or enforcement of local government decisions as part of its work related to salmon recovery.

Response on Enforcement Role From Division of State Lands

Monitoring

The DSL does not have a formal monitoring program for removal-fill permits. Some permits include specific monitoring requirements (e.g., for water quality parameters) that the permittee is responsible for conducting. Projects that include wetland creation, restoration, or enhancement as compensatory mitigation must have a site-specific monitoring plan designed to track the success of mitigation.

DSL field staff conduct "spot-check" monitoring of removal-fill permits in the following circumstances:

- When a complaint is received about the way a project is being done, and after a telephone conversation with the permittee, we believe a site visit is warranted (see discussion of enforcement below).
- When staff travel plans provide coincidental opportunities for visits at recently issued permit sites.

In addition, monitoring of specific projects may also be conducted by ODFW District Biologists, Watermasters, DEQ field staff, soil and Water Conservation Districts, NRCS personnel, and others.

Enforcement

Enforcement of the Removal-Fill Law generally is based on complaints received. These may be from casual observers such as neighbors, or from agency personnel such as ODFW and OSP. When a complaint is logged, DSL calls the alleged violator to confirm the details and inform them of the law's requirements. Staff visit the site as soon as possible after receiving the complaint (sometimes the same day, usually within a day or two). Sometimes ODFW or DEQ staff will go along. If, based on the phone contact, we believe the violator will be uncooperative (or worse), we request OSP to accompany us on the site visit.

Program Measures

DSL has three OCSRI program measures that will improve our monitoring and enforcement capability:

- Strengthen interagency coordination in removal-fill permitting.
- Add field staff in coastal salmonid areas.
- Reclassify support staff to OS-2 to free up professional staff time for field work.

Response on Enforcement Role From Oregon Parks and Recreation Department

The Scenic Waterway Program was created to protect and enhance the scenic beauty, recreation, fish and wildlife, botanical, geologic, historic, archaeologic and scientific values of selected waterways in Oregon. Nineteen rivers and one lake (Waldo) have been designated as state scenic waterways. The rivers include all or parts of: Nestucca, Walker Creek, Elk, Sandy, Clackamas, Little North Santiam, McKenzie, North Fork of the Middle Fork Willamette, North Umpqua, Rogue, Illinois, Metolius, Deschutes, John Day, Minam, Wallowa, Grande Ronde, Owyhee and Klamath.

The Oregon Parks and Recreation Department is the primary administrator of the Scenic Waterway Program. However, the Department of Fish and Wildlife, Division of State Lands, and Water Resources Department have specific authority set forth in the Scenic Waterway Act. The Act explicitly directs OPRD to adopt rules regulating the management of related adjacent lands. Related adjacent lands are defined as those lands within 0.25 miles of either bank of the scenic waterway.

The law requires owners of related adjacent lands to "notify" OPRD prior to making improvements or developing lands within designated scenic waterways. OPRD has one year in

which to approve, deny, or negotiate an acceptable resolution to a landowner's proposal. Any change in the use of the land requires the landowner to go through the "notification" process. Common improvements and developments include such things as: timber harvest, mining, road building, houses, garages, and other structures. Some activities (e.g., firewood cutting, hazard tree removal, fence building, and crop changes) are exempt from notification.

Failure to go through the notification process before changing the use of related adjacent lands is a violation of the Scenic Waterways Act. ORS 390.925 vests OPRD with the power to obtain injunctions and other appropriate relief against violations of any scenic waterway statute, rule, or agreement made under the Scenic Waterway Act. ORS 390.990 (5) declares a violation of any of OPRD's scenic waterway land management rules as a Class A park and recreation infraction.

Prosecution of scenic waterway violations is rarely done, largely because the bail for a Class A park and recreation infraction is minimal, while the legal costs to OPRD for obtaining an injunction or an order for restitution are high. It is not uncommon for OPRD's legal costs to substantially exceed the cost of restitution by the violating party.

Response on Enforcement Role From Marine Board

The following information from the Marine Board is divided into three separate program parts:

- Registration of Outfitters and Guides
- Marine Law Enforcement
- Submersible Polystyrene Regulation

State Marine Board: Program on Registration of Outfitters and Guides

Description: Over 1,200 guides and outfitters are registered with the Marine Board, ranging from horse packers to whitewater rafting companies. Fishing guides are one of the most numerous types of registrations. To be registered with the Marine Board, a guide must have proof of insurance, a current first-aid card, pay a \$50 fee, and sign an affidavit relating to convictions or sanctions under federal or state laws.

Authority: ORS Chapter 704; amended 1995 by HB 2093 B-Engrossed.

Status: The 1995 amendments added significant sanctions authority to this program. The law now requires all guides operating on federally navigable waterways to possess a valid Coast Guard operator's license; requires all guided boats to display a valid decal; makes violation of state or federal wildlife, hunting, angling or commercial fishing laws grounds to deny state registration; makes revocation of a permit or denial to issue a permit by a federal agency grounds to deny state registration; and provides for reprimands, suspensions, and revocations of guide/outfitter registration for serious repeated violations of certain state or federal laws including fishing violations. Administrative Rules to implement these changes were adopted by the Board in early April of 1996.

Proposed Program Enhancements

- Coordinate with OSP and county marine patrols to concentrate early education/enforcement efforts on coastal streams, particularly in source and recovery areas.
- Cooperate with federal agencies to share current information.

Habitat Impacts: None

Harvest Impacts: No significant impact.

State Marine Board: Marine Law Enforcement Program

Description: The Marine Board contracts with Oregon State Police and county sheriffs to enforce boating laws and regulations statewide. Marine patrol officers are trained and certified through an instructional course operated by Board staff and certified instructors. Contracts pay for personnel costs, boats and other equipment, supplies, fuel, and maintenance and repair necessary to operate a basic program. Counties provide varying degrees of matching funds or in-kind services to complement the contract dollars. Marine programs typically have a core of full-time officers and add seasonal deputies during the busy summer months. During the off-season, deputies are encouraged to conduct in-school water safety education classes in elementary schools. At present, nearly half of all counties are providing in-school education.

Authority: The Board contracts with OSP and 31 counties. There are approximately 29 full-time officers assigned year-round to marine patrol duties. Another 100 are employed throughout the state during the summer. Besides conducting boat inspections, officers issue warnings and citations for violations of equipment requirements or operating restrictions (e.g., speed limits, no-wake zones, reckless operation, and operating under the influence of intoxicants). Marine patrol officers also do extensive education of the water with boaters, stressing courtesy, safe operation, and proper boat handling.

Proposed Program Enhancements

- Provide for cooperation State Police, ODFW, county marine patrol, and program to adjust patrol locations and timing where beneficial to fish recovery, particularly in source managers to review incidence of boating law violations and current patrol schedules, and recovery streams.
- Review marine patrol programs in the study area to assess manpower commitments and equipment adequacy and adjust contracts if possible.
- If necessary, seek additional state funding for boating law enforcement efforts to replace dwindling and unsteady federal funds.

Habitat Impacts: None anticipated.

Harvest Impacts: Law enforcement presence on waters at certain times of year may reduce illegal harvest.

State Marine Board Program: Submersible Polystyrene Regulation

Description: Prohibits the installation of a submersible polystyrene (foam) device on a dock, buoy, or float unless fully encapsulated by a protective covering. In accordance with Administrative Rules, the Board issues permits for encapsulated foam flotation in new docks and significant expansions or renovations of older docks or floats built before January 1, 1992.

Authority: ORS 830.950 enacted by 1991 Laws, Chapter 759, Sections 3,4, and 5.

Status: Since its passage in 1991, permits have been issued for legal foam flotation.

Proposed Program Enhancements

- Task marine patrol officers to report new construction utilizing unencapsulated polystyrene on coastal streams.
- Provide for agency follow-up to seek compliance and issuance of a valid permit.

Habitat Impacts: Unencapsulated submersible polystyrene can break down to the foam cell level and pose a risk to fish and wildlife through unintentional ingestion. Properly encapsulated foam leads to an overall improvement in water quality.

Harvest Impacts: None

Response on Enforcement Role from Oregon State Police

Harvest Law Enforcement

The traditional role of fish and wildlife enforcement has been to ensure compliance of harvest measures. Harvest measures were recognized in the early years as the most appropriate method of managing fish and wildlife populations. Therefore, the role of *game warden* was tied to harvest laws, rules and regulations. This is still a vital part of the role of the fish and wildlife officer but not the total role.

The Oregon State Police Fish and Wildlife Division is involved in gaining compliance with the following harvest measures:

- Ocean - Commercial Fisheries: The officers conduct at-sea boardings and dockside inspections of commercial fishing vessels to monitor species, catch limits, licensing and permit compliance. They ensure that seasons are observed and legal gear is used. They also monitor fish dealers and processors for licensing, species, and records compliance. It is often necessary to conduct investigations to assure compliance with the regulations. Document and record investigations are common in this facet of fish and wildlife law enforcement. Parties involved in a commercial industry will forge records to conceal unlawful harvest of regulated and protected stocks.
- Ocean - Recreational Fisheries: Monitoring of these resource users is also conducted at-sea and dockside to check for license and tag compliance, as well as to ensure that the appropriate

species, sizes, and catch limits only are taken. Monitoring for compliance may also include conducting investigations.

- Inland - Commercial Fisheries: Officers monitor commercial harvest of fish in the Lower Columbia River in much the same way as the ocean commercial fishery. They ensure that the seasons are observed, legal gear is used, and the correct species and sizes are retained. Compliance of licensing and permit regulations is also checked. This effort also requires the monitoring of fish dealers and processors.
- Inland - Recreational Fisheries: Recreational (sport) fisheries conducted on the coastal streams are monitored by officers for season, species, size, and catch limit compliance. Appropriate licenses and tags for the activity are also checked.

Environment and Habitat Law Enforcement

As anadromous fish populations began to decline in the face of more restrictive harvest regulations, it soon was recognized that suitable habitat is the key to preserving and sustaining viable fish and wildlife populations. This increased the importance of protecting and enhancing habitat required for fish and wildlife to thrive. As the importance of habitat protection and ecosystem management were recognized as the key issues that would protect, sustain and enhance fish and wildlife populations, the enforcement component of fish and wildlife management began to expand its efforts into the arena of habitat and environmental protection. Law enforcement identified habitat and environmental protection as the area in which it could exert the greatest influence for maximum results in protecting and, more importantly, enhancing fish and wildlife populations. In contemporary times, this area of enforcement presents the most potential for law enforcement to achieve maximum results.

In accordance with the needs of fish and wildlife management, the Oregon State Police Fish and Wildlife Division has shifted away from the traditional role of harvest enforcement to include enforcement of habitat and environmental law. The Oregon State Police Fish and Wildlife Division is a contemporary contributor to restoration of coastal anadromous fish

Program Enhancements

OSP's enforcement contributions will be enhanced when the following actions are endorsed by all natural resource agencies:

- Interagency Cooperation with State Natural Resource Agencies: By establishing interagency cooperation with local state natural resource agencies, officers will be able to determine priorities and coordinate their efforts with the agencies to create a unified front in gaining compliance. Cooperating state agencies would include Department of Fish and Wildlife, Department of Environmental Quality, Department of Forestry, Department of Water Resources, Department of Agriculture and Division of State Lands. As this initiative evolves, other agencies and their respective responsibilities may be identified that can benefit from a partnership with law enforcement.

- *Interagency Cooperation with Federal Natural Resource Agencies:* By establishing interagency cooperation with local federal natural resource agencies, officers will expand the opportunity to positively influence habitat and environmental protection by including the arena of federal regulations in seeking solutions for depleted fish stocks and degraded habitat. Cooperating federal agencies would include: National Marine Fisheries Service, Environmental Protection Agency, U. S. Forest Service, Bureau of Land Management, U. S. Fish and Wildlife Service, Bureau of Reclamation, and Army Corps of Engineers.
- *Enforcement of Applicable Habitat Regulations:* In cooperation with the appropriate state and federal agencies, officers will seek to gain compliance with laws and regulations pertaining to water quality, water diversion, fill and removal, forest practices, and land use.
- *Investigation of Environmental Violations:* In cooperation with the appropriate state and federal agencies, officers will investigate incidents of waterway pollution, hazardous materials violations, industrial waste violations, pesticide use violations, and point source and non-point source pollution.

Enhancement of proactive enforcement to protect depleted fish stocks and the critical habitat upon which they depend can be achieved through analysis of various databases and use of Geographical Information System (GIS) technology to identify the potential threats and vulnerability. Use of this technology will enable proactive measures to be taken before resources suffer damage or loss. It is essential that cooperating agencies possessing the databases and GIS capability share these resources with law enforcement to accelerate the restoration of coastal salmon.

Concluding Remarks

Natural resource management has long been aware that management of people is the key to managing natural resources. Harvest regulations, season regulations, land use regulations, forest practices laws, water quality regulations, and environmental laws set by legislature and Oregon's natural resource commissions are all devised to manage the behavior of people. Enforcement of these laws and rules is a police function. In this respect, with natural resource enforcement being a police function and knowing that policing has a direct effect on people's behavior, the Fish and Wildlife Division of the Oregon State Police plays a vital role in supporting natural resource management by effecting voluntary compliance with Oregon's natural resource laws.

The future of natural resources in Oregon will be largely dependent upon enforcement of habitat and environmental laws and regulations and enforcement of protection laws over those species which are classified as sensitive, threatened, or endangered.

The Oregon State Police Fish and Wildlife Division has shifted from its traditional role and has moved away from doing the same thing and expecting different results. Endorsement of this role by the natural resource agencies, forming partnerships, and strengthening cooperation will serve to raise accountability and create voluntary compliance.

It is important for natural resource agencies to identify the law enforcement support needed for their agency missions to be attained. The Oregon Department of Fish and Wildlife has identified the role of enforcement through the Cooperative Enforcement Plan (CEP), which is a process of prioritizing enforcement efforts directed towards conservation and resource issues. It would be a simple task to incorporate the other natural resource agencies into the same process.

Response on Enforcement Role From Water Resources Department

Watermasters and assistant watermasters are the primary enforcement personnel for the Water Resources Department. The Oregon State Police (OSP) provides backup assistance as needed, and they also report violations to the department.

In response to the coastal salmon situation, the WRD has increased its enforcement presence. New watermaster offices were established this summer in Newport and Florence, and the presence in the Tillamook office was significantly increased. The offices also increased public service on water right and water management assistance. An additional 15 person-days/month of monitoring and enforcement activities has been occurring in the north and mid-coast region. Thirteen stream-walkers were hired for summer 1996 to locate points of diversions on priority streams, and WRD is seeking funding to hire 10 stream-walkers during the 1997-1999 biennium. While these stream-walkers are not involved in enforcement activities, their work can significantly improve the ability for watermasters to efficiently monitor and enforce water use.

Program Enhancements

- To continue improvements in compliance monitoring and enforcement, the Water Resources Department is seeking to establish two new watermaster districts on the north and central coasts.
- As part of its budget request for the 1997-1999 biennium, WRD is also seeking up to 15 additional field staff to monitor instream flows and water diversions to prevent illegal use.
- Additionally, funds are being sought for the OSP Fish and Wildlife Division to increase overall enforcement capabilities. Lack of field staff, not authority, is the biggest enforcement difficulty faced by the Water Resources Department.

Part II

Strategy for Achieving A Coordinated Enforcement Program

Introduction

This strategy endorses the original philosophy of fish and wildlife management, which is simply enforcement protection of existing fish and wildlife populations. It was recognized early in the planning stages of the Coastal Salmon Restoration Initiative that enforcement of existing laws and regulations was necessary in order to bring accountability to fish and wildlife management implementation. Increased funding of additional enforcement personnel is critically important to ensure compliance of existing laws and regulations is sufficient to allow restoration of Oregon's coastal salmonids.

Overview

The Endangered Species Act (ESA) [1973 16 USC 1531 to 1543] provides for the protection of species of fish, wildlife and plants that are designated as becoming endangered or threatened to become endangered. The act prohibits persons subject to the jurisdiction of the United States from committing specific acts. Under the ESA, the general prohibition states that persons may not take species of fish, wildlife or plants so listed. "Take" is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct within the United States. Further, "taking" includes destruction or significant alteration of habitat on which protected species depend.

Objectives of the ESA are to conserve endangered or threatened species and provide a means to conserve the ecosystem upon which these species depend. (The ultimate goal of the ESA is to make itself obsolete through conservation and by returning species to levels at which protective statutes are no longer needed.) Conservation involves the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which these measures are no longer necessary. [§ 1532(3)]

Further, a species may be listed as endangered or threatened if the species is jeopardized by the present or threatened destruction, modification or curtailment of the species' habitat or range; over-utilization for commercial, recreational, scientific or educational purposes; disease or predation; inadequacy of existing regulatory mechanisms, or other factors affecting the species' continued existence. [§ 1533(A)(1)] In addition, any efforts by the state or foreign government to protect the species must be considered if a species is to be listed. [§ 1533(D)(1)(A)]

The National Marine Fisheries Service (NMFS) has provided a working guidance document for a comprehensive salmon restoration initiative on the Pacific Coast. Three significant components to this restoration strategy include critical and desirable elements:

- Substantive protection and conservation element
- A high level of certainty that the strategy will be reliably implemented, including necessary authorities, commitments, funding, staffing and enforcement measures; and

- A comprehensive monitoring program [§ Coastal Salmon Conservation NOAA 9-15-96 (p. 1)]

The Coastal Salmon Restoration Initiative consists of many elements designed to conserve and restore populations of salmon and trout in Oregon. Elements include actions to conserve "core" populations of salmon; procedures to provide continuing leadership and improve interagency cooperation; adjustments in harvest and hatchery programs; opportunities to improve compliance with existing environmental laws; public education programs, and comprehensive monitoring programs.

The Oregon Coastal Salmon Restoration Initiative recognizes that voluntary compliance should be emphasized and efforts made to improve compliance with existing environmental protection laws. The intent is to make the existing system work better, not establish new laws and regulations. It is the position of the State of Oregon that current statutes and administrative rules governing the protection of Oregon's natural resources, when complied with, are sufficient to meet the listing criteria of regulatory mechanism as outlined by NMFS. [§ Draft Oregon Coastal Salmon Restoration Initiative 8/26/96.]

Concept I

Fish and Wildlife Enforcement Division Role in Habitat and Environment Law

The traditional role of the Oregon State Police Fish and Wildlife Enforcement Division is to ensure compliance with both recreational and commercial fish harvest management regulations, which had been recognized in the past as the most appropriate method to manage fish and wildlife populations. As fish stocks declined, more restrictive harvest regulations were introduced, and management emphasis began shifting toward maintenance of viable habitat and environmental protection. It is now recognized that habitat and the environment play major roles in preserving and enhancing fish and wildlife populations. The importance and appreciation of environment and ecosystem management has caused and will continue to cause the role of the Fish and Wildlife Enforcement Division to expand.

Law enforcement directed at ensuring compliance with existing habitat and environmental regulations enhances both credibility and accountability of regulatory programs. It can exert a positive influence for obtaining maximum protection and enhancement of fish and wildlife resources. Enforcement presence fosters voluntary compliance which, in turn, creates longevity and ownership. Enforcement is a critical component of regulatory authority. The Fish and Wildlife Enforcement Division is an enforcement component of fish, wildlife, their habitat, and environmental regulation compliance.

As Oregon's demographics become more complex and urban, habitat and environmental issues and concerns will become more complex and important. As the consequences and effects resulting from violations of laws will become greater; correspondingly, so will sanctions against those who violate the law. The State Police can bring its investigative expertise and criminal justice resources to bear on such violators. State statutes and administrative rules governing harvest, habitat, and environmental law that carry criminal penalties must be enforced with due regard to laws of evidence and search and seizure. Facts documented during criminal investigations can also result in compelling evidence for

seizure. Facts documented during criminal investigations can also result in compelling evidence for civil and administrative litigation.

Education is recognized as the means to bring understanding and appreciation to Oregon's natural resource laws as well as an understanding of the impact and consequences of regulatory statutes and administrative rules. The Fish and Wildlife Enforcement Division has years of experience and expertise in efforts to educate and outreach to citizens of Oregon. People are more willing to comply with regulations when those regulations are understandable, have validity and merit, and are uniformly enforced. The Division has demonstrated its ability to ensure equitable, fair, and uniform enforcement for Oregon's citizens. The Division stands ready to assist natural resource regulatory agencies in educating and enforcing the regulatory and conservation components of the Salmon Restoration Initiative.

Agency Role/Responsibility Law Enforcement Support for the Coastal Salmon Restoration Initiative

Oregon Department of Agriculture

The Oregon Department of Agriculture (ODA) utilizes Oregon State Police enforcement to assist in situations where ODA staff have been denied access to private property when conducting investigative activities or when safety to state agency personnel is a concern (dealing with hostile landowners). Also, ODA may turn to the State Police for support in cases that may result in criminal prosecution. (Refer to memorandum dated February 3, 1997, by Mark Peters, ODA - Natural Resources Division - Appendix A.)

The Oregon State Police offers assistance to ODA that would include:

- Pesticide/herbicide application compliance investigations and documentation of results
- Education and outreach efforts
- Coordinated monitoring through patrol
- Documentation and reporting on compliance indexing of regulations concerning non-point pollution (SB 1010) (CAFO.)

[Example: The Fish and Wildlife Enforcement Division's Tenmile Lake watershed involvement with the Department of Environmental Quality (water quality limited issues and non-point pollution of Tenmile Lakes watershed).]

Oregon Division of State Lands

The Division of State Lands (DSL) does not have a formal monitoring program for removal-fill permits, although some permits contain specific monitoring requirements. Projects including wetland creation, restoration or enhancement as compensatory mitigation must have a site-specific monitoring plan. Monitoring of removal-fill projects may be conducted by the Oregon Department of Fish and Wildlife (ODFW), Oregon Water Resources Department (OWRD), SWCD, NRCS personnel and others. Enforcement of removal-fill is generally based upon complaints received from the public or state agency personnel.

DSL has three Coastal Salmon Restoration Initiative program measures that will improve their monitoring and enforcement capability:

1. Strengthen interagency coordination in removal-fill permitting. DSL plans to revise its Memorandum of Understanding (MOU) with ODFW and DEQ to more clearly delineate each agency's responsibilities with regard to reviewing permit application, permit monitoring and enforcement. The DSL also plans to develop a Memorandum of Understanding with the State Police which highlights the high priority areas for assistance with monitoring and enforcement.
2. Add field staff in coastal salmonid areas. The DSL budget request (Phase 1 measure) would add one field staff and one support staff focused primarily on public education, technical assistance, monitoring and enforcement in essential indigenous anadromous salmonid habitat in coastal basins.
3. Reclassify support staff to Office Specialist 2 to free up professional staff time for field work, including monitoring and enforcement.

(Refer to memorandum dated February 3, 1997, by Jenifer Robison, DSL - Appendix B.)

The Oregon State Police proposes to partner with DSL to assist with inventory and assessment for permit and permit condition compliance for water diversion in "core" habitat areas. Other functions include but are not limited to:

- Patrol deterrence
- Delivery of "cease and desist" orders
- Investigation, documentation and coordinated regulatory enforcement for removal-fill law
- Assistance and support for education/outreach efforts
- Organization and development of volunteer programs
- Compliance indexing

[Example: Coordinated agency action plan with DSL/OSP in the Applegate River drainage and Illinois Valley River Basin on push-up dams.]

Oregon Water Resources Department

The Oregon Water Resources Department's (OWRD) water quantity issue team identified three factors of decline regarding water quantity: inadequate flow, inadequate fish passage, and inadequate fish screening. Biological objectives for these factors of decline include maintenance of existing healthy conditions and restoring conditions where needed. Areas of general agreement include:

- Protection and maintenance of existing stream flows where implemented actions to ensure that additional out-of-stream water rights will not adversely affect stream flows and provide significant salmon habitat values;
- Protection, maintenance and restoration of adequate fish passage by ensuring that the issuance of additional water rights will not adversely affect fish passage and that existing fish passage problems are resolved; and

- Protection, maintenance and implementation of adequate fish screening through processes which ensure that all water intake and diversion structures in salmonid habitat areas have appropriate fish screening devices to prevent salmon from becoming entrapped in water intake structures.

The only issue of contention between the state and the NMFS deals with restoration of water flows. The quantifiable flow level with time lines that NMFS seeks exists in in-stream water rights. These issues are based on flow levels salmon need to fully utilize their habitat, and OWRD feels these are inappropriate measures since the goals are institutionally unattainable because they fail to recognize water for domestic use, municipalities, irrigation and other existing consumptive uses. (Refer to water quantity briefing paper from Bob Rice, OWRD, dated January 31, 1997 - Appendix C.)

The Oregon State Police proposes to partner with OWRD to protect and maintain existing stream flows, maintain adequate fish screening, and restore adequate fish passage. The State Police can assist with inventory assessment and permit condition compliance; enforce appropriate water use, water allocation and fish screening law. Through patrol presence, the State Police provides a deterrence to water use abuse; investigate, documents and reports those issues regarding inadequate fish passage, fish screening and water flow; assists in educational/outreach programs, compliance indexing, and organization of volunteer programs [examples: Illinois Valley pilot project on push-up dams, the Applegate River Basin diversion project and Columbia Basin fish screen enforcement project].

Oregon Department of Transportation

The Oregon Department of Transportation (ODOT) is not a regulatory agency and, therefore, relies on the State Police for enforcement. ODOT does enforce project specifications and plans related to water quality and wetlands as part of construction contracts. Compliance issues arising from ODOT contracts are resolved through regional staff and management. Regulatory agencies are included in the documentation and resolution of the issue. (Refer to ODOT Coastal Salmon Restoration Initiative Enforcement Package by Sue Chase dated January 31, 1997 - Appendix D.)

The Oregon State Police can assist ODOT's coordinated efforts to implement OCSRI action items by communicating problems that are noted during the course of other OSP work to appropriate ODOT regional staff.

Oregon Department of Fish and Wildlife

The Oregon Department of Fish and Wildlife (ODFW) is responsible for statutes and administrative rules regulating the protection and harvest of fish and wildlife resources. Enforcement of those provisions is the responsibility of the Fish and Wildlife Enforcement Division of the Oregon State Police. Enforcement priorities are established annually through a joint process of developing local Cooperative Enforcement Plans (CEP) between the State Police and ODFW staff. The State Police and ODFW, as partners in the Coastal Salmon Restoration Initiative, are aware of the need to protect coho and other depressed salmonids. ODFW and State Police staff will identify specific enforcement

actions which are high priority for restoration of those depressed populations and incorporate them into the CEP.

ODFW will also increase emphasis on bringing water diversions and in-channel structures into compliance with regulations regarding fish passage and screening. The heightened awareness of landowners and local communities for the need to protect salmonids and enforcement of existing fish passage and screening regulations will be given higher priority. ODFW staff will approach landowners and operators of structures needing screening or fish passage provisions to encourage compliance with the requirements through cooperative means, such as fish screening cost share program; however, when that encouragement is not sufficient, State Police officers will be asked to participate in contacts and to initiate enforcement actions as necessary.

Enforcement of regulations that protect salmonid habitat can also contribute to salmon restoration. Through the Coastal Salmon Restoration Initiative, the need for habitat enforcement is becoming recognized, and ODFW will contribute by communicating with the State Police when ODFW field staff encounter possible violations of environmental laws that may pose threats to salmon restoration. (Refer to Oregon Coastal Salmon Restoration Initiative plan for increasing law enforcement efforts dated February 3, 1997, by Bruce Schmidt, ODFW - Appendix E.)

The Oregon State Police proposes to expand CEP to include issues surrounding fish passage and screening. The State Police will assist in inventory, assessment and monitoring of these issues. Action plans will be developed in conjunction with other regulatory agencies and watershed councils to ensure compliance with issues that protect and enhance salmonid and trout habitat. The State Police will assist with outreach/education programs and volunteer organization to ensure compliance with these fish issues. (Refer to memorandum dated July 23, 1996, regarding Performance Measures and Anadromous Fish Compliance Rate 1995; to memorandum dated July 23, 1996, regarding Anadromous Fish Protection Compliance Rate - Appendix E1 and E2.)

Oregon State Marine Board

(No report).

The Oregon State Police will coordinate with the Marine Board and county sheriffs to enforce provisions of new outfitter/guide operations, monitor and report watercraft operation impacts on source and recovery streams, assist in education/outreach to Oregon boaters regarding Coastal Salmon Restoration Initiative issues, and assist in monitoring non-point pollution control programs through patrol presence and detection.

Oregon Parks and Recreation Department

(No report).

The Oregon State Police will assist the State Parks Department with education/outreach concerning issues and protection efforts of salmonids, healthy streams, and the Coastal Salmon Restoration Initiative as well as monitor and enforce regulations governing litter and pollution in state parks (example: "Outdoor Ethics" video).

Oregon Economic Development Department

(No report.)

Department of Land Conservation and Development

(No report.)

The Oregon State Police can assist in monitoring non-point pollution control programs, especially on the Oregon Coast through patrol, documentation, investigation and enforcement of applicable state law.

Department of Geology and Mineral Industries

(No report.)

The Oregon State Police can assist in monitoring and documenting run-off problems in mining operations and enforcement of appropriate regulations governing turbidity issues. Officers will investigate, collect evidence and report to appropriate regulatory authorities.

Oregon Department of Forestry

The Oregon Department of Forestry (ODF) implements its compliance plan with a balanced program of rule education, technology transfer, and enforcement. Compliance is first achieved through education, pre-operation planning, and effective communication. Written plans are used as one planning and communication tool for operations within 100 feet of most streams and up to 300 feet on sensitive sites and significant wetlands. These written plans are enforceable documents. Ongoing inspections of forest operations are based upon a priority system which, in turn, is based on potential resource damage and will include "core" areas.

Enforcement of the Oregon Forest Practices Act occurs through efforts of 54 Forest Practices Foresters (FPF's). Violation complaints are given a high priority and must be inspected within 48 hours. It is the policy of ODF that when non-compliance of a rule has occurred and damage has resulted, enforcement action will be undertaken. If damage has not yet occurred, the operator is given written direction to come into compliance. If the operator complies and avoids damage, a citation may be avoided. ODF cooperates with the State Police in taking enforcement action when the situation requires their professional expertise.

As part of the Coastal Salmon Restoration Initiative/Healthy Streams budget proposal, ODF has added Service Foresters and clerical support to provide additional program response through education to non-industrial landowners regarding rule compliance and restoration of riparian and aquatic habitat. The Service Foresters will be allocated to districts with coastal salmon streams.

ODF will develop and implement a compliance audit program to:

- Determine through statistically valid sampling the level of operator/landowner compliance with best management practices;
- Determine the accuracy, consistency and efficiency of agency program administration;
- Identify opportunities to improve program administration, operator education, technology transfer or rule clarity.

(Refer to the Oregon Department of Forestry's Coastal Salmon Restoration Initiative Compliance Strategy by Ted Lorensen dated January 29, 1997 - Appendix F.)

The Oregon State Police can partner with ODF in:

- Monitoring, investigating, documenting and enforcing provisions of the Forestry Practices Act.
- Monitoring of protective efforts on riparian, significant wetlands and estuaries.
- Providing patrol presence and documentation to conserve, restore and enhance salmonid habitat on the North Coast Restoration Habitat Initiative, Mid-Coast Restoration Initiative and South Coast Restoration Initiative.

Immediate intervention of violations can lessen impact and enhance compliance. The State Police can also participate in the compliance audit program through additional field presence for monitoring.

Department of Environmental Quality

The Department of Environmental Quality (DEQ) is the state's primary environmental regulatory agency with federal authorization and delegation to implement and enforce the requirements of federal environmental law. DEQ has authority to enforce various federal programs, such as sewage treatment, solid waste, hazardous waste and materials, air and water quality. In addition, DEQ has both administrative civil and criminal authority under state statute.

Approximately 70 civil inspectors are available to conduct permit processing, complaint response, inspections, and civil enforcement. A team of four criminal investigators is dedicated full-time to enforcement of environmental crimes. One Oregon State Police officer and three U. S. Environmental Protection Agency criminal investigators comprise part of DEQ's statewide environmental crime enforcement coordination team. The State Police Fish and Wildlife Enforcement Division also provides additional assistance when work loads demand the State Police to lead or assist the environmental crimes team.

The Oregon Coastal Salmon Restoration Initiative is a high priority for DEQ, and the department is dedicated to working on technical aspects of the salmon recovery plan on the Rogue, Umpqua and Tillamook Basins. Effective enforcement is a necessary and valuable tool in ensuring that any technical or environmental strategy is implemented and maintained.

DEQ has placed an equal priority on ensuring enforcement support for the salmon strategy. Managers and staff will give highest priority to complaints that have actual or potential impact on coastal salmon natural resources, such as spill response or toxic releases. Inspections that may be significant to support of the strategy will also have high priority. Managers and staff working with other governmental agencies, watershed councils, national estuary projects and local groups will provide information about the enforcement tools available and their coordination. (Refer to DEQ Enforcement Strategy for Oregon Coastal Salmon Restoration Initiative by Tom Bispham dated February 6, 1997 - Appendix G1 and G2.)

The Fish and Wildlife Division of the Oregon State Police proposes to assist DEQ with monitoring, investigating, documenting, and reporting environmental offenses related to the Coastal Salmon Restoration Initiative. The Division has enforcement officers who are trained by the Environmental Protection Agency on hazardous materials investigation. The strategic location of these officers, coupled with local knowledge of community and quick response ability, place them in positions to ensure effective and efficient enforcement of environmental law.

Coordination of Oregon State Police efforts with DEQ and other natural resource agencies and respective watershed councils can ensure an effective, efficient means to monitor, detect and investigate environmental crimes. The Fish and Wildlife Enforcement Division's capability for quick response to complaints of turbidity, fish kill or toxic spill can ensure preservation of evidence, documentation of damage, and apprehension of violators. Further, agency coordination and awareness of issues of water quality limited streams and their impacts as they relate to life cycles of salmonids will allow for directed patrols and monitoring for regulation compliance. The Oregon State Police can assist in outreach/education efforts, and organization of volunteer programs that bring community involvement and awareness to issues regarding environmental health and its relationship to restoration of salmonids (example: "Outdoor Ethics" video; Tenmile Lakes Basin action plan.)

Fish and Wildlife Enforcement Division Role and Responsibility

The opportunity to redirect enforcement efforts of thirteen officers toward salmon and healthy streams would result in providing credibility and accountability for regulatory issues of the Coastal Salmon Restoration Initiative. These positions would be strategically placed at key or "core" areas where protection and enhancement efforts would have the greatest impact on restoration of critical fish stocks.

Officers assigned to the Fish and Wildlife Enforcement Division have years of experience in directing, partnering and accounting for work effort (CEP). Strategically assigned enforcement officers can provide a multitude of services including program development for enforcement as it relates to restoration efforts.

Elements that each officer will contribute to protection of salmon and healthy streams include:

- Criminal investigation expertise, including detection, identification and prosecution of regulatory offenders
- Agency resources including manpower, equipment, programs and communications
- Coordination with federal, state and local agencies, watershed councils and basin steering committees
- Liaison with other governmental enforcement agencies (federal, county and local jurisdictions)
- Development and implementation of directed and coordinated work plans
- Identification of measurable objectives
- After action reports and critiques
- Assistance with monitoring and assessment
- Development of educational/outreach efforts and programs to instill community involvement and stewardship for Oregon's natural resources
- Patrol presence and deterrence
- Data program development
- Facilitation and organization of volunteer programs
- Assistance with identification of funding support
- Identification and documentation of administrative roadblocks
- Advocate for water resource councils through interagency cooperation and watershed council coordination

Officers and natural resource agencies can create a unified effort to gain compliance and understanding with regulatory laws governing water quality, water diversion, fill and removal, forest practices and land use. Further officers will investigate incidents involving waterway pollution, hazardous materials violations, industrial waste violations, pesticide use violations and point source and non-point source pollution.

Concept II

Organizational Approach to Habitat/Environmental Enforcement

To ensure optimum enforcement effort and accountability for salmon protection and enhancement, state resource agencies and State Police enforcement must coordinate on a formal basis. Enforcement should focus on regulatory laws that most closely relate to salmon protection and restoration. Such coordination will provide for an effective and efficient enforcement effort that:

- Identifies and defines critical restoration issues
- Directs protective and enhancement efforts toward "core" areas or critical habitat
- Develops enforcement goals and objectives toward compliance with regulations governing healthy streams and salmonid protection
- Defines roles and responsibilities
- Eliminates duplication of effort

- Identifies and resolves administrative roadblocks
- Integrates agency work plans and actions
- Consolidates agency resources
- Coordinates education/outreach efforts
- Establishes time frames for work accomplishment
- Develops measurable objectives
- Provides uniformity
- Ensures accountability and reporting
- Makes recommendation for statutory or administrative rule change
- Identifies other agency or organizational support
- Fosters interagency cooperation

The forum from which the planning effort will be developed is similar to the Cooperative Enforcement Plan (CEP) process now established between the State Police and ODFW. CEP provides a directed and planned approach that can measure and account for compliance criteria required by NMFS in the Coastal Salmon Restoration Initiative.

A Cooperative Interagency Enforcement Plan (CIEP) for natural resource agencies and the State Police (plan of work):

- Targets core areas or areas of resource concern
- Identifies resource issues regarding protective and enhancement efforts for healthy streams and salmonids
- Defines work effort (roles and responsibilities)
- Establishes time frames for work accomplishment
- Develops goals and objectives
- Provides measurement and accountability (efficient and effective measurement)
- Reviews and recommends for regulatory change if needed
- Establishes baselines to identify degree of change and direction
- Documents and critiques

Lastly, a Cooperative Interagency Enforcement Plan provides a platform from which federal agencies, watershed councils or water basin steering committees may partner, participate, and cooperate.

Concept III

Inclusion of Federal Agencies and Watershed Councils Into Interagency Enforcement Action Plans

The Oregon Coastal Salmon Restoration Initiative plan recognizes that factors or conditions that have reduced or limited the production of native species in individual basins must be identified and corrected at the watershed level. The protection and restoration effort must involve cooperation and commitment from local communities as well as governmental agencies. Watershed councils have been developed and provide the means for organizing, directing and implementing change, and attaining the

goals of the Coastal Salmon Restoration Initiative. A CIEP can provide the means to a unified approach to protection and regulation compliance.

Inclusion and participation of watershed councils with the enforcement component is an absolute necessity. Through effective partnering with watershed councils, regulation compliance may be accomplished through voluntary means. Watershed councils provide the means for outreach to local communities with education and understanding of regulatory compliance. Law enforcement can demonstrate patience and bring about compliance by providing direction, reason, understanding, dedication and involvement. Watershed support may be demonstrated through commitment of agency resources as well as assistance with inventory, assessment, monitoring, participation, resolution of administrative roadblocks, and development of outreach and education programs.

To conclude, restoration of critical fish stocks must include a strategy that is reliably implemented, identifies enforcement measures, and details a comprehensive monitoring scheme. Implementation of a formal plan structured in accountability can ensure a successful plan for protection and restoration of salmon.

Exhibit A

MEMO



Oregon
Department
of Agriculture

To: Sgt. Larry Belcher
OSP-Fish & Wildlife Division

From: Marc Peters
ODA-Natural Resources Division

Subject: Law Enforcement Support For CSRI

Date: February 3, 1997

For the most part, the Oregon Department of Agriculture does not seek law enforcement support from the OSP for fulfilling its mission and/or assisting with its normal enforcement efforts. We appreciate the availability of enforcement support from the OSP, and have utilized their assistance in a limited number of cases in the past where Department staff were denied private property access when conducting investigation activities. We would more than likely again request OSP support if assistance was needed during a difficult ODA investigation, particularly where an uncooperative landowner has denied ODA access to their property. The OSP have always responded to requests for support when the safety of public officials (eg, state employees) was in question. Our most frequent use of the OSP has been when we believed a hostile landowner was capable of posing a serious threat to our personnel.

ODA may also request OSP support in cases where an investigation has turned criminal (eg, landowners falsifying records) or where flagrant water quality violations have caused imminent danger to public health and safety (eg, certain pesticide application violations, field burning activities, etc.). In general, the department prefers to handle enforcement issues internally in order to maintain credibility with stakeholders and peace of mind within the agricultural community.

If you have any questions, please do not hesitate to call me at 503/986-4714.

John A. Kitzhaber
Governor



Exhibit B


Oregon



MEMORANDUM

February 3, 1997

TO: Jim Martin
Lindsay Ball

FROM: Jenifer Robison 

SUBJECT: DSL's Monitoring and Enforcement for the Removal-Fill Law

 DIVISION OF
STATE LANDS

 STATE LAND BOARD
 JOHN A. KITZHABER
 Governor

 PHIL KEISLING
 Secretary of State

 JIM HILL
 State Treasurer

 775 Summer Street NE
 Salem, OR 97310-1337
 (503) 378-3805
 FAX (503) 378-4844
 TTY (503) 378-4615
Monitoring:

DSL does not have a formal monitoring program for removal-fill permits. Some permits include specific monitoring requirements (e.g., for water quality parameters) that the permittee is responsible for conducting. Projects that include wetland creation, restoration or enhancement as compensatory mitigation must have a site-specific monitoring plan designed to track the success of mitigation.

DSL field staff conduct "spot-check" monitoring of removal-fill permits in the following circumstances:

- When we receive a complaint about the way a project is being done and, after a telephone conversation with the complainant and/or permittee, believe a site visit is warranted (see discussion of enforcement, below).
- When staff travel plans provide coincidental opportunities for visits at recently issued permit sites.

Also, in 1996 DSL hired a full-time mitigation specialist who monitors the success of wetlands projects.

In addition, monitoring of removal-fill projects may be conducted by ODFW District Biologists, Watermasters, Soil and Water Conservation Districts, NRCS personnel, and others.

Enforcement:

Enforcement of the Removal-Fill Law generally is based on complaints received. These may be from casual observers, such as neighbors, or from agency personnel (e.g., ODFW, OSP). When a complaint is logged, DSL will call the alleged violator to confirm the details and inform them of the Law's requirements. Staff visit the site as soon as possible after receiving the complaint (sometimes the same day, usually within a day or two). Sometimes ODFW or DEQ staff will go along. If, based on the phone contact, we believe the violator will be uncooperative (or worse), we ask OSP to accompany us on the site visit.

Program Measures:

DSL has three CSRI program measures that will improve our monitoring and enforcement capability:

- Strengthen interagency coordination in removal-fill permitting: We plan to revise our Memoranda of Understanding with ODFW and DEQ to more clearly delineate each agency's responsibilities with regard to reviewing permit applications, and permit monitoring and enforcement. We also will develop a MOA with OSP, highlighting the high priority areas for their assistance with monitoring and enforcement.
- Add field staff in coastal salmonid areas: This Phase II measure (included in the DSL budget request) would add one field staff and one support staff focused primarily on public education, technical assistance, monitoring and enforcement in essential indigenous anadromous salmonid habitat in coastal basins.
- Reclassify support staff to OS-2 to free up professional staff time for field work, including monitoring and enforcement.

Exhibit C

Oregon

WATER
RESOURCES
DEPARTMENT

To: Governor Kitzhaber
From: Water Quantity Issue Team (WRD, ODFW, DSL, OSP, USFWS, NMFS)
Geoff Huntington, Team Leader
Subject: Water Quantity Briefing Paper
Date: January 31, 1997

Overview

The Water Quantity Issue Team had few factors of decline as compared with the other issue teams. The three factors of decline are:

1. Inadequate Streamflow,
2. Inadequate Fish Passage, and
3. Inadequate Fish Screening.

For all of the factors of decline there are biological objectives which are established to address and reverse those factors. The biological objectives for factors of decline pertaining to water quantity can be broken down into two categories:

- maintaining healthy conditions which exist, and
- restoring conditions where needed.

The Water Quantity Issue Team reached general agreement on the biological objectives for maintaining streamflows, and maintaining, restoring, and implementing fish passage and screening. The only significant difference of understanding is the expectations of the biological objectives for restoring flows. The State believes that NMFS is seeking quantifiable flow levels (with timelines), even though the only scientifically based quantifiable flow is an unattainable ideal flow which may result in all water being left instream and may preclude having water available for domestic use, municipalities, irrigation, and other existing consumptive uses.

Areas of General Agreement

The State's team agreed with NMFS in principle on the following biological objectives, and that the State's measures currently achieve these objectives:

1. Protect and Maintain Existing Streamflows

Continue to implement actions which ensure that the issuance of additional out-of-stream water rights will not adversely affect streamflows that provide significant salmon habitat values.

2. Protect, Maintain and Restore Adequate Fish Passage

Continue to implement actions which ensure that the issuance of additional water rights will not adversely affect fish passage and that existing fish passage problems are resolved.



Water Quantity Briefing Paper
Page 2

3. Protect, Maintain and Implement Adequate Fish Screening

Continue to implement processes which ensure that all water intake and diversion structures in salmonid habitat areas have appropriate fish screening devices to prevent salmon from being entrained in water intake structures.

The Team had some very productive discussions with NMFS staff which focused on the measures to achieve these biological objectives and state agencies are realigning their measures to further support the attainment of these objectives in a manner which can be tracked and measured.

Flow Restoration: A Gap in Expectations

NMFS Expectations

It is the State's understanding that NMFS is expecting that the CSRI should:

1. Identify current streamflow levels in streams which support fish.
 - The State agrees that monitoring streamflows is important, but there are not gaging stations on all streams which support fish, or even on all streams with instream water rights (ISWRs).
2. Identify target flow levels using scientifically based numbers. The established ISWRs represent the only existing data for determining all fish species life history needs.
 - The State agrees that the ISWR amounts are the only scientifically based flows that currently have been determined. The State is concerned that setting ISWR levels as a recovery target is using them in a way in which they were not originally intended, nor for which they are appropriate.
3. Identify the gap between the current flow levels and the target (ISWR) levels.
 - The State agrees that the seasonal gaps between the current flows and ISWR flows need to be locationally specific. Measures are being realigned to address this.
4. Develop measures and a timetable to meet ISWR flows.
 - The flow levels set by many of the ISWRs were established at levels for the total value of the natural streamflow (streamflow without any consumptive uses). NMFS advocates that these ISWR target flow levels, with timelines, be used as the biological objective which identifies the flows required to recover the salmon. The State believes this is inappropriate since these are aspirational goals which are institutionally unobtainable.

The Significance of Instream Water Rights (ISWRs) as Target Flows

ISWRs are the only available scientifically based instream flow amounts which currently exist that indicate salmon needs. These ISWRs are based on the flow levels salmon need to fully

Water Quantity Briefing Paper

Page 3

utilize the habitat. In most cases, the ISWRs are established with different instream flow amounts needed for each month. During late fall, winter, and early spring the ISWRs frequently do not require all of the natural streamflow, and the ISWRs are therefore met. However, during late spring, summer, and early fall, many of the ISWRs amounts are at the estimated average natural flow of the river, or in some cases, higher. Meeting these flows would require that no consumptive uses of water occur during this time period — a return to pre-settlement conditions. These ISWR amounts were arrived at and adopted within the context of establishing water rights under the priority system of the Prior Appropriation Doctrine, with the understanding that it is an aspirational goal to use all the available instream habitat for fish life history functions, without regard to existing consumptive uses of water.

By adopting a restoration goal of meeting all ISWRs for all months of the year, the State is setting an aspirational, but regionally unachievable objective. The State believes that any biological objectives for flows must recognize the institutional constraints which have evolved around the Prior Appropriation Doctrine. A restoration plan should be focused on the interrelationship of all factors of decline rather than an ideal for any one factor of decline. Other interrelated ecosystem factors which play a critical role in creating suitable habitat necessary for salmon recovery include riparian conditions, habitat diversity, and stream morphology.

What the State Proposes

1. Identify where there are informational gaps concerning whether an ISWR is being met, and develop a workplan to collect the needed data.
2. Recognize that the ISWR amounts are aspirational goals to strive for, but are inappropriate targets to attach timelines to since they are regionally unobtainable due to institutional constraints. The State's team believes that salmon recovery is not predicated on these instream water right targets being met. Rather, incremental streamflow recovery in combination with other actions will provide step-by-step targets for salmon recovery.
3. Prioritize streams on which to augment instream flows based on providing the maximum benefit to salmon, with a commitment to timed, incremental improvements.
4. Develop measures which augment instream flows with realistic and quantifiable objectives.

Productive Discussions

Although there have been differences in understanding on the streamflow restoration objectives, the discussions between the State and NMFS have been very productive. Clarification of how specific measures will benefit flow restoration have been discussed in detail, and there is general agreement on the importance of increasing enforcement to restore streamflows, as well as pursuing instream leases and transfers on specific reaches. Based on these discussions, the State is realigning its measures to strengthen the overall goal of restoring streamflows.

Date: January 31, 1997
To: Captain Lindsey Ball
Oregon State Police
From: Sue Chase
ODOT Salmon Recovery Program Manager
Subject: ODOT CSRI Enforcement Package

As ODOT is not a regulatory authority, ODOT relies on the State Police for enforcement when violations are detected. ODOT does enforce project specifications and plans related to water quality, wetlands, etc., as part of construction contracts.

When compliance issues arise resulting from ODOT contracts, ODOT works through its field staff, project manager, and region management staff to resolve the issue. Regulatory authorities, such as Oregon Department of Environmental Quality, are included in the documentation and resolution of the issue. The regulatory authority would involve the State Police if, at this point, the issue has not been resolved.

ODOT expects its employees to follow state and federal laws. Employees are made aware of this expectation through policies, procedures, training and performance appraisals.

Oregon Coastal Salmon Restoration Initiative
ODFW Plan for Increasing Law Enforcement Efforts

February 3, 1997

Background

The Oregon Department of Fish and Wildlife (ODFW) is responsible for a number of statutes and rules relating to the protection and use of fish and wildlife resources. Enforcement of those provisions is actually carried out by the Fish and Wildlife Division of the Oregon State Police (OSP). Enforcement priorities are established annually through a joint process of developing local Coordinated Enforcement Plans (CEP) between OSP staff and ODFW district staff. This cooperative approach to establishing enforcement priorities has been highly successful for many years at enforcing many regulations, such as season closures, bag limits, area closures, gear restrictions, etc.

Because ODFW and OSP have a long standing cooperative program that is actively directed at enforcing rules and laws protecting fish and wildlife, any increase in enforcement effort will be dependent on increased funding and staff, either through legislative action for increased General Fund or through reprioritizing funds from the ODFW budget, which already supports programs directed at managing and protecting fish and wildlife. Unfortunately, recent declines in license and tag sales and other programs that fund ODFW and OSP have necessitated budget and staff reductions in both organizations. Thus, increasing emphasis on enforcement as part of the Coastal Salmon Restoration Initiative can be approached only through careful focusing of enforcement efforts through the CEP process.

Approach

Increasing enforcement efforts to support CSRI will be part of the annual CEP process. OSP, as a partner in the CSRI effort, is already aware of the need to protect coho and other depressed salmonids. ODFW district staff will identify specific enforcement actions which are high priority for restoration of those depressed populations and incorporate them in the CEP.

ODFW will also increase emphasis on bringing water diversions and in channel structures into compliance with regulations requiring fish passage and screening. In the past, the sensitive nature of these requirements led to a cautious approach. With the heightened awareness of land owners and local communities on the need to protect depressed salmonids, enforcement of existing fish passage and screening regulations will be given a higher priority. ODFW staff will approach land owners and operators of structures needing screening or fish passage provisions to encourage compliance with the requirements through cooperative means, such as the fish screening cost share program. However, when that encouragement is not sufficient, OSP officers will be asked to participate in contacts and to initiate enforcement actions as necessary.

Enforcement of regulations that protect salmonid habitat can also contribute to salmon restoration. These regulations fall under the jurisdiction of agencies beside ODFW, and in the past OSP has not been asked to play a large role. Through CSRI, however, the need for this kind of enforcement is becoming recognized, and the Governor's budget submission to the 1997 Legislature contains funding to increase OSP efforts. ODFW will contribute to this new area of enforcement by communicating with OSP when field staff encounter possible violations of environmental laws that may pose threats to salmon restoration.

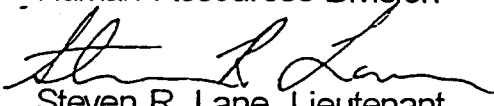
Conclusion

Because it is not possible to reduce violations to zero, there will always be a need to increase or improve enforcement efforts, which ultimately will require additional staff and funding. The present enforcement effort, however, is efficient and effective, and provides for significant protection of fish and wildlife resources. ODFW will continue to work closely with OSP to maintain and support continuing efforts, and will assist in any way possible given present staffing and funding levels.

MEMORANDUM
OREGON STATE POLICE

DATE: July 23, 1996

TO: Major Danny Bisgaard, Director
Human Resources Division

FROM: 
Steven R. Lane, Lieutenant
Fish and Wildlife Division

SUBJECT: UPDATED PERFORMANCE MEASURES

Attached to this memorandum are the updated performance measures of License Compliance Rate and Anadromous Fish Protection: Compliance Rate as maintained by the Fish and Wildlife Division.

The following is furnished for your information:

License Compliance Rate 1995

Total Statewide License Checks -	77,127
Total Statewide License Arrests -	2,049
Compliance Rate -	97.35%

Anadromous Fish Compliance Rate 1995

Total Statewide Contacts -	19,766
Total Statewide Violations -	2,275
Compliance Rate -	88.50%

If you require further information, please don't hesitate to contact me.

SRL/srl

cc: Major Russell, Support Services Bureau
Major Erickson, Operations Services Bureau
Captain Ball, Fish and Wildlife Division

Department of State Police
Fish & Wildlife Division
 Performance Measures

7.

Measure: Anadromous Fish Protection: Compliance Rates

DEFINITIONS: The compliance of fish resource users, contacted in the field, that are in compliance with rules and laws set forth for the protection of wild salmon and steelhead.

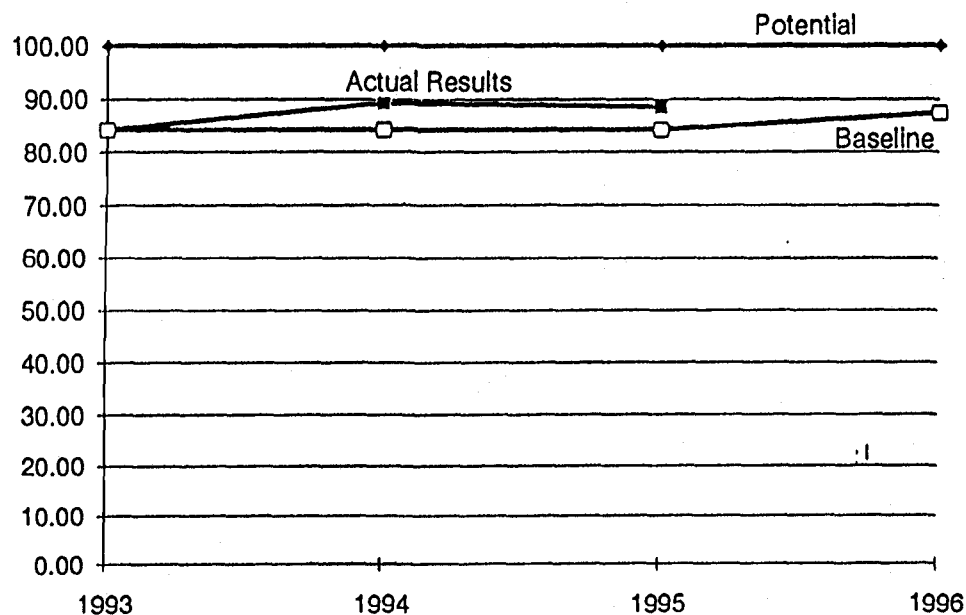
DEMONSTRATES: Effectiveness in increasing public compliance with natural resource protection rules and laws. Increased compliance will generate increased protection of threatened/endangered species. Strategies include education, cooperative/collaborative planning, partnerships and enforcement. Each management area will generate a specific compliance target needed, depending on the species needing protection.

POTENTIAL: 100% is optimal in some areas of the state. Potentials will be developed in accordance with population densities of specified species.

BASELINE: Historical 3-year average.

Success of the enforcement effort will be evaluated by fisheries biologists with respect to voluntary compliance complementing their management goals and objectives. If compliance does not complement the management goals and objectives, then an increased enforcement effort must be accomplished.

Year	Actual	Baseline	Potential
1993	84.20	84.20	100
1994	89.20	84.20	100
1995	88.50	84.20	100
1996		87.30	100



Department of State Police
Fish & Wildlife Division
Performance Measures

6. Measure: License Compliance Rate

DEFINITIONS: Annual average of individuals in compliance with licensing requirements at time of enforcement contact.

DEMONSTRATES: Effectiveness measure. Percentage of consumptive users of wildlife resources in compliance with licensing requirements as determined by enforcement contacts. Each 1% change in compliance rate approximates \$134,000.00 in licensing revenues to ODFW/year.

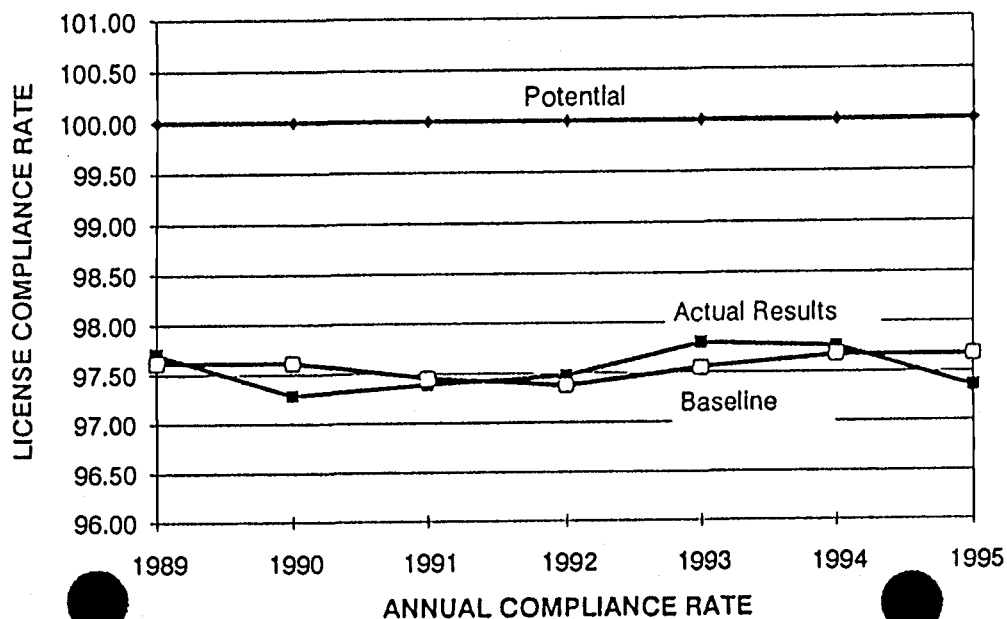
DATA SOURCE: Arrest records and license checks.

POTENTIAL: The level of compliance which could be expected as a result of adequate enforcement effort directed to the protection of Oregon's wildlife resources.

BASELINE: Historical three year average.

Reduced enforcement presence in the field will result in a lower compliance rate.

Year	Actual	Baseline	Potential
1989	97.70	97.61	100
1990	97.28	97.61	100
1991	97.38	97.45	100
1992	97.47	97.37	100
1993	97.80	97.55	100
1994	97.76	97.67	100
1995	97.35	97.67	100



**MEMORANDUM
OREGON STATE POLICE**

DATE: July 23, 1996

TO: Captain Lindsay A. Ball, Director
Fish and Wildlife Division

FROM: 
Steven R. Lane, Lieutenant
Fish and Wildlife Division

SUBJECT: **ANADROMOUS FISH PROTECTION: COMPLIANCE RATE**

REFER: To Memorandum by Lt. Horner, dated April 8, 1996, subject as above.
To Memorandum by Lt. Casciato, dated March 14, 1996, subject as above.
To Memorandum by Lt. Belcher, dated July 19, 1996, subject as above.
To Memorandum by Lt. Salle, dated May 14, 1996, subject as above.

The following Anadromous Fish Protection: Compliance Rates were developed from information provided by each respective District. They are as follows:

District I	Contacts: 14,043	District II	Contacts: 2,331
	Violations: 1,638		Violations: 256
	Compliance: 88.4%		Compliance: 89.0%
District III	Contacts: 890	District IV	Contacts: 2,502
	Violations: 135		Violations: 246
	Compliance: 84.8%		Compliance: 90.2%
Statewide	Contacts: 19,766		
	Violations: 2,275		
	Compliance: 88.5%		

If you require further information, please don't hesitate to contact me.

SRL/srl

cc: Major Russell, Support Services Bureau
Major Erickson, Operations Services Bureau
Lieutenant Larson, Fish and Wildlife Division

CSRI COMPLIANCE STRATEGY:**OVERVIEW**

Compliance with state regulatory programs will be achieved through a strategy that includes education, technology transfer, enforcement, and compliance auditing (gathering statistically valid data about levels of compliance). The various elements within this strategy for each agency are described below under the individual agency sections. This section provides a general overview.

Compliance is first achieved through education. Education is supported by pre-action planning and effective agency communication to the regulated communities to ensure they understand how and why the regulations must be applied.

Technology transfer is the process of providing the regulated communities with technical information so that they can comply with the regulations. Agencies have and will be developing a range of technology transfer "tools" that assist the regulated communities develop technically sound solutions that will assure compliance with the regulations.

Enforcement occurs through ongoing random inspections or investigation of complaints. Enforcement priorities will be set based upon salmon issues, often focusing on compliance within Core Areas. To improve the effectiveness and efficiency of enforcement, regional agency groups organized around Oregon State Police will provide enforcement teamwork, and coordinate priorities and re-deployment of resources as the situations may dictate. For example, if a severe flood event occurs, the team will consider how resources should be redeployed to address emergency fill and removal issues.

Finally, compliance auditing will be planned and implemented within the next two years by state regulatory programs. Compliance auditing programs provide a statistically valid sample of the level of compliance and help establish how identified compliance problems are best resolved.

COMPLIANCE PLAN FOR OREGON DEPARTMENT OF FORESTRY**Current program -**

The Department of Forestry implements its compliance plan through a balanced program of rule education, technology transfer and enforcement. Compliance is first achieved through education, pre-operation planning and effective communication. For operations within 100 feet of most streams or with a risk of material entering a stream, written plans are used as one planning and communication tool. Written plans are also mandatory within 300 feet of certain sensitive sites and significant wetlands. Approved written plans are enforceable documents.

The Department provides ongoing random inspections of forest operations using a priority system based upon the potential for resource damage. "Core areas" will become a new basis for setting inspection priorities.

Enforcement of the Oregon Forest Practices Act occurs through the efforts of 54 Forest Practices Foresters (FPFs). From 15,000 to 20,000 on-site inspections of operations will be made annually.

Complaints (of violations) received by the Department are given high priority and operations receiving a complaint are to be inspected within 48 hours. It is the policy of the Department that when noncompliance of a rule has occurred and damage has resulted, enforcement action will be undertaken. If damage has not yet occurred, the operator is given written direction to come into compliance. If the operator complies and avoids damage a citation may be avoided.

Enforcement action always includes an enforceable order to cease further violation. Enforceable orders to repair damage are issued whenever damage can be reduced or prevented. When citations are issued the department can choose civil penalties or criminal prosecution, with civil penalties being the primary mechanism. Failure to comply with an order to cease further violation or repair damage results in a minimum civil penalty of \$2500 (the order is still pursued as well), with all penalties carrying a potential maximum of \$5000 per violation. This policy will continue to be used.

The Department cooperates with Oregon State Police in taking enforcement action when the situation requires their professional expertise. However, the department has been actively enforcing the Forest Practices Act for 25 years and has trained professionals to administer both the technical forestry and enforcement aspects of the program. Our successful relationship with landowners in administering this program relies in part on our enforcement policies and attitudes and therefore the department does not anticipate directing enforcement toward State Police efforts. Both agencies will continue to cooperate on reporting activities of concern to each other and sharing appropriate training.

Enhanced program -

The Department has added X Service Foresters and additional clerical support as part of CSRI/Clean Streams budget proposal to provide additional program response in education to non-industrial landowners. The Service Foresters will be allocated to districts with coastal salmon streams. These foresters will focus on educating non-industrial forest landowners and operators about how to conduct operations to conform with the intended rule standard, plus assist them in achieving restoration of riparian and aquatic habitat.

Measure ODF38 ASSOCIATED OREGON LOGGER EDUCATION AND CERTIFICATION PROGRAM is a certification and education program organized by the Association of Oregon Loggers that requires participation in forest practice rule training courses to receive certification as an Oregon Professional Logger. This education program improves operator knowledge of the forest practice rules, especially BMPs related to sediment control from roads and harvesting. While certification is voluntary, two large industrial landowners have established a policy of giving preference to logging companies working on their lands that are certified under this program. The Department will be developing additional training materials to support AOL's program.

The Department will develop and implement a compliance audit program within the next two years. The development effort is funded by existing budget. The objectives of this program are:

1. Determine through statistically valid sampling the level of operator/landowner compliance with the best management practices.
2. Determine the accuracy, consistency and efficiency of agency program administration.
3. Identify opportunities to improve program administration, operator education, technology transfer or rule clarity.

This program will be develop through involvement of stakeholders and other key agencies, particularly ODFW.

The forest industry will also be enhancing education and technology transfer in several key areas. Large industrial landowners will be developing road maintenance plans and "tools" to better support achievement of road maintenance water quality objectives. Similarly, development of "tools" to support better achievement of ground-based yarding rules will also be completed. The development of these tools will be completed by Sept. 1, 1997.

State of Oregon
Department of Environmental Quality

Memorandum

Date: February 6, 1997

To: Oregon State Police

From: Department of Environmental Quality

Subject: Enforcement Strategy for the Oregon Coastal Salmon Initiative

The Department of Environmental Quality (DEQ) is the State's primary environmental regulatory agency with federal authorization and delegation to implement and enforce the requirements of federal environmental law. This authority is granted by the United States Environmental Protection Agency (EPA) for the Clean Water Act, the Clean Air Act and the Resource Conservation and Recovery Act (which addresses hazardous and solid waste). One element of receiving program delegation from the federal government is a requirement that the state have adequate civil and criminal authority to enforce the respective programs.

Authorization for DEQ to accept, conduct and enforce the various federal programs has been granted by the Oregon State Legislature and can be found in the following chapters of the Oregon Revised Statutes (ORS): ORS 454 Sewage Treatment, ORS 459 Solid Waste, ORS 465/456 Hazardous Waste and Materials, ORS 468 and 468 A & B Air and Water Quality. Administrative civil penalty and criminal authorities can be found in ORS 468.

With regard to the Department's administrative civil penalty authority, the Department under ORS 468.130, has the authority to impose penalties up to \$10,000 per day. Under 468.996, the Dept. may impose civil penalties up to \$100,000 per day where it finds that any person who violates provisions of ORS 459, 465, 466, 468, 468 A/B or any rule, or standard or order of the Environmental Quality Commission adopted pursuant to these statutes which results in or creates the imminent likelihood for an extreme hazard to the public health or which causes extensive damage to the environment.

The statutory authority for civil enforcement was subsequently incorporated into the Depts. administrative rules by the Environmental Quality Commission. Civil enforcement authority can be found in Oregon Administrative Rules, Chapter 340, Division 12, ENFORCEMENT PROCEDURE AND CIVIL PENALTIES. The Department has and continues to utilize the administrative civil penalty as its primary enforcement tool. Attached is a copy of the Department's annual report for enforcement which summarizes its actions by program. As the reader can note, use of this tool has continued to increase since 1989 when the administrative rules underwent major revision.

Criminal authority was authorized by the 1993 Oregon Legislature with the passage of the 1993 Environmental Crimes Act which is now codified in ORS 468.920. This law provides for Class B misdemeanor and Class B felonies for hazardous waste, air and water crimes. Class B felonies in the first degree are punishable by a fine up to \$200,000 and 10 years imprisonment.

The above information is intended to establish that the Department has the authority and tools to enforce the federal laws, the States statutes and the rules, standards or orders adopted pursuant to the laws. With regard to pure enforcement implementation as it might relate to salmon recovery, the Oregon coast falls within the jurisdiction of DEQ's Northwest Region (Clatsop and Tillamook counties) and the Western Region (Lincoln, Lane, Douglas, Coos and Curry counties). Attached is a map outlining the respective regions and their field office locations as well as organization charts for each region. Between the two regions there are approximately 70 civil inspectors or specialists available to conduct permitting, complaint response, inspections, conduct civil enforcement (they could also be employed to assist in a criminal investigations) and to provide technical assistance for water, hazardous waste, and underground tanks. There is also a core group to respond to spills and toxic releases. It should be understood that some of this resource is currently being dedicated solely to salmon recovery and are identified in other parts of the plan. We simply wish to point out in this document the resources available at any time to focus on an enforcement action.

Should a criminal action be necessary, the Department currently has four criminal investigators (soon to be five) dedicated full-time to environmental crimes. This resource is available for the salmon initiative should the need arise. One investigator is with the Oregon State Police (OSP) and three are US Environmental Protection Agency criminal investigators. With the DEQ, they are part of our statewide Environmental Crimes Enforcement Coordination Team. This group is located in the DEQ's NWRegion office and meets every Friday with the NWRegion Administrator who also oversees civil and criminal enforcement for the Dept. All cases are coordinated and assigned by this group for criminal investigation. The Oregon State Police has also provided additional assistance when the work load demands, by using other officers from their local Fish and Game Enforcement Division offices to lead or assist the environmental crimes team. This has been a benefit to the program because of their local knowledge and their ability to respond quickly within their jurisdiction. This cooperative relationship between DEQ, OSP and EPA has been very sound and rewarding in addressing serious crimes. We believe this cooperative relationship is unique in the country.

DEQ is not the only agency conducting enforcement or assisting with enforcement as other agencies such as the Oregon Department of Agriculture, the Oregon Department of Fish and Wildlife and the Oregon Department of Forestry have specific laws that apply to protection of natural resources. They also have "eyes and ears" in the field and from an enforcement perspective, we frequently exchange information that is used for enforcement purposes. We also use documented information from local government (fire depts., hazmat teams, health depts., etc.) to support enforcement actions. Information from the public is also utilized to investigate and enforce against environmental crimes.

The Oregon Coastal Salmon Recovery Plan is a high priority matter for the Department and as mentioned above, DEQ staff have been dedicated to work on many of the technical aspects of the salmon recovery plan in the Rogue, Umpqua and Tillamook Basins. Effective enforcement is a necessary and valuable tool in ensuring that any technical or environmental strategy is implemented and maintained. Therefore, the Dept. has placed an equal priority on ensuring

enforcement support for the salmon strategy. Managers and staff shall give the highest priority to complaints that have actual or potential impact on coastal salmon natural resources, place high priority on inspections that might have significance in support of the strategy, give highest priority to enforcement actions related to coastal water resources and highest priority to spill response or toxic releases impacting coastal waters. Managers and staff working with other government agencies, watershed councils, national estuary projects and other local groups shall provide information about the enforcement tools available and how we might coordinate the use of those tools.

In conclusion, the Department of Environmental Quality has the authority and the resources to conduct enforcement in support of the Oregon Coastal Salmon Recovery Initiative. DEQ also has a proven record of using its available authority and most importantly the Department has the will and commitment to use this tool to its utmost to support all of the technical work being done to recover and maintain this most valuable resource.

Attachments: 1995 Annual Enforcement Report
Map of Regions
Organization Charts

DEQ REGIONAL & BRANCH OFFICES + HEADQUARTERS

NORTHWEST REGION:
(County)

- ◆ Clatsop
- ◆ Columbia
- ◆ Tillamook
- ◆ Washington
- ◆ Multnomah
- ◆ Clackamas

WESTERN REGION:
(County)

- ◆ Yamhill
- ◆ Polk
- ◆ Lincoln
- ◆ Benton
- ◆ Marion
- ◆ Linn
- ◆ Lane
- ◆ Douglas
- ◆ Coos
- ◆ Curry
- ◆ Josephine
- ◆ Jackson

EASTERN REGION:
(County)

- ◆ Hood River
- ◆ Wasco
- ◆ Sherman
- ◆ Gilliam
- ◆ Morrow
- ◆ Umatilla
- ◆ Union
- ◆ Wallowa
- ◆ Jefferson
- ◆ Wheeler
- ◆ Grant
- ◆ Baker
- ◆ Deschutes
- ◆ Crook
- ◆ Klamath
- ◆ Lake
- ◆ Harney
- ◆ Malheur

North Coast Branch Office:
19 N Highway 101
Warrenton, OR 97146
Telephone: (503) 861-3280
FAX: (503) 441-3259

Northwest Region Office:
2020 SW 4th Avenue, #400
Portland, OR 97201-5884
Telephone: (503) 229-5263
FAX: (503) 229-6945

The Dalles Office:
400 E. Scenic Dr. #307
The Dalles, OR 97058
Telephone: (541) 298-7155
FAX: (541) 298-7330

Hermiston Office:
256 East Hurlburt, #117
Hermiston, OR 97835
Telephone: (541) 567-5297
FAX: (541) 567-4741

Baker City Branch Office:
2034 Auburn Avenue
Baker City, OR 97814
Telephone: (541) 523-7998
FAX: (541) 523-9198

Salem Office:
750 Front Street NE, #120
Salem, OR 97310
Telephone: (503) 378-8240
FAX: (503) 373-7944

Eugene Office:
1102 Lincoln St., #230
Eugene, OR 97401
Telephone: (541) 686-7835
FAX: (541) 686-7551

Coos Bay Branch Office:
340 N Front Street
Coos Bay, OR 97420
Telephone: (541) 269-3721
FAX: (541) 269-7984

Roseburg Office:
715 SE Main
Roseburg, OR 97470
Telephone: (541) 440-3338
FAX: (541) 440-3396

Grants Pass Office:
810 NW 4th, Room 76
Grants Pass, OR 97526
Telephone: (541) 471-2850
FAX: (541) 479-2764

Medford Office:
201 W Main Street, 22-D
Medford, OR 97501
Telephone: (541) 776-6010
FAX: (541) 776-6262

Klamath Falls Office:
403 Pine Street
Klamath Falls, OR 97601
Telephone: (541) 883-5599
FAX: (541) 883-4270

Bend Office:
2146 NE 4th, #104
Bend, OR 97701
Telephone: (541) 388-6146
FAX: (541) 388-8283

Pendleton Office:
700 SE Emigrant, #330
Pendleton, OR 97801
Telephone: (541) 276-4063
FAX: (541) 278-0168

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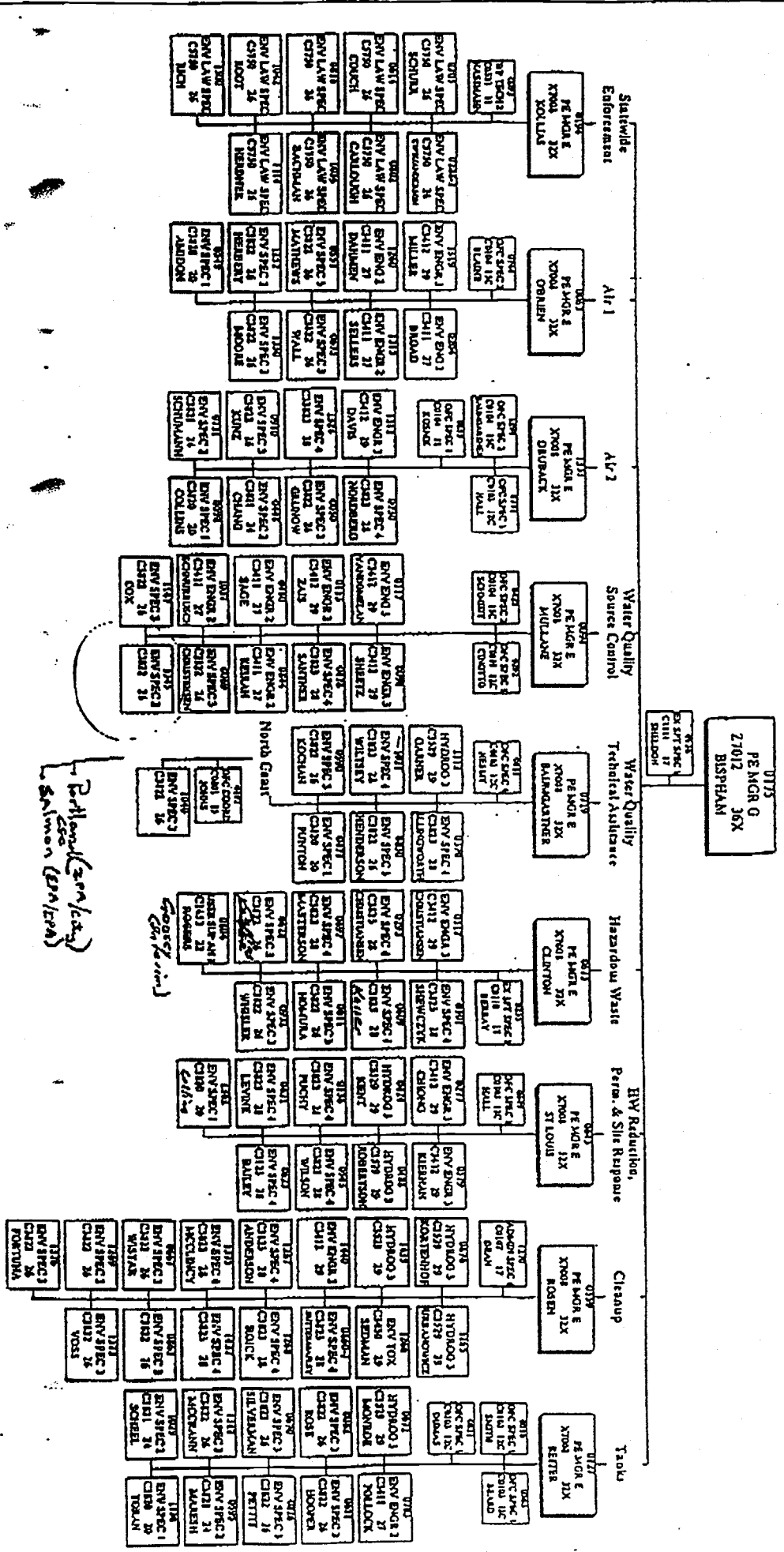
North: Implications of Air Quality

<p>HEADQUARTERS OFFICE: 811 SW Sixth Avenue Portland, OR 97204 (503) 229-5696, 229-5630 Toll-free Inside Oregon 1-800-452-4011 TDD (503) 229-6993 - FAX (503) 229-6124</p>	<p>Air Quality Division (503) 229-5359 Water Quality Division (503) 229-5279 Waste Management & Cleanup Division (503) 229-5913 (Hazardous Waste, Solid Waste, Cleanups & Underground Storage Tanks)</p>	<p>Laboratory Division: 1712 SW Jefferson Avenue Portland, OR 97201 Telephone: (503) 229-5983 FAX: (503) 229-6924</p>
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Northwest Region Division

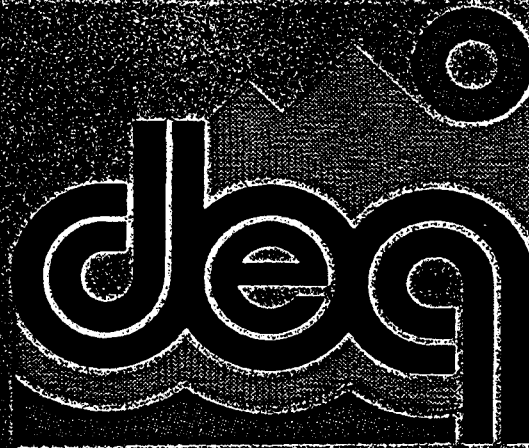
Department of Environmental Quality
May 1994



OREGON DEPARTMENT OF
ENVIRONMENTAL QUALITY

ENFORCEMENT
ACCOMPLISHMENTS REPORT

1995



Statewide Enforcement Section
Dept. Environmental Quality, Suite 400
2020 S.W. Fourth Avenue
Portland, OR 97201-4937

1995 ENFORCEMENT ACCOMPLISHMENTS REPORT

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I. INTRODUCTION AND OVERVIEW

Oregon's citizens take great pride in the beauty and livability of their State. We have a strong environmental ethic and a tradition of supporting environmental protection. Toward this end, the Oregon Legislature established the Oregon Department of Environmental Quality (DEQ). DEQ operates under laws delegated to it by the Legislature and by the Environmental Quality Commission (DEQ's rule-making and adjudicative body). Pursuant to the Commission's rules, DEQ seeks to restore and preserve the quality of Oregon's environment, and obtains and maintains compliance with environmental laws through conference, conciliation, and persuasion.

Under the leadership of Director Langdon Marsh, newly-appointed in 1995, DEQ continues to serve the public interest, and has begun using more of its resources to provide technical assistance to Oregon's regulated citizens and businesses. However, DEQ recognizes that a strong enforcement presence is necessary to stimulate voluntary compliance and to deter those violators who would benefit at the expense of Oregon's public health and the environment. During 1995, DEQ continued its strong commitment to an effective, consistent, and visible enforcement program. One indication of this commitment is the number and value of formal enforcement actions initiated. In 1995, the Department initiated as many formal enforcement actions as in any prior year and far more civil penalties than in any prior year (*see* Table I, figure 1). This represents an increase in most program areas (*see* figures 2, 3, and 4).

Table I. The total number of all formal enforcement actions issued and dollar value of total penalties assessed for the last five years.

Year	1990	1991	1992	1993	1994	1995
Number	266	277	314	297	287	314
Penalties	328,555	669,640	1,116,288	1,226,536	1,265,251	1,492,663

While these numbers are not indicators of overall levels of compliance with environmental laws, they do indicate the need for continued vigilance. We believe that most companies and individuals do attempt to comply with environmental laws. Enforcement is only one tool, but an important one, in maintaining high levels of compliance. It is also a way of ensuring that those who comply are not disadvantaged by those who chose not to make the necessary investments to assure compliance.

The Department has continued to refine the way it handles violators. Last year, DEQ issued a revised and expanded version of its internal enforcement directive for field staff, augmented its process for collecting penalties in default, and continued improving its communication with violators and the regulated community on matters of pollution prevention. The Department also completed a plan to allow violators to mitigate a portion of their penalty amounts by conducting Supplemental Environmental Projects (SEPs) designed to improve public health and the environment.

Although DEQ is placing increased emphasis on technical assistance and pollution prevention, DEQ is also escalating the consequence for extreme environmental violations. As authorized under the 1993 Oregon Environmental Crimes Act, DEQ coordinates investigation of environmental crimes with the Oregon State Police and the US Environmental Protection Agency. Completed cases are referred to the US Department of Justice and county District Attorneys for prosecution. In 1995, DEQ investigated approximately 20 new cases, obtained criminal sanctions in three cases, and continues prosecution in several others.

Table II. A summary of the NONs and formal enforcement actions issued, in 1995, in all program areas. NON=Notice of Noncompliance; NPV=Notice of Permit Violation; CP=Civil Penalty Assessment; O=Order.

Program area	NON	NPV	O	CP	CP/O	Formal Actions	Total Penalties
Air Quality	653	n.a.	27	94	6	128	\$622,239
Water Quality	367	46	32	31	5	114	\$218,881
Waste Management & Cleanup	495	6	11	16	39	72	\$651,543
Total	1,515	52	70	141	50	314	\$1,492,663

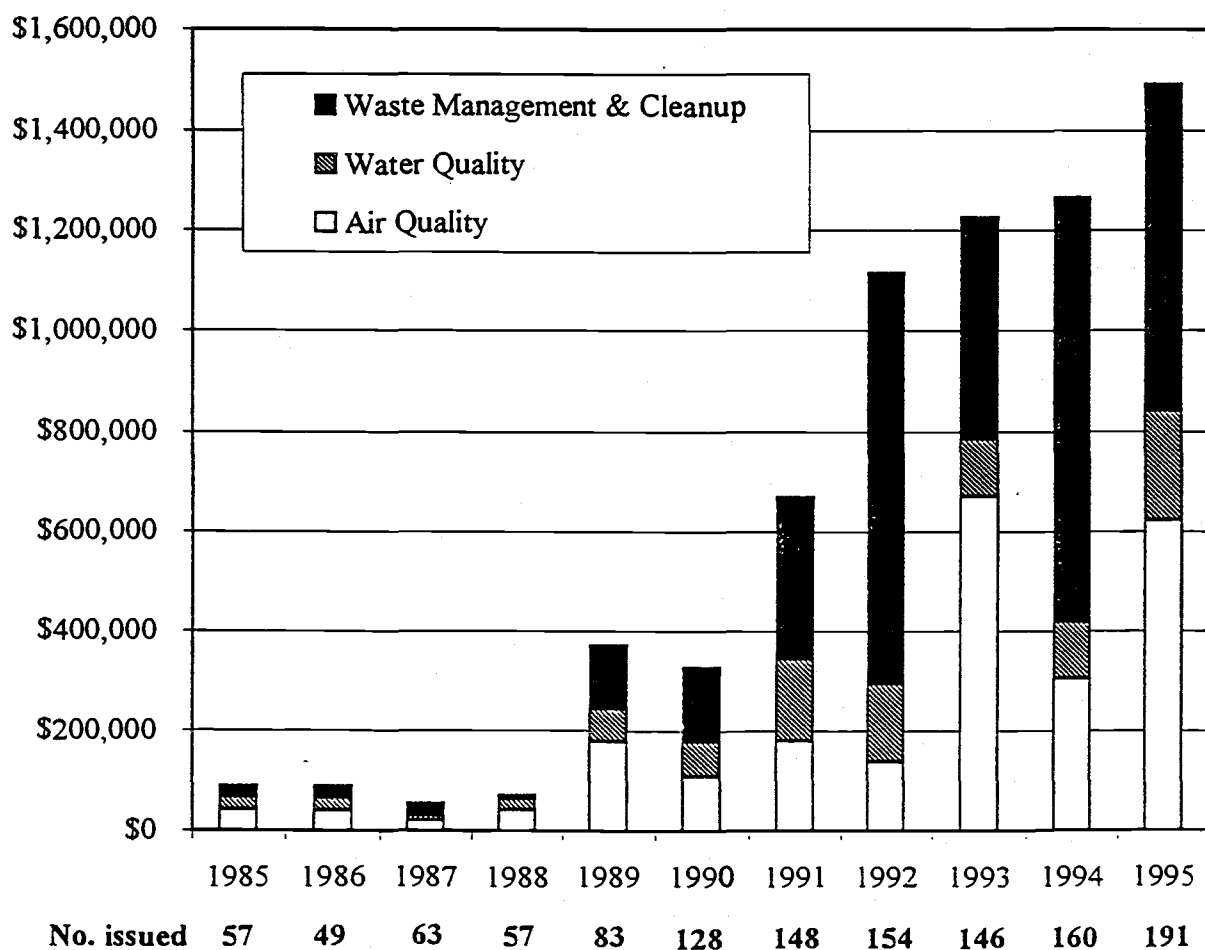


figure 1. A summary of the total number of penalties issued each year from 1985 through 1995, and the amount attributable to each program for each year.

II. TOOLS FOR ENFORCEMENT

A. ADMINISTRATIVE ENFORCEMENT

1. **Notice of Noncompliance (NON)** – By rule, the Department must issue a NON for every documented violation, regardless of the Class of the violation. A NON is not a formal contestable document and therefore does not include any penalty or appealable order. Its purpose is to inform a person of a violation and the consequences of the violation, and may state a schedule of actions required to resolve the violation or remediate the effects of the violation.

2. **Notice of Permit Violation (NPV)** – A NPV is issued for violation of solid waste disposal permits and wastewater permits. A NPV specifies the violation, and states that a civil penalty will be imposed for the permit violation unless the permittee submits one of the following to the Department within five working days: (1) a statement certifying that the permitted facility is in compliance with the permit; or (2) a written proposal to bring the facility into compliance with the permit within the shortest time possible. A NPV carries no appeal rights and may not include a civil penalty. However, after the first NPV in any 36 month period, the Department may send the violator a Notice of Civil Penalty Assessment without any further formal warning notice.

3. **Notice of Civil Penalty Assessment (CP)** – DEQ may initiate a formal enforcement action in which the Department assesses a civil penalty for a violation of any environmental statute, rule, order or permit. A civil penalty may be coupled with a Department or Commission Order. Penalties are calculated according to a formula given in Oregon Administrative Rule (OAR) 340-12-045 which considers the classification, magnitude, and duration of the violation, and the violation history, mental state, and cooperativeness of the recipient. The penalty may contain a non-punitive estimate of the economic benefit received through noncompliance. Inclusion of this estimate takes away the economic advantage the violator gained over its competitors. The recipient of a CP may appeal the action so long as certain procedural requirements are met.

4. **Department Order or Commission Order** – An Order includes a schedule of requirements designed to bring the recipient into compliance with the environmental regulations and/or to require the recipient to remediate the effects of the violation. Commission orders may be issued by the Environmental Quality Commission or by the Director on behalf of the Commission. Department Orders are issued by the Director or an authorized representative. The recipient of the Order generally may appeal the action. In some circumstances, for example if the Order was issued as the result of an emergency, the recipient has no administrative or judicial appeal right and may suffer treble damages for costs incurred if the Department is forced to respond to the emergency with its own resources. Violation of an Order is in itself a violation which may be subject to civil penalty.

5. Mutual Agreement and Order (MAO) – Formerly known as “Consent Order” or “Stipulation and Final Order,” an MAO is composed of two integrated parts: (1) a negotiated agreement signed by the regulated party and the Director on behalf of DEQ and (2) an Order signed by the Director on behalf of the Commission. An MAO may include a schedule of requirements or limitations on the regulated party, and may contain stipulated civil penalties for past or ongoing violations. It may provide for stipulated civil penalties for violations of the Order. A MAO is designed to finalize a formal enforcement action through settlement or other negotiated resolution.

B. CIVIL INJUNCTIVE RELIEF

The Commission has the power to seek equitable remedies in circuit court, including temporary injunctions in cases of emergency and permanent injunctions in circumstances when administrative enforcement has not been successful.

C. CRIMINAL PROSECUTION

In cases of extreme violation, the Department may coordinate a criminal investigation using its resources, as well as those of the Oregon State Police and the US Environmental Protection Agency. Completed investigations are referred to the county district attorneys, the US Attorney General, or the US Department of Justice for prosecution (for more details about the environmental crimes program, see below page 25).

III. PROGRAM DEVELOPMENTS

A. THE ENFORCEMENT GUIDANCE FOR FIELD STAFF

The Director issued a revised internal directive entitled the *Enforcement Guidance for Field Staff* on November 2, 1995. The primary purpose of the document is to assist field staff in determining whether to refer a given violation for formal enforcement. The document helps maintain statewide consistency with regard to treatment of similar violations in the various areas of the state, while reserving enough flexibility for regional offices to respond to particular circumstances of each case and the needs of the specific geographical area. It also provides approved language to be included in Notices of Noncompliance. The new 1995 edition includes chapters on administrative and criminal searches and warrants, sample chain of custody, assessing the economic benefit of noncompliance, environmental consequences of violations, and pollution prevention.

B. ADVANCED ENFORCEMENT TRAINING SESSIONS

The *Enforcement Guidance* was issued to DEQ field staff concurrently with advanced enforcement-training sessions conducted last fall. Representatives from the Department's

Enforcement Section, the State Police, and the District Attorney's Association held these training sessions in Pendleton, Bend, Roseburg, Salem, and Portland. Following a brief over-view of the Department's enforcement process, the moderators discussed advanced topics of parallel proceedings, criminal search warrants, criminal evidence and burden of proof, and the trial process. Later, participants were asked to identify ways in which the Enforcement Section could improve its responsiveness to their needs, and to list topics on which they would like more detailed instruction. The enforcement section will integrate many of the suggested ideas into its processes and into future training agenda.

C. Supplemental Environmental Projects Program

On September 11, 1995, the Director approved an internal management directive that defines the Department's Supplemental Environmental Projects (SEPs) program. Under this program, the Department may mitigate a part of a civil penalty if the violator conducts a project that benefits human health or the environment in Oregon. Projects benefiting the local area in which the violation occurred are preferred. The new directive states that the Department may approve a SEP when (1) the penalty to be mitigated is \$2,000 or greater, (2) the project is not otherwise required by law, and (3) the project does not create a market advantage for the violator. Furthermore, the project should not involve an inordinate amount of DEQ staff time to plan, arrange, implement, monitor, or follow-up. Currently, the Department relies on the violator to come forward with suggested projects. The Department will examine the successes and failures of the SEP program during the next year to determine whether any aspects of the directive should be amended.

Since the SEP directive was approved, the Department disapproved several proposals that would have primarily benefited the violator/proposer, and approved two proposals that fit the criteria. One approved SEP was to build a used-oil recycling facility. The other involved holding a free one-day conference for local small-quantity hazardous-waste generators and used-oil generators; speakers would outline the law and offer practical advice on proper management and disposal.

D. IMPROVEMENTS TO COLLECTIONS PROCESS

Payment on a civil penalty is due 10 days after an order imposing the penalty becomes final through operation of law or on appeal. If a debtor defaults in payment, DEQ proceeds with its collections process. That process includes filing a claim for collection with the Oregon Department of Revenue and filing a lien on the debtor's real property. As a last resort, DEQ may work with the Department of Justice to compel payment through the legal process. In the fall of 1995, DEQ obtained access to an electronic database that contains a multitude of public records for the various counties in Oregon, Washington and Idaho. Through searching these databases, DEQ is better able to locate the assets of defaulting debtors and better protect its claim for payment of civil penalties by attaching other properties held by the debtor in different locations.

E. POLLUTION PREVENTION

In 1995, the Department continued and improved its pollution prevention (P2) efforts. P2 can be achieved by increasing process efficiency; reducing energy, chemical or other raw material use; or reducing the quantity or toxicity of pollutants, discharges, emissions or wastes generated. The Department has a draft vision statement which states "DEQ will incorporate the principles of pollution prevention into Agency internal and external activities at every available opportunity."

Inspectors in the DEQ's compliance programs, and staff in DEQ's technical-assistance programs, have continued to help individual businesses identify specific areas where the businesses might implement P2 into their processes. In 1989, a new law (ORS 465.003 *et seq.* (1989)) required some businesses to submit Reduction Reports to the Department's Toxic Use Reduction Program for review. Since then, participating large-quantity hazardous waste generators have reduced their hazardous solvent wastes by approximately 18% and their hazardous discarded-products wastes by approximately 60%. This contributes to a total reduction of more than 12,000 tons hazardous waste generated during that time. In addition, many participating small-quantity generators have curtailed their generation of hazardous wastes sufficiently to attain the regulatory status of conditionally-exempt generators. This benefits the environment because less hazardous wastes are generated, and benefits the businesses because conditionally-exempt generators are relieved from much of the regulatory requirements and need not pay generation fees.

In an effort to get the public to consider P2 alternatives, Department inspectors now typically include a DEQ brochure entitled *Pollution Prevention Begins at Home* when issuing Notices of Noncompliance to individuals. DEQ has also tried to incorporate the benefits of P2 into its enforcement program. For example, several Mutual Agreements and Orders have required the parties to conduct P2 studies as a condition of settlement (for a discussion of some special Mutual Agreements and Orders involving P2, see the Department's VOC Amnesty Project on page 7).

F. ENVIRONMENTAL PARTNERSHIPS FOR OREGON COMMUNITIES PROJECT

The Oregon Health Division and the DEQ codeveloped a new approach to assisting small communities comply with the regulatory mandates concerning wastewater, drinking water, solid and hazardous wastes and air quality. Small communities may have few administrative and technical staff to assess problems and limited financial resources to meet requirements. When the communities violate environmental laws, they endanger public health, the environment, their quality of life, and their ability to sustain and expand their local economy. Noncompliance with the law can also lead to assessments of civil penalties, resulting in even fewer resources to meet the requirements.

EPOC Teams, which include representatives from the state agencies, local government, and non-profit organizations work together with local citizens to define environmental

problems, evaluate public health and environmental risks, and determine the relative priority for solving each problem. After the problems are prioritized, the state agencies and the community negotiate a formal agreement with a proactive compliance schedule. In 1995, the Department completed compliance-schedule agreements with the Cities of Powers, Nyssa, and Rainier, and began negotiating agreements with the Cities of Lakeview, Westfir, Garibaldi, Oakland and Vale.

On November 22, 1995, the US EPA issued a new federal enforcement policy statement based on a study of community-compliance flexibility projects in Oregon and Idaho. The policy statement notes that the EPOC concept offers significant potential for better enabling small local governments to achieve compliance, and supports EPOC and similar efforts to help small communities comply with federal environmental requirements.

G. THE VOLATILE ORGANIC COMPOUNDS AMNESTY PROJECT

The Portland Air Quality Maintenance Area (AQMA) currently meets federal clean air standards for ozone. However, the city has carried a formal designation as a "nonattainment area" since 1970. In order to have Portland designated an "attainment area" for ozone, the Department must control the emissions of volatile organic compounds (VOCs) which cause the formation of atmospheric ozone. VOCs are released as evaporating solvents from a number of industrial processes. Although the Department has controlled VOC emissions by requiring any business that emits more than 10 tons VOCs per year to have a permit, many small businesses are unaware of the amount of VOCs they emit, and have been operating without the needed permits.

When a business fails to have a permit for its VOC emissions, it has, in essence, escaped regulation and control by the Department. In order to decrease the number of Portland businesses emitting unregulated VOCs, DEQ designed a VOC Amnesty Project. This innovative project offered Portland companies amnesty from civil penalty if they approached the Department, agreed to implement feasible pollution-prevention alternatives, and agreed to obtain a permit if necessary. Initially, the Department was concerned that the project might be viewed as inconsistent with its enforcement program. However, representatives of the business community supported the project because it addressed a specific air quality problem in the Portland area and was clearly limited in both duration and scope. Furthermore, the amnesty only applied to those businesses approaching the Department -- businesses that the Department identified through its normal inspection and compliance program would not be entitled to amnesty from penalty.

The Department received partial funding for the project through an EPA Pollution Prevention Incentives for States Grant in the amount of \$20,815. In July 1995, the Department mailed information packets to over 800 small businesses identified as potential emitters of VOCs. These potential sources were requested to indicate whether their VOC emissions were above or below 10 tons and whether they would like to attend a workshop concerning VOC emissions. The workshop, held in August, was designed to assist companies to: 1) calculate their emissions; 2) conduct pollution prevention assessments;

3) share success stories; and 4) understand the regulatory process. Over one-third of the contacted businesses replied. Eventually, 22 businesses participated in the Project. Of these, seven successfully reduced VOC emissions to below 10 tons per year by implementing pollution prevention strategies, for a total reduction of 70 tons VOC from the Portland airshed. The remaining businesses have entered into consent agreements that require them to obtain permits if they are unable to reduce their emissions below the 10-ton threshold.

The Department views this project as a success because it educated numerous businesses about the impact of their processes on Portland's air, because it brought many businesses into the regulatory fold in a much more efficient way than a traditional approach, and because it reduced the amount of VOCs being emitted in the area.

H. AIR QUALITY SMALL BUSINESS ASSISTANCE PROGRAM

The 1990 federal Clean Air Act Amendments put new air-protection requirements on an estimated 17,000 small businesses such as dry cleaners, auto body shops, printers, and furniture manufacturers. In response to the need for compliance assistance, DEQ established the Small Business Assistance Program (SBAP) to help small business owners find practical, cost-effective solutions to air and other environmental problems. The SBAP distributes educational materials and provides confidential assistance on issues of process engineering and pollution prevention. The SBAP also helps with permit applications, financing for equipment purchases, and applications for pollution prevention tax credits. In order to better serve the small business community, the SBAP has broadened the scope of available services by working in partnership with DEQ's Toxic Use Reduction Program, the Small Business Development Centers, the Pollution Prevention Outreach Team, and OR-OSHA.

During 1995 the SBAP sponsored satellite teleconferences on the use of halogenated cleaning solvents and chrome electroplating and anodizing. The SBAP and hazardous waste staff are currently working with the dry cleaning industry regarding air and hazardous waste compliance. This interprogram effort will result in the generation of less air, water, and hazardous pollution.

I. EASTERN REGION HAZARDOUS WASTE TECHNICAL ASSISTANCE OUTREACH PROGRAM

In September 1995, DEQ's Eastern Region began a four-month Technical Assistance Outreach Program. Unlike outreach programs in the other regions, this project focused on those businesses that were not currently registered as hazardous waste generators. Businesses that had registered but had not been inspected or given technical assistance during the last four years were also included. DEQ staff hoped to visit 240 facilities during the program and thus far have visited or have invitations from 75 facilities. During the visits, DEQ staff offer assistance and answer questions about hazardous waste

regulations. These visits are intended to be nonadversarial and do not result in formal enforcement.

J. WESTERN REGION HAZARDOUS WASTE GENERATOR ASSISTANCE PROJECT

From February through July 1995, DEQ's Western Region conducted a hazardous waste generator assistance project. The purpose of the project was to increase compliance with the hazardous waste regulations and to promote waste reduction and pollution prevention. The Region targeted 139 registered small quantity hazardous waste generators for this project, and focused on previously-registered facilities because it had historical data concerning those facilities. That database will serve as a basis of statistical comparison to judge the effectiveness of the project.

DEQ inspectors and technical assistance staff examined the facilities, and provided site-specific assistance to them including identification of compliance violations and options for waste reduction and pollution prevention. Each facility received a follow-up survey that identified progress toward eliminating the violations. In addition, the Region conducted follow-up inspections at 15 facilities to check the validity of the survey results and to gain feedback on the success of the project. The Region believes that, within two months after the original visit, 65% of the facilities had significantly improved their compliance and 52% of the facilities had made significant progress toward reducing their generation of hazardous wastes. Because no egregious violations were identified during the project, no civil penalties or other formal enforcement resulted from the project.

K. DRY CLEANER ENFORCEMENT

In response to a proposal from the dry-cleaning industry, the 1995 Oregon Legislature passed a new act, ORS 465.500 *et seq.* (1995), that limits individual dry-cleaner liability for the costs of cleaning up environmental contamination caused by releases of their dry-cleaning solvents. The law established an exemption from both individual dry-cleaner liability for cleanup and from individual liability to third parties. That exemption does not apply to civil penalty actions. It also does not apply when the dry cleaner caused the release negligently or in violation of the law, or when the dry cleaner attempted to conceal evidence of the release or otherwise interfered with the cleanup. Furthermore, the exemption does not apply to releases of any hazardous substances other than dry-cleaning solvents.

In "exchange" for the limitation on liability, the law places new requirements on dry cleaners. First, dry cleaners must implement certain containment procedures to reduce evaporation and loss of solvents to the environment. Second, the state will collect fees on the sale and use of dry-cleaning solvents. These fees are placed in a "Dry Cleaner Environmental Response Account" and may be used at the Department's discretion for site assessment and cleanup. At this time, the Department does not know if the fund will adequately cover the necessary response costs.

IV. SUMMARIES AND STATISTICS BY DIVISION

A. AIR QUALITY

Table III. A summary of the NONs and formal enforcement actions issued, in 1995, for violations of air quality law.

Program area	NON	Orders	CP	CP/O	Formal Actions	Total Penalties
Asbestos	65	0	19	0	19	\$135,572
Field Burning	25	0	15	0	15	\$41,600
Open Burning	360	0	37	0	37	\$44,705
Oxyfuels	77	0	2	0	2	\$1,200
Permits	112	26	21	5	53	\$388,932
Stage II Vapor	14	1	0	1	2	\$7,562
Total	653	27	94	6	128	\$622,239

1. Asbestos -- The Department regulates asbestos because asbestos is a known carcinogen for which no safe level of exposure is known. During 1995, the Department issued 19 Notices of Civil Penalty Assessments for a total of \$135,572 in civil penalties. Most of the violations occurred when construction contractors conducted asbestos-abatement projects without being licensed by the Department or without properly managing the asbestos to prevent the asbestos fibers from becoming airborne. Below is a table of parties receiving formal enforcement action for asbestos violations in 1995:

NAME	DOING BUSINESS AS	LOCATION	ACTION	ASSESSED	STATUS
ALBERTS, ROY		Merlin	CP	\$3,000	Paid
BAUMGARTNER, CRAIG	SO. OR. HOME IMPVMT.	Medford	CP	\$5,700	Paid
BESSEMER PLYWOOD		Merlin	CP	\$5,600	Settled \$5,000
C&R SALVAGE		White City	CP	\$1,000	Contested
COSTCO CONSTRUCTION		Portland	CP	\$3,927	Contested
GERRY HOBSON GEN. CONTR.		Portland	CP	\$2,600	Paid
INDEP. ORDER OF ODDFELLOWS	BARNUM LODGE 7	Corvallis	CP	\$2,400	Paid
IRS ENVIRONMENTAL		Albany	CP	\$160	Paid
JOHNSON, KAROLYN		Central Point	CP	\$3,000	Settled \$2,400, PS
LAWRENCE, ALAN		Medford	CP	\$3,775	Settled \$1,000
MILLER REDWOOD CO.		Merlin	CP	\$76,400	Settled \$52,400
MJM & ASSOCIATES		Medford	CP	\$3,927	Default
SERVICEMASTER OF HILLSBOR		Raleigh Hills	CP	\$7,200	Settled \$1,440, PS
SO. OREGON ST. COLLEGE		Ashland	CP	\$3,927	Paid
VAN METRE, MARK		Odell	CP	\$3,927	Settled \$1,000
VICTOR, MANUEL	NORTHERN INVEST.	Sweethome	CP	\$1,029	PS
WESTERN STATES ENVIRON.		Cave Junction	CP	\$3,600	Settled \$1,200
WADE, SHERMAN		Central Point	CP	\$800	Paid
WESTERN STATES ENVIRON.		Cave Junction	CP	\$3,600	Settled \$1,200

2. Field Burning -- Grass seed and cereal grain growers burn their fields to sanitize them. However, the burning can produce smoke that contributes to the air-quality problem of excess particulate. The smoke also can cause a public transportation hazard by concealing roadway features. DEQ issued 15 Notices of Civil Penalty Assessment for a total of \$41,600 in civil penalties for field burning violations documented during the 1995 field

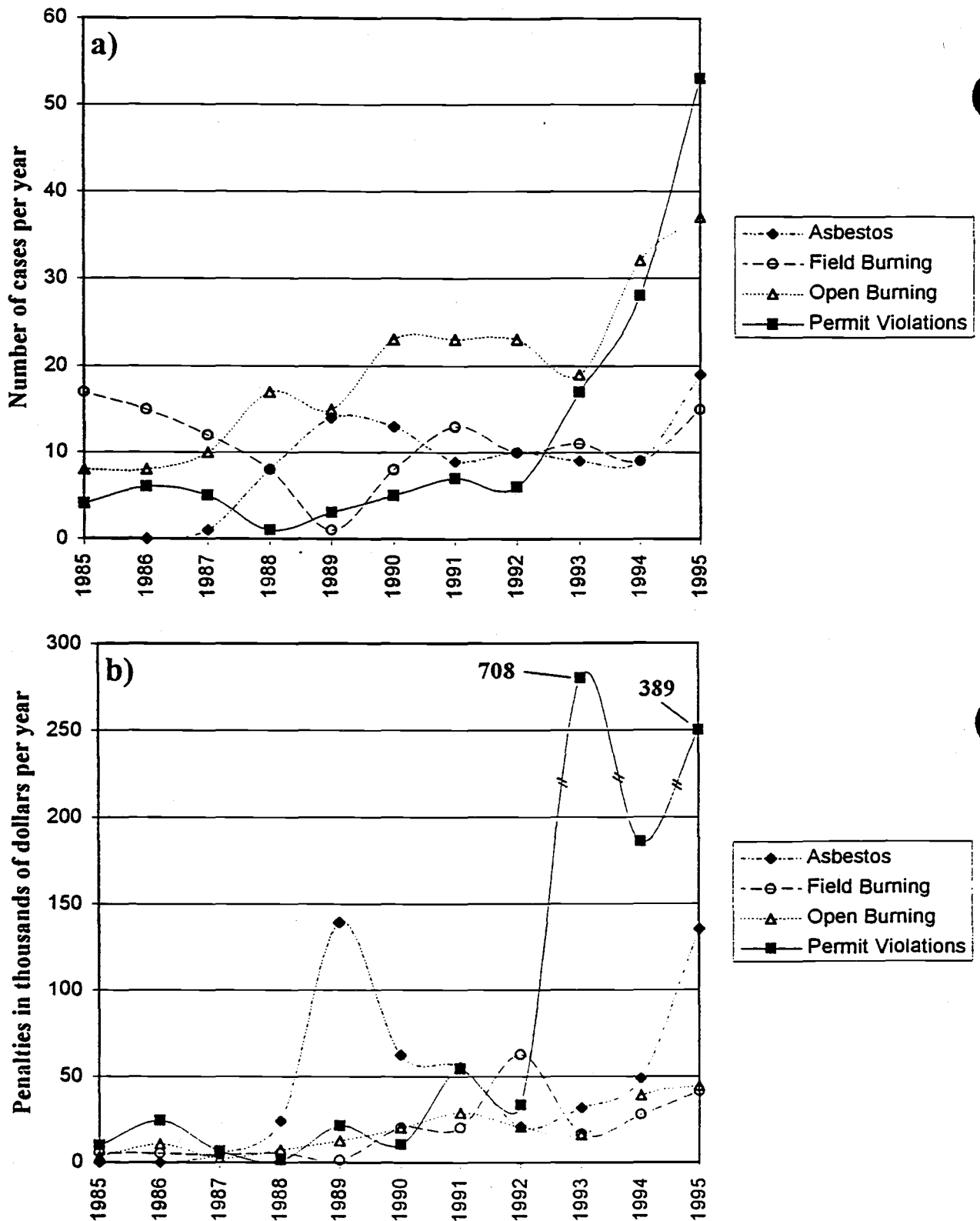


figure 2. Air Quality a) The number of cases per year in each program area.
 b) The total amount of penalties assessed each year in thousands of dollars per year for the program areas.

burning season. This is nearly twice the number of penalties issued in 1994. The violations that received civil penalties included: open field burning without a permit; burning at an unpermitted time; sustained open fire from a propane flaming operation; and burning within the fire-safety buffer zone adjacent to designated highways. Although the Oregon legislature enacted a bill, in 1995, to turn over the field-burning program to the Department of Agriculture (DOA). Pursuant to an agreement with DOA, DEQ will continue to enforce the rules through at least the 1996 field-burning season. Below is a table of parties receiving formal enforcement action for field-burning violations in 1995:

NAME	DOING BUSINESS AS	LOCATION	ACTION	ASSESSED	STATUS
CALA FARMS, INC.		Pugh Dairy Road	CP	\$3,600	Settled \$1,200
COLEMAN, JOHN		Yamhill Co.	CP	\$800	Paid
COOLEY, CARL		Silverton Area	CP	\$3,000	Paid
DITCHEN, DAVID	GOLDEN VALLEY FARMS	Marion County	CP	\$3,600	Settled \$1,200
FITZMORRIS, CHRIS		Lake Creek Dr.	CP	\$1,200	Paid
KEITH AND KENNETH BURGER	BURGER FARMS	Near Perrydale	CP	\$1,300	Contested
KROFF, LEROY		Linn County	CP	\$3,600	Settled \$1,200
LONNIE PARKER FARM, INC.		Halsey	CP	\$4,800	Contested
LONNIE PARKER FARM, INC.		Halsey	CP	\$6,000	Contested
MILLER, THOMAS L.		Marion Co.	CP	\$1,000	Paid
NEUSCHWANDER, ROGER		Rowland Road	CP	\$3,600	Settled \$3,000
PARKER, STEVE	PARKER FARMS	Near Shedd	CP	\$3,900	Settled \$1,300
PHELAN, INC.		Tangent	CP	\$3,000	Settled \$2,400
SHOWALTER, GLEN		Linn County	CP	\$1,000	Settled \$800
WOLF, FRANCIS & JOHN		Sublimity	CP	\$1,200	Settled \$1,000

3. *Open Burning* -- The open burning of plastics, garbage and other materials that produce dense smoke is prohibited statewide. Open burning of agricultural, construction, demolition, and yard debris is allowed at certain times of the year in some non-urban areas of the State. The Department bases most of the open-burning program on cases referred from fire departments. DEQ issued 37 Notices of Civil Penalties for a total of \$44,705 compared to last year's 32 penalties totaling \$39,198. Below is a table of parties receiving formal enforcement action for open-burning violations in 1995:

NAME	DOING BUSINESS AS	LOCATION	ACTION	ASSESSED	STATUS
ANDREWS, ROBERT	WESTERN BUILDERS	Gresham	CP	\$818	Settled \$418
BELLO, JOE AND GLENNA		Salem	CP	\$100	Default
BROWER CAROL		Albany	CP	\$1,852	Settled \$802, PS
BUNN, FLOYD W.		Grand Ronde	CP	\$4,104	Settled \$3,104, PS
CHIDDIX, JERRY		Madras	CP	\$1,600	Default
COLT, TIM	COLT AUTO SPECIALTIES	Troutdale	CP	\$619	Default
CONTRACTORS INCORP.		McMinnville	CP	\$2,660	Paid
CORCORAN, MYRON		Central Point	CP	\$500	Settled \$200
COURTNEY, DARRELL		Hillsboro	CP	\$200	Paid
D&D CONCRETE		Dallas	CP	\$1,187	Contested
ELLIOTT, RAYMOND D.		Redmond	CP	\$1,212	Settled \$1,012, PS
FAHLMAN, MARY		Portland	CP	\$89	Paid
FERREN, O.W.	OREGON TRAIL	Nr. Oregon City	CP	\$4,006	Contested, PS
GRAVES, DEBRA ANN		Gaston	CP	\$1,000	Default
HANSAKER		Charleston	CP	\$1,050	Contested
HOUSE OF CABINETS, INC.		Mulino	CP	\$424	Paid
LOYNES, DANIEL		Lyons	CP	\$120	Paid
LUNDERSHAUSEN, HARVEY	CONTINENTAL GOLF	Eagle Point	CP	\$2,400	Settled \$2,200
MASAMI FOODS		Klamath Falls	CP	\$4,272	Settled \$2,772

Open burning cont.

NAME	DOING BUSINESS AS	LOCATION	ACTION	ASSESSED	STATUS
MILER, ROCKY		Near Redmond	CP	\$2,840	Service pending
MORGAN AND STAIR		Salem	CP	\$60	Paid
MURRY, MARK RANDALL		Hubbard	CP	\$718	Action postponed
NAUMES, INC.		Medford	CP	\$2,850	Paid
NEWSOME, WALTER "DUKE"		Milwaukie	CP	\$160	
PARKS, STEVEN		Albany	CP	\$40	Default
REX, JIM		Near Baker City	CP	\$500	PS
ROSS BROS. & COMPANY,		Brooks	CP	\$1,600	Settled \$1,200
SELINGER, SCOTT		Sandy	CP	\$255	Default
SHELTON, JR., JAMES O.		Albany	CP	\$1,124	Default
SIRI, FRED		Clackamas	CP	\$400	Paid
TAYLOR, RICHARD		Vernonia	CP	\$800	Default
TIDEWATER CONTRACTORS	w/ RICHARD HOLLIBAUGH	Brookings	CP	\$1,095	Settled \$495
VANKIESBILCK, FRED		Silverton	CP	\$240	Default
VARGA, STEFAN		Eagle Creek	CP	\$600	Settled \$100
VICTOR, MANUEL L.	NORTHERN INVEST.	Sweethome	CP	\$1,029	Payment schedule
WINEBARGER, ED	CASCADE SOURCE SALV.	Corbett	CP	\$1,632	Settled \$800, PS
YOST, DONALD H.		Coos Bay	CP	\$549	Settled \$216

4. *Oxyfuels* -- The Department requires gas stations within certain airsheds to distribute oxygenated fuel during the winter months because these "oxyfuels" produce less carbon monoxide than non-oxyfuels. Airsheds targeted for carbon monoxide reduction and oxyfuel distribution include the Portland-Metro area, Klamath Falls, Medford-Ashland, and Grants Pass because these airsheds have had a history of nonattainment under the Clean Air Act. The Department issued two civil penalty actions for improperly selling or distributing non-oxygenated fuels in an oxyfuel area during 1995. Details of the cases are provided below:

NAME	DOING BUSINESS AS	LOCATION	ACTION	ASSESSED	STATUS
HOME SERVICE OIL COMPANY		Dayton	CP	\$600	Paid
MCMANIMIE, JAN R.		Dayton	CP	\$600	Settled \$400

5. *Permit Violations* -- The Department uses a permitting process to regulate sources of air contaminants in the state. In 1995 DEQ issued 53 formal actions for a total of \$388,932 against violators who had exceeded emission limitations in their Air Contaminant Discharge Permits, operated without a required permit, or failed to timely submit documentation required by the Oregon Title V Operating Permit Program. During the past year, many facilities began work to fill out the Title V applications to meet the required deadlines. In the process, some facilities conducted source tests, discovered they had been in violation, and reported the violations to the Department. The Department collected the economic benefit of non-compliance from these sources, and considered the facilities' cooperativeness and self-reporting in calculating the amounts of the penalties. Below is a table of parties receiving formal enforcement action for violations related to air-quality permits in 1995:

NAME	DOING BUSINESS AS	LOCATION	ACTION	ASSESSED	STATUS
AKZO NOBEL COATINGS, INC.		Salem	MAO	\$10,620	Paid
AQUA GLASS WESTERN, INC.		Klamath Falls	MAO	\$36,685	Paid
BAYLINER MARINE CORP.		Roseburg	MAO	\$0	Complied

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Air permits cont.

NAME	DOING BUSINESS AS	LOCATION	ACTION	ASSESSED	STATUS
BAYLINER MARINE CORP.		Roseburg	CP/DO	\$26,909	Settled \$10,189
CASCADE STEEL ROLLING MILLS		McMinnville	MAO	\$8375	Paid
CLEAR PINE MOULDINGS, INC		Prineville	MAO	\$34,040	Payment schedule
COATS, ROBERT L.	DESCHUTES READY-MIX	Redmond	CP	\$2,493	Paid
FCC COMMERCIAL FURNITURE		Roseburg	CP	\$800	Paid
FRIERWOOD, JIM	JEFCO ENTERPRISES	Lake County	CP	\$8,400	Settled \$2,400
HAWK OIL COMPANY		Medford	MAO	\$0	Complied
HNS, INC.		Enterprise	MAO	\$2,701	Paid
INTEL CORPORATION		Hillsboro	CP	\$3,678	Paid
JAMES RIVER CORP.		Clatskanie	CP	\$4,200	Paid
JENSEN, DONALD & SUSAN	BRIDGETOWN COFFEE	Portland	MAO	\$0	Complied
KLAMATH VENEER		Klamath Falls	CP	\$800	Paid
LAMB-WESTON, INC.		Umatilla Co.	CP	\$800	Paid
LEER, INC.	GEM TOP	Clackamas	CP	\$9,995	Settled \$2,426
LOUISIANA PACIFIC CORP.		Pilot Rock	CP	\$800	Paid
MEDALLION INDUSTRIES, INC		Portland	CP	\$8,358	Payment schedule
NORTHWEST PIPE AND CASING		Portland	MAO	\$0	Complied
ONTARIO ASPHALT & CONCR.		Nyssa	CP	\$3,609	Paid
OREGON METALLURGICAL CORP		Albany	MAO	\$10,532	Paid
PACIFIC PIERCE MANUF.		Tigard	MAO	\$5,166	Paid
PATRICK INDUSTRIES, INC.		Woodburn	MAO	\$5,281	Settlement
PERMAPOST		Hillsboro	CP	\$1,600	Paid
PETERKORT ROSES, L.L.C.		Hillsboro	MAO	\$7,493	Paid
PORT OF PORTLAND	SWAN ISLAND SHIP	Portland	CP	\$3,600	Paid
PRAEGITZER INDUSTRIES		Dallas	MAO	\$8,117	Payment schedule
PREMIER INDUSTRIES, INC.		The Dalles	MAO	\$8,255	Paid
SCHULER CORPORATION		Salem	CP	\$2,439	Paid
SISTERS OF PROVIDENCE		Portland	CP	\$3,600	Paid
SMURFIT NEWSPRINT CORP.		Sweet Home	CP	\$3,874	Paid
SPACE AGE FUELS		Gresham	CP	\$8,830	Pending
ST. HELENS ROCK CO.		St. Helens	CP	\$1,400	Default
TAMCO		Gold Beach	MAO	\$12,242	Paid
TELEDYNE WAH CHANG		Albany	CP	\$6,000	Paid
THE BOEING COMPANY		Portland	CP	\$3,600	Paid
TILLAMOOK COUNTY CREAMERY		Tillamook	CP	\$70,000	Paid with SEP
WEYERHAUSER COMPANY		Klamath Falls	MAO	\$23,600	Paid
WILLAMETTE INDUSTRIES		Albany	MAO	\$40,040	Paid

The Department also entered into a number of Compliance Orders representing agreements made with small businesses in Portland's Volatile Organic Compounds Amnesty Project. For more information about the project see page 7. Below is a complete list of the participating businesses, including those businesses which signed their Compliance Orders in early 1996:

NAME	DOING BUSINESS AS	LOCATION	ACTION	ASSESSED	STATUS
ACME INDUSTRIES		Portland	CO	\$0	
AMER. MAILWELL ENVELOPE		Portland	CO	\$0	
ATLAS INDUS. COATINGS		Lake Oswego	CO	\$0	
BODEN STORE FIXTURES		Portland	CO	\$0	
CONTINENTAL BAKERY		Portland	CO	\$0	
CZ INKS		Portland	CO	\$0	
DEITER FRANCK, INC.		Portland	CO	\$0	
DELTA ENGINEERING		Tualatin	CO	\$0	
DIMENSIONAL FABRICATORS		Tigard	CO	\$0	

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VOC amnesty project cont.

NAME	DOING BUSINESS AS	LOCATION	ACTION	ASSESSED	STATUS
DYNAGRAPHS		Portland	CO	\$0	
FOUGHT AND COMPANY		Tigard	CO	\$0	
FRANZ BAKERY		Portland	CO	\$0	
FRED MEYER BAKERY		Portland	CO	\$0	
HEISLEY MARINE		Portland	CO	\$0	
HUGGY BEARS CUPBOARDS		Portland	CO	\$0	
MOLDED CONTAINER		Portland	CO	\$0	
PLANAR AMERICA		Beaverton	CO	\$0	
QUALITY MILLWORK		Portland	CO	\$0	
RODDA PAINT		Portland	CO	\$0	
RONO GRAPHICS		Portland	CO	\$0	
WILLAMETTE INDUSTRIES		Tigard	CO	\$0	
WILLAMETTE INDUSTRIES		Beaverton	CO	\$0	

6. *Stage II Vapor Recovery* -- The vapor recovery rules are designed to reduce harmful volatile organic compounds (VOCs) that escape into the atmosphere from gasoline dispensers. During 1995, the Department entered into two MAOs to bring gasoline stations into compliance with the vapor recovery rules. Seventy-six MAOs were issued in 1994 when the rules were first adopted. Below are the details of the 1995 cases:

NAME	DOING BUSINESS AS	LOCATION	ACTION	ASSESSED	STATUS
ANDERSON, LARRY	ANDERSONS SERVICE	Wilsonville	CP/DO	\$7,562	Payment schedule
PAAN, SEAN		Portland	MAO	\$0	Settlement

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B. WATER QUALITY

Table IV. A summary of the NONs and formal enforcement actions issued, in 1995, for violations of water quality law.

Program area	NON	NPV	Orders	CP	CP/O	Formal Actions	Total Penalties
Industrial Waste	149	9	7	5	4	25	\$88,681
Municipal waste	125	27	18	12	0	57	\$82,050
On-site	75	0	6	5	1	12	\$16,350
Storm Water	18	10	1	9	0	20	\$31,800
Total	367	46	32	31	5	114	\$218,881

1. Industrial Wastes Discharges -- DEQ issued 25 formal actions for a total of \$88,681 in civil penalties. Most of the penalties were assessed against repeat violators who exceeded the discharge provisions and limitations in their permits by discharging excessive pollutants into the waters of the state. Below is a table of parties receiving formal enforcement action for industrial-waste violations in 1995:

NAME	DOING BUSINESS AS	LOCATION	ACTION	ASSESSED	STATUS
A.E.STALEY MANUFACTURING		Stanfield	NPV		Complied
ADAMS, STACEY	ADAMS CARPET CLEANING	Near Meford	CP	\$800	Bankruptcy filed
BP OIL COMPANY		Beaverton	NPV		Complied
COASTWIDE READYMIX S & G		Tillamook	CP	\$1,000	Paid
DAUGHERTY, DALE & JULIE		Roseburg	DO		Contested
JELD-WEN, INC.		Klamath Falls	MAO	\$8,000	Paid
LAMB-WESTON, INCORP.		Umatilla	NPV		Complied
MASAMI FOODS, INC.		Klamath Falls	MAO	\$0	Complied
MCCALL OIL AND CHEMICAL		Astoria	MAO	\$0	Complied
NORTHWEST ESSENTIAL OILS		Ontario	CP/DO	\$3,600	Settled \$1,800
NORTHWEST ESSENTIAL OILS		Ontario	NPV		
OREGON METALLURGICAL CORP		Albany	NPV		Complied
OREGON METALLURGICAL CORP		Albany	MAO	\$0	Complied
OREGON STEEL MILLS, INC.		Portland	MAO	\$0	Complied
POPE & TALBOT		Halsey	NPV		Complied
RAKHRA MUSHROOM FARM		Vale	MAO	\$0	Complied
READY-MIX LTD. PARTNERSHP		Boardman	NPV		
ROSBORO LUMBER COMPANY		Springfield	NPV		Complied
ROSS ISLAND SAND & GRAVEL		Portland	NPV		Complied
SELMET, INC.		Albany	CP	\$17,184	Contested
SMITH FROZEN FOODS, INC		Near Weston	CP	\$900	Paid
SPACE AGE FUELS		Gresham	CP/DO	\$6,097	Contested
TELEDYNE WAH CHANG		Albany	CP	\$1,100	Paid
VALE, CITY OF		Vale	MAO	\$0	Complied
WEYERHAEUSER COMPANY		North Bend	MAO	\$50,000	Settled \$0, SEP

2. Municipal Waste Discharges -- The Department issued 57 formal actions for a total of \$82,050 in civil penalties. The majority of these violations related to outdated or overburdened septic systems or lift stations that failed and discharged raw sewage. Raw sewage can be a health hazard because of the pathogenic parasites it may contain. Many of these municipalities were placed on MAOs to bring the facilities back into compliance.

NON=Notice of Noncompliance; NPV=Notice of Permit Violation; CP=Civil Penalty Assessment; CO, DO, O=Order; MAO=Mutual Agreement and Order; PDN=Penalty Demand, PS=Payment Schedule.

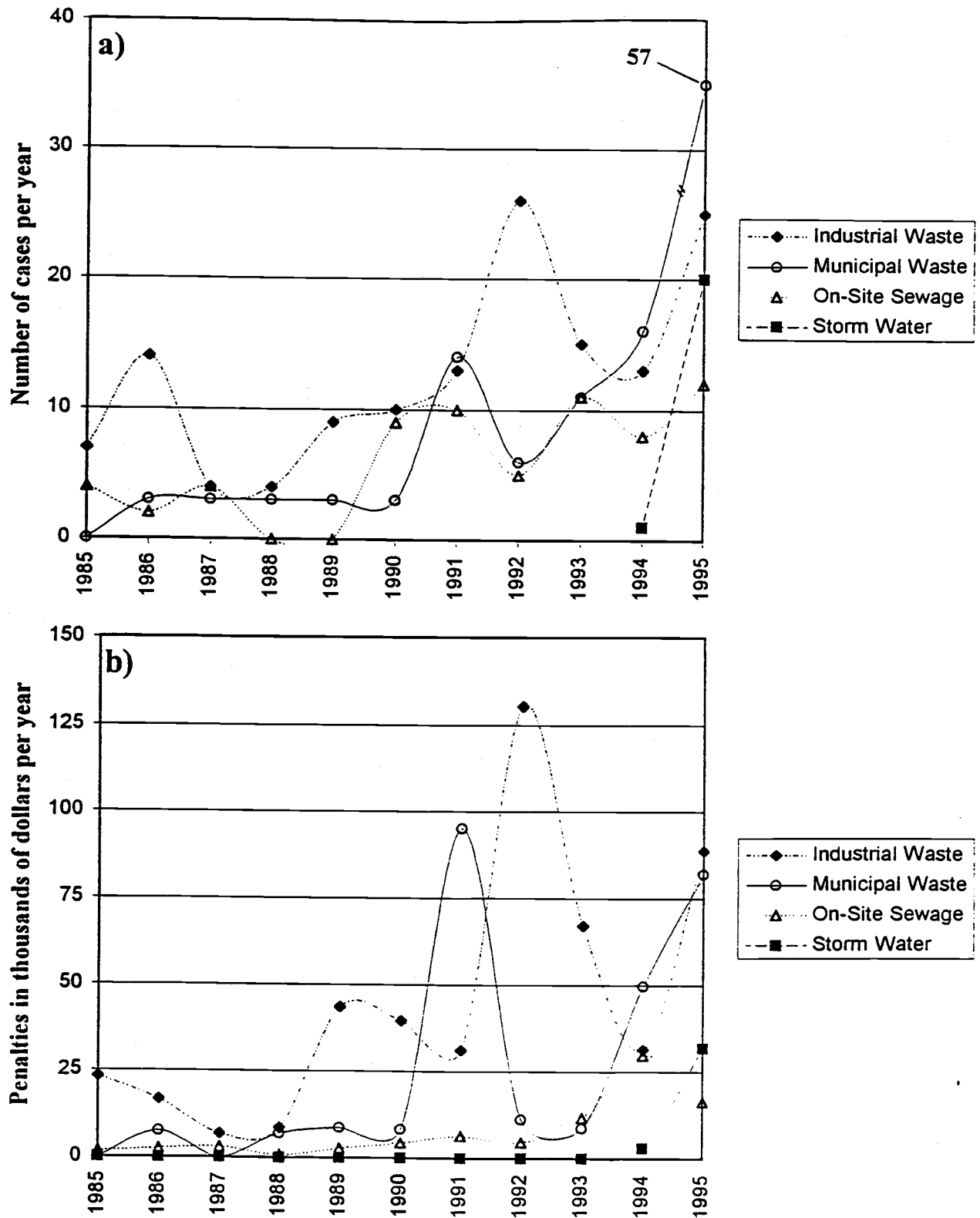


figure 3. Water Quality a) The number of cases per year in each program area. b) The total amount of penalties assessed each year in thousands of dollars per year for the program areas.

Below is a table of parties receiving formal enforcement action for Municipal-waste violations in 1995:

NAME	DOING BUSINESS AS	LOCATION	ACTION	ASSESSED	STATUS
AMITY, CITY OF		Amity	NPV		Complied
AMITY, CITY OF		Amity	CP	\$3,000	Contested
ASHLAND, CITY OF		Ashland	MAO	\$0	Complied
BABECKOS, WILLIAM & BETTY		Portland	MAO	\$0	Complied
BEND, CITY OF		Bend	NPV		Complied
BINDANA INVESTMENT CO.	BANDAC	Eugene	CP	\$6,600	PS
BINDANA INVESTMENT CO.	BANDAC	Eugene	PDN	\$800	PS
BINDANA INVESTMENTS CO.	BANDAC	Eugene	CP	\$6,780	Settled \$2,200 PS
BINDANA INVESTMENTS CO.		Eugene	PDN	\$28,000	Settled 27,000 PS
BROOKINGS, CITY OF		Brookings	NPV		Complied
BROOKINGS, CITY OF		Brookings	MAO	\$0	Complied
CANYONVILLE, CITY OF		Canyonville	NPV		Complied
CARLTON, CITY OF		Carlton	NPV		
CASCADE LOCKS, CITY OF		Cascade	MAO	\$0	Complied
CLOVERDALE SANITARY DIST.		Cloverdale	NPV		Complied
COMBS, CLIFF AND DIANE	CYPRESS GROVE RV PARK	Gold Hill	NPV		Complied
COOS BAY, CITY OF		Coos Bay	CP	\$9,900	Settled \$4,800
COTTAGE GROVE, CITY OF		Cottage Grove	MAO	\$0	Complied
CRESWELL, CITY OF		Creswell	NPV		Complied
DEPOE BAY, CITY OF		Depoe Bay	NPV		Complied
DUFUR, CITY OF		Dufur	NPV		
GARIBALDI, CITY OF		Garibaldi	MAO		EPOC program
GERVAIS, CITY OF		Gervais	NPV		
GERVAIS, CITY OF		Gervais	CP	\$1,800	Paid
GOLD BEACH, CITY OF		Gold Beach	NPV		Complied
GRESHAM, CITY OF		Gresham	MAO	\$0	Complied
HERMISTON, CITY OF		Hermiston	MAO	\$0	Complied
HUBBARD, CITY OF		Hubbard	NPV		Complied
JUNCTION CITY, CITY OF		Junction City	MAO	\$0	Complied
LEHMAN HOT SPRINGS, INC.		Umatilla	NPV		Complied
MERRILL, CITY OF		Merrill	NPV		Complied
NEWPORT, CITY OF		Newport	PDN	\$1,100	Paid
OAK LODGE S.D.		Milwaukee	MAO	\$0	Complied
OAKLAND, CITY OF		Oakland	CP	\$1,320	Paid
PILOT ROCK, CITY OF		Pilot	NPV		Complied
PORT ORFORD, CITY OF		Port Orford	NPV		Complied
PORTLAND, CITY OF		Portland	CP	\$9,600	Paid
PORTLAND, CITY OF	TRYON CREEK STP	Lake Oswego	NPV		Complied
POWERS, CITY OF		Powers	MAO	\$0	EPOC Program
RAINIER, CITY OF		Rainier	NPV		Complied
RAINIER, CITY OF		Rainier	MAO	\$0	Complied
REDMOND, CITY OF		Redmond	MAO	\$0	Complied
SEASIDE, CITY OF		Seaside	MAO	\$0	Complied
SEASIDE HEIGHTS DEV. LLC		Seaside	NPV		Complied
SIAW, CALEB	FOREST HAVEN MOBILE	Boring	NPV		
SWEET HOME, CITY OF		Sweet Home	NPV		
TONNESON	ROCKY POINTE MARINA	Portland	CP	\$1,400	Settled \$500
TWIN ROCKS S.D.		Twin Rocks	MAO	\$0	Complied
USA - FOREST GROVE STP		Forest Grove	NPV		Complied
USA - ROCK CREEK STP		Hillsboro	NPV		Complied
USA FOREST GROVE STP		Forest Grove	MAO	\$0	Complied
USFS-TIMBERLINE SKI AREA		Gov't Camp	MAO	\$0	Complied
VERNONIA, CITY OF		Vernonia	MAO	\$0	Complied
WALDPORT, CITY OF		Waldport	NPV		Complied

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Municipal waste discharges cont.

NAME	DOING BUSINESS AS	LOCATION	ACTION	ASSESSED	STATUS
WESTFIR, CITY OF		Westfir	NPV		Complied
WILLAMINA, CITY OF		Willamina	NPV		Complied
WILSONVILLE, CITY OF		Wilsonville	PDN	\$11,750	Paid

3. On-site Sewage-system Installation and Operation -- In order to reduce the amount of raw sewage discharged into the environment and to protect human health from exposure to potential pathogens in the sewage, the Department regulates on-site sewage system installation and operation. DEQ issued 12 formal enforcement actions in 1995, including 6 civil penalties totaling \$16,350. Below is a table of parties receiving formal enforcement action for on-site installation violations in 1995:

NAME	DOING BUSINESS AS	LOCATION	ACTION	ASSESSED	STATUS
EASTER, DONALD A.	MACE'S EXCAVATION	Grants Pass	CP	\$1,000	Paid
FRANK WRIGHT	SO. OREGON EQUIPMENT	Cave Junction	CP	\$3,400	Contested, PS
MCINNIS, DAVID		Portland	DO		Pending
OREGON COAST SANITATION	ROTO ROOTER PUMBING	Coos Bay	CP	\$2,200	PS
PERRY, LESLIE		Grants Pass	CP	\$1,600	Settled \$1,000

Below is a table of parties receiving formal enforcement action for on-site operation violations in 1995:

NAME	DOING BUSINESS AS	LOCATION	ACTION	ASSESSED	STATUS
ESTACADA MOBILE VILLAGE		Estacada	CP	\$1,600	Settled \$800
HANKINS, GERALD		Cave Junction	DO		Complied
MOONS AND HUMBERT		Umatilla Co.	MAO	\$0	Complied
PETERSON, KEN		LaPine	CP/DO	\$6,550	Contested
WALKER, RICHARD DALE	BEEF N' BREW	Butter Cr.	MAO	\$0	Complied
WATKINDS, STEVEN G.		Near	MAO	\$0	Complied
WYSS, RAYMOND		Tillamook	DO		Default

4. Storm Water -- The Department issued 20 formal actions for a total of \$31,800 in civil penalties. This was the second year that the Department issued penalties for the stormwater discharges. Stormwater runoff, which can contain sediment, petroleum products, pesticides, and other contaminants, is a significant source of pollution for Oregon's streams and rivers. Below is a table of parties receiving formal enforcement action for storm-water violations in 1995:

NAME	DOING BUSINESS AS	LOCATION	ACTION	ASSESSED	STATUS
A.L. CALCAGNO		St. Helens	CP	\$3,000	Settled \$400
A.L. CALCAGNO		St. Helens	NPV		Complied
BAYRIDGE DEVELOPMENT		Tillamook	CP	\$3,600	Settled \$1,000
CORBETT SCHOOL DIST. 39		Corbett	NPV		Complied
EPPING, LARRY	DEER RIDGE ESTATES	Salem	CP	\$3,600	Settled \$3,000
EPPING, LARRY	DEER RIDGE ESTATES	Salem	NPV		Complied
KVATERNICK, JOSEPH		Coos Bay	MAO	\$0	Complying
NORTHRIDGE DEVELOPMENT		Oregon City	CP	\$3,600	Settled \$3,000
NORTHRIDGE DEVELOPMENT		Oregon City	NPV		Complied
RANDALL REALTY CORP.		Wilsonville	CP	\$3,600	Settled \$3,000
RANDALL REALTY CORP.		Wilsonville	NPV		Complied
SEASIDE HEIGHTS DEVELOPMT		Seaside	NPV		Complied

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Storm water cont.

NAME	DOING BUSINESS AS	LOCATION	ACTION	ASSESSED	STATUS
SECURITY CAP.IND.TRUST		Portland	NPV		Complied
SECURITY CAP.IND.TRUST		Portland	CP	\$3,000	Settled \$1,000
TRI-MET		Portland Metro	NPV		Complied
TRI-MET		Portland Metro	CP	\$4,200	Paid
WILLIAM I. PETERSON ENG.		Devils Lake	NPV		Complied
WILLIAM I. PETERSON ENG.		Devils Lake	CP	\$4,200	Settled \$3,000
WILLIAMS, HOMER G.	THE SUMMIT JV NW	Portland	CP	\$3,000	Settled \$1,000
WILLIAMS, HOMER G.	THE SUMMIT JV NW	Portland	NPV		Complied

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C. WASTE MANAGEMENT AND CLEANUP

Table V. A summary of the NONs and formal enforcement actions issued, in 1995, for violations of waste management and cleanup laws.

Program area	NOV					Formal Actions	Total Penalties
	NON	/NPV	Orders	CP	CP/O		
Hazardous Waste	135	2	4	3	31	40	\$442,778
Spills	77	0	0	6	2	8	\$114,933
Solid Waste	91	4	2	1	2	9	\$62,600
(UST) Tanks	192	0	5	6	4	15	\$31,232
Total	495	6	11	16	39	72	\$651,543

1. Hazardous Waste -- Hazardous waste violations are the largest source of penalty actions because of the elaborate regulatory regime required to protect the public from harmful exposure to these toxic and dangerous materials. During 1995, DEQ issued 40 formal actions for a total of \$442,778 in civil penalties. This is more than the 29 actions resulting in \$287,427 in 1994. Below is a table of parties receiving formal enforcement action for hazardous waste violations in 1995:

NAME	DOING BUSINESS AS	LOCATION	ACTION	ASSESSED	STATUS
ASHLAND CHEMICAL		Portland	CP/CO	\$8,218	Settled \$4,618
BEND MILLWORK SYSTEMS		Bend	CP/CO	\$3,000	Paid
BLOUNT, INC.		Milwaukie	CP/CO	\$1,000	Paid
BUSHER, MICHAEL		Portland	CP/CO	\$10,000	Contested
CASCADE WOOD PRODUCTS		White City	CP/CO	\$1,100	Paid
CLIFF SMITH MOTORS		Hood River	CP/CO	\$1,000	Paid
COLT, TIM		Troutdale	CO		Complied
CROP PRODUCTION SERVICES		Umatilla	CP/CO	\$1,200	Paid
DESCHUTES CTY READY-MIX		Bend	CP	\$72,600	Contested
DURA INDUSTRIES, INC.		Portland	CP/CO	\$1,000	Paid
EAST SIDE PLATING		Portland	CP/CO	\$1,000	Paid
EDMAN CORP.	SCHNITZER STEEL	Bend	CP/CO	\$3,600	Paid
FLIGHTCRAFT INCORPORATED		Portland	CP/CO	\$4,800	Paid
GEORGIA PACIFIC WEST, INC		Toledo	CP/CO	\$800	Paid
GRAPHIC ARTS CENTER		Portland	CP/CO	\$7,200	Paid
GUNDERSON, INC.		Portland	CP/CO	\$3,982	Paid
HOLIDAY POOLS & SPAS		Eugene	CP/CO	\$1,200	Settled \$800
JACKSONVILLE CORP.		Wilbur	CP/CO	\$12,250	Contested
KK BOAT ENTERPRISES, INC.		White City	CP/CO	\$17,484	Contested
KLAMATH PACIFIC CORP.		Klamath Falls	CP/CO	\$8,000	Settle \$6,000 SEP
LAKEA CORP.	COLUMBIA AM PLATING CO	Portland	CP/CO	\$2,200	Paid
MAXWELL, DAN	PSI MANUFACTURING	St. Helens	CP	\$210,000	Default
MCCALL OIL AND CHEMICAL		Portland	CP/CO	\$2,400	Paid
NORTHWEST INDUSTRIES, IN.		Albany	MAO	\$0	Complied
NU PROCESS VINYL FABRIC.		Madras	NOV		Complied
OREGON BRASS WORKS		Portland	CP/CO	\$1,000	Paid
OREGON COAST SANITATION		Coos Bay	NOV		Complied
OREGON STEEL MILLS, INC.		Portland	CP	\$1,000	Paid
PECO MANUFACTURING		Portland	CP/CO	\$1,000	Paid
PUREFORMS, INC., ET.AL.		Portland	DO		Complied
R.S. DAVIS RECYCLING, INC		White City	CP/CO	\$6,000	Paid
SPACE AGE FUELS		Gresham	CP/CO	\$1,000	Contested

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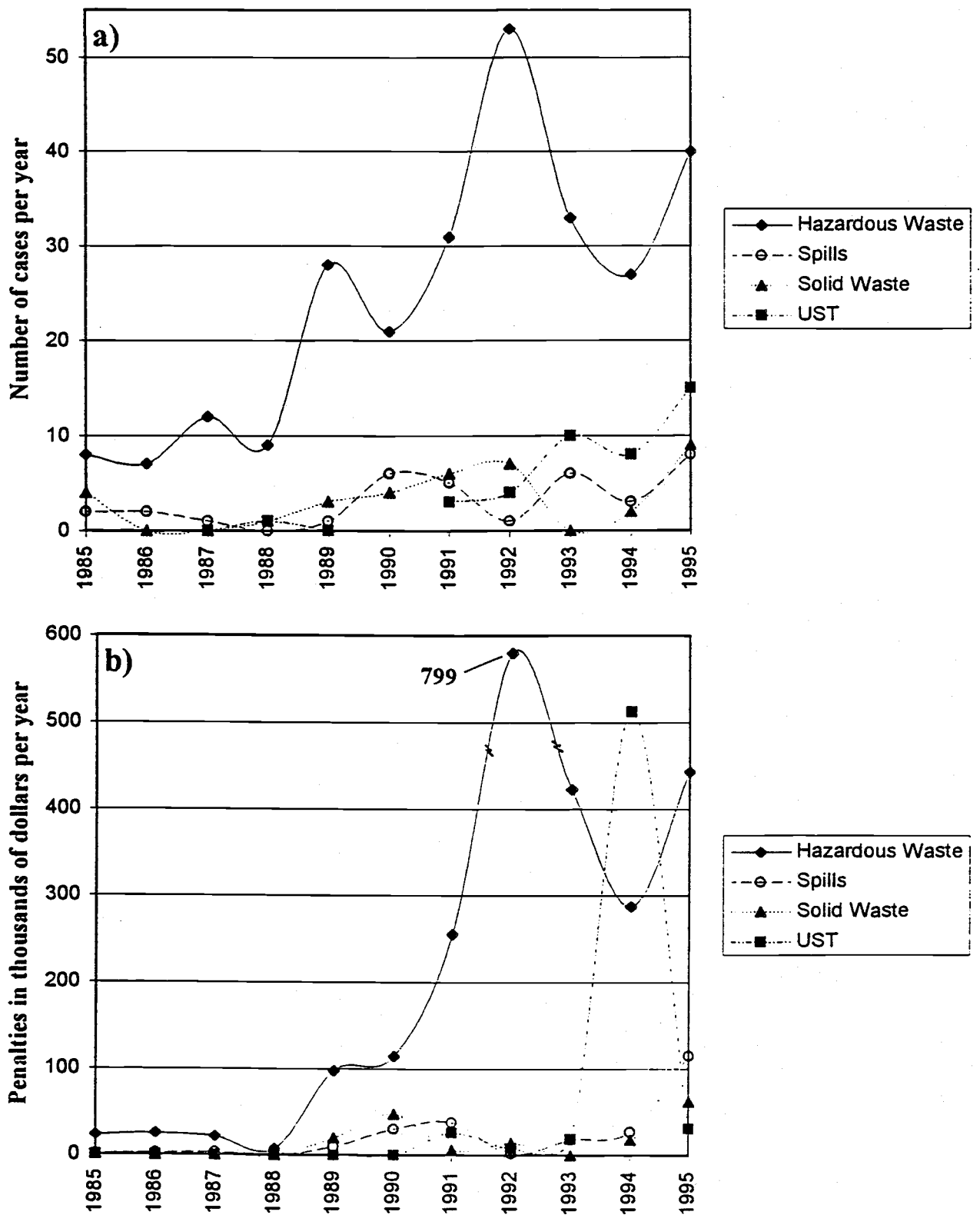


figure 4. Waste Management and Cleanup a) The number of cases per year in each program area. b) The total amount of penalties assessed each year in thousands of dollars per year for the program areas.

Hazardous waste cont.

NAME	DOING BUSINESS AS	LOCATION	ACTION	ASSESSED	STATUS
SPECIALTY FINISHES, INC.		Portland	CP/CO	\$5,500	Default
TANKLINERS, INC.		Hillsboro	CP/CO	\$20,200	Contested
TAYLOR, DENNIS LEON		Portland	CP/CO	\$3,175	Settled \$1,200
TEKTRONIX		Beaverton	MAO	\$0	Complied
THOMAS SALES AND SERVICE		Bend	CP/CO	\$4,800	Paid
US COAST GUARD		Tongue Pt.	CP/CO	\$3,000	Settled \$1,000
WAGSTAFF BATTERY MANUF.		Portland	CP/CO	\$6,669	Settled \$2,400
WESTERN COMPLIANCE SERV.		Sherwood	CP/CO	\$15,400	Settled \$14,800

2. Solid Waste -- Improperly disposed solid waste can contaminate soils, cause polluted runoff to surface and groundwater, and create a public nuisance. The Department issued 9 formal actions for a total of \$62,600 in civil penalties for violations of operating solid waste disposal sites without a permit. These include four NPVs. Below is a table of parties receiving formal enforcement action for solid-waste violations in 1995:

NAME	DOING BUSINESS AS	LOCATION	ACTION	ASSESSED	STATUS
DEVILS LAKE ROCK LAKE COUNTY		Lincoln County	CP/DO	\$27,000	HO reduce to 7200
LAKE COUNTY		Lakeview	CP	\$2,000	Contested, SEP
LAKE COUNTY		Christmas	NPV		Complied
LAKE COUNTY		The Landfill	NPV		Complied
LOKKEBERG, STEVEN		Boring	NPV		Complied
OREGON COAST SANITATION		Coos Bay	NPV		Complied
RMAC INTERNATIONAL, ET.AL		Troutdale	DO		Contested
SPACE AGE FUELS		Gresham	CP/DO	\$3,600	Contested
STIEHL, THERON		Rogue River	DO		Contested

3. Spills -- The Department issued 8 formal actions and assessed \$114,933 in civil penalties against persons who spilled or discharged oil or hazardous materials, or failed to clean up the spills. In cases where the material was spilled through a negligent or intentional act, the Department had statutory authority to double the penalty. The Department is concerned about the spills, especially spills into waters of the State, because the cumulative effects of many spills can create significant damage to the environment and pose a danger to public health. Below is a table of parties receiving formal enforcement action for spill violations in 1995:

NAME	DOING BUSINESS AS	LOCATION	ACTION	ASSESSED	STATUS
COLUMBIA HELICOPTERS, INC		Mosier Creek	CP	\$10,800	Settled \$4,200
JACK GRAY TRANSPORT INC.		Hwy. I-84	CP	\$6,000	Paid
JERRY BROWN COMPANY		Eugene	CP	\$6,000	Paid
LIMEX TRANSPORTATION, INC		Portland	DO	\$61,333	Settle \$21,618 PS
LINTON PLYWOOD, INC.		Portland	CP	\$3,000	Paid
MORRELLO, FRANK ALFRED	TUG SUZY Q	Upper Klamath	CP	\$9,800	Contested
ROY WEBSTER ORCHARDS,		Hood River Co.	CP/CO	\$4,800	Paid
WOOD, MICK	M.R. WOOD OIL COMPANY	Waldport	CP/DO	\$8,400	Contested

4. Underground Storage Tanks -- The Department issued 15 formal actions under the underground storage tank (UST) rules for a total of \$31,232 in civil penalties during 1995, compared to 10 formal actions for a total of \$512,605 in civil penalties for 1994. However most of the 1994 penalties were due to a single case worth \$480,000. Most of the 1995 civil penalties were based on violations for improperly decommissioning USTs or

NON=Notice of Noncompliance; NPV=Notice of Permit Violation; CP=Civil Penalty Assessment; CO, DO, O=Order; MAO=Mutual Agreement and Order; PDN=Penalty Demand, PS=Payment Schedule.

for failing to submit proper notices and permits. The Department uses the notice-and-permit system to track USTs, identify any potential contamination, and ensure general compliance with the UST rules. Below is a table of parties receiving formal enforcement action for UST violations in 1995:

NAME	DOING BUSINESS AS	LOCATION	ACTION	ASSESSED	STATUS
ACT ENVIRONMENTAL		Milwaukie	CP	\$3,600	Contested
ANDERSON, LARRY	ANDERSON'S SERVICE CTR.	Wilsonville	CP/DO	\$1,600	PS
DESCHUTES CTY READY-MIX		Bend	CP/DO	\$6,000	Contested
DOUGLAS CO. FARMERS CO-OP		Roseburg	MAO	\$0	Complied
EXUM, ROY		Rice Hill	CP	\$3,846	Contested
FAKHOURY, NADER		St. Helens	CP/DO	\$2,840	Settled \$1,400
LEATHER'S ENTERPRISES INC		Portland	CP	\$9,600	Settled \$4800
M.E. MOORE CONSTRUCTION		St. Helens	CP	\$1,346	Contested
NELSON PAINT COMPANY		Lane Co.	MAO	\$0	Complied
OR CONFERENCE SEVENTH DAY		Linn County	MAO	\$0	Complied
OVCHINNIKOFF, MIKE		Salem	DO		Complied
PEMCO, INC.		Portland	CP	\$600	Paid
PEMCO, INC.		Astoria	CP	\$1,000	Settled \$500
SOUTH LANE SCH.DIS. 45J3		Lane Co.	MAO	\$0	Complied
SPACE AGE FUEL		Portland	CP/DO	\$800	Contested

NON=Notice of Noncompliance; NPV=Notice of Permit Violation; CP=Civil Penalty Assessment; CO, DO, O=Order; MAO=Mutual Agreement and Order; PDN=Penalty Demand, PS=Payment Schedule.

V. ENVIRONMENTAL CRIMES PROGRAM

1. Structure of DEQ's Program

In 1993, Oregon enacted a series of environmental-crimes laws that provide authority for the criminal prosecution of extreme violations of environmental law. These statutes are administered by the Oregon Department of Environmental Quality with assistance from state and local coordination teams which provide direction for, and augment communication between, the environmental regulators, county emergency response teams, law enforcement officers, and criminal prosecutors. As Oregon's primary environmental-enforcement agency, DEQ leads the development of the statewide environmental enforcement program.

Toward this end, in 1994, DEQ organized an Environmental Crimes Coordination Team composed of representatives from DEQ, Oregon State Police, the federal Environmental Protection Agency, the Oregon Department of Justice, and the Federal Bureau of Investigation. Once a week, the Team meets to discuss environmental crimes. The Team discusses whether to initiate a full criminal investigation based on evidence supplied by federal, state and local regulators, law enforcement agencies, citizens and other individuals and agencies. In deciding whether to go forward with the criminal case, the Team considers:

- a. The violator's *history* of noncompliance -- If the violator has a history of violating the environmental laws, criminal enforcement may be warranted as a punishment and deterrent.
- b. The violator's *culpability* -- A criminal investigation may be warranted if the violator was intentional, deceitful, deliberate or dishonest in committing the violation.
- c. The *results* of the violator's conduct -- Violators who cause a threat to public health or environmental damage are more likely to be prosecuted criminally than violators whose acts did not cause actual harm or threat of harm.

In some cases the Team, using investigative discretion, determines that the alleged conduct does not meet the criteria as an environmental crime, and that the DEQ inspector should proceed with a civil enforcement action. In other cases, the Team determines that the state or federal law enforcement officers should initiate a criminal investigation. The Team also discusses the progress of ongoing investigations and strategies based on resource availability and the particular needs of the investigation. Any decision to commit DEQ's resources to a criminal investigation is made after consulting with the DEQ Director.

2. County Environmental Crimes Response Teams

The Multnomah County District Attorney's Office has organized an interagency response team to investigate environmental crimes that occur in Multnomah County. The

Multnomah County Environmental Crimes and Emergency Response Team was organized to ensure interagency communication and coordination. The agencies involved include: the Department of Environmental Quality, the Multnomah County District Attorney's Office, the Portland Fire Department and Hazmat Team, the Gresham Fire Department and Hazmat Team, the Multnomah County Sheriff's Office, METRO, and the Oregon State Police. The team is developing written protocols to be followed when a potential environmental crime is discovered. The team will be available 24 hours a day to respond to any environmental crime where immediate action is required.

Although Multnomah County is furthest along in developing its team, other counties are also examining their environmental response systems and are in the process of reaching similar agreement on criminal responses.

3. Sanctions Imposed

Since its inception, the Environmental Crimes Coordination Team discussed almost 200 potential crimes and referred over 50 to the law enforcement officers for criminal investigation. Of these, 12 hazardous waste cases, 4 asbestos cases, 5 water quality cases and an underground storage tank case have been referred to state and federal prosecutors. So far, these have led to the charging of approximately 20 environmental crimes. As a result of subsequent misdemeanor and felony prosecutions, criminal sanctions imposed in 1995 included the following:

- A husband and wife team, respectively the president and secretary of a plating company, performed plating operations on contract without properly disposing of any of the resulting waste sludges. When under investigation, the pair fled, abandoning 43,000 gallons of hazardous wastes and a number of unfulfilled contractual obligations. The pair were found guilty of six counts of illegal storage and disposal of hazardous wastes in the first degree, supplying false information to a state agency, and theft. He received a sentence of 14 months jail, 3 years supervision, and \$18,000 in restitution to injured parties. She received a sentence of 120 hours community service, 5 years probation, and \$5,000 in restitution to injured parties.
- A corporation and its president pled guilty to two counts of unlawful disposal of hazardous wastes when it was discovered that they had dumped chrome-plating solutions and contaminated an aquifer in a residential area. The plater knew the aquifer was contaminated, and began to supply bottled water to a neighboring resident, but did not tell her that her well-water was contaminated. In a negotiated settlement, the corporation and president agreed to pay a continuing fine of \$3,000 per month plus 40% of the future profits until the cleanup is completed and all costs of cleanup are repaid. The agreement also required 100 hours of community service, 5 years probation, and \$30,000 in restitution to the injured neighbor.
- A fuel and used oil processor was discovered illegally accepting hazardous wastes and illegally blending hazardous wastes for energy recovery in a boiler. In settlement, the

corporation agreed to bring the facility into compliance, to conduct studies and submit compliance reports, to pay a \$133,000 penalty, and to 4 years of probationary oversight. The processor has violated the terms of its probation and the Department is currently seeking additional sanctions.

Chapter 10

Funding and Economic Incentives Proposals

Overview

The OCSRI Plan is a comprehensive effort to conserve and restore coastal populations of salmon, steelhead, and trout to levels that are considered healthy and capable of supporting fisheries. Many of the actions proposed to accomplish this goal have already been implemented and will be maintained under existing state and federal agency budgets. Many actions initiated or proposed to restore the productive capability of habitats that support salmon production represent voluntary contributions by private landowners. Many other elements of the OCSRI will require new funding sources.

Oregon clearly understands the importance of adequate funding to implement the OCSRI. The purpose of this section is to describe the opportunities that are being pursued to secure the needed funding.

STATE FUNDING

Introduction

The proposed state funding package is contained in the Governor's 1997-99 Recommended Budget. The Oregon Legislative Assembly is currently considering the Governor's Recommended Budget. There are three principle elements of the budget related to implementation of the OCSRI: the Natural Resource Investment Budget, natural resource agency current service level budgets, and agency policy option packages.

Governor's Natural Resource Investment Budget

The Governor's recommended Natural Resource Investment Budget totals approximately \$60 million. This budget element would invest approximately \$30 million in the Oregon Coastal Salmon Restoration Initiative and the Healthy Streams Partnership, a critical element of the OCSRI. As proposed, the Investment Budget is funded through a new excise tax on returnable beverage containers. The proposed surcharge will generate between \$60 million to \$100 million in revenue per biennia when applied to an estimated 1.1 billion containers returned under the existing bottle bill.

The Natural Resource Investment Budget provides \$20 million in grant funding to support watershed council coordinators and other local organizations, including Soil and Water Conservation Districts; monitoring activities; and grants to landowners. The existing Governor's Watershed Enhancement Board will administer the grant program. The budget also provides approximately \$10 million to add technical staff resources in the Department of Agriculture (19 positions), Department of Environmental Quality (19 positions), Department of Fish and Wildlife (14 positions), Department of Forestry (6 positions), Water Resources

Department (4 positions), and Department of Land Conservation and Development (1 position). The investment budget funding proposal for each state agency is described below.

Department of Agriculture

Water Quality: (Approximately \$3.1 million Other Funds, 16 positions, 16.38 FTE) Allows the department to develop and carry out management plans to meet state water quality standards in basins where agricultural nonpoint source pollution is a significant factor. Funding provides the department with the capability to meet mandated responsibilities and increased workload associated with expanding nonpoint water quality programs. The positions include six regional coordinators and seven technical specialists responsible for completion of management plans for water quality limited basins, a program coordinator, a fiscal support specialist, and an office specialist. In addition, \$1.1 million is included to support local organizations working on nonpoint source issues.

Confined Animal Feeding Operations (CAFO): Approximately \$380,500 Other Funds, 3 positions, 3 FTE) Provides resources for the department to work with CAFOs to improve the level of compliance with water quality regulations. The department will monitor compliance of all permitted CAFOs through a periodic inspection system and provide educational outreach and technical assistance to landowners. Two of the positions will be regional enforcement inspectors and one will provide courtesy inspections.

Department of Environmental Quality (Approximately \$2.5 million Other Funds, 19 positions, 19 FTE) Provides the department with staff necessary to complete water quality plans in subbasins. The positions will be located in field offices and the laboratory and would monitor water quality, develop total maximum daily loads, allocate pollution loads, and modify permits to stabilize and restore stream health, and eventually remove streams from the 303(d) list. The proposed funding would also be used to purchase water quality monitoring equipment, supplies and services for the laboratory. The positions will include 10 positions focused on data collection, analysis and evaluation: 4 total maximum daily load (TMDL) specialists, 2 water quality monitoring specialists, 2 watershed monitoring specialists, 1 TMDL modeler, and one state water quality specialist. Nine positions will focus on TMDL development and technical assistance: 4 nonpoint source specialists, 3 basin TMDL specialists, and 2 complex TMDL permit specialists.

Department of Fish and Wildlife (\$2.2 million Other Funds, 14 positions, 14 FTE) Adds 3 positions to undertake index stream monitoring to estimate wild salmon smolt production from selected, previously sampled, streams that can provide historical comparison, 3 positions to monitor core habitat to provide protection, adaptive management, habitat enhancement, and population re-establishment; 3 positions to provide technical support to private interests, watershed councils, and others on habitat protection and restoration in the north, central and south coast areas; 2 positions to coordinate and implement the OCSRI monitoring plan; 1 position to coordinate implementation of the OCSRI; and two positions to improve education and outreach efforts to local communities.

Department of Forestry (Approximately \$1.1 million, 6 positions, 5.75 FTE) Adds resources for three projects: fish presence surveys, technical assistance for landowners (5 positions) and integrated forest resource assessments (1 position). Fish presence surveys will identify the upper limits of fish distribution to classify streams as required by the Oregon Forest Practices Program water protection rules. Technical assistance positions will provide more resources to ensure that water protection rules are adhered to during a timber harvest. The integrated forest resource assessment will allow the department to incorporate an integrated look at multiple forest resources, and determine the effect of forest practices and policy decisions.

Governor's Watershed Enhancement Board (GWEB) (Approximately \$482,200 Other Funds, 4 positions, 4 FTE) Funding would restore GWEB staff to its 1995-97 level and add one position. Restoration is necessary to continue the current grant program and expand it as envisioned in the investment budget. The intent is to use GWEB as the state's natural resource granting body, with technical groups to advise on particular grant issues. Two of the three positions being restored are field staff positions that work with local watershed councils; the other position provides fiscal grant management for the program.

Department of Land Conservation and Development (Approximately \$114,000, 1 position, 1 FTE) Adds one position to coordinate and provide technical assistance to agencies and coastal cities and counties that have resource management responsibilities for implementation of the Coastal Nonpoint Source Pollution Control Program.

Current Service Level Budgets and Policy Option Packages

The Governor's 1997-99 Recommended Budget supports numerous programs in state natural resource agencies that contribute to the OCSRI at current service levels. These programs are reflected in the agencies' proposed measures. To build on this existing base of agency resources, the budget also includes a number of "policy options packages" that represent new funding above current service levels. The packages directly related to the OCSRI are described below.

Department of Fish and Wildlife (\$1.1 million General Funds, 10 positions, 10 FTE) Funds habitat biologists who would offer technical support on fishery issues to local communities and watershed councils and other state and federal agencies making permit decisions that affect fish.

Department of Fish and Wildlife (\$200,000 General Funds) Provides funds to support Oregon's share of the multi-state For the Sake of the Salmon effort. Other participating states include Washington, Idaho and California.

Department of Forestry (\$250,000 General Fund, \$250,000 Other Funds, 5 positions, 4.25 FTE) Adds staff to provide small forest landowners with assistance to help them voluntarily invest in practices that will accelerate the improvement of clean water in streams and restore salmon habitat while managing their forest lands.

Division of State Lands (Approximately \$194,000 Other Funds, 2 positions, 2 FTE) Adds positions to help agency meet statutory mandate of prompt permit application review and enforcement actions for the removal or fill of more than 50 cubic yards of material in all waters of the state.

Water Resources Department (Approximately \$1.9 million General Funds, 11 positions, 11 FTE) Adds eight field staff to support water users, watershed councils and the public. Adds funds for one limited duration position and contract funds for ground water studies of the Klamath, Rogue, and South Coast basins. Adds two information services staff positions to improve central data management.

Two other policy option packages would restore existing positions related to OCSRI implementation in the Department of Environmental Quality and State Police.

Department of Environmental Quality (Approximately \$2 million Other Funds, 14 positions, 14 FTE) Restores 14 existing positions that provide permitting services to point sources that discharge polluted wastewater.

State Police (Approximately \$2.1 million General Funds, 13 positions, 13 FTE) Restores staffing for 13 Fish and Wildlife Division positions. The positions are responsible for enforcement of fish and wildlife rules and regulations, environmental crime enforcement, fill/removal regulations, water quantity and quality and other natural resource rules and regulations. The positions will be directed toward salmon restoration and protection and healthy streams.

FEDERAL FUNDING

The federal contribution in the OCSRI is important primarily in terms of what federal agencies offer in their management of public lands, but also in their ability to bring intergovernmental and interagency assistance to local communities.

The Federal Agency Workplan section (Chapter 17D) of this plan provides details of programs that have been authorized by Congress over the years as well as the technical assistance, activities and legal requirements that agencies are able to commit to with current budgets (Phase 1). They describe memoranda of understandings that facilitate coordinated efforts among agencies and provide greater efficiencies with the available dollars. They also detail what they would be able to provide under their congressional mandates and authorities given additional funds (Phase 2).

It is important to note that some of the authorized programs described currently provide the authority for programmatic activity, but are not funded or are not currently available for much funding in the range of the coastal coho under the constraints of federal regulations. Similarly, while the federal agencies' Phase 2 efforts are important to salmon recovery, they will need to be Congressionally funded in an era of federal budget reductions, and an unfavorable shift in congressional seniority away from Oregon. The Governor's Office,

members of the Oregon Legislative Assembly, along with numerous other interest groups and Oregonians, will work with the Oregon Congressional delegation, other members of Congress, and the Administration to try to obtain this needed federal funding for efforts to restore coho salmon runs.

Proposals for Economic Incentives

Introduction

The OCSRI Plan represents a comprehensive effort to conserve and restore coastal populations of salmon, steelhead, and trout to levels that are considered healthy and capable of supporting fisheries. Many of the actions proposed to accomplish this goal have already been implemented and will be maintained under existing state and federal agency budgets. Funding some activities has already required reprogramming of agency budgets. Many actions initiated or proposed to restore the productive capacity of habitats that support salmon production represent voluntary contributions by private landowners. Many other elements of the OCSRI Plan will require new funding sources.

The purpose of this section is to describe a number of opportunities that will be pursued to provide needed funding for implementation of Oregon's conservation plan. Many aspects of future funding are not clear at this time. Additional information will be provided to NMFS, cooperating agencies, and stakeholders as soon as it is available. The following information is provided in this section:

- Needs and options for state funding
- Needs and options for federal funding
- Proposals for economic incentives

Preliminary Recommendations for OCSRI Incentives Programs

Introduction

Five proposals have been developed in response to Oregon's Coastal Salmon Restoration Initiative to provide incentives for measures that will impact coastal salmon restoration in Oregon. The proposals represent, in no particular priority, the best recommendations for the OCSRI from dozens of currently proposed ideas for biodiversity in the Northwest. While the first incentive recommendation is easy and inexpensive to implement, the other four pose tougher policy and fiscal choices. If fully implemented, however, the proposals would have significant short- and long-term impacts for salmon and land stewardship in general.

These proposals are based upon an extensive search of current reports and other materials regarding incentives for biological diversity, environmental restoration, and endangered species protection, in addition to consultations with individuals and organizations working on similar projects across the United States. The proposals in this report are provided to the OCSRI as

recommendations for action by the Governor, the Legislature, and other interested parties. A timetable for making decisions regarding these possible incentive programs has not yet been established. At the present time, For The Sake Of Salmon (FSOS) is also working on a parallel track to prepare a series of recommendations for incentive programs that will be endorsed by the Executive Committee for local, state, regional and federal action in late 1996.

Proposal 1 - Design and Implement a Watershed Stewardship Award Program

The simplest and least expensive incentive for private landowners is official recognition and praise for their efforts to do the right thing in management of their land for salmon protection and restoration. Giving praise plentifully and strategically is a powerful tool. People everywhere want to be appreciated.

Recommendations for Proposal 1

1. The Governor's office should immediately design and implement an awards program recognizing individual landowners for outstanding projects to restore private lands for salmon restoration. Awards would be made on an occasional basis year round with the Governor personally presenting appropriate plaques and recognition in public ceremonies at county fairs, Chamber of Commerce luncheons, and other events or meetings. The awards should be dated and specific, relating the award to projects done in a certain time frame.
2. An additional "Stewardship Master" award could be given annually to an individual or family who has demonstrated an outstanding long-term commitment to land management for biodiversity. The award could be named for a state or community leader, and possibly be called "Governor's Steward of the Land Award" or some other "in honor of" designation.
3. Nominations could come from various sources including individuals, organizations, and state agencies. To give the awards some weight, an advisory panel could be appointed to evaluate and recommend nominations to the Governor two or three times a year.
4. A separate category of equivalent awards should be implemented to recognize business and nonprofit organizational leadership in these areas.
5. All departments represented in the OCSRI should also implement similar award programs within their agencies.

Proposal 2 - Significantly Modify and Expand the Riparian Tax Incentive Program

A consensus exists among many constituencies that the existing riparian tax credit incentive program, due to end in January 1997, is a good idea but is (as currently funded and implemented) of marginal practical value for most eligible landowners. For current use of agricultural lands, the property tax credit amounts to an insignificant benefit relative to the paperwork involved.

Recommendations for Proposal 2

1. In addition to its existing applicability, make the Riparian Tax Incentive Program available within urban growth boundaries. Urban streams have, and can provide, significant salmon habitat; many still have some useful habitat in place. Examples, such as Johnson Creek in

the Portland area and many others around the state, would show major benefits with a significantly expanded program. Keep the credit applicable to property tax within the urban growth boundaries.

2. For lands outside the urban growth boundary, make the tax credit applicable to the income tax. This would likely carry a heavier incentive for many exclusive farm and forest landowners, and also would be much easier to quantify and measure.
3. Significantly expand the number of field habitat restoration biologists within ODFW to support landowners in restoration design and implementation.

Proposal 3 - Provide a Bonus to Local Governments That Meet or Exceed Salmon Restoration Performance Standards in Road Operation and Maintenance

Local transportation departments have reduced budgets, so any incentive that would generate additional funds for their departments would attract great efforts.

Recommendations for Proposal 3

1. Provide a 10 percent bonus to local transportation block grants for local governments that meet design and operation standards for salmon passage and habitat restoration projects on local highways.

Proposal 4 - Federal Estate Tax Reform

Federal estate tax requirements are a major obstacle for private landowners who have been sensitive of their lands' environmental value and would like to pass their land to their heirs without destroying that value. The imposition of federal estate taxes, however, often forces large parcels of environmentally valuable land to be divided into smaller, less environmentally valuable parcels. Some of the best remaining habitat for endangered species is put at risk in this manner.

Federal law imposes a tax on the amount of a decedent's estate in excess of \$600,000. The tax begins at a rate of 37 percent and climbs to 55 percent for estates in excess of \$3 million. For estates in which undeveloped land represents a significant portion of the estate's total value, the need to pay the federal tax creates powerful pressure to develop or sell part or all of the land, or to liquidate the timber or other resources of the land.

Because land is appraised by the Internal Revenue Service according to its "highest and best use" and such use is usually deemed to be its fully built-out value, the effect of the tax is to make retention of undeveloped land in forest or other undeveloped condition difficult at best. For farmers, ranchers, forest landowners, and others who are "land rich and cash poor," the federal estate tax is a widely perceived threat to the ability to pass on the family's property to the next generation, or to allow that generation to permanently preserve its natural resource values.

Efforts to reform estate tax law pertinent to protecting endangered species and managing for biodiversity should have two goals: (1) keep large parcels of environmentally sensitive land intact, and (2) ensure this land is managed for biological diversity and species protection. To

address this problem, the Governor should support several provisions of estate tax reform currently seeing a fair amount of support in Congress and with a good prognosis for action in the next session.

Recommendations for Proposal 4

1. To bolster donation incentives, the estate tax law should be changed to explicitly allow the estate or heirs to do what the decedent could have done before death, namely allow the estate to make a tax-deductible gift of land or an interest in land to a qualified organization. This change would not only allow the estate to reduce the value of the taxable estate and thereby decrease the amount of taxes payable by the estate, but would also ensure that the land ended up in conservation ownership or with conservation restrictions.
2. A second, more attractive proposal, would be to go one step further by providing that any gifts of land, or interest therein, with endangered species habitat from an estate to a qualified conservation organization would give the estate a tax *credit* rather than a simple deduction. Not only would this provision reduce the amount of taxable estate, it would also provide a credit against any tax owed.
3. Landowners could also be given the opportunity to reduce their estate tax burden in return for voluntarily entering into revocable agreements to manage their lands in ways that benefit endangered species. To qualify, the owner or executor would need to enter into a written agreement with the Secretary of Interior (or a state fish and game agency if a suitable agreement existed between the Secretary and the state agency) to manage an identifiable parcel of land in a way that provided significant benefits to endangered species. Such management could include measures not otherwise required by law, or an agreement to refrain from activities not prohibited by law.
4. Landowners already practicing beneficial habitat management may need only agree to continue existing uses and to forgo other legally permissible uses. The heirs would, however, be liable for any tax originally due with respect to the property aside from the agreement if the heirs subsequently ceased to honor the conservation agreement, or if they disposed of the property without securing the agreement of the new owners to continue the conservation agreement and assume the tax liability in the event of a breach. The amount of any tax then due should be adjusted to reflect any intervening changes in the land's value not relative to improvements thereon. In this manner, heirs can (for as long as they wish) effectively defer estate tax due on a parcel of land at the time of death of the person from whom the property was inherited. By maintaining the conservation agreement indefinitely, they escape the estate tax on property altogether.

Proposal 5 - Incentives for Decommissioning Roads and Conducting Concurrent Habitat Restoration on State Lands

The construction and use of highways and forest roads carries the potential to degrade and pollute natural systems, including nearby streams. While the Northwest's network of highways (which covered 220,000 miles in 1994) has expanded relatively little since 1960, forest roads have proliferated. In Oregon alone the number of forest roads has more than tripled since 1960; and in both Idaho and Washington, they have more than doubled.

According to the Department of Forestry, state forest lands will be spending over \$5 million during the next two years for restoration of roads, replacement of culverts, and repair of other stream crossing structures damaged by the February 1996 storm and floods. State forest lands are also proposing to spend an additional \$15 million over the next six years to improve roads including stream crossing structures. This effort will upgrade approximately 130 miles of road in each biennium. The majority of these roads are in the Tillamook Bay watershed.

Recommendations for Proposal 5

1. Rather than limit mitigation of damage on salmon (caused by roads), to improved passage and improvements, Oregon (given its much higher density of forest roads than the rest of the region) should set an example to the federal and private land managers by providing incentives for decommissioning roads on state lands and restoring the habitat in the process. One possible incentive could be an increase for a specific period of time in the operating budget of a state forest per every 10 miles of decommissioned roads with concurrent habitat restoration.
2. The OCSRI should also consider designing federal incentives for decommissioning of national forest roads.

Chapter 11 Changes in Management Related to Risk Agents

Harvest Management

The purpose of this section is to give a broad overview of the recent and substantial decline in fishery-related mortality of wild coastal coho, and to describe exploitation rates that are expected to be associated with future fishery management measures. Additional technical information is contained in ODFW's management measures and in previous published status reviews.

Coho salmon have been harvested in Oregon since the mid-1800s. Initially, most harvest occurred in terminal gill-net fisheries located at the mouths of most coastal river basins. These fisheries were almost entirely eliminated by the mid-1950s, and none occur presently. Ocean commercial troll fisheries were initiated sometime around 1912. By 1919 there were one to two thousand boats fishing off the mouth of the Columbia. Troll fisheries rapidly expanded to become the primary fishery on Oregon coastal coho stocks. Ocean recreational fisheries for Oregon coho increased in the 1950s and peaked from about the mid-1970s to mid-1980s. The exploitation rate of ocean fisheries on coho generally increased in concert with growing commercial and recreational fleets and peaked near an estimated 90 percent in the mid-1970s. Since then, fishery restrictions based on conservation concerns have gradually reduced exploitation rates to levels less than 15 percent. The prognosis is for fishery exploitation rates on Oregon coastal coho to remain below 15 percent until substantial stock recovery occurs.

This section summarizes the chronology of fishery exploitation of Oregon coastal. Estimates of fishery-related mortality are more reliable since 1970. Oregon's proposed regime for managing future ocean salmon fisheries that affect coastal coho is designed to obtain measurable and substantial recovery of depressed populations prior to allowing the possibility to increase ocean salmon fishery opportunities. This is achieved by requiring attainment of spawner escapement rebuilding criteria in four discrete geographical groupings of coastal coho stocks in the parent generation, before modest increases in harvest opportunities on their progeny are allowed.

The matrix at the end of this section of the chapter (Proposed Fishery Management Regime) illustrates the proposed fishery management regime for each stock sub aggregate, with parent spawner escapement and current marine survival as the adjustment criteria for a particular allowable fishery impact rate. Total fishery impacts represent all fishing-related mortality, including both marine and freshwater fisheries and from both retention and catch and release fishing. Fishery impact rates range from a low of less than 15% under conditions like 1994-96 to a high of up to 35% if two generations of spawner rebuilding have been demonstrated and marine survival is high enough to expect continued improvements in spawner escapement for a third generation.

Focusing first on the lowest row in the matrix, fishery impacts are proposed to remain at < 15% if parent spawners of a stock sub aggregate have not achieved the lower level spawner escapement rebuilding criteria. Under medium and high marine survival conditions, allocating 85% of the

annual abundance to spawning escapement should facilitate rebuilding to the lower level spawner escapement criteria in the next generation. While the lowest-left matrix category allows a fishery impact of < 15%, it is important to note that this proposal is not intended to call for any increase in harvest impacts over the recent historic low levels, when the coastal stock sub aggregate is in the lowest parental escapement tier. Since 1993, total fishery impacts were managed for actual pre-season targets of 10%, 12%, and 13% in 1994-96, respectively. Status quo fishery impacts of 10-13% are proposed for situations with status quo ocean conditions and the parental spawning escapement is well below the lower spawner escapement criteria. In the event parent spawners decline to even lower levels than seen in recent years, further reductions in controllable domestic impacts are proposed, recognizing that there is a limit to further by-catch reduction opportunities. However, in the event parent spawners improve to levels near, but still below, the lower rebuilding criteria level, and significant numbers of healthy stocks would otherwise be available to fisheries, the small increase to < 15% could be allowed.

Increases in fishery impacts above < 15% level are proposed only after the lower spawner escapement rebuilding criteria has been achieved in at least the parent generation and significant improvements in the next generation of spawner escapement can be projected:

- The first increases in fishery impact rates (to either < 20% or < 25%) are proposed to be allowed when the parental brood achieves the lower spawner escapement criteria and ocean conditions are projected to be favorable enough that the progeny will return at least 150% of the parent level to the spawning grounds after fishery effects.
- The next level of increases in fishery impacts are allowed after rebuilding has been shown in two parent generations and ocean conditions are projected to be sufficient to show continued improvement. When the grandparent generation has achieved the lower spawner criteria and the parent generation has achieved the higher spawner criteria, fishery impacts of either 30% or 35% are proposed, depending on productivity of ocean conditions.

A cap of 35% in total fishery impacts is proposed regardless of high parental spawning levels or projected favorable ocean conditions to test the effects of high spawner levels. A limitation of < 15% remains in effect even at the two higher tiers of parent escapement if ocean conditions are not favorable to preserve rebuilding progress achieved to that point.

Chronology of Changes in Exploitation Rates Associated with Commercial and Recreational Fisheries for Oregon Coastal Coho Salmon.

Fishery	Time Period	Exploitation Rate	Comments
Oregon coastal river and estuary gillnet	1890's-1920s	40%	ODFW estimate.
Combined coastal river net and ocean troll	1930s-1940s	40-60%	Estimated range only.
Ocean troll/sport	1950s	60-80%	River gillnet fisheries mostly eliminated by this period.
Ocean troll/sport	1960s	60-80%	
Ocean troll/sport	1970-1983	60-90%	Peak period of ocean harvest and exploitation, and prior to comprehensive PFMC management.
Ocean troll/sport	1984-1986	30-40%	PFMC response to 1983 El Nino; creates OCN spawning escapement goal via salmon fishery management plan (FMP).
Ocean troll/sport	1987-1992	45-65%	PFMC amends FMP; less restrictive OCN escapement goal; higher ocean harvest on surpluses during this period.
Ocean troll/sport	1993	35%	PFMC responds to current El Nino and uses new ODFW OCN spawning study data for first time in pre-season evaluation of management strategies.
Ocean troll/sport	1994-1996	7-12%	PFMC prohibits ocean coho fisheries off OR/CA (all WA/OR/CA in 1994). Coho exploitation rate reflects harvest impacts mostly in chinook targeted fisheries. PFMC acts on data from ODFW coho study and ESA concern, and sets higher OCN escapement goal; caps OCN coho HR at $\leq 20\%$ until OCN escapement is 150% of goal. ODFW closes most bays and rivers to sport fishing.

Proposed Fishery Management Regime

(Current as of 10 March 1997)

Allowable Total Impact from Fisheries

Marine Survival

Spawner Escapement Rebuilding Criteria

Low

Medium

High

(like
1994-96)

(like
1978-85)

(like 1972-74,
1976 and
1986)

Parent Spawning Escapement:

High

North \geq 16,100 and
Mid \geq 42,800 and
South \geq 36,700 and
Rogue \geq 4,100

Must have met Medium
Criteria in parent generation

\leq 15%

\leq 30%

\leq 35%

Medium

North \geq 10,700 and
Mid \geq 28,500 and
South \geq 24,400 and
Rogue \geq 2,700

\leq 15%

\leq 20%

\leq 25%

Low

North $<$ 10,700 or
Mid $<$ 28,500 or
South $<$ 24,400 or
Rogue $<$ 2,700

\leq 15%

\leq 15%

\leq 15%

10% - 13%

Hatchery Management

Introduction

The purpose of this section is to summarize significant changes that have occurred in relation to hatchery coho management in the last two decades. Overall, there have been significant changes, as follows:

- The number of coho released each year has declined significantly. During the 1980s, ODFW coastal hatcheries released about 6 million coho, and private hatcheries about 12 million coho annually. Projected coastal coho releases are about 2 million smolts annually.
- Transfers of coho stocks between basins were fairly common, but are now rare.
- Coho stocks from outside Oregon were released by private hatcheries, but such stocks are no longer released.
- Off-site releases of coho have been substantially reduced. Remaining off-site releases of coho generally include acclimation and return to their native basin for release.
- Off-site releases of surplus hatchery coho adults are rare.
- All hatchery coho smolts are now being marked.

All of the above changes are consistent with the Wild Fish Management Policy and the desire to manage hatchery fish in ways that are compatible with wild populations.

Three programs (discussed in more detail following the table) have released hatchery coho into Oregon coastal basins: ODFW hatcheries; ODFW Salmon and Trout Enhancement Program (STEP) projects; and private hatcheries. The table below compares numbers of coho salmon released from the three types of hatchery programs (brood years 1981, 1989, and 1993, which are the most recent complete data). Preliminary 1994 brood year data shows ODFW with a continued decline in fingerling/fry (0.03 million) and smolt (2.58 million on-site and 0.81 million off-site) releases; private hatcheries with no releases; and STEP with releases similar to the 1993 data.

Release Stage	Release Location	Number of Fish Released (in millions)					
		ODFW Hatcheries		STEP		Private Hatcheries	
1993 Brood Year							
Smolt	On-Site	2.81		0.06		None	
	Off-Site	0.90		0.01		None	
Fingerling /Fry	On-Site		None		None		None
	Off-Site		0.23		0.08		None
Hatch Box Eggs			None		1.16		None
1989 Brood Year							
Smolt	On-Site	3.12		0.06		None	
	Off-Site	2.15		0.01		None	
Fingerling /Fry	On-Site		0.26		<0.01		2.83
	Off-Site		1.05		0.06		None
Hatch Box Eggs			None		2.93		None
1981 Brood Year							
Smolt	On-Site	2.14		None		1.27	
	Off-Site	0.89		0.03		None	
Fingerling /Fry	On-Site		0.04		None		19.84
	Off-Site		3.60		0.12		0.06
Hatch Box Eggs			None		0.14		None

Oregon Department of Fish and Wildlife Hatcheries

The Oregon Department of Fish and Wildlife operates seven hatcheries that produce coho salmon for release in Oregon coastal basins. Four of these hatcheries are involved in rearing coho stocks from other coastal basins for transfer and release in their native basins. With one exception (Cole Rivers Hatchery), the main purpose of the coho programs has been to supplement ocean coho harvest. Cole Rivers Hatchery, located on the Rogue River, was built as mitigation for Lost Creek Dam.

There has been a gradual shift in the intent of ODFW's coastal coho programs over the last decade due to several factors, including:

- Concerns over impacts and attempts to reduce impacts of hatchery fish on wild populations.
- Implementation of genetic protection strategies of the Wild Fish Management Policy.
- Implementation of the results of research and hatchery monitoring.
- Attempts to improve the harvest of hatchery fish.

Generally, these changes have begun a shift from an emphasis on ocean fishery supplementation to providing harvest opportunities for hatchery fish while minimizing impacts on wild coho populations. Specific changes include:

- Forty percent reduction in the total number of coho released by ODFW hatcheries (1981 versus 1993 brood years).
- Near elimination of fingerling/fry releases.
- Substantial reduction in off-site releases.

- Use of acclimation facilities for many of the remaining off-site release programs.
- Significant reduction of releases of hatchery coho into basins other than that from which the stock was developed.
- Additional reductions in release numbers and a shift to native or wild type broodstocks are proposed for initiation with the 1996 brood.

Information on ODFW's hatchery program are in the Chapter 17B State Agency Measures.

ODFW Salmon and Trout Enhancement Program

The STEP program began in 1982 with four main goals:

1. Citizen volunteer participation in ODFW management objectives.
2. Rehabilitation and enhancement of natural habitat for salmon and trout.
3. Rehabilitation and enhancement of populations of salmon and trout.
4. Public education.

As part of actions to achieve these goals, some STEP projects have been involved in the rearing and release of coho salmon. The projects, which have included work to restore wild populations and to enhance fisheries, have released coho at all life history stages. The vast majority of projects releasing coho salmon have involved the use of hatchboxes and release of unfed fry. The number of unfed fry released increased rapidly with program development, but has declined in recent years.

The smolt releases of the last few years are mostly in the Coos Basin at the Noble Creek site. This is a STEP hatchery that does final rearing and release of Coos stock coho smolts reared mostly at Cole Rivers Hatchery. The site is low in the basin (tributary of Isthmus Slough) and allows for segregation, harvest, and recovery of returning hatchery coho away from wild coho populations.

Private Hatcheries

Three private hatcheries have released coho salmon in Oregon's coastal basins:

- Oregon Aqua-Foods Inc. (Yaquina Bay and Coos Bay)
Began operations with the 1973 brood year.
Last releases at the Coos Bay site were with the 1980 brood year.
Last releases at the Yaquina Bay site were with the 1991 brood year.
- Anadromous Inc. (Coos Bay)
Began operations with the 1975 brood year.
Last releases were with the 1987 brood year.
- Domsea Farms (Siuslaw Bay)
Began operations with the 1981 brood year.
Last releases were with the 1986 brood year.

The hatcheries mostly released foreign stock coho, as well as both yearling and zero-age smolts. Releases peaked in the early 1980s at over 23 million coho. Some hatcheries also experimented with ocean releases (up to 1 million coho released at sea in a given year). However, there have been no private hatchery coho releases since the 1991 brood year, and no further releases are anticipated. Any future releases of coho from a private hatchery would be managed under a plan of operations subject to approval by the Oregon Fish and Wildlife Commission.

Habitat Management

Introduction

The purpose of this section is to give a broad overview of the changes in habitat management that have been occurring during the last two decades and that are expected as a result of the measures in support of the OCSRI Plan submitted by agencies, watershed councils, and industrial and private landowners. The vast majority of management measures that have been implemented and are proposed for implementation in the near future are related to habitat management. Emphasis in development of the OCSRI Plan has been focused on identifying changes that can be accomplished to assist conservation and restoration of coastal salmon. The Plan recognizes that human population growth and related issues such as demand for water and other natural resources, construction of new roads, plus natural occurrences (e.g., severe winter floods and drought) may affect the habitat that supports coastal coho, steelhead and cutthroat.

Evaluation of habitat management measures is far more complicated than evaluating changes in harvest regulations or hatchery management programs. The following points illustrate some of the difficulties involved in evaluating habitat measures.

Evaluation of Harvest and Hatchery Measures	Evaluation of Habitat Measures
<ul style="list-style-type: none">• Harvest rates are estimated on a routine basis; any changes in harvest rates can be compared with historic data to estimate relative benefits to populations or groups of populations.• Releases of hatchery fish of various sizes and stock origins are routinely recorded; proposed hatchery programs can be compared with historic data to evaluate relative impacts of the change.• When changes are made to harvest or hatchery management programs, the effects of the change take place immediately, and the geographic area affected by the change is clearly defined.	<ul style="list-style-type: none">• Changes in habitat management programs may take years or decades to result in improved habitat conditions.• Baseline data are often weak.• It is often difficult to predict how general changes to habitat management practices will affect specific populations because limiting habitat factors often vary within and among basins.• Habitat restoration projects that have been done in the past usually have not been described well enough to assess their effect, short of making a field inspection of each site.• Habitat projects that have been proposed for completion in the near future, similarly, have not been described sufficiently to predict the benefits that may result.

Many of the measures related to habitat management promote a sense of optimism. However, proposed changes must be implemented and evaluated on a watershed basis to determine if the productive capacity of aquatic habitats and riparian areas actually improves over current conditions. It is impossible to predict with certainty what the habitat management measures, collectively, will achieve, or how they will interact with proposed harvest and hatchery management measures to affect production of coho or other anadromous salmonids over a coastwide or ESU-wide scale. It is also important to note that the Conservation Plan explicitly asserts that management measures will be changed and improved over time, if needed, based on information obtained from the Monitoring Program.

Positive Changes Related to Habitat Management

Compared to a few years ago, there have been many significant improvements that relate to habitat conservation and restoration in the Oregon coastal region. The Northwest Forest Plan, for example, represents a recent landmark change in the conservation emphasis that is applied on federal forest lands, many of which include important productive areas for coastal salmonids. The Oregon Forest Practice rules also are a marked improvement to the level of protection that will be provided on both private and state forest lands. Watershed councils that were established in the south-coastal region several years ago have developed science-based analyses to identify limiting factors and are in the process of implementing action plans to address habitat problems. New Watershed Councils are being formed in the mid- and north-coast region. Special protocols are being developed to protect sensitive aquatic habitats in the Elliott and Tillamook State Forests. Finally, the Department of Agriculture is placing emphasis on efforts to implement Senate Bill 1010 in priority areas of the Tillamook, Umpqua, and Rogue basins, and expects to achieve material improvement in riparian and aquatic habitats in agricultural areas of these basins.

A summary of significant efforts that have occurred or are proposed relative to conservation of productive salmon, steelhead, and cutthroat habitat includes the following examples:

- Many fish passage problems associated with state highways and forest roads will be assessed and remediated within the next ten years, and revised maintenance and construction standards will continue to reduce fish passage impacts in the future.
- Fish passage problems related to diversion and push-up dams will be greatly reduced through multi-agency coordination and action to address enforcement of existing laws, more rapid implementation of screening, and development of alternatives to traditional water diversion methods.
- Riparian zone health and related stream functions (e.g., shade, large woody debris [LWD], bank stability, and nutrient cycle) will be greatly improved through a combination of improved forest practices rules, implementation of new Goal 5 standards, implementation of SB 1010 on agricultural lands, improved state highway construction and maintenance measures, and voluntary efforts of landowners.
- Riparian protection and water quality on forest land is regulated through the Oregon Forest Practices Act and related administrative rules. The rules establish a desired future condition

for riparian vegetation. For most fish-bearing streams, the desired future condition is to grow and maintain stands similar to "mature forest conditions" within riparian management areas of specified widths. These widths represent approximately 70 to 95 percent of the potential source area for large woody debris recruitment, respectively. For non-fish-bearing streams the desired future condition is to grow and retain vegetation sufficient to support the functions and processes that are important to downstream waters that have fish, maintain the quality of domestic water, and supplement wildlife habitat across the landscape. The prescriptions described in the rules have been designed to meet the desired future conditions on average across the landscape. However, the prescriptions are based upon some assumptions about stand condition and growth and may not ideally address all site conditions. Monitoring is in place to evaluate the adequacy of the prescriptions and the assumptions upon which they were developed. On OFIC member industrial lands in core areas and state forest lands through western Oregon, meeting the desired future condition in the most timely manner will be assured through several voluntary measures that retain additional conifer within riparian areas along both fish-bearing and non-fish-bearing streams on a more site-specific basis. These measures are described more fully Chapter 17B.

- Instream habitat projects in areas most likely to benefit species of concern are being planned and implemented. Many of these projects attempt to improve habitat by placing large woody debris, creating backwater alcoves, and improve connectivity to wetlands and side channels. Habitat projects will remain a major component of salmonid restoration efforts for years to come. Specific incentives to encourage such actions are provided and may be strengthened, existing economic and regulatory obstacles to conducting such projects and barriers to these actions will be reduced. Habitat restoration projects will be guided by a cadre of fish biologists funded by forest landowners that will assist landowners implement the ODFW Habitat Restoration Guides and other restoration actions.
- Instream habitat will be improved by "protecting" and encouraging beavers on key sites. This work will involve adaptive management and cooperative working arrangements that include land management agencies, ODFW, and many private landowners.
- Instream flows, especially in *core production areas* that are critical to conservation of salmonids, will be improved through: a) the purchase, lease, or donation of water rights; b) improved administration and enforcement of water rights laws; c) monitoring; and d) voluntary efforts.
- Sediment delivery (including debris flows) will be reduced through implementation of forest practice BMPs and a forest road erosion and risk reduction project on forest lands; improved fill-removal administration; improved state highway maintenance efforts; and implementation of SB 1010 on agricultural lands. Forest practice rules and administrative processes will be reviewed over the next year to identify opportunities for further reducing water quality and habitat impacts from landslides.
- Forest roads represent a high risk for increased sediment delivery to streams. For roads and other activities that may be sediment sources, the forest practice rules include state-of-the-art practices that when implemented minimize sediment source and delivery. However, many roads built prior to current practices retain higher risks for sediment delivery than would be

the case if the roads had been constructed under the current standards of design. The OCSRI addresses the legacy of risk posed by forest roads through an aggressive program to identify and correct potential road sediment risk related to cut- and fill-slope failure, road surface drainage, stream crossings and fish passage. It is expected that approximately \$130 million will be spent on industrial and state forest lands over the next ten years to address the legacy road issue.

- Adverse effects of gravel mining will be reduced by limiting removal to recruitment, developing and implementing best management practices, considering time or area restrictions to be applied in core production areas, and improved monitoring and enforcement.
- Habitat condition will be assessed and restoration efforts will be effectively prioritized and implemented. Core areas will be identified and given special emphasis under all key measures.
- The Northwest Forest Plan will provide significant measures to conserve productive salmonid habitat on federal lands.
- Many new watershed councils have been organized and efforts are underway to establish councils in every coastal river basin. These watershed councils are conducting watershed assessment and developing action plans to correct limiting factors.

The many recent, new, and proposed management measures have the potential to materially improve the productive capacity of coastal basin habitats that support salmonids. Roughly 200 habitat management measures that are relevant to coho salmon have either been implemented or are proposed for implementation as part of the OCSRI. Hundreds of focused habitat restoration projects have been conducted during the past few years under the guidance of watershed councils and ODFW, and with financial support of private and industrial landowners.

Hundreds of similar projects are being planned for action in the next few years. A progressive evolution has been occurring in the quality of recent restoration work, and continued improvement in the quality of focused restoration work is expected with the results of current monitoring work. An inventory of habitat restoration projects on private industrial lands conducted by ODFW for the Oregon Forest Resources Institute provides an overview of the magnitude of effort, type of work, and the basis for design of restoration projects. Also, detailed monitoring of a number of habitat restoration projects conducted in the north coast area in 1995 and 1996 is expected to contribute to improved design of future similar projects.

The Crucial Role of Monitoring

A comprehensive monitoring program is an essential part of the Conservation Plan. Many management measures and restoration projects have been implemented recently, or are proposed for implementation in the near future. These measures, when evaluated individually, tend to indicate that certain habitat features should improve (in relation to the habitat needs of anadromous salmonids). *For many habitat features, it was not possible to quantitatively predict whether the conditions will actually improve coastwide, or if the historic rate of decline in habitat condition will only be moderated.* The answer to this question on a coastwide, or ESU-wide basis, is probably not quantifiable, especially given the promised evolutionary nature of the Conservation Plan. Only a well-designed monitoring program that tracks indicators of biological

communities and their supporting habitats will establish whether conditions decline, stay the same, or get better. In addition, a properly designed and integrated monitoring and analysis program is essential to active adaptive management; such a program will provide for the process of testing alternative hypotheses through management action, learning from experience, and making appropriate change to policy and management practice.

Oceanic Conditions

Natural cyclic changes in the ocean environment have been identified as an extremely important determinant of survival, and therefore production, of Oregon coho salmon. The ocean environment has been generally unfavorable for survival of coho off the Oregon coast since the late 1970s. There is no indication that these unfavorable conditions will remain constant. A return to more favorable survival conditions is expected, based on the historic record. However, the timing of return to a more favorable survival scenario, and the magnitude of improvement that may occur, are unknown.

In hindsight, exploitation rates of 50% to 70% experienced by some coastal coho stocks as late as the early 1990s were clearly too high given the poor marine survival conditions experienced by the fish. As harvest has decreased, spawner abundance has increased (see Chapter 14). Since 1990, there has been a fairly steady increase in spawner abundance despite a generally flat trend in total production. Population modeling suggests that if marine survival continues at the level of the past decade, slow but steady rebuilding of coho salmon spawner populations should be expected, but little or no harvest opportunities. However, if marine survival improves by two-thirds, spawner abundance should rebuild rapidly to levels near full seeding within four generations even after providing increased harvest opportunities allowed under the proposed OCSRI harvest strategy.

Chapter 12

Accountability and Coordination of Effort Among Contributors

The actions of government alone are not sufficient to conserve and restore salmon across the landscape. Oregon's Conservation Plan recognizes that conservation and restoration of coho and other species must be accomplished by local communities and landowners, with local knowledge of problems and ownership in solutions. Watershed councils, soil and water conservation districts, the OSU Cooperative Extension Service, and other grassroots efforts are vehicles for getting the work done. State and federal agencies and programs will provide the regulatory foundation and technical support to the watershed councils, but the bulk of the work needed to conserve and restore watersheds will be accomplished by local people.

State and federal agencies are responsible for many management programs and the administration of statutes and rules that fundamentally affect natural resources, including the following:

- Fishery harvest management
- Production of hatchery fish
- A wide variety of habitat alteration, protection, and restoration activities

Previously, agencies often conducted business independently. Salmon suffered because their life cycles cross the physical and jurisdictional boundaries of all of these agencies. They suffered because they were affected by the actions of all agencies, but no single agency was responsible for comprehensive, life-cycle management. Under Oregon's Plan, all state and federal agencies that have an impact on salmon are held accountable for conducting business in a coordinated manner that is consistent with the conceptual foundation and the goals and strategies of the OCSRI.

Leadership

To date, the essential mechanism in Oregon's Conservation Plan has been the Governor's leadership. It has brought management agencies and affected stakeholders together to develop solutions to long-standing problems. The OCSRI Plan recognizes that leadership of this nature is essential to achieving the goals of the Conservation Plan. While the institutional arrangements that allowed salmon to decline will not be resolved quickly, effective leadership has the best opportunity to resolve the inherent conflicts that exist. Maintaining momentum in Oregon's Coastal Salmon Restoration Initiative hinges on continued leadership of state agencies and coordination with federal agencies. This essential leadership will be maintained through the Governor's role with the Salmon Strategy Team and a legislative oversight committee.

Focused Coordination Infrastructure

The Conservation Plan will be implemented through an infrastructure that includes both focused and diffuse elements. Focused elements include the following:

Legislative Oversight Committee

The Legislative Oversight Committee will provide coordinated political support and changes in statutes where needed. This committee will also ensure that budget and staffing proposals receive appropriate review and support.

Continuation of the Governor's leadership through the SST

The governor shall convene the SST at regular intervals that may vary from weekly to monthly, depending on the urgency of matters to consider.

Continuation of the SST with membership as described below:

- Agriculture Department Director
- Economic Development Department Director
- Environmental Quality Department Director
- Fish and Wildlife Department Director
- Forestry Department Director
- Land Conservation and Development Department Director
- Division of State Lands Director
- Transportation Department Director
- Water Resources Department Director
- AOC/LOC and Ports representatives
- NMFS representative
- Pacific Salmon Coordinating Committee representative
- Oregon Progress Board representative
- Conservation Plan Implementation Team Leader
- Legislative Oversight Committee member

Conservation Plan Implementation Team

State and federal agencies, local governments, soil and water conservation districts, OSU Extension Service, watershed councils, and other participants will designate representatives to the Conservation Plan Implementation Team. This team will meet monthly or bi-weekly as appropriate to facilitate implementation of the Plan and to coordinate efforts within and among agencies.

The team may be enlarged to include conservation organizations and industry representatives for participation in implementing the Plan. Outreach and science teams will also provide for coordination of effort among participants in the OCSRI.

Implementation Team Leader

This position will be established to provide routine leadership for the Implementation Team. The team leader will be a liaison to the Independent Scientific Assessment Team and the Monitoring Program Coordinator.

Operational Coordination

State agencies have organized at the field level to coordinate implementation of the Plan and ensure accountability. Directors of activities at the regional administrative level have been instructed to meet on a regular basis with state and federal management partners. These meetings are designed to coordinate implementation of agency measures, ensure proper support is provided to grassroots efforts, and ensure that monitoring is conducted in an efficient manner.

Diffuse Coordination Infrastructures

Much of the work essential to conservation and restoration of Oregon's salmon populations will be accomplished through the efforts of local watershed councils, soil and water conservation districts, private and industrial landowners, and similar grassroots efforts. Technical support, scientific expertise, and access to relevant data will be provided by state and federal agencies and the OSU Cooperative Extension Service.

Recovery of salmonids will require coordination among all interests at unprecedented levels. Salmonids are distributed over a wide range of habitats that interact with an equally broad array of local, state, federal, and international institutions.

As a direct result of the OCSRI, coordination of efforts is currently occurring at unprecedented levels in Oregon. This coordination includes the participation of government, industry, conservation organizations, Oregon State University, local organizations, and citizens. A commitment by these parties to communicate and coordinate has been sustained throughout the process of development of the Conservation Plan.

Many day-to-day working relationships have been created through this process, and many more have been strengthened. Like ecosystems, socio-political systems are complex, and there will always be room for improved coordination. For example, streamlining technical and financial assistance is needed to improve efficiency in the delivery of grassroots and government restoration actions. Ideally, state and federal grants that support grassroots efforts will be delivered through a streamlined application and review process. Maintaining and creating critical coordination processes and infrastructures will remain a priority of the Plan. Examples of a diffuse coordination infrastructure include the following:

Grassroots Coordination

Grassroots organizations will play key roles in developing and implementing watershed protection and restoration. These organizations include soil and water conservation districts, watershed councils, and efforts such as the North Coast Initiative. Key links

among grassroots efforts and state agencies will be facilitated through avenues such as the Governor's Watershed Enhancement Board and the OSU Extension Service.

League of Oregon Cities, Association of Oregon Counties, Oregon Public Ports Association, Oregon Coastal Zone Management Association, and councils of government are local government bodies that coordinate among agencies and grassroots efforts.

Coordination with fishery management

Pacific Fisheries Management Council provides regional coordination of fisheries management that is linked with ODFW and fish management agencies of other states. Other organizations that provide for coordination of fishery management include the following:

- Pacific Salmon Commission - coordination of salmon management at the international level.
- Pacific States Fisheries Commission - coordinates among western states.
- Columbia Basin Fish and Wildlife Authority - coordinates among states, tribes, and federal fish management agencies in the Columbia basin.
- Klamath Fishery Management Council and Restoration Task Force - coordinates among states, tribes, and federal agencies that work on Klamath River issues.

Coordination with habitat initiatives

Coordination to achieve habitat objectives requires that technical information and financial assistance or other incentives, along with landowners and volunteers, be brought together. Much of this coordination will take place through watershed councils.

Technical information coordination

- OSU Sea Grant, Forestry and Agriculture Extension
- Natural Resource Conservation Service
- Soil and water conservation districts
- Watershed councils
- State forestry programs
- ODFW habitat biologists

Financial assistance

- GWEB grants
- ODFW Restoration and Enhancement Board
- Lottery funds/local government grants
- Hire-the-Fisher Program
- Jobs-in-the-Woods Program
- Clean Water Act grants

- Agricultural Conservation Program, Stewardship Incentives Program, and Conservation Reserve Program
- FEMA grants
- Farmers Home Administration programs

Landowners and volunteers

Coordination among landowners and volunteers has been hampered by concern over property damage and tort liability. Legislation has been introduced to limit the liability of landowners who engage in fish or wildlife habitat restoration or enhancement (SB108). Among key landowners and volunteers are the following:

- Oregon Forest Industries Council (OFIC)
- Oregon Farm Bureau
- Oregon Small Woodlot Owners Association (OSWOA)
- Oregon Cattlemen and Dairymen Associations
- Oregon Wildlife Heritage Foundation
- Oregon Trout
- Association of NW Steelheaders
- Pacific Rivers Council
- Oregon Farm Bureau
- Audubon Society
- Sierra Club

Coordination with economic initiatives

Hire-the-Fisher and Jobs-in-the-Woods are two key federal programs designed to assist displaced fishers and forest industry workers in finding employment doing habitat restoration. These programs provide training and family wages jobs.

Incorporation of salmon recovery and clean streams will be encouraged to be considered key elements of the Regional Strategies Program, administered in partnership with OEDD and local government.

Continuing Role of NMFS

NMFS will annually evaluate Oregon's progress toward goals to determine whether coho or other species should be listed or de-listed under the federal ESA. NMFS will review recommendations of the Independent Scientific Assessment Team and the coordinated monitoring program annual report to assess whether management measures proposed under Oregon's Coastal Salmon Restoration Initiative Plan are accomplished as promised. Evidence that state partners are deficient in taking action, or that the status of salmon stocks or supporting habitats have not improved, will be considered a basis for NMFS to establish a listing.

Chapter 13

Independent Scientific Assessment of The Plan

Institutional barriers will be a major impediment to the successful implementation of the OCSRI, and those barriers can arise from two primary sources: Fragmented responsibility and authority among state and federal institutions and the strong inertia against change within individual institutions. These impediments have to be reduced or eliminated if the OCSRI is to be successful. Reducing the effect of institutional barriers will require steps that are unprecedented in the history of salmon restoration programs in Oregon.

As early as 1938, the Oregon State Planning board recognized that salmon management was not able to prevent depletion in part because responsibility and authority for salmon conservation were fragmented among several state and federal agencies. The board viewed the problem from the perspective of salmon management in 1938. At that time, management focused on harvest and artificial propagation, largely independent of the ecosystem and the ecological processes that produced the salmon. Today, nearly 60 years later, the importance of an ecosystem perspective and the maintenance or restoration of ecological processes important to salmon production is recognized. While an ecosystem perspective will in the long term mean more effective restoration programs, it compounds the problem of institutional barriers and institutional fragmentation. Viewing salmon restoration from an ecosystem perspective automatically involves a broader range of private and public institutions whose activities can influence the quality and quantity of salmon habitat and critical ecological processes in Oregon's Coastal watersheds. Salmon management, when viewed from the ecosystem perspective, is even more fragmented today than it was in 1938. Even more problematic is the fact that the primary goals of those institutions do not include healthy salmon populations.

Institutional barriers also arise from within individual institutions. Agency activities are often restrained by the influence of traditional approaches and assumptions whose roots have most likely been forgotten and whose fundamental assumptions may never have been critically evaluated. In some cases tradition may be invalid or inconsistent with current scientific understanding. Some aspects of artificial propagation and harvest management of salmon are examples of these internally derived institutional barriers. The detrimental practice of transferring salmon between hatcheries and watersheds illustrates the power of institutional barriers. In 1939, Hugh G. Mitchell, the Director of the Department of Fish and Culture for the Oregon Fish Commission, realized that interbasin transfers of salmon were detrimental to the long-term health of salmon populations:

"The older system of transferring by truck fish raised at a station on one stream to another stream for liberation is now considered undesirable on account of the resulting disturbance to the homing instinct. With this in mind the policy has been adopted, insofar as the available funds will permit, to establish and operate small stations on such streams of the state as are suitable for salmon runs." (OFC 1939)

Fifty-six years later, Flagg et al. (1995), after reviewing the causes for the extinction of lower Columbia River coho salmon, recommended that inter-hatchery transfers of salmon be restricted. The OCSRI states that there will be a substantial reduction of off-site releases of salmon. From 1939 to the recent past, large numbers of hatchery fish were transferred from their home streams to foreign streams. In 1939, transfers had been the norm for 50 years. It took another 56 years to reduce the institutional barriers and substantially reduce this detrimental practice. Where internal institutional barriers are allowed to persist, adaptive management cannot be implemented.

The OCSRI has taken an important and unprecedented step to reduce institutional barriers. Governor Kitzhaber brought together all the relevant state agencies (Agency Planning Team) to develop and implement the plan to restore salmon in Oregon's coastal basins. In addition, grassroots watershed councils, the Soil and Water Conservation Service, and OSU Cooperative Extension Service will be incorporated into the OCSRI's implementation. Those are unprecedented steps, but they are not enough to resolve the problem of institutional barriers. The OCSRI Implementation Team will help resolve intra-agency barriers, but will do little to correct inter-agency barriers.

Additional action is needed to ensure that institutional barriers do not impede full implementation of the OCSRI and prevent adaptive change and adjustment that will be critical to the long term success of the program. The institutions will, through diligent and conscientious effort, ultimately be responsible for reducing or eliminating barriers to the successful implementation of OCSRI. However, history has demonstrated they will not accomplish that task alone. An additional action independent of the institutions charged with implementing the OCSRI is required. To ensure the greatest possibility of success, Oregon will establish an independent team of scientists to audit the performance of OCSRI's implementation.

In addition to reducing institutional barriers, the independent audit will ensure a high level of accountability for OCSRI's implementation. It will ensure more effective use of adaptive management. The annual audit report will, among other things, synthesize new information emerging from the program and recommend changes - a critical step in the adaptive management process. Monitoring and evaluation have been a major weak point in salmon restoration programs. The commitment to monitoring shown to date by OCSRI and the implementation of the monitoring team are a significant improvement over past plans, but establishing an independent review and assessment of the monitoring program will help to insure continued support. The independent audit will provide an important incentive to maintain an effective monitoring and evaluation effort. Too often restoration plans are prepared with a great deal of determination, unveiled with fanfare and enthusiasm, but within months and, at most, a few years, they are relegated to history as agency staff deal with day-to-day crises. The plans end up collecting dust on the shelves of agency staff. The independent audit will ensure the OCSRI maintains a high profile in the implementing agencies.

Oregon cannot let the OCSRI repeat the historical pattern of salmon restoration plans. There is too much at stake for the salmon, for the coastal communities, and for Oregon. Therefore, an independent group of scientists will be appointed to conduct an annual audit of the OCSRI's implementation.

Scientific Assessment Team: Selection, Structure, and Responsibilities

- Within the first three months after their initial appointment, the team will draw up *terms of reference* and operating procedures for approval by the governor. The formation and election of the Independent Scientific Assessment Team should be guided by the criteria contained in the Independent Scientific Advisory Board Terms of Reference, dated August 1996, as agreed upon by the Northwest Power Planning Council and the National Marine Fisheries Service (see Exhibit A at the end of this Chapter). Section III B, Criteria (for selecting members) and Section IV.C, Bias and Conflict of Interest, are particularly important.
- The team will consist of four to five scientists with recognized expertise in salmonid ecology, habitat requirements, artificial propagation, and management. Appointment to the science team will be for minimum terms of five to six years. Each member will commit at least 10-25 percent of time averaged over an entire year. The team will report directly to the Governor, who will make the appointments and identify the chairman within six months of the implementation of the OCSRI.
- The team will meet monthly to receive briefings from agency staff on specific aspects of the OCSRI. The team will determine the meeting agendas and contact the appropriate agency for staff briefings. In addition, the team members will work independently on specific topics as assigned by the chairman. A member of the team will be assigned to coordinate with the OCSRI Monitoring Group, specifically to work with the Cumulative Effects/Watershed Assessment Team.
- The team will prepare an annual report on the implementation of OCSRI, including recommendations for changes/adjustments in the program and a description of progress, successes, and problems encountered. The report will contain syntheses of new information. The syntheses will be topic specific and be completed at irregular intervals after sufficient information has been collected.
- The members of the team will be compensated for their services by the state of Oregon. Reasonable travel expenses will be reimbursed.

References

- Flagg, T. A., F. W. Waknitz, D. J. Maynard, G. B. Milner and C. V. W. Mahkhen. 1995. The effect of hatcheries on native coho salmon populations in the lower Columbia River. Pages 366-375 in H. L. Schramm, Jr. and R. G. Piper (eds.) *Uses and Effects of Cultured Fishes in Aquatic Ecosystems*. American Fisheries Society Symposium 15, Bethesda, MD.
- Oregon Fish Commission. 1939. Biennial report of the Fish Commission of the State of Oregon to the Governor and the Fortieth Legislative Assembly, 1939. State of Oregon, Salem, OR.
- Oregon State Planning Board. 1938. A study of commercial fishing operations on the Columbia River. Report submitted to the Governor of Oregon, Salem, OR.

Exhibit A

Independent Scientific Board Northwest Power Planning Council and National Marine Fisheries Service

Terms of Reference August 1996

I. Purpose

The independent Scientific Advisory Board (ISAB) is jointly established by the Northwest Power Planning Council (Council) and the National Marine Fisheries Service (NMFS). ISAB will provide independent scientific advice and recommendations regarding scientific issues posed by the respective agencies on matters related to their fish and wildlife programs. The Council has specified a series of tasks in its Fish and Wildlife Program, while NMFS has statutory obligations under the Endangered Species Act and other federal laws requiring independent scientific review.

The ISAB will address scientific and technical issues relating to the Council's Fish and Wildlife Program and the NMFS recovery plans for Snake River salmon and other anadromous fish stocks, including related marine areas. Its purpose is to foster a scientific approach to fish and wildlife recovery and the use of sound scientific methods in research related to the programs of the Northwest Power Planning Council and the National Marine Fisheries Service. It is understood that the interests of the National Marine Fisheries Service relate particularly to anadromous fish conservation and management, while those of the Council include all fish and wildlife populations affected by operation and development of the hydroelectric system.

II. Scope of ISAB activities

A. Relationship to sponsoring agencies

The ISAB will address scientific and technical issues relating to the Council's Fish and Wildlife Program and the National Marine Fisheries Service Recovery Program for Columbia River Basin salmonids. Principal activities include:

- 1) As specified in its December 1994 rule, evaluate the scientific aspects of the Council's Fish and Wildlife Program and suggest critical information needs.
- 2) As requested by the Council and NMFS in section II.D. below, review the Coordinated Research, Monitoring and Evaluation Plan, the Plan for Analyzing

Testable Hypotheses (PATH) and other documents and plans for completeness, scientific merit and consistency with an adaptive management approach.

- 3) Oversee the development of procedures for peer review of research proposals addressing high priority scientific and technical issues associated with regional efforts to provide survival increases at all life history stages and throughout their range consistent with regional fishery recovery goals; establish expert panels as needed to provide this review in a scientifically sound manner.
- 4) Oversee the development of an experimental design to test fundamental hypotheses regarding mainstem passage as called for in the Council's December 1994 rule.
- 5) As provided in section II.D below, provide scientific advice and review of topics identified as critical to fish recovery and conservation in the Columbia River Basin.

B. Relationship to other agencies

To the extent allowed by time and resources, the group should be responsive to questions and issues posed by the region's management agencies, Indian Tribes and other parties. Questions for consideration by the Board should be submitted to the Science Coordinator as described in (II.D.) below. The Council and NMFS will use the existing policy making bodies within the basin to review work plans, schedules and products for the ISAB. These parties should also use these forums to suggest ideas and issues for consideration by the ISAB.

C. ISAB role in setting its agenda

The ISAB is to review questions that are amenable to scientific analysis and investigation. Questions will be presented to the Board as described below in (II.D.) and the Board may also initiate review of questions that are suggested by its own analysis. Many questions pertaining to the recovery of the Columbia River ecosystem contain both scientific and policy aspects. The ISAB should confine itself to dealing only with scientific aspects of issues. The Board should review questions that are submitted to it and decide if the question is amenable to scientific analysis. If not, the Board may respond that it is unable to address the question or it may suggest aspects of the question for which scientific insight would be useful.

D. Procedure

Questions for consideration by the Board should be submitted to the Science Coordinator (III.E.2). The Science Coordinator will bring these to the Board who will discuss the scientific aspects of the question and accept or reject the question or suggest aspects that are amenable to scientific analysis. Questions that are accepted by the Board will go to the Executive Committee (IV.D.2) who will schedule consideration of the issue within the ISAB workplan and identify needed personnel and other resources.

III. Membership

Members of the ISAB should be experienced scientists with demonstrated achievement and high standing in their field. They will be chosen to fill specific, identified areas of expertise that are needed by the group. They will be expected to provide objective scientific advice in a timely and professional manner, and work effectively in a multi-disciplinary setting.

ISAB membership will be open to individuals employed by all agencies, institutions and organizations with the exception that members may not be salaried employees of the Council or NMFS, or be a member of the selection panel discussed below.

A. Appointment Procedures

Members of the Independent Scientific Advisory Board will be appointed jointly by the chair of the Northwest Power Planning Council and by the Regional Director of the National Marine Fisheries Service. They will use the advice of an ad hoc selection panel who will review nominees and make recommendations to the Council and NMFS. While nominations to the ISAB may come from any of a variety of sources, members of the Board are independent scientists and do not represent the interests of the nominating entity or any other entity.

- 1) *Purpose of the Selection Panel.* A selection panel will be constituted with the specific purpose of making recommendations to the Council and NMFS regarding membership on the ISAB. The selection panel will make recommendations regarding membership on the board giving careful consideration to the advice of the ISAB regarding membership and needed expertise. They will also review nominations for qualifications to fill these needs using criteria specified below as well as their best professional judgment.
- 2) *Constitution of the Selection Panel.* The selection panel will consist of three members. these shall be senior scientists familiar with the operation of scientific panels and the problems faced by the Council and NMFS. A selection panel will be convened when vacancies arise on the Board. One member each shall be appointed to the selection panel by the Chair of the Northwest Power Planning Council and the Regional Director of the National Marine Fisheries Service. The third member will be appointed jointly by the first two members of the panel. The selection panel will operate with the advice and assistance of the Science Coordinator and the Ex-Officio members of the Board. The selection panel will make its recommendations to the Council and NMFS in writing, after which the selection panel will dissolve.

B. Criteria

The following specific criteria should be considered in selecting members:

- 1) High achievement in a relevant scientific discipline which may include biology, ecology, fisheries, hydrology, river geomorphology or other appropriate disciplines.
- 2) A strong record of scientific accomplishment documented by contribution to the peer-reviewed literature or other evidence of creative scientific accomplishment.
- 3) High standards of scientific integrity, independence and objectivity.
- 4) Ability to forge creative solutions to complex problems.
- 5) Interest in and ability to work effectively in an interdisciplinary setting.

C. Length of Appointments

Appointment to the ISAB will normally be three years. Appointments can be renewed once using the normal appointment procedures outlined above.

D. Ex-Officio Members

The Council and NMFS can each appoint one Ex-Officio member to the group. Ex-Officio members are excluded from voting membership on the Board. These members should be senior staff scientists who are familiar with the fish and wildlife recovery plans of the Council and NMFS. They will be expected to provide their scientific advice independent of the policies of their employing agencies.

E. Staff

- 1) **Support Staff**. Meeting arrangement, fiscal management and other support functions will be provided by the Council or NMFS who may elect to use the services of another umbrella organization.
- 2)
- 3) **Science Coordinator(s)**. One or more Science Coordinators as needed will be appointed by the Council and NMFS to assist the ISAB and to act as liaison between the Council, NMFS and the ISAB. The Science Coordinator will work closely with the Chair of the ISAB in establishing agendas, workplans and scheduling of projects by the group. The Science Coordinator will also be the point of contact between the ISAB and other organizations and committees in the region. He/She will act as a resource to the board and should be a capable scientist familiar with the policy and scientific issues that are likely to come before the board. The Science Coordinator may also serve as one of the Ex-Officio members of the board as determined by the Council Chair and the Regional Director of the NMFS.

F. Temporary Appointments

From time to time, it may be necessary to secure the services of outside experts to provide assistance on specific projects. Such appointments can be made by the Chair in consultation with the Science Coordinator and as allowed by budget limitations. Temporary appointees to the group should be selected using the same criteria as for regular members (section III.B) and are subject to the same rules regarding bias and conflict of interest as regular members (IV.C).

IV. Procedures

A. Meetings

The ISAB will meet on a regular basis. Much of the work of the ISAB will be conducted by members responding to assignments from the Chair of the ISAB. Meetings will provide the opportunity to discuss work and formulate Board positions on assignments. Members are expected to place a high priority on attendance and participation in ISAB meetings.

Meetings are normally to be held at a location within the boundaries of the members states of the Council at intervals appropriate to the requirements of business. Summaries of meetings will be prepared by the Chair and will include the agenda, summary of action taken, work assignments and schedules.

B. Communication

The Chair of the ISAB will normally act as spokesperson unless another member is designated by the Chair to speak on specific topics. The ISAB will normally respond to questions or issues in writing, and public statements should be based on written opinions. All written communications shall be submitted to the Science Coordinator who will be responsible for distributing them to the Council and NMFS and other appropriate parties.

The Science Coordinator will act as the point of contact for requests to the ISAB. The Science Coordinator will ensure that these communications are conveyed to the ISAB.

Within the ISAB, a standard protocol for electronic communication of documents and messages will be established. These procedures should be adopted to facilitate development of products between members to maximize work efficiency between meetings.

C. Bias and Conflict of Interest

For the efforts of the ISAB to be influential and credible, it must be perceived to be free of any significant conflict of interest, not compromised by bias and untainted by allegations of scientific misconduct. The ISAB will deal with a broad range of issues concerning

Council and NMFS fish and wildlife recovery and restoration efforts. For this reason, there is ample opportunity for potential conflicts to arise for members on specific topics. It is imperative that the members of the ISAB are aware of the potential for conflict, and especially aware of the dangers of a *perception* of conflict. The ISAB will base its definitions of bias and conflict on those developed by the National Academy of Science.

- 1) **Bias**. Bias relates to views stated or positions taken that arise not from scientific analysis, but from the close identification or association with the positions or perspectives of a particular group.
- 2) **Conflict of Interest**. Conflict of interest means any financial or other interest which would benefit the individual and which conflicts with the service of an individual because it could impair the individual's objectivity or create an unfair competitive advantage for any person or organization.
- 3) **Procedures**
 - a. Members of the ISAB are expected to take the responsibility of ensuring that real or perceived bias or conflict of interest on their part are identified prior to taking part in any project. Members are permitted to excuse themselves from work on any topic on which they perceive a real or potential conflict or bias.
 - b. By April 1 of each year, each member of the ISAB will submit to the Science Coordinator and the Chair information disclosing relevant information regarding:
 - i. Financial interests
 - ii. Research support
 - iii. Agency or group affiliation
 - iv. Public statements and positions
 - v. Other circumstances or information
 - c. Disclosure information should identify any connection between the individual and programs or activities of the Northwest Power Planning Council, the National Marine Fisheries Service, Bonneville Power Administration, regional fishery managers and Indian Tribes. Northwest energy interests or other users of the Columbia River. Information submitted will be considered confidential. Within a year, members are required to update this information if necessary.
 - d. In making assignments on specific tasks, the Chair will take into account this information, while members are expected to announce any potential conflict or bias relating to particular assignments. In the event that there remains any substantial question on the existence of a conflict of interest, it is preferred that the member request to be excused in order to protect the ISAB from any appearance of conflict or bias.

- e. Questions regarding bias and conflict will be decided by a vote of the Chair and the Ex-Officio members of the board.

D. Organization

1) Officers

- a. Elections. Officers of the ISAB will be elected by secret ballot of the members presided over by the Science Coordinator. Ex-Officio members are excluded from serving as officers or voting. Election of officers should occur at least 30 days prior to the expiration of the previous officer's term. An election of officers will occur each year. After the initial election of officers, terms will commence with the first Board meeting in January.
- b. Officers and Terms. Officers of the ISAB shall consist of the Chair and vice-Chair who will serve one year terms. At-large members of the Executive Committee (IV.D.2.a., below) will be elected and serve one-year terms.
- c. Duties of the Chair. The Chair is the executive officer of the board. The Chair acts as the main spokesperson of the group. The Chair arranges for the time and place of meetings, makes or causes to be made a record of the minutes, sends or causes to be sent minutes and other documents to the membership. The Chair conducts the meetings, seeing that business is conducted in a timely and efficient manner and that each member has the opportunity to be heard.
- d. Duties of the vice-Chair. A standing executive committee shall be formed that will consist of the Chair, the vice-Chair, Science Coordinator and two at-large members of the Board. The executive committee will address issues of procedure, workplans and internal matters of the Board.

2) Committees

- a. Executive Committee. A standing executive committee shall be formed that will consist of the Chair, the vice-Chair, Science Coordinator and two at-large members of the Board. The executive committee will address issues of procedure, workplan, and internal matters of the Board.
- b. Other Committees. The Chair of the ISAB can designate members of the ISAB to form subcommittees to address specific topics. Each subcommittee should have a designated Chair who will be responsible for overseeing completion of the task. Subcommittees can include experts from outside the ISAB as necessary. Subcommittee members from outside the ISAB will be designated using the procedure outlined in III.F. above.

Chapter 14

Oregon Coastal Coho Salmon: Production Potential, Recent Population Trends, and Prospects for the Future

Production Potential

The 1982 ODFW Coho Salmon Management Plan identified production goals for wild coastal coho. Because of a number of factors, including unfavorable marine survival, these production levels have never been realized. Much new information is now available about the factors affecting production of coho salmon. For example, extensive habitat inventory data are now available, a model has been developed to estimate coho salmon smolt capacity from habitat data, spawner numbers are estimated using statistically valid methods, and there is a better understanding of the effects of variability in climate on salmon production. New understanding of the interactions between freshwater and marine survival of coho salmon is of particular interest to the development of realistic production goals for wild fish.

Research has demonstrated that the quality of freshwater habitat (particularly over-winter habitat) has a direct influence on freshwater survival rate. Habitat and population modeling has demonstrated that to be equally productive, salmon inhabiting a stream with poor quality habitat will require a higher rate of marine survival than salmon inhabiting a stream with good quality habitat. As a result of these interactions, marine survival plays a dominant role in determining the productivity and sustainability of coho salmon populations.

The modeling predicts that extended periods of low marine survival, particularly combined with high fishery exploitation rates, cause extirpation of coho salmon from all but the best freshwater habitats. In fact, this is exactly what is observed today. A prolonged period of poor marine survival has occurred for coho off Oregon since the late 1970s. Harvest during this period was also excessive until the most recent years. Random sampling of coho spawner abundance indicates that very few stream reaches have large spawner populations, and that most stream reaches have few or no spawning coho salmon.

Thus, the concept of a single production goal has become obsolete. The concept of production potential is more appropriate. Production potential is the estimated number of adult salmon that might be expected from a population under a particular set of natural environmental circumstances. When estimating production potential, both the quality of the freshwater habitat and the probable levels of marine survival must be considered. Production potential and range of coho salmon abundance within a basin would be expected to expand and contract as marine survival increases and decreases.

The estimates of production potential presented in this chapter were developed based on actual measurements of habitat in individual stream reaches made during the period 1990-95 and two assumed levels of marine survival: 3% and 5% (see Table 1). Therefore, two tiers of freshwater habitat would be capable of supporting coho production, corresponding to the two levels of marine survival.

Table 1. Estimated Production Potential of Current Habitat for Coho Salmon in Oregon Coastal ESUs.

Basin	Marine Survival	Production potential	Spawners needed	Estimated Spawners					Preliminary 1996	
				1990	1991	1992	1993	1994		1995
Oregon Coastal ESU										
Nehalem	5%	59,100	31,700	1,600	4,000	1,300	2,300	2,400	1,600	1,100
	3%	24,000	17,500							
Tillamook	5%	8,300	5,700	300	3,000	300	900	900	300	700
	3%	2,400	2,000							
Nestucca	5%	10,500	6,400	200	700	700	400	300	1,800	500
	3%	2,400	1,800							
Siletz	5%	13,100	7,400	400	1,000	2,400	400	1,200	600	800
	3%	5,500	4,300							
Yaquina	5%	21,700	11,800	400	400	600	500	2,400	5,700	4,600
	3%	9,100	7,100							
Alsea	5%	42,600	21,500	1,200	1,600	7,000	1,100	1,300	700	1,600
	3%	20,200	15,100							
Siuslaw	5%	69,000	39,200	2,700	3,700	3,400	4,400	3,000	6,100	8,800
	3%	28,500	22,800							
Coastal Lakes	5%	20,000		4,400	7,300	2,000	10,100	5,800	11,200	13,500
	3%	12,000	6,700							
Umpqua	5%	106,200	62,200	3,700	3,600	2,200	9,300	4,500	11,000	14,400
	3%	38,400	29,400							
Coos	5%	25,100	14,600	2,300	3,800	15,600	15,300	14,600	10,400	12,100
	3%	8,900	7,200							
Coquille	5%	28,600	18,900	2,700	5,600	2,100	7,400	5,000	2,100	16,200
	3%	7,700	5,400							
Direct Ocean Tributaries	5%	26,400	16,100	1,100	1,600	2,000	2,300	2,200	900	4,000
	3%	9,500	7,300							
Total ESU	5%	430,600	235,100	20,900	36,300	39,700	54,400	43,700	52,400	78,300
	3%	168,600	126,600							
Transborder ESU										
Rogue	5%	28,900	14,200	2,800	800	1,900	200	5,300	4,200	5,800
	3%	6,800	5,400							

All estimates of production potential were derived with the assumption of having fully seeded freshwater habitat, and should be viewed as *potentially* achievable levels of production based on current habitat condition. For the transborder ESU that includes southern Oregon and Northern California, estimated production potential was calculated for the Rogue Basin only. Production potential for coho salmon is thought to be very small in other Oregon streams in this ESU.

Because estimates of potential production are based on modeling of freshwater habitat capacity, which relies heavily on winter habitat conditions, these estimates may be optimistic in some cases - especially for areas where high summer water temperatures may occur such as the Umpqua and Rogue basins. Temperature may be a more severe constraint than winter habitat on populations in some streams in these basins and limit production below the maximum levels estimated (*see* Table 1). Consequently, current estimates of potential production should be viewed as giving general guidance. Undoubtedly, this guidance will be revised in the future as population models are improved and more habitat data are collected.

To assess the status of a population relative to its potential, it is necessary to consider its history of relative marine survival. Potential production levels vary as marine survival changes. Thus, because marine survival for the last two decades has been poor and escapement has been reduced by over-fishing, attaining the production potential of the higher levels of marine survival will occur only after achieving adequate spawner abundance in the poor habitat that currently has few, if any, spawners. Achieving adequate spawner abundance in these poorer habitats may require that several generations experience improved marine survival and that the more restrictive harvest controls proposed in this plan are implemented (*see* Fish Management Measures in Chapter 17B).

For current habitat conditions, the modeling predicts that wild coho salmon production could range approximately from 168,000 in 800 miles of habitat to 430,000 in 2,100 miles of habitat in the Oregon Coastal ESU. Spawner needs are in the range of 126,000 to 235,000. Similarly, production potential for the Rogue Basin ranges approximately from 7,000 to 29,000 with spawner needs of 5,000 to 14,000.

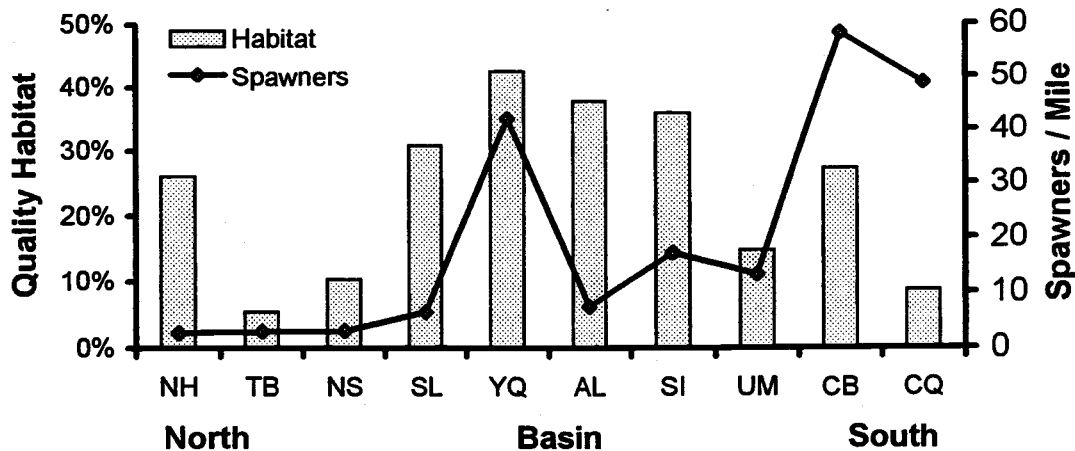
Recent Population Trends

Since 1990, coho salmon spawner populations in the northern Oregon Coastal ESU have been estimated using statistically-designed, stratified random surveys. From 1950 to 1990, populations were monitored using standard survey sites. Whereas the standard surveys provided an index of abundance from year-to-year, the new methods provide actual population estimates. In the Rogue Basin, population estimates are made from ratios of unmarked fish to marked hatchery fish collected in a seining operation at Huntley Park in the lower river.

The populations estimated for each major coastal basin since 1990 are listed in Table 1. Abundance of spawners in the Coos and Coquille basins have been relatively strong since 1992, the first year of substantial harvest reduction on the south coast. In 1995, and especially in 1996, spawning populations in the coastal lakes, and the Umpqua, Siuslaw, and Yaquina basins have also seen substantial increases in abundance. The preliminary estimates for 1996 show a significant increase in total abundance for all but the northern third of the Oregon Coastal ESU.

The stronger spawner returns in the southern two-thirds of the ESU do not appear to be due to better habitat quality. For example, based on our habitat modeling, the Coos and Coquille basins have habitat of similar quality to that in the Nehalem and Nestucca basins, respectively, yet had a 15- to 20-fold greater density of spawners in 1996.

Figure 1. Relative Habitat Quality & 1996 Spawners



Total production of the coastal populations can be estimated by dividing escapement estimates by one minus the exploitation rate. Figures 2 and 3 show these estimates for the Oregon Coast ESU and for the Rogue Basin, respectively. In five of the last seven years, coastal basins as a whole have been producing coho salmon at about one-half of their estimated potential, given the poor marine survival conditions. The primary reason for this reduced production is lack of adequate spawners. Figure 2 clearly demonstrates the effects of high exploitation rates during periods of poor marine survival. In hindsight, exploitation rates of 50% to 70% experienced by some coastal coho stocks as late as the early 1990s were clearly too high given the poor marine survival conditions experienced by the fish. As harvest has decreased, spawner abundance has increased. Since 1990, there has been a fairly steady increase in spawner abundance despite a generally flat trend in total production. Spawner-to-spawner ratios have ranged from 1.2 to 2.6 during the past four years. Estimated spawner abundance has increased by about four-fold in two generations (1990-96).

In the Rogue basin, the population has been much more variable (Figure 3). However, marine survival of hatchery fish has greatly improved since 1994. Abundance of wild spawners has also increased dramatically.

Prospects for the Future

The improved survival of coho salmon in the Rogue Basin and in the south and mid-coast basins in recent years are hopeful signs. We know that climate is cyclic and strongly influences marine survival. We have been in a poor survival cycle since 1977. The improved marine survival of coho from the Rogue Basin since 1994, and apparent improved survival in mid-coast basins in

Figure 2. Coho Salmon Population in the Oregon Coastal ESU

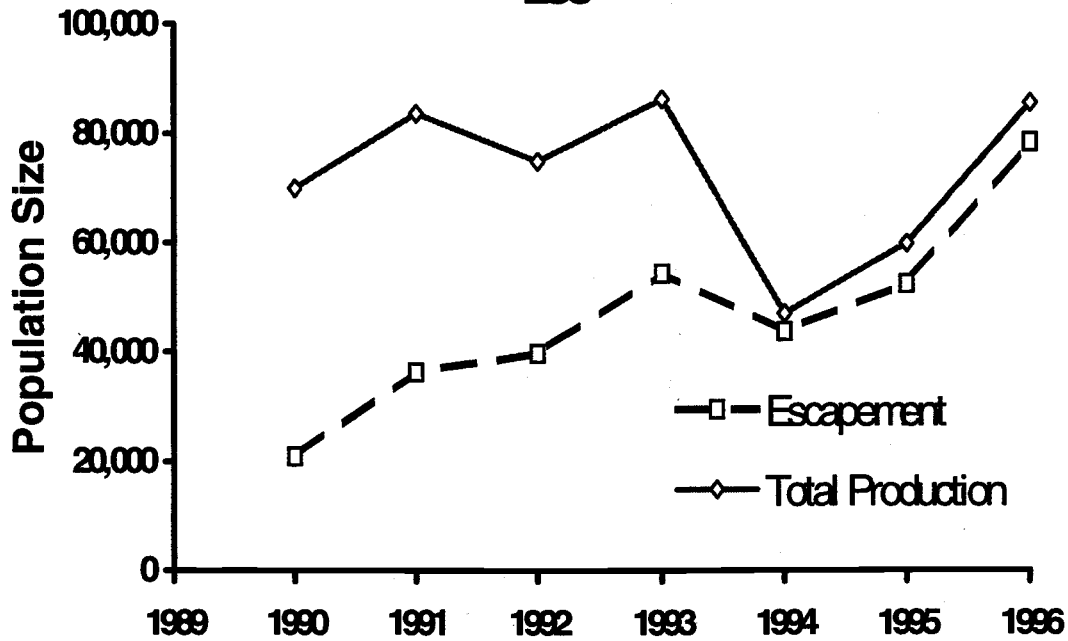
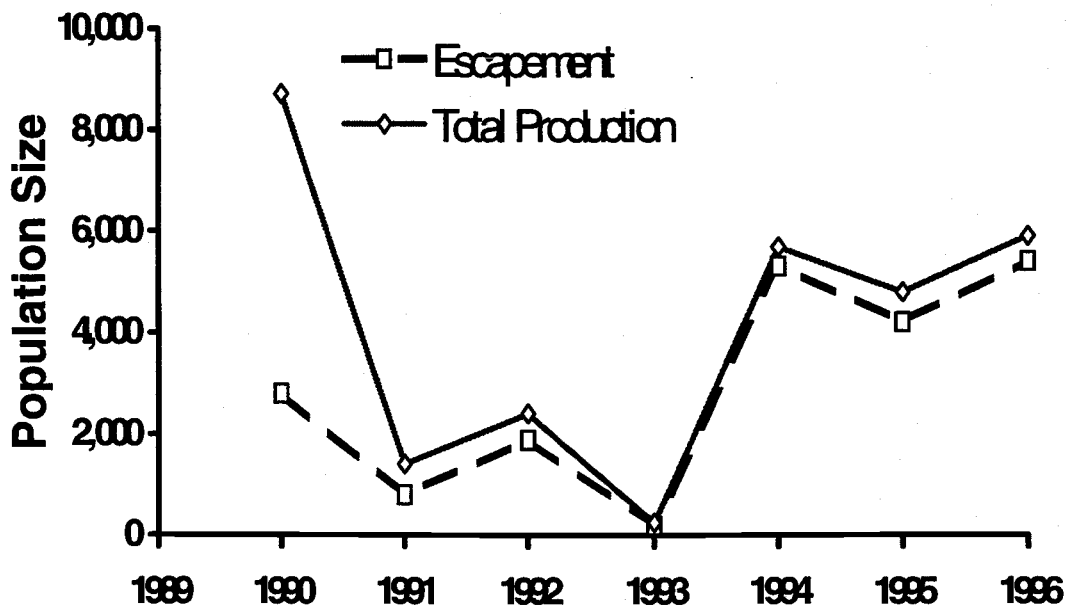


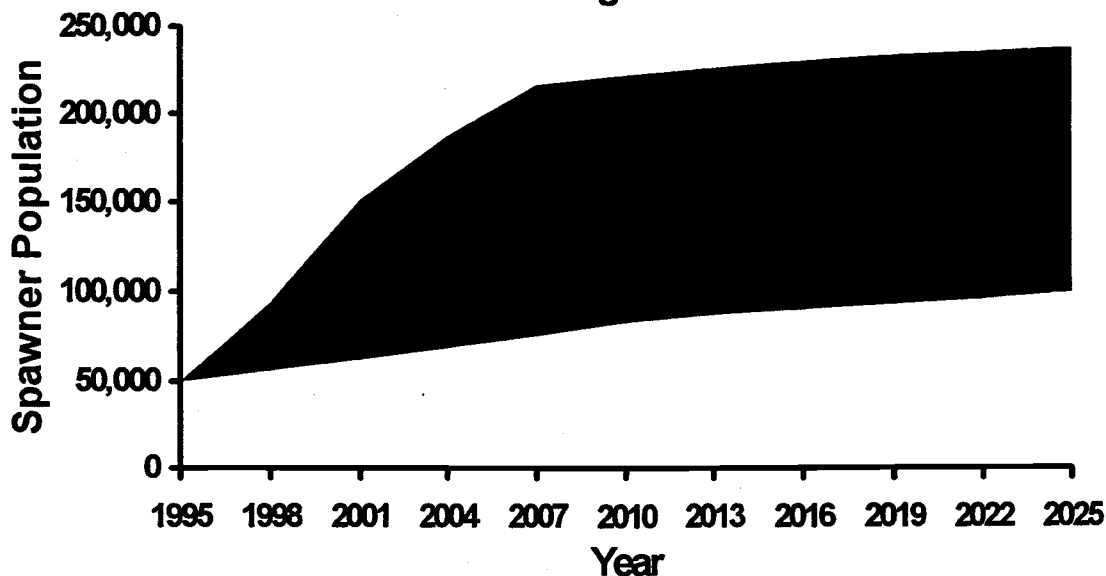
Figure 3. Coho Salmon Population in the Rogue Basin



1996 may be precursors of better survival in the near future. Climatologists predict a return to a wetter climate similar to that experienced in the 1960s, a period of good survival conditions for Oregon coho salmon.

So, what trends in production are populations likely to experience in the future? One possible answer has come from a simple model of projected populations that would result from the proposed OCSRI Harvest Strategy. If we consider two assumptions -- that marine survival will remain poor (average 3%), or that marine survival will improve (average 5%) -- we can develop a range of possible outcomes. Starting with the average spawner abundance of 50,000 fish for 1993-95, the model predicts an expected rebuilding trajectory for spawner abundance in the Oregon Coast ESU at 3-year intervals (Figure 4) while following the proposed harvest strategy. The typical cycle of Oregon coho salmon populations is three years from spawner-to-spawner. Thus, the values for 1998 in Figure 4 represent populations in 1996-98. Based on the model, the spawner population would be expected to be between 56,000 and 94,000 after one generation, and between 75,000 and 216,000 after four generations. The estimated returns for 1996 fall near the upper boundary of this predicted range after one generation.

Figure 4. Range of Anticipated Coho Salmon Spawner Abundance in The Oregon Coastal ESU



A second answer to the question of where populations are likely to go in the future comes from a more sophisticated habitat-based, life cycle model. This model is based on the reach-level habitat data used to estimate production potential and incorporates a range of probable variation in survival at each life stage. The model also includes factors for straying of spawners, multiple spawning periods, sex ratio, redd failure, and loss of genetic fitness at low population size. Populations were modeled for ten generations using average marine survival rates and for 33 generations using a cyclic pattern of marine survival. (A detailed description of the model and results are presented in ODFW Attachment 1.)

Populations in the Yaquina, Coos, and Tillamook basins were analyzed using the model. These basins have the best, an intermediate level, and poorest habitat in the northern Oregon coast ESU, respectively. Results suggest that future population abundance will be heavily influenced by marine survival and by exploitation rate when marine survival is low. Only the habitats with high productivity remained viable when marine survival was low. Therefore, distribution and abundance of fish was a function of long- and short-term variability in marine survival and long-term patterns of habitat quality. Within a reach, populations were resilient, unless numbers dropped to a level where demographic risk factors became more important than density dependent population dynamics. Persistence of populations in a basin during periods of poor marine survival depended on the highest quality reaches.

The model predicts that there is a high probability of persistence of coho populations in all major basins of the northern Oregon coast ESU for the next century if habitat condition remains as it is today. The model was also used to predict risk of extinction assuming future declines in habitat quality ranging from 10% to 60%.

Based on these analyses, the model predicts that there would be a substantial increase in the risk of extinction (population of ≤ 50 spawners occurring at any time) in basins with poor quality habitat, such as the Tillamook if habitat quality over the next century declines by 30-60%. This would probably also be the case in the Nestucca, and Coquille, based on an evaluation of habitat quality (see Figure 1). Similar declines in the quality of habitat in the remaining major basins in the northern Oregon coast ESU would not result in an appreciable decrease in the probability of persistence of coho salmon populations in those basins. However, decreased habitat quality would result in smaller populations.

Summary

- Actual measurements of stream habitat were used as the basis for estimating production potential for coho salmon in coastal basins.
- Production potential is a more appropriate concept than production goals because it varies greatly over time, depending on marine survival conditions.
- The population model predicts that productive habitat in the Oregon Coast ESU ranges from about 800 miles when marine survival is 3% (the estimated average for the last decade) to about 2,100 miles when marine survival is 5%.
- Estimated total production of coho salmon from the northern Oregon coast ESU has been relatively constant since 1990, whereas spawner escapement has increased significantly. Estimated escapement in 1996 is about four times the estimated escapement in 1990.
- Population modeling suggests that if marine survival continues at the level of the past decade, slow but steady rebuilding of coho salmon spawner populations should be expected, but there will be few or no harvest opportunities. However, if marine survival improves by two-thirds,

spawner abundance should rebuild rapidly to levels near full seeding within four generations, even after providing increased harvest opportunities allowed under the proposed OCSRI harvest strategy.

- A sophisticated population model suggests that populations have a high probability of persisting over the next century if habitat quality remains in its present condition. If significant declines in habitat quality occur, persistence will be jeopardized in basins with poor habitat, although population abundance will decline in all affected basins.
- Improvement in habitat quality is expected through implementation of the Northwest Forest Plan on federal lands and through the OCSRI measures on state and private lands. These improvements will increase the expected production of coho salmon at various levels of marine survival and will help ensure persistence of coho salmon during periods of poor marine survival, particularly in basins with poor habitat.

Chapter 15

Provisional Core Area Maps and Process for Revision

Introduction

This document is a revision of the chapter on mapping Core Areas that was included in the August 1996 draft of the Conservation plan. Included are descriptions of the background and basis of mapping Core Areas, description of methods used to conduct the mapping, and a discussion of the results of this work. Also included is: (1) a summary of comments received from reviewers, and (2) a description of the procedure and schedule for revising the maps based on these comments. Until this revision is complete, it should be noted that these maps represent the initial attempt at defining Core Areas and, therefore, are provisional.

Salmon Core Areas are defined here as reaches or watersheds within individual coastal basins that are judged to be of critical importance to the persistence of salmon populations that inhabit those basins. Ideally, Core Areas contain the resources and habitats necessary for the survival of each population. Furthermore, Core Areas will be a major source for seeding new habitats as restoration programs are implemented. Identification of Core Areas is needed to enable resource managers to better prioritize protection and restoration efforts that are planned to occur as part of the Oregon Coastal Salmon Restoration Initiative (OCSRI) to recover these stocks. Core Areas are also key in the design of the monitoring that is planned to track progress of OCSRI.

Selections of Core Areas were based primarily on available population abundance and habitat inventory data. Rationale for selecting each Core Area have been documented in detail. Additionally, selections were not associated with specific land uses or land ownership. Because of this approach, mapping of Core Areas differs from previous mapping exercises conducted to identify important salmonid areas.

Background and Basis of Mapping Core Areas for Salmon

Description of a Core Area

Under pristine conditions, salmon (including coho, chum, and chinook salmon; steelhead; and cutthroat trout) are not evenly distributed throughout river basins. Instead, they tend to concentrate in local reaches of river basins to spawn and rear. These concentrations reflect the combination of local differences in the character of the stream environment and preferences of each species for certain habitat features. Stream reaches where these habitats occur are called Core Areas. Many factors explain why certain river reaches support higher concentrations of spawning or rearing salmon than other reaches. For example, some stream reaches may have better spawning gravel, better winter rearing areas, and more optimal water temperatures than others.

Core Areas Differ by Species

Each species of salmon has a somewhat distinct life history and exhibits different habitat preferences throughout its life. However, because considerable overlap exists in the habitats used by different species, they are only occasionally completely isolated, either in space or in time within a river basin. These differences in habitat preferences make it common for certain stream reaches to be coho domain, and others to be mostly the domain of coho, chinook, steelhead or chum.

This general segregation within habitat types in a river basin is noticeable at both the adult-spawning and juvenile-rearing life-stages. At spawning, for example, it is common to find chinook, coho, and steelhead segregated in rather distinct stream reaches. It is also common to observe somewhat different distributions of rearing juvenile chinook, coho, and steelhead, although some stream reaches may contain rearing juveniles of all species. Where juveniles coexist in the same stream reach, habitat preferences often are exhibited at the micro-habitat scale.

Need for Mapping Core Areas

The concept of identifying on maps the portions of river basins particularly important to salmon is appealing. Foremost reasoning for a mapping efforts such as this is that knowledge of areas currently supporting the highest concentrations of spawning and rearing salmon is essential in any efforts to stabilize and improve the health of salmon populations. In addition, the mapping information would help state and federal agencies and private landowners in deciding where to focus their limited budgets on management actions that will conserve and improve the status of salmon populations in these areas. In utilizing maps of Core Areas, it is important to distinguish among scopes of geographic coverage. Core Areas strictly represent stream reaches identified to contain critical habitats for anadromous salmonids. In many cases, protection and restoration measures need to recognize watersheds as the level of landscape where the measures need to be focused. Core Areas simply serve as a tool in helping to prioritize where these watersheds occur.

Previous Approaches to Identifying Important Areas for Salmon

A number of other processes were used to identify important areas of Oregon coastal streams for salmon in the past. Other designations used to identify areas considered to be important to salmon and other aquatic species include:

- FEMAT Key Watersheds (selected by federal biologists as part of the Presidents Forest Plan; all located on federal lands)
- AFS Aquatic Diversity Areas (selected by committee of members from the Oregon Chapter of the American Fisheries Society)
- DSL Essential Salmonid Habitat; and ODFW Source Watersheds (both selected by Oregon Department of Fish and Wildlife)

Although these processes were useful as a first step in determining important locations, they are limited in their application as a means of identifying critical salmon habitat for all species throughout all coastal basins. Limitations associated with these prior designations include inconsistent and undocumented rationale for particular selections, selections based on associations with particular land uses or land ownership, and ambiguous correspondence to particular salmon species. For example, rationale used to select AFS Aquatic Diversity Areas, DSL Essential Salmonid Habitat and ODFW Source Watersheds varied appreciably among locations and was based on professional judgment without documentation of selection rationale. FEMAT Key Watersheds are located almost exclusively on federal land and, therefore, are lacking in coastal basins where little federal land exists.

We set out to improve upon the limitations of these prior mapping exercises in determining Core Areas. Our goal was to produce a product based on more consistent and well-documented rationale. This rationale was to be based primarily on contemporary inventories of populations and their habitats. Furthermore, Core Area selections were to be unrestricted by land use or land ownership, readily revisable as new data became available.

Appropriate Use of Core Area Maps

Mapping, or otherwise identifying, core salmon areas has strong overall support. Already several conservation-oriented uses of these maps have been proposed, in large part due to recognition of their importance in providing guidance to resource managers. Providing knowledge of salmon and rearing salmon areas does carry some risk of being misunderstood or misrepresented. However, given the declines in numerous salmon populations, there is greater risk associated with not mapping Core Areas as presently known.

To address concerns of landowners and other people interested in continued utilization of natural resources, as well as people interested in conserving and restoring salmon populations, it should be emphasized that the maps are intended to allow managers of the coastal landscape to make

informed decisions regarding the effects of human activity on salmon. They are not part of a plan to prohibit any human activity near Core Areas, nor by default, to indicate that non-Core Areas of rivers can be discarded or exempted from basic environmental protection rules. As noted earlier, almost every part of a river basin is crucial to the survival of some species of salmon at one time of the year or another. Therefore, stream reaches not identified as Core Areas for salmon should not be construed as unimportant. In fact, many non-Core Areas provide critical migration corridors for fish traveling between the Core Areas and the ocean.

Maps of Core Areas for salmon are not intended to result in economic penalties to private landowners if salmon currently concentrate for spawning or rearing in stream reaches on their property. The maps are not intended to endorse relaxation of existing environmental protection rules in areas presently outside of Core Areas. Such actions would serve to perpetuate existing geographic patterns of salmon production within river basins and would inhibit the restoration process.

Technical Obstacles to Mapping Core Areas

Mapping Core Areas is a challenging task. Part of the challenge is determining a map scale that allows for effective display of Core Area designation. Another challenge is meeting people's expectations that the areas will: (1) represent some relatively small subset of the overall watershed, (2) be similarly important to all salmonid species or races, and (3) be clearly definable by unambiguous data that are currently available.

Few situations exist where a particular species of salmon depends on only a specific portion of a river basin. Usually, species are best adapted to certain types of habitat within a river basin. These species-specific adaptations result in different habitats being used as the fish grow and seasons change.

Essentially all reaches of a river serve critical function in the life cycle of anadromous fish at some time throughout the year. Also, protection of discrete, distinct stream reaches will not secure salmon populations because these stream reaches are functionally interacting with adjacent stream reaches and with the riparian and upslope areas of the watershed.

However, there are differences in aspects of anadromous salmonid life history among species that can be associated with certain portions of coastal basins and, thus, lend themselves to be identified through Core Area mapping. Coho, for example, tend to spawning the fall and winter, rear during the summer, and over-winter in small tributaries. Alternatively, chinook generally concentrate in portions of the mainstem or larger tributaries of a river when they spawn during November, but the young fish distribute throughout the entire basin below these spawning areas as they rear and migrate downstream through the estuary from April through October.

Another obstacle associated with producing Core Area maps is the adequacy of appropriate data. Data suitable to identify important salmon areas are not equally available for all species. Relatively more data are available for coho than for chum or chinook, and very little data exist for

steelhead and sea-run cutthroat. Preparing maps of Core Areas for salmon does not imply that all areas of the basins have been surveyed for all species. For example, while there is a reasonably good "feel" for identifying locations having high densities of spawning chinook, chum, and coho, there is not a similar basis for identifying stream reaches having the highest spawning density of steelhead and sea-run cutthroat. Data identifying stream reaches that support especially high densities of rearing juveniles are also scant. As a consequence of inadequate surveying, maps of Core Areas for salmon will not identify some stream reaches that are especially important to salmon production.

Procedure for Determining Core Areas

There were a number of key considerations in developing our procedure for determining Core Areas:

- The process should be conducted separately for each major coastal basin and, to the degree possible, separately for each species.
- The procedure to identify and screen candidates for Core Areas should be sufficiently defined to allow it to be as repeatable as possible. Although because of information gaps, it will not be possible to maintain complete consistency across all species or basins, the procedure should be defined in enough detail to specify what criteria were used for identifying candidate Core Areas for each species in each basin.
- To the largest extent possible, the process of identifying Core Areas candidates should be "data driven". Selection of candidates should be based on data that identifies these areas as having above-average population densities or habitat quality.
- The rationale for selecting each Core Area should be well documented to facilitate review and revision of this exercise.

Working within the framework defined by the above list of considerations, the following procedure was used to select Core Areas:

1. Electronic versions of 1:100,000 Hydrologic Unit (HUC) maps for coastal basins were obtained from the USGS. Using ARC-INFO software (Environmental Systems Research Institute, Inc.), preliminary maps for each of the nineteen individual HUC's of coastal basins were prepared that displayed the spawning and rearing distribution of anadromous fish, land ownership and locations of stream reaches previously identified as important for salmon. The spawning and rearing coverage was represented by the spawning and rearing distribution of coho salmon because of limitations of the availability and accuracy of this information for other species (steelhead, chum and chinook), and the fact that the spawning and rearing distributions of these other species were generally well encompassed by that for coho. Also plotted on the maps were the locations of areas that have been identified as being important to salmon and other aquatic species in prior mapping exercises.

These areas included:

- FEMAT Key Watersheds
 - AFS Aquatic Diversity Areas
 - DSL Essential Salmon Habitat
 - ODFW Source Watersheds
2. For each basin, databases of adult spawner density, juvenile density and, habitat quality were assembled and perused to identify stream reaches having either above-average fish density or habitat quality. These databases consisted of: (A) Adult spawner densities of spring and fall chinook, coho, and chum salmon observed in surveys conducted by ODFW during the last six years (1990-95); (B) Inventories of chinook spawning habitat in the Nehalem, Wilson, Siletz, Alsea and Siuslaw basins conducted by ODFW in 1995; (C) Predictions of coho smolt density derived from aquatic habitat inventories and the ODFW habitat-limiting factors model (see chapter on population sustainability modeling); and (D) densities of sub-yearling coho observed on juvenile fish surveys. Criteria for identifying candidate reaches were not consistent among species, nor were they consistent among different basins; however for each case, we documented the criteria that were used. Criteria could not be consistently applied across all basins because of the high variability in both spawner abundance and habitat quality among basins, and the inconsistent proportion of each basin that had been inventoried for habitat and fish abundance.
 3. Once these reaches were identified their locations were plotted on the map to assess correspondence between candidate reaches based on habitat or abundance attributes or areas identified under item 1. Additionally, we plotted locations identified by special studies or local experts to be important for salmon spawning and rearing.
 4. After the plotting was completed, we reviewed the map to select Core Areas. This exercise was conducted separately for each species. Our initial choices were reaches or watersheds that showed the highest overlap between attributes of population abundance and habitat quality, and were previously identified as any of the areas listed under item 1. Remaining candidates were reviewed and included as selections based on a variety of other factors, such as correspondence with future stream restoration sites, anecdotal observation of apparent high juvenile or adult abundance, presence of important recreational fisheries, etc. Initially, arbitrary limits were not set on the number of Core Areas selected for each species in each basin. As many areas as could be identified were selected based on the information available. One weakness of this approach is the scope of coverage was dependent on the information base, so that species or basins with better databases automatically had the highest number of selections regardless of any other factors. However, it did minimize inconsistencies among locations that were designated as Core Areas.
 5. As reaches were selected as Core Areas, the basis for each inclusion was documented in a relational database that included a description of the location of each Core Area and a list of the factors used in making the selection.

Results and Discussion

Description of Core Areas

Preliminary maps of Core Areas for each of the 19 coastal HUCs were distributed as part of the August 1996 CSRI plan draft and are available from the ODFW Geographic Information Systems Branch of the upon request. Because no revisions have been made to the original versions of these maps, they are not included here. Table 1 lists the total miles of Core Areas, the proportion of total anadromous habitat that are Core Areas, and the proportion of total stream miles that are Core Areas for each HUC. Overall, we designated about 2,900 miles of coastal streams as Core Areas. This constituted about 40% of the overall anadromous salmonid habitat and 15% of the overall stream mileage. A listing of the designated Core Areas for each coastal basin is provided in Table 2. Note that because of its length, Table 2 appears at the end of the document.

Among the species or races of anadromous salmonids reviewed, coho received the highest number of Core Area miles (Table 3). This was due to a couple of factors. First, coho tend to be widely distributed throughout coastal basins and therefore inhabit a fairly large proportion of available habitat. Secondly, a greater volume of inventory data on population abundance and habitat availability exists for coho than for other species, providing a more direct means of identifying Core Areas for this species than for others. The least amount of Core Area miles were assigned to chum salmon, a reflection of the limited distribution of this species in coastal basins. Core areas for chum salmon were restricted to the five northernmost HUC's (Necanicum-Alsea). Over half of the Core Area miles for chum salmon were located in the Tillamook HUC, the location having the overwhelmingly highest population of chum salmon in the state.

Table 1. Mileage of Core Areas identified for all anadromous salmonids for each hydrological unit.

Hydrologic unit	Core Areas		
	Miles	Percent of anadromous salmonid habitat	Percent of total stream miles
Necanicum	24.9	25	14
Nehalem	213.3	40	23
Tillamook	252.0	46	22
Siletz	182.8	33	16
Alsea	148.1	28	18
Siuslaw	281.2	39	31
Siltcoos	59.4	73	40
Lower Umpqua	200.1	20	12
North Umpqua	185.2	60	13
South Umpqua	428.3	52	22
Coos	185.8	35	20
Coquille	211.5	44	17
Sixes	100.5	65	21
Lower Rogue	45.0	19	5
Middle Rogue	78.0	54	9
Upper Rogue	87.8	66	5
Illinois	54.8	22	5
Applegate	43.0	34	5
Chetco	92.5	34	17
Total	2,874.2	38	15

Core Areas for fall chinook salmon were identified for all HUC's except the Necanicum, Siltcoos, North Umpqua and Upper Rogue. These areas are primarily sites where intensive spawning occurs, and thus, do not encompass essential riverine and estuarine rearing habitats. Nine of the nineteen coastal HUC's support populations of spring chinook salmon and have Core Areas for this species. These Core Areas constitute the primary holding and spawning areas for this species.

The 795 miles of Core Areas designated for winter steelhead should be viewed as incomplete. Except for a few locations where detailed studies have occurred, data are generally lacking to make informed choices for this species. We expect to make substantial revisions to Core Area designations for this species following review by field staff. Native populations of summer steelhead occur only in the Siletz, North Umpqua and Rogue Basins. Core Areas for this species represent locations in these basins that are known to be important for spawning and rearing of summer steelhead. We were unable

to designate Core Areas for sea-run cutthroat trout because of the lack of detailed inventory data for this species and a generally poor understanding of its life history in freshwater.

Table 3. Total mileage of Core Areas for each species or race of anadromous salmonids for all coastal hydrological units.

Species or race	Core Areas		
	Miles	Percent of anadromous salmonid habitat	Percent of total stream miles
Coho Salmon	1,489.1	20	8
Chum Salmon	63.9	1	<1
Fall Chinook Salmon	705.1	9	4
Spring Chinook Salmon	248.7	3	1
Winter Steelhead	795.4	10	4
Summer Steelhead	175.4	2	1

Basis for Core Area Selection

A detailed description of the rationale for selecting each Core Area was presented in Appendix A of the August 1996 CSRI plan draft of this chapter. The basis of these rationale are summarized in Table 4 for each species or race. Except for winter steelhead, most Core Areas included criteria associated with population abundance as part of their rationale for selection. For example, 83% of the 105 Core Areas selected for coho salmon had selection criteria based on population abundance. Because little quantitative inventory data exists for coastal populations of winter steelhead, rationale for Core Area selection was based primarily on professional judgment. This is a major weakness in our ability to determine Core Areas for this species.

Table 4. Basis for selecting Core Areas for each species or race of anadromous salmonid. Values in the four right-hand columns indicate the percent of Core Areas for each species or race that included a given criterion as part of the selection rationale.

Species or Race	Number of Core Areas	Percent of Core Areas selected because of each criterion			
		Population abundance	Habitat quality	Professional judgment	Prior designations
Coho Salmon	105	83	59	7	85
Chum Salmon	26	73	0	27	73
Fall Chinook Salmon	101	86	14	14	75
Spring Chinook Salmon	14	57	14	21	80
Winter Steelhead	28	32	4	61	64
Summer Steelhead	5	80	0	20	80

Habitat quality also composed a major portion of the rationale used to select Core Areas for coho salmon. This was possible because of extensive habitat surveys conducted during the last six years and the ability to readily apply these data to a habitat -limiting factors model developed by ODFW. The relatively high degree of overlap between stream reaches or watersheds having apparently good winter rearing habitat (as indicated by this model's output) and above-average population abundance supports the validity of this model's application for determining Core Areas for coho salmon.

Summary of Reviewer Comments

Preliminary Core Area maps were distributed to the following entities for review:

- National Marine Fisheries Service (NMFS)
- Oregon Chapter of the American Fisheries Society (AFS)
- Oregon Forest Industries Council (OFIC)
- Oregon Trout (OT)
- Pacific Rivers Council (PRC)
- Coastal Watershed Councils (CWC)
- Coastal District Fishery Biologists of Oregon Department of Fish and Wildlife (ODFW)

In soliciting the reviews, we asked each reviewer to address the following questions:

1. Are there significant errors of inclusion or omission?
2. Is adequate information provided to explain each selection?
3. If not, how should selections be documented?
4. Few areas are identified for steelhead. How can we do a better job identifying steelhead Core Areas?
5. How often should these maps be revised and updated?

Table 5 summarizes the comments that we received and list how each will be addressed during the revision process.

Table 5. Summary of comments and concerns received for Core Area maps. Comments and concerns are grouped into major categories followed by a list of which reviewers provided comments pertaining to each category and how each category will be addressed during the revision process. Acronyms for reviewers are defined in the text.

Comment or Concern	Reviewer(s)	Planned Revision Action
Failure to utilize "Watershed Approach" in identifying Core Areas	AFS, OT, CWC	None. As defined, Core Areas consist of stream reaches where critical salmonid habitats occur. This is not to say that the persistence of these habitats is independent of the rest of the watershed. Core Areas are identified to assist in guiding CSRI actions in all coastal watersheds.
Lack of specification of protection and restoration measures associated with Core Areas	AFS, OT, PRC	None. Addressed in other portions of the CSRI.
Failure to assess adequacy of core areas as to whether there are enough core areas and whether they are spatially close enough to conserve the species (coho)	PRC	Ask that the Independent Scientific Review Group address this question.
Lack of including non-stream areas such as floodplains and wetlands as Core Areas	AFS	None. Such areas are not identifiable at the resolution used to map Core Areas. Will be considered in designing CSRI restoration and protection measures.
Inconsistencies in selection rationale among different Core Area designations	AFS, OFIC, OT, CWC	Subjective rationale will be documented in greater detail during revision.
Errors in inclusion or omission	All reviewers except NMFS	Suggestions will be considered on a case-by-case basis during revision. Changes will be made where sufficient rationale are available.
Errors associated with using abundance indexes that are inflated by hatchery-reared strays	AFS, OT	Most data on spawner abundance was adjusted to reflect natural production. Specific designations where hatchery strays may exist will be reviewed during revision process.
Lack of sufficient data to adequately define Core Areas	AFS, OT, CWC	Implementation of the CSRI monitoring plan will increase available data in future. Future revisions will incorporate new data as it becomes available. Need to maintain "data driven" selection approach.
Failure to utilize water quality data in identifying Core Areas	AFS	None. Rationale based primarily on abundance. Little reach-specific water quality data currently exists.
Incorporation of data sources other than those collected by ODFW	AFS, OT	Utilized all data sources available. Little additional data was suggested by reviewers. Will solicit additional data during revision.

Proposed Revision Process

Because of other work commitments, we were unable to update Core Area Maps prior to submitting the revised CSRI plan to the National Marine Fisheries Service. We plan to complete these revisions prior to the winter of 1997. Revisions will address the applicable comments and concerns listed in Table 5. In completing the revisions, we plan to incorporate a review team comprised of representatives from watershed councils, private and industrial landowners, conservation organizations, local state and federal biologists. Peer reviewers of the draft plan also will be invited to participate on this team.

Our proposed schedule for completing the map revisions is to meet the following objectives by the dates listed below. Given the uncertainty in upcoming work schedules and availability of interested participants, this schedule should be viewed as a general guide that may be modified.

- Mid-May 1997: Obtain commitments from participants of the review team.
- Mid-June 1997: Hold initial meetings to determine procedure for completing revisions and schedule team work sessions.
- Mid-October 1997: Complete revisions of all HUCs.
- January 1998: Complete GIS production of revised data layer and revised printed maps.
- February 1998: Complete report that documents revision process, revised maps and selection rationale.

Core Areas presented in this document should be considered preliminary until this revision process is complete. However, given the limitations of available data and knowledge, even upon completion of this review, designations of Core Areas should be viewed as a dynamic process that is periodically updated as new information becomes available. Core Area maps will be revised, perhaps on a biannual basis, as new data become available.

The next step in this process is to map potential Recovery Areas for coastal basins. Our intent would be to perform GIS analysis to identify locations where restoration activities have the highest likelihood of providing critical habitats for coastal salmonids. The planned approach of this analysis is to extrapolate physiographic and biographic attributes associated with Core Areas to entire coastal watersheds using available GIS data layers. If successful, this exercise would be exceptionally valuable in guiding restoration efforts. It is our intent to complete mapping of Recovery Areas by the end of 1998.

Table 2. Listing of designated Core Areas for coastal basins. Coastal basins containing Core Areas are listed north to south.

BASIN	SUBBASIN	ID CODE	SPECIES	STREAM REACH
NECANICUM RIVER	MAIN STEM	NCCU1	CHUM	NECANICUM R
NECANICUM RIVER	MAIN STEM	NCCO1	COHO	NECANICUM R
ECOLA CREEK	NORTH FORK	ECCO1	COHO	ECOLA CR, N FK
NEHALEM RIVER	MAIN STEM	NCU1	CHUM	FOLEY CR
NEHALEM RIVER	MAIN STEM	NCO1	COHO	FOLEY CR
NEHALEM RIVER	MAIN STEM	NSTW2	WINTER STEELHEAD	COOK CR
NEHALEM RIVER	MAIN STEM	NCHF2	FALL CHINOOK	HUMBUG CR
NEHALEM RIVER	MAIN STEM	NCO3	COHO	FISHHAWK CR
NEHALEM RIVER	MAIN STEM	NCHS1	SPRING CHINOOK	NEHALEM R
NEHALEM RIVER	MAIN STEM	NCO4	COHO	DEER CR
NEHALEM RIVER	MAIN STEM	NCO6	COHO	CLEAR CR
NEHALEM RIVER	MAIN STEM	NCO7	COHO	NEHALEM R
NEHALEM RIVER	NORTH FORK	NCU2	CHUM	ANDERSON CR
NEHALEM RIVER	NORTH FORK	NCHF4	FALL CHINOOK	SOAPSTONE CR
NEHALEM RIVER	NORTH FORK	NCO2	COHO	GODS VALLEY CR
NEHALEM RIVER	NORTH FORK	NCHF3	FALL CHINOOK	NEHALEM R, N FK
NEHALEM RIVER	SALMONBERRY RIVER	NCHF1	FALL CHINOOK	SALMONBERRY R
NEHALEM RIVER	SALMONBERRY RIVER	NSTW1	WINTER STEELHEAD	SALMONBERRY R
NEHALEM RIVER	ROCK CREEK	NSTW3	WINTER STEELHEAD	ROCK CR
NEHALEM RIVER	ROCK CREEK	NCO5	COHO	ROCK CR
MIAMI RIVER	MAIN STEM	TBCU1	CHUM	MOSS CR
MIAMI RIVER	MAIN STEM	TBCU8	CHUM	MIAMI R
MIAMI RIVER	MAIN STEM	TBCU2	CHUM	MIAMI R
MIAMI RIVER	MAIN STEM	TBCO1	COHO	MIAMI R
MIAMI RIVER	MAIN STEM	TBCU3	CHUM	PROUTY CR
KILCHIS RIVER	MAIN STEM	TBCU4	CHUM	COAL CR
KILCHIS RIVER	MAIN STEM	TBCU5	CHUM	KILCHIS R
KILCHIS RIVER	MAIN STEM	TBCU9	CHUM	KILCHIS R
KILCHIS RIVER	MAIN STEM	TBCU7	CHUM	CLEAR CR
KILCHIS RIVER	MAIN STEM	TBCO2	COHO	KILCHIS R, N FK
KILCHIS RIVER	LITTLE SOUTH FORK	TBCO3	COHO	KILCHIS R, LITTLE S
WILSON RIVER	MAIN STEM	TBCHF2	FALL CHINOOK	WILSON R
WILSON RIVER	MAIN STEM	TBCU10	CHUM	WILSON R
WILSON RIVER	MAIN STEM	TBCHS1	SPRING CHINOOK	WILSON R
WILSON RIVER	MAIN STEM	TBCHF3	FALL CHINOOK	WILSON R
WILSON RIVER	MAIN STEM	TBCHF4	FALL CHINOOK	WILSON R
WILSON RIVER	MAIN STEM	TBCHS2	SPRING CHINOOK	WILSON R
WILSON RIVER	MAIN STEM	TBCO4	COHO	CEDAR CR
WILSON RIVER	MAIN STEM	TBCHF5	FALL CHINOOK	WILSON R
WILSON RIVER	LITTLE NORTH FORK	TBCU6	CHUM	WILSON R, N FK,
WILSON RIVER	LITTLE NORTH FORK	TBCHF1	FALL CHINOOK	WILSON R, N FK,
WILSON RIVER	DEVIL'S LAKE FORK	TBCO5	COHO	WILSON R, DEVIL'S
TRASK RIVER	MAIN STEM	TBCHF10	FALL CHINOOK	TRASK R
TRASK RIVER	NORTH FORK	TBCHS3	SPRING CHINOOK	TRASK R, N FK
TRASK RIVER	NORTH FORK	TBCHF8	FALL CHINOOK	TRASK R, N FK
TRASK RIVER	NORTH FORK	TBCO6	COHO	ELKHORN CR
TRASK RIVER	SOUTH FORK	TBCHF6	FALL CHINOOK	EDWARDS CR
TRASK RIVER	SOUTH FORK	TBCHF9	FALL CHINOOK	TRASK R, S FK
TILLAMOOK RIVER	MAIN STEM	TBCO7	COHO	TILLAMOOK R
TILLAMOOK RIVER	MAIN STEM	TBCU12	CHUM	TILLAMOOK R
TILLAMOOK RIVER	MAIN STEM	TBCHF7	FALL CHINOOK	TILLAMOOK R
NESTUCCA RIVER	MAIN STEM AND BAY	NSCU2	CHUM	HORN CR
NESTUCCA RIVER	MAIN STEM AND BAY	NSCU1	CHUM	CLEAR CR
NESTUCCA RIVER	MAIN STEM AND BAY	NSCO3	COHO	CLEAR CR

BASIN	SUBBASIN	ID CODE	SPECIES	STREAM REACH
NESTUCCA RIVER	MAIN STEM AND BAY	NSCHF3	FALL CHINOOK	CLEAR CR
NESTUCCA RIVER	MAIN STEM AND BAY	NSCO1	COHO	EAST CR
NESTUCCA RIVER	MAIN STEM AND BAY	NSCHF2	FALL CHINOOK	MOON CR
NESTUCCA RIVER	MAIN STEM AND BAY	NSCHS1	SPRING CHINOOK	NESTUCCA R
NESTUCCA RIVER	MAIN STEM AND BAY	NSSTW1	WINTER STEELHEAD	NESTUCCA R
NESTUCCA RIVER	MAIN STEM AND BAY	NSCHF1	FALL CHINOOK	NIAGARA CR
NESTUCCA RIVER	MAIN STEM AND BAY	NSCO2	COHO	ELK CR
NESTUCCA RIVER	LITTLE NESTUCCA	NSCU3	CHUM	FALL CR
NESTUCCA RIVER	LITTLE NESTUCCA	NSCO4	COHO	LITTLE NESTUCCA R
NESKOWIN CREEK	MAIN STEM	NWCU1	CHUM	NESKOWIN CR
SALMON RIVER	MAIN STEM AND BAY	SRCU2	CHUM	SALMON CR
SALMON RIVER	MAIN STEM AND BAY	SRCU3	CHUM	SALMON R
SALMON RIVER	MAIN STEM AND BAY	SRCHF1	FALL CHINOOK	SALMON R
SALMON RIVER	MAIN STEM AND BAY	SRCHF2	FALL CHINOOK	BEAR CR
SALMON RIVER	MAIN STEM AND BAY	SRCU1	CHUM	BEAR CR
SALMON RIVER	MAIN STEM AND BAY	SRSTW1	WINTER STEELHEAD	SALMON R
SALMON RIVER	MAIN STEM AND BAY	SRCHF3	FALL CHINOOK	SALMON R
SILETZ RIVER	MAIN STEM	SCU1	CHUM	BEAR CR
SILETZ RIVER	MAIN STEM	SCHF1	FALL CHINOOK	CEDAR CR
SILETZ RIVER	MAIN STEM	SCU2	CHUM	CEDAR CR
SILETZ RIVER	MAIN STEM	SSTW1	WINTER STEELHEAD	EUCHRE CR
SILETZ RIVER	MAIN STEM	SCHF2	FALL CHINOOK	EUCHRE CR
SILETZ RIVER	MAIN STEM	SCHF3	FALL CHINOOK	SILETZ R
SILETZ RIVER	MAIN STEM	S1	COHO	DEWEY CR
SILETZ RIVER	MAIN STEM	S2	COHO	BENTILLA CR
SILETZ RIVER	MAIN STEM	S3	COHO	SAM CR
SILETZ RIVER	MAIN STEM	S4	COHO	MILL CR
SILETZ RIVER	MAIN STEM	S6	COHO	PALMER CR
SILETZ RIVER	MAIN STEM	SCHF4	FALL CHINOOK	SILETZ R
SILETZ RIVER	MAIN STEM	SCHS1	SPRING CHINOOK	SILETZ R
SILETZ RIVER	MAIN STEM	SSTW2	WINTER STEELHEAD	SILETZ R
SILETZ RIVER	MAIN STEM	SCHF7	FALL CHINOOK	SUNSHINE CR
SILETZ RIVER	MAIN STEM	SSTW4	WINTER STEELHEAD	SUNSHINE CR
SILETZ RIVER	MAIN STEM	S5	COHO	SUNSHINE CR
SILETZ RIVER	ROCK CREEK	SCHF6	FALL CHINOOK	BIG ROCK CR
SILETZ RIVER	NORTH FORK	SSTS1	SUMMER STEELHEAD	SILETZ R, N FK
SILETZ RIVER	DRIFT CREEK	SCHF8	FALL CHINOOK	DRIFT CR
SILETZ RIVER	DRIFT CREEK	SSTW3	WINTER STEELHEAD	DRIFT CR
SILETZ RIVER	DRIFT CREEK	SCHF5	FALL CHINOOK	DRIFT CR
YAQUINA RIVER	MAIN STEM AND BAY	YCO1	COHO	MILL CR
YAQUINA RIVER	MAIN STEM AND BAY	YCU1	CHUM	MILL CR
YAQUINA RIVER	MAIN STEM AND BAY	YSTW1	WINTER STEELHEAD	MILL CR
YAQUINA RIVER	MAIN STEM AND BAY	YCHF1	FALL CHINOOK	SIMPSON CR
YAQUINA RIVER	MAIN STEM AND BAY	YCU2	CHUM	SIMPSON CR
YAQUINA RIVER	MAIN STEM AND BAY	YCO2	COHO	THORNTON CR
YAQUINA RIVER	MAIN STEM AND BAY	YCO8	COHO	BALES CR
YAQUINA RIVER	MAIN STEM AND BAY	YCHF6	FALL CHINOOK	BALES CR
YAQUINA RIVER	MAIN STEM AND BAY	YCO3	COHO	BUTTERMILK CR
YAQUINA RIVER	MAIN STEM AND BAY	YCHF2	FALL CHINOOK	YAQUINA R
YAQUINA RIVER	MAIN STEM AND BAY	YSTW2	WINTER STEELHEAD	YAQUINA R
YAQUINA RIVER	MAIN STEM AND BAY	YCO4	COHO	YAQUINA R
YAQUINA RIVER	ELK CREEK	YCO7	COHO	DEER CR
YAQUINA RIVER	ELK CREEK	YCHF5	FALL CHINOOK	DEER CR
YAQUINA RIVER	ELK CREEK	YSTW3	WINTER STEELHEAD	WOLF CR
YAQUINA RIVER	ELK CREEK	YCO5	COHO	WOLF CR
YAQUINA RIVER	ELK CREEK	YCHF3	FALL CHINOOK	ELK CR
YAQUINA RIVER	LITTLE ELK CREEK	YCHF4	FALL CHINOOK	SALMON CR
YAQUINA RIVER	LITTLE ELK CREEK	YCO6	COHO	SALMON CR
BEAVER CREEK	NORTH FORK	BCCO1	COHO	BEAVER CR, N FK
ALSEA RIVER	MAIN STEM AND BAY	ALCU1	CHUM	CANAL CR

BASIN	SUBBASIN	ID CODE	SPECIES	STREAM REACH
ALSEA RIVER	MAIN STEM AND BAY	ALCHS1	SPRING CHINOOK	ALSEA R
ALSEA RIVER	MAIN STEM AND BAY	ALCHF3	FALL CHINOOK	ALSEA R
ALSEA RIVER	DRIFT CREEK	ALCHF1	FALL CHINOOK	DRIFT CR
ALSEA RIVER	DRIFT CREEK	ALCO1	COHO	DRIFT CR
ALSEA RIVER	FIVE RIVERS	ALCHF2	FALL CHINOOK	LOBSTER CR
ALSEA RIVER	FIVE RIVERS	ALCO3	COHO	LOBSTER CR
ALSEA RIVER	FIVE RIVERS	ALCO2	COHO	FIVE RIVERS
ALSEA RIVER	FIVE RIVERS	ALCHF4	FALL CHINOOK	FIVE RIVERS
ALSEA RIVER	SOUTH FORK	ALCO4	COHO	TOBE CR
YACHATS RIVER	MAIN STEM	YACO2	COHO	YACHATS R, SCHOOL
YACHATS RIVER	NORTH FORK	YACO1	COHO	YACHATS R, N FK
SIUSLAW RIVER	MAIN STEM	SUCHF5	FALL CHINOOK	SWEET CR
SIUSLAW RIVER	MAIN STEM	SUCO7	COHO	SWEET CR
SIUSLAW RIVER	MAIN STEM	SUSTW5	WINTER STEELHEAD	SAN ANTONE CR
SIUSLAW RIVER	MAIN STEM	SUCO6	COHO	MILLER CR
SIUSLAW RIVER	MAIN STEM	SUCHF8	FALL CHINOOK	SIUSLAW R
SIUSLAW RIVER	MAIN STEM	SUCHF7	FALL CHINOOK	WHITTAKER CR
SIUSLAW RIVER	MAIN STEM	SUSTW6	WINTER STEELHEAD	ESMOND CR
SIUSLAW RIVER	MAIN STEM	SUCHF6	FALL CHINOOK	ESMOND CR
SIUSLAW RIVER	MAIN STEM	SUCO3	COHO	SIUSLAW R
SIUSLAW RIVER	NORTH FORK	SUCO1	COHO	SIUSLAW R, N FK
SIUSLAW RIVER	NORTH FORK	SUCO2	COHO	SIUSLAW R, N FK
SIUSLAW RIVER	NORTH FORK	SUCHF3	FALL CHINOOK	SIUSLAW R, N FK
SIUSLAW RIVER	LAKE CREEK	SUCHF2	FALL CHINOOK	INDIAN CR
SIUSLAW RIVER	LAKE CREEK	SUCO4	COHO	INDIAN CR
SIUSLAW RIVER	LAKE CREEK	SUSTW1	WINTER STEELHEAD	INDIAN CR, W FK
SIUSLAW RIVER	LAKE CREEK	SUCHF1	FALL CHINOOK	LAKE CR
SIUSLAW RIVER	LAKE CREEK	SUSTW2	WINTER STEELHEAD	GREEN CR
SIUSLAW RIVER	LAKE CREEK	SUCHF4	FALL CHINOOK	DEADWOOD CR
SIUSLAW RIVER	LAKE CREEK	SUCO5	COHO	DEADWOOD CR
SIUSLAW RIVER	LAKE CREEK	SUSTW3	WINTER STEELHEAD	GREENLEAF CR
SIUSLAW RIVER	LAKE CREEK	SUSTW4	WINTER STEELHEAD	FISH CR
SILTCOOS RIVER	MAPLE CREEK	SCCO1	COHO	MAPLE CR
SILTCOOS RIVER	FIDDLE CREEK	SCCO2	COHO	ALDER CR
SILTCOOS RIVER	FIDDLE CREEK	SCCO3	COHO	FIDDLE CR
TAHKENITCH CREEK	FIVEMILE CREEK	TKCO1	COHO	FIVEMILE CR
TAHKENITCH CREEK	LEITEL CREEK	TKCO2	COHO	MALLARD CR
UMPQUA RIVER	MAIN STEM AND BAY	UMCO1	COHO	SCHOLFIELD CR
UMPQUA RIVER	SMITH RIVER	UMCHF2	FALL CHINOOK	SMITH R, N FK
UMPQUA RIVER	SMITH RIVER	UMCO4	COHO	SMITH R, N FK
UMPQUA RIVER	SMITH RIVER	UMCHF1	FALL CHINOOK	WASSEN CR
UMPQUA RIVER	SMITH RIVER	UMCO2	COHO	WASSEN CR
UMPQUA RIVER	SMITH RIVER	UMCHF3	FALL CHINOOK	BUCK CR
UMPQUA RIVER	SMITH RIVER	UMCO3	COHO	BUCK CR
UMPQUA RIVER	SMITH RIVER	UMCHF4	FALL CHINOOK	SMITH R, W FK
UMPQUA RIVER	SMITH RIVER	UMCO5	COHO	SMITH R, W FK
UMPQUA RIVER	SMITH RIVER	UMCO6	COHO	TWIN SISTER CR
UMPQUA RIVER	SMITH RIVER	UMCO7	COHO	BIG CR
UMPQUA RIVER	SMITH RIVER	UMCO8	COHO	SMITH R, S FK
UMPQUA RIVER	ELK CREEK	UMCO9	COHO	BRUSH CR
UMPQUA RIVER	ELK CREEK	UMPCO11	COHO	SAND CR
UMPQUA RIVER	NORTH UMPQUA	NUMCHS	SPRING CHINOOK	N UMPQUA R
UMPQUA RIVER	NORTH UMPQUA	NUMSTW	WINTER STEELHEAD	N UMPQUA R
UMPQUA RIVER	NORTH UMPQUA	NUMSTS1	SUMMER STEELHEAD	STEAMBOAT CR
UMPQUA RIVER	SOUTH UMPQUA	SUMCHF1	FALL CHINOOK	S UMPQUA R
UMPQUA RIVER	SOUTH UMPQUA	SUMCHF2	FALL CHINOOK	COW CR
UMPQUA RIVER	SOUTH UMPQUA	SUMCO1	COHO	COW CR, W FK
UMPQUA RIVER	SOUTH UMPQUA	SUMCO2	COHO	MIDDLE CR
UMPQUA RIVER	SOUTH UMPQUA	SUMSTW	WINTER STEELHEAD	S UMPQUA R
UMPQUA RIVER	SOUTH UMPQUA	SUMCHS	SPRING CHINOOK	JACKSON CR

BASIN	SUBBASIN	ID CODE	SPECIES	STREAM REACH
UMPQUA RIVER	SOUTH UMPQUA	SUMCHS	SPRING CHINOOK	S UMPQUA R
UMPQUA RIVER	CALAPOOYA CREEK	UMCO10	COHO	CALAPOOYA CR
TENMILE CREEK	NORTH TENMILE LAKE	TMLCO1	COHO	NOBLE CR
TENMILE CREEK	SOUTH TENMILE LAKE	TMLCO2	COHO	JOHNSON CR
COOS RIVER	MAIN STEM	CBCO1	COHO	LARSON CR
COOS RIVER	MILLICOMA RIVER	CBCHF2	FALL CHINOOK	MILLICOMA R, E FK
COOS RIVER	MILLICOMA RIVER	CBCO3	COHO	MILLICOMA R, E FK
COOS RIVER	MILLICOMA RIVER	CBSTW2	WINTER STEELHEAD	MILLICOMA R, E FK
COOS RIVER	MILLICOMA RIVER	CBCHF3	FALL CHINOOK	MILLICOMA R, W FK
COOS RIVER	MILLICOMA RIVER	CBSTW1	WINTER STEELHEAD	MILLICOMA R, W FK
COOS RIVER	MILLICOMA RIVER	CBCO4	COHO	MILLICOMA R, W FK
COOS RIVER	SOUTH FORK	CBCO2	COHO	DANIELS CR
COOS RIVER	SOUTH FORK	CBCHF1	FALL CHINOOK	COOS R, S FK
COOS RIVER	SOUTH FORK	CBSTW3	WINTER STEELHEAD	TIOGA CR
COOS RIVER	SOUTH FORK	CBCHF4	FALL CHINOOK	TIOGA CR
COOS RIVER	SOUTH FORK	CBCO5	COHO	TIOGA CR
COOS RIVER	SOUTH FORK	CBCO6	COHO	CEDAR CR
COOS RIVER	SOUTH FORK	CBCHF5	FALL CHINOOK	WILLIAMS R
COQUILLE RIVER	NORTH FORK	CQCHF2	FALL CHINOOK	MIDDLE CR
COQUILLE RIVER	NORTH FORK	CQCO2	COHO	MIDDLE CR
COQUILLE RIVER	NORTH FORK	CQCHF1	FALL CHINOOK	COQUILLE R, N FK
COQUILLE RIVER	NORTH FORK	CQCO1	COHO	COQUILLE R, N FK
COQUILLE RIVER	EAST FORK	CQCHF3	FALL CHINOOK	COQUILLE R, E FK
COQUILLE RIVER	EAST FORK	CQCO3	COHO	HANTZ CR
COQUILLE RIVER	MIDDLE FORK	CQCO4	COHO	BIG CR
COQUILLE RIVER	MIDDLE FORK	CQCHF5	FALL CHINOOK	ROCK CR
COQUILLE RIVER	MIDDLE FORK	CQCHF4	FALL CHINOOK	COQUILLE R, M FK
COQUILLE RIVER	MIDDLE FORK	CQCO5	COHO	SANDY CR
COQUILLE RIVER	MIDDLE FORK	CQCO6	COHO	SLATER CR
COQUILLE RIVER	SOUTH FORK	CQCHS1	SPRING CHINOOK	COQUILLE R, S FK
COQUILLE RIVER	SOUTH FORK	CQSTW1	WINTER STEELHEAD	COQUILLE R, S FK
COQUILLE RIVER	SOUTH FORK	CQCHF6	FALL CHINOOK	COQUILLE R, S FK
COQUILLE RIVER	SOUTH FORK	CQCO7	COHO	SALMON CR
FOURMILE CR	MAIN STEM	NRCO1	COHO	FOURMILE CR
NEW RIVER	CROFT LAKE	NRCO2	COHO	DAVIS CR
FLORAS CREEK	MAIN STEM	FCCO1	COHO	WILLOW CR
FLORAS CREEK	MAIN STEM	FCCHF1	FALL CHINOOK	FLORAS CR
SIXES RIVER	MAIN STEM	SXCO1	COHO	CRYSTAL CR
SIXES RIVER	MAIN STEM	SXCO4	COHO	EDSON CR
SIXES RIVER	MAIN STEM	SXCHF1	FALL CHINOOK	EDSON CR
SIXES RIVER	MAIN STEM	SXCHF2	FALL CHINOOK	DRY CR
SIXES RIVER	MAIN STEM	SXCO2	COHO	DRY CR
SIXES RIVER	MAIN STEM	SXCHF3	FALL CHINOOK	SIXES R
SIXES RIVER	MIDDLE FORK	SXCHF4	FALL CHINOOK	SIXES R, M FK
SIXES RIVER	NORTH FORK	SXCO3	COHO	SIXES R, N FK
ELK RIVER	MAIN STEM	ERCHF1	FALL CHINOOK	ELK R
ELK RIVER	MAIN STEM	ERSTW1	WINTER STEELHEAD	ELK R
ELK RIVER	MAIN STEM	ERCHF2	FALL CHINOOK	ELK R
ELK RIVER	MAIN STEM	ERCHF3	FALL CHINOOK	ELK R
ELK RIVER	MAIN STEM	ERCHF4	FALL CHINOOK	ELK R, N FK
EUCHRE CREEK	MAIN STEM	EUCHF2	FALL CHINOOK	CEDAR CR
EUCHRE CREEK	MAIN STEM	EUCHF1	FALL CHINOOK	EUCHRE CR
ROGUE RIVER	MAIN STEM	LRCO3	COHO	QUOSATANA CR
ROGUE RIVER	MAIN STEM	LRCHF2	FALL CHINOOK	QUOSATANA CR
ROGUE RIVER	MAIN STEM	LRCO1	COHO	SILVER CR
ROGUE RIVER	MAIN STEM	LRCHF3	FALL CHINOOK	SHASTA COSTA CR
ROGUE RIVER	MAIN STEM	LRCO5	COHO	QUARTZ CR
ROGUE RIVER	MAIN STEM	LRCO4	COHO	LIMPY CR
ROGUE RIVER	MAIN STEM	LRCHF5	FALL CHINOOK	ROGUE R
ROGUE RIVER	MAIN STEM	MRCHF2	FALL CHINOOK	EVANS CR

BASIN	SUBBASIN	ID CODE	SPECIES	STREAM REACH
ROGUE RIVER	MAIN STEM	MRCO1	COHO	EVANS CR, W FK
ROGUE RIVER	MAIN STEM	MRSTW1	WINTER STEELHEAD	EVANS CR, W FK
ROGUE RIVER	MAIN STEM	MRSTS1	SUMMER STEELHEAD	FOOTS CR
ROGUE RIVER	MAIN STEM	MRCHF3	FALL CHINOOK	ROGUE R
ROGUE RIVER	MAIN STEM	MRCHF1	FALL CHINOOK	ROGUE R
ROGUE RIVER	MAIN STEM	MRCHS1	SPRING CHINOOK	ROGUE R
ROGUE RIVER	MAIN STEM	URSTS1	SUMMER STEELHEAD	ANTELOPE CR
ROGUE RIVER	MAIN STEM	URCO1	COHO	LITTLE BUTTE CR
ROGUE RIVER	MAIN STEM	URCHS1	SPRING CHINOOK	ROGUE R
ROGUE RIVER	MAIN STEM	URCO3	COHO	TRAIL CR
ROGUE RIVER	MAIN STEM	URCO3	COHO	ELK CR, W BR
ROGUE RIVER	MAIN STEM	URCO2	COHO	ELK CR
ROGUE RIVER	LOBSTER CREEK	LRCHF1	FALL CHINOOK	LOBSTER CR
ROGUE RIVER	LOBSTER CREEK	LRCHF4	FALL CHINOOK	LOBSTER CR, S FK
ROGUE RIVER	LOBSTER CREEK	LRCO2	COHO	LOBSTER CR, S FK
ROGUE RIVER	ILLINOIS RIVER	ILCHF1	FALL CHINOOK	ILLINOIS R
ROGUE RIVER	ILLINOIS RIVER	ILCHF3	FALL CHINOOK	ILLINOIS R, W FK
ROGUE RIVER	ILLINOIS RIVER	ILCO1	COHO	ELK CR
ROGUE RIVER	ILLINOIS RIVER	ILCHF2	FALL CHINOOK	ILLINOIS R, E FK
ROGUE RIVER	ILLINOIS RIVER	ILCO2	COHO	SUCKER CR
ROGUE RIVER	ILLINOIS RIVER	ILCO3	COHO	ALTHOUSE CR
ROGUE RIVER	ILLINOIS RIVER	ILCO4	COHO	DUNN CR
ROGUE RIVER	APPLEGATE RIVER	APPCHF1	FALL CHINOOK	APPLEGATE R
ROGUE RIVER	APPLEGATE RIVER	APPCHF2	FALL CHINOOK	SLATE CR
ROGUE RIVER	APPLEGATE RIVER	APPCO1	COHO	WATERS CR
ROGUE RIVER	APPLEGATE RIVER	APPCO2	COHO	CHENEY CR
ROGUE RIVER	APPLEGATE RIVER	APSTS1	SUMMER STEELHEAD	CHENEY CR
ROGUE RIVER	APPLEGATE RIVER	APPCO3	COHO	WILLIAMS CR
ROGUE RIVER	BIG BUTTE CREEK	URCHS2	SPRING CHINOOK	BIG BUTTE CR
HUNTER CREEK	MAIN STEM	HCCHF1	FALL CHINOOK	HUNTER CR
HUNTER CREEK	MAIN STEM	HCCHF2	FALL CHINOOK	HUNTER CR, LITTLE
HUNTER CREEK	MAIN STEM	HCSTW1	WINTER STEELHEAD	HUNTER CR
PISTOL RIVER	MAIN STEM	PRCHF3	FALL CHINOOK	DEEP CR
PISTOL RIVER	MAIN STEM	PRSTW1	WINTER STEELHEAD	PISTOL R
PISTOL RIVER	MAIN STEM	PRCHF2	FALL CHINOOK	PISTOL R
PISTOL RIVER	SOUTH FORK	PRCHF1	FALL CHINOOK	PISTOL R, S FK
CHETCO RIVER	MAIN STEM	CTCHF5	FALL CHINOOK	JACK CR
CHETCO RIVER	MAIN STEM	CTCHF3	FALL CHINOOK	EMILY CR
CHETCO RIVER	MAIN STEM	CTCHF4	FALL CHINOOK	CHETCO R
CHETCO RIVER	NORTH FORK	CTCHF1	FALL CHINOOK	CHETCO R, N FK
CHETCO RIVER	SOUTH FORK	CTCHF2	FALL CHINOOK	CHETCO R, S FK
WINCHUCK RIVER	MAIN STEM	WCCHF4	FALL CHINOOK	WINCHUCK R
WINCHUCK RIVER	MAIN STEM	WCCHF1	FALL CHINOOK	BEAR CR
WINCHUCK RIVER	MAIN STEM	WCCHF2	FALL CHINOOK	FOURTH OF JULY CR
WINCHUCK RIVER	MAIN STEM	WCCHF3	FALL CHINOOK	WHEELER CR

Chapter 16

Monitoring Program

Oregon's Coastal Salmon Restoration Initiative (OCSRI) is a collaboration of inter-governmental and community based effort focused on conserving and restoring native coastal salmon populations. Development and implementation of a monitoring program is a crucial component of the overall strategy. The monitoring program:

- Outlines a spatial, biologic, and temporal framework for collecting and analyzing information and develops a focus of investigation at the level of the coho Gene Conservation Group.
- Provides organizational integration for the expansion of existing programs and establishment of new projects that address the two most fundamental monitoring issues--(1) reliable detection and documentation of future declines or increases in coho populations and (2) a comprehensive evaluation of the quality of their supporting habitats.
- Describes 15 major elements--Tasks that work together to create a comprehensive monitoring program.
- Documents developing coordination between state and federal efforts; also acknowledges support for OCSRI from local watershed associations and initiative groups, Soil and Water Conservation Districts, and Oregon State University Extension Service Programs.
- Has established an interdisciplinary interagency approach and program structure that provides opportunities for collaboration and participation from all groups.
- Incorporates peer and public review of the August 1996 draft monitoring plan, responding to issues and developing a team approach to refine sampling designs, monitoring protocols, data standards, and mechanisms for the distribution of information.
- Will document the implementation and evaluate the effectiveness of actions and measures conducted as part of OCSRI.
- Makes a commitment to provide annual reporting of assessment and effectiveness monitoring that will be used to support adaptive management approaches.
- Recognizes that the monitoring program has made significant progress during the last six months, but that continued work is needed to improve interagency coordination, establish ongoing funding support, and develop broad understanding and participation among all participants.

As a crucial part of Oregon's Coastal Salmon Restoration Initiative, state and federal agencies, and other groups have made major commitments to the development and support of this monitoring program. These commitments must be maintained.

Peer Review - Progress Toward Implementation

Concurrent with the release of the Draft Proposal for a Comprehensive Monitoring Program for OCSRI in August, 1996, work began on the formation of a Monitoring Group responsible for further development and implementation of the monitoring program. The Monitoring Group is comprised of representatives from participating state and federal agencies, watershed associations, and other groups. The initial task of the Monitoring Group was to identify and further develop the description of agency monitoring activities, working primarily in areas of assurance of implementation and coordination. Next, the group began to respond to issues identified through the process of peer review and to provide public opportunities to comment on, and participate in, continued development of the plan. Finally, the group created monitoring Issue Teams and gave them the responsibility to evaluate the effectiveness of proposed monitoring measures relative to the factors of decline identified by the Collaborative Issues Discussion Project.

Peer Review

In general, responses from the peer review of the Draft Monitoring Proposal were very supportive of the plan while acknowledging the difficulty and complexity associated with such a large program. In particular, there was strong support for the approach to sampling design, integration of tasks, and shared responsibility for reporting, and acting on the information. Most of the critical comment focused on the need to get past the plan and actually fund and implement the program. All reviews strongly supported the need for a comprehensive, well integrated monitoring plan and the broad scope of the monitoring proposal.

A sampling of some critical comments:

- "A consistent and strategic approach to indication selection as well as standardized protocols must be developed"
- "Long term agency accountability as well as resource commitments must be guaranteed."
- "The link between the monitoring plan, the Interagency Planning Team, and the Benchmarks for Agency Actions need to be made explicit."
- "...to a significant extent, they (the Tasks) are a grab bag of past monitoring elements supplemented by a few new approaches. ... Little or no effort is made to show how each element or the set of elements will be used to make the difficult decisions that will be required ..."
- "My most serious concern is the absence of substantive discussion regarding links between the monitoring program and changes in policy or management."

The Monitoring Group took these comments seriously and has worked to resolve these, and other, issues raised through the peer review process. Changes in organization were made and more explicit links between the monitoring and policy and management were developed. Changes found throughout this draft reflect the review process. New actions

designed to address linkage between monitoring and policy are specifically addressed later in this chapter in sections describing Program Structure and Organization and Monitoring Support for Adaptive Management.

Public Comment and Participation

From November 1996 until January 1997, a series of public scoping sessions and planning meetings were held to involve stakeholders and other interested parties in determining the common direction of the OCSRI Monitoring Plan. Representatives from state and federal agencies, watershed councils, soil and water conservation districts, private interest groups, tribes, university professors and extension agents, and other entities participated in each of two scoping sessions. These groups formed the Monitoring Plan Advisory Team. Their active participation, feedback, and contribution revealed an active commitment to an evolutionary process of refining and improving the state-wide Monitoring Plan. This process continues to date. Interest in the objectives, purpose, and logistics of the Monitoring Plan was keen and many excellent suggestions, ideas, and courses of action have been incorporated into the Monitoring Plan as a result of these scoping session forums.

Input from the scoping sessions was similar to that received from the peer review process, though often more directed at the immediate needs for guidance and support identified by the participants. A common theme, expressed most clearly by one participant: "We need standards (protocols) to follow for monitoring, regional databases to enter results, review by technical advisors, and we need to share equipment and expense."

Questions, responses, and suggestions were generally structured around the proposed monitoring Tasks. Participants frequently identified programs and new opportunities for cooperation (local Soil and Water Conservation District programs and expertise from OSU Extension Service in particular) that will be incorporated into the monitoring plan and the Monitoring Group process.

A complete summary of the Scoping Session Record is in Appendix II. The summary includes a discussion of OCSRI strategy, a synthesis of background information, and a summary of agency actions and databases relevant to the monitoring effort. The scoping session solicited monitoring questions from participants, these are summarized and referenced to specific items in the plan. Many participants emphasized the importance of developing trust and shared ownership in OCSRI overall and the monitoring program in particular.

Implementation

Progress toward implementation of the monitoring program has occurred at both organizational and action levels. Work plans and job assignments for participants in the Monitoring Group have been formally adjusted. Short term funding support for monitoring program leadership was secured. Monitoring Issues and Protocol Teams, small groups with representation from the Monitoring Group and subject area experts were formed. These groups evaluate monitoring relative to issues associated with the decline in salmon populations, assess the adequacy of monitoring actions, and continue development of shared monitoring protocols.

The members of the Monitoring Group have responsibility for the ongoing development, evaluation, and adaptation of monitoring Tasks, and of the monitoring elements organized under the Tasks. They have also developed a process by which the Monitoring Group will make recommendations based on monitoring results to the Inter-agency planning. Changes and development of the monitoring elements of individual agencies are detailed in the State Agency Measures section (Section 17B). Continued efforts to improve integration and coordination of these monitoring elements remains as a major of the Monitoring Group. Highlights of progress relevant to specific programs are included in the discussion of individual tasks.

Structural Changes From the August 1996 Draft Plan

A comparison of this draft to the August 1996 Monitoring Proposal shows the following structural changes:

- Core Area and Index Area Monitoring are combined under a single task. This change emphasizes the role of core and index areas at the most quantitative levels of assessment, research, and adaptive management. Also, by combining the two tasks, and linking monitoring efforts at this level to continued assessment at broader spatial scales, a system for continued development and review of the Core Area concept is established.
- Ocean Conditions Monitoring is identified as a new Task. This recognizes the need for improved coordination with efforts designed to characterize and understand the role of fluctuating ocean conditions on coastal ecosystems and salmon populations.
- Task 11, Estuary Populations and Habitat is expanded to explicitly include Wetland assessment and monitoring.
- Task 14, Coordinate and Facilitate Monitoring has been expanded to explicitly states that Annual Reports and periodic reports of implementation and evaluation will be produced.
- Discussion of the Monitoring Program Structure and Organization is updated to reflect changes resulting from the current level of implementation.

Program Overview

This description of the monitoring program of Oregon's Coastal Salmon Restoration Initiative (OCSRI) outlines the essential components of a strategy to collect and integrate information on the status of salmon populations and factors that influence the quality of their habitat. The objectives of the monitoring effort are to develop accurate information on the status of salmon populations and their habitats, detect declines or increases in abundance, determine the effectiveness of measures designed to improve conditions for salmon, and provide the analysis needed to help develop adaptive management strategies for agencies, private landowners, and individuals with interests in this resource.

The monitoring program proposed to meet these objectives has five primary components:

1. Currently funded monitoring programs and activities.
2. Established monitoring efforts that require expanded and intensified sampling effort.
3. New efforts to fill gaps in information and analysis.
4. An integrated program structure to coordinate projects, synthesize data, and provide timely reports.
5. Explicit links between the monitoring program, the independent scientific review team, and the inter-agency strategic implementation team to assure the best quality of information and to support adaptive management.

Currently funded programs, such as the surveys of adult coho spawner abundance, provide established and tested protocols for data collection and reporting. Analysis of the spawner survey data, however, also shows an example of the need to expand programs to provide resolution at meaningful regional and biologic scales. Existing monitoring programs within both state and federal agencies provide a starting point for more comprehensive efforts. Both new and expanded programs are needed to provide resolution at appropriate spatial and temporal scales, applying sufficient sampling effort to support scientific confidence in the results.

The OCSRI monitoring effort must also provide program leadership and integration sufficient to ensure the quality and availability of information, manage effort and cost, and integrate various monitoring elements within a coherent context of quantifiable objectives. This structure will demonstrate the commitment of the OCSRI process to create an open, scientifically sound, yet flexible process through which state and federal agencies, private and industrial landowners, and watershed associations or local initiative groups can coordinate. Integration of these programs will require establishment of an overall structure to manage dispersed monitoring elements, and report information in a useful fashion. As a whole, the program will contribute to the development an adaptive management strategy based on evaluation and application of monitoring data combined with scientific testing of new approaches.

An effective monitoring program for coastal salmon will require a long-term commitment of money and personnel. For the Coastal Salmon Restoration Initiative to succeed,

adequate funds will need to be allocated to support both established and new monitoring work and funding must be sustained long enough to allow evaluation in the context of changing climatic, oceanic, ecological, and social conditions. All of the monitoring elements that comprise this effort have high priority, the primary differences between elements are the intensity of sampling effort and the timing for initiation and duration of sampling. Also, because of the integrated nature of the monitoring effort, all of the major tasks and activities are essential as they work together to create scientifically credible assessments. The effort required will be large, and a serious commitment of funds and personnel must be made over an extended time period.

Effective coordination among participating OCSRI groups can help control the cost of a comprehensive monitoring program, particularly by sharing expertise on effective techniques, avoiding duplication of effort, and by providing timely and open reporting of results. An OCSRI Monitoring Group has been established to develop this level of efficiency and coordination. Links to ongoing projects can also provide training and facilitation of voluntary efforts in support of the overall monitoring program, expanding its scope and creating a greater sense of involvement and ownership.

Traditionally, many monitoring programs have been slow to initiate and difficult to sustain. Ineffective monitoring programs result when the biologic, temporal, and spatial scales are too narrowly defined, and when institutional or ownership barriers prevent integrated analysis and application of information. Other problems result when the information is incomplete, inconsistent, or poorly reported. The capacity to initiate and sustain successful monitoring of populations and habitat quality, does not exist within any single agency, corporation, interest group, or individual. The interdisciplinary approach described in this chapter is designed to overcome some of these problems. Success of the OCSRI monitoring effort will require focused leadership and a commitment from participants in many scientific and management disciplines representing multiple interests.

Monitoring is more than the systematic and periodic collection of data; it is the basis for effective adaptive management. Properly supported and implemented, the OCSRI monitoring program will provide an unbiased data set for determining baseline conditions, cause and effect relationships, and trends in conditions over time. Data will also be used to assess current water quality standards and management practices, determine the effectiveness of restoration activities, and suggest new actions. The monitoring program is an essential component of an overall strategy to improve our management of resources and to restore coastal salmon populations.

The emphasis of the proposed monitoring program is on coho salmon populations, but the approach has application to all of Oregon's salmon species, including steelhead and cutthroat trout. The bottom line of any monitoring program must be a reliable assessment of population numbers, and adequate determination of trends in abundance based on time series information. Equally important, however, is a broad assessment of habitat factors, from the abundance of large woody debris within a stream reach to the cycles of ocean productivity that influence salmon populations.

Overall, each major element that comprises the monitoring program is designed to be flexible and able to accommodate both changes in emphasis and additional input. These elements, described as Tasks, represent broad subject areas. In addition to the specific OCSRI activities described under each task, opportunities for direct cooperation or sharing of information with related projects are identified. The open and flexible approach is necessary as participants develop their monitoring programs and continue to define their role in the process. Just as we expect to implement management changes in response to new information gathered by monitoring, the monitoring program must also have the capacity to adapt and evolve.

Application of Monitoring and Watershed Assessment Results

Monitoring and watershed assessment information will be linked and applied to state agency and watershed council programs in several ways:

- Support the development and application of effective best management practices (BMPs).
- Support decision-making that may be made under state permitting authority.
- Correct problems identified by the monitoring or assessment programs through restoration actions.
- Support development of appropriate quantitative habitat objectives.

Monitoring results will be used and applied through several key feedback loops. In general, the individual agencies monitor BMPs and other agency specific actions to determine their effectiveness. Each agency has a responsibility to report the results of their monitoring efforts and make recommendations to the monitoring group and to their respective policy boards or commissions for appropriate action. Such reporting shall be done annually.

The individual agency monitoring efforts are described in Appendix II of this section and they are also included with the agency management measures in Section 17B.

There will be an *Annual Monitoring Report and Conference* organized by the interagency monitoring group where agencies and other partners will be required to present the results of their monitoring efforts. This conference will be used to direct adjustments to monitoring efforts and protocol. The conference will describe the habitat and population trends related to the monitoring with broader temporal and spatial scales. These monitoring results and trends will be placed within the context of the biological and habitat objectives to describe annual progress. The report and results of the conference will be provided to the independent science team for their use in auditing the program and to support their recommendations.

The annual Governor's report about the State of the Salmon will also include discussion and recommendations related to monitoring results. This report will describe what

commitments will be made to adjusting BMPs or program measures based upon the monitoring results.

For more localized decision-making, the key monitoring and assessment data will be provided to agency managers, watershed councils or initiative groups, and other interested participants on an on-going basis. Regional interagency groups have been organized based upon state agency administrative boundaries. Participants of the regional groups are lead agency decision-makers of field operational programs. Relevant watershed assessment efforts and data will be routinely reported to this group for coordination and application purposes. The participants of this group are expected to provide coordination with the watershed councils and SWCDs to ensure they receive the same information in a timely manner.

Watershed councils, SWCDs, and other partners will report the results of their watershed assessment efforts to the Monitoring Program coordinator as each module is completed. These results will also be provided to the involved state and federal agencies to support their day-to-day decision making.

A Hierarchical Approach to Assessment: Monitoring at the Regional, Watershed, and Site Scales

The distribution of populations and the patterns of habitat characteristics must be described at appropriate spatial scales. This approach to monitoring the status of salmon populations has regional components that are relevant to salmon biology and conservation. At a minimum, the monitoring program will detect these factors at the level of the coho Evolutionarily Significant Unit (ESU). This monitoring program is designed to meet that objective, and to provide equivalent resolution at the geographic scale of the region or river basin and the population level of the Gene Conservation Group (GCG).

At intermediate scales, the program provides a structure for meaningful interpretation of intensive monitoring and experimental studies conducted at the sub-basin and watershed level. Local experimental investigations and restoration actions conducted at the site and reach level will be interpreted as they contribute to changes within the context of watershed, basin and regional classifications. In this way, site prescriptions and watershed analysis can include monitoring components that are imbedded at larger spatial scales, evaluating effectiveness compared to the overall scope of habitat influences.

The coho GCG has been chosen as the fundamental level of organization. The GCGs were identified in the 1995 Biennial Report on the Status of Wild Fish in Oregon as geographic and metapopulation regions that form the basis for assessment, represent an important subdivision of the range of coho within Oregon, and form realistic management units. Originally described as four units, we have created an additional division of the

North-Mid Coast GCG. This created the five regional/basin level groups (GCG Regions) as follows:

- North-Mid Coast (Necanicum River to Neskowin River)
- North-Mid Coast (Salmon River to Siuslaw River)
- Mid-South Coast (includes lake basins, Coos and Coquille Rivers)
- Umpqua Basin
- South Coast (Cape Blanco to California border)

Monitoring activity in the South Coast GCG must coordinate with California monitoring in the remainder of the Southern ESU. Regardless of the level of commitment made by agencies and groups within California, OCSRI will fully support appropriate levels of monitoring effort for the South Coast GCG within the Southern ESU.

The assessment of coho populations, habitat conditions, and actions directed at restoration will start at this regional spatial scale. Within these GCG Regions, assessment will also occur at the river basin scale, with appropriate resolution developed for approximately sixteen basins. Across all scales, the major monitoring activities described below are designed to be complementary. While each inventory method or task has a primary purpose, each provides additional information and a context for integrated analysis. For example, where water quality and community assessments occur in the same reach as summer juvenile sampling, adult spawner counts, and habitat surveys, improved understanding of the productivity of different types of habitat and the relationship between adult spawners and subsequent juvenile seeding would result.

The first task of the monitoring program will be to provide a coarse level analysis of these regions and to identify appropriate subdivision of sub-basins, watersheds, stream reaches and sites that comprise the sampling units. In this way, the regional characterizations are supported by more intensive monitoring activities in representative selections of smaller sub-basins and watersheds. Incorporation of monitoring activities at the stream reach or site scale will be aggregated and interpreted within the regional context. The same monitoring activities will be conducted in all regions. The exact number of sample sites and general appropriation of effort will vary in both region and by the particular task. Table 1 provides a summary of the major activities at each of these scales, gives a general idea of sampling intensity, and shows some of the relationships between tasks. Although organized hierarchically, each monitoring task has elements and applications that apply to the other levels.

The recommendations for staffing and implementation of individual tasks and elements within tasks are updated since publication of the August 1996 draft plan. These recommendations were considered in the process of OCSRI and agency budget development, but will continue to be modified and adjusted as the final program structure is established.

Regional Characterizations

Task 1: Stratified Probability Sampling Design. We propose to combine elements of a true probability sampling design with stratification based on basin geomorphic and salmon population characteristics. This approach will provide the framework for all other monitoring activities. The sampling design will require a preliminary, coarse level regional characterization and analysis of coastal basins that includes information on vegetation, land use, drainage networks, road networks, topography, geomorphology, and salmon abundance and distribution.

The Environmental Monitoring and Assessment Program (EMAP) has well developed protocols for selecting sites designed to evaluate the state of surface waters based on a probabilistic design. This approach, essentially a multi-scaled grid overlying a regional map, results in an unbiased sample of sites spread across the area of interest. This type of sampling design has clear advantages in the to ability to make statistically valid characterizations of physical and biologic conditions. However, when only a limited number of samples can be collected from within heterogeneous subregions, the ability to create a representative sample may be restricted.

Stratified sampling designs attempt to be more representative by collecting data from within groups based on "important" factors. For stream habitat evaluation, stratification of sites within regions can be effectively based on type of channel confinement, channel slope or gradient, and the watershed area using a combination geographic analysis and stream channel surveys of (Moore et al. 1991, Montgomery et al. 1995). This approach must be combined with strata based on knowledge of the general distribution of fish species within the region. A successful stratified approach depends on good information on the spatial characteristics of each strata and an understanding of processes that influence the spatial distribution.

A combined stratified probability, design will allow an efficient application of increased sampling effort focused at strata within each of the five GCG Regions. The developers of the EMAP probability approach have worked with the OCSRI monitoring program both in sampling design and statistical interpretation. The ability to generate a stratified approach based on basin characterizations currently resides or is in the process of development on Geographic Information Systems located in the State Services Center of the Water Resources Department, the Oregon Department of Forestry, the Oregon Department of Fish and Wildlife, and at Oregon State University. Stream channel classifications can be obtained from ODFW Research Section Aquatic Inventory project and from assessments made by USFS and BLM.

Other EPA Corvallis Research Laboratory and Region 10 staff have participated in discussions to combine probability designs with methods to stratify regions. Additional assistance is available from USFS PSW, Oregon State University and Humboldt State University to apply approaches to quantifying regional measures of fish abundance within a habitat context. Much discussion has focused on issues of pre-stratification versus post-

stratification of the probability design. As a practical matter, and as the need to proceed with sampling efforts develops, future evaluation will focus on evaluation of the most appropriate approach.

The modified Stratified Probability approach will be directly applied to assessments specifically designed to characterize status of coho populations at the regional scale. These assessments include juvenile population sampling, spawner surveys, and measures of upstream and downstream movement specific to life history stage. The selection process will also consider incorporation of sites with long term records and others with ongoing sampling.

Recommendations: Create a quantitative assessment and sampling design workgroup to develop a comprehensive sampling plan.
Provide additional analysis and feedback throughout the monitoring period.

Progress: Corvallis EPA laboratory staff (EMAP program) have created maps showing candidate sampling locations based on probability sampling techniques. Different densities of sampling sites can be developed as appropriate to different sampling projects. The creation of candidate sampling sites has not been stratified but, the selection process included a weighting factor to avoid overrepresentation of small channels.

Coordination/Related Programs: FEMAT Aquatic Conservation Strategy Monitoring Team is working with OCSRI to develop an integrated sampling approach.

Cost: This project rely largely on participation based on modification of existing work plans. Additional funds \$50,000-\$100,000 may be needed to support refinement of the statistical design and analysis and to provide for travel, per diem, and GIS computer analysis.

Time frame: Significant preliminary agreement on this topic is complete at the time of this draft proposal. A combination of probability selection within population and geographic strata is currently employed by the SRS Spawning Surveys (ODFW). Full identification of strata and identification of sampling sites for all components of the monitoring proposal can be completed by June 1997.

Task 2: Stream Biotic Condition and Ambient Water Quality. Although direct measures of salmonid abundance and habitat quality are important components of the monitoring program, these measures must be supported by more comprehensive assessments of aquatic biota and water quality. This type of assessment is needed to obtain basic information about the status, productive capacity, and limiting conditions in watersheds. The Oregon Department of Environmental Quality has two programs that address this issue, Ambient Water Quality Monitoring and the Index of Biotic Condition and Stream Condition Assessments.

The Ambient Water Quality Monitoring program should be maintained to provide basic water chemistry and temperature information. The main purpose of ambient monitoring is to look at trends in chemical parameters within and between sites over a long time period. Water samples are currently collected from 30 reference sites sampled quarterly and an additional 20 sites sampled eight times per year. The network of potential sampling sites can be expanded in accordance with the Stratified/Probability design with protocols standardized and made available to OCSRI participants.

DEQ has also adopted new temperature and dissolved oxygen standards that are designed to be more protective of cold water species like salmon. This includes a standard for intergravel dissolved oxygen in spawning areas to protect egg and fry incubation.

The Index of Biotic Condition and Stream Condition Assessments are developed from a sampling protocol that measures channel characteristics, invertebrate communities, water chemistry, riparian plant communities, and fish communities. The selection of sites and sampling methods are based on modifications of the federal (EPA and Regional Ecosystem Office) EMAP and REMAP protocol. The condition of these communities can point to watershed problems that would go undetected by other data. For example, a loss of cold water invertebrate or fish taxa can identify temperature problems within a watershed. Or an increase in sediment tolerant taxa can point to sedimentation problems. These data can identify problems early, before salmon stocks are significantly impacted.

These assessments are designed to look at trends in stream conditions over the long-term. This means that the sample sites are resampled at a 3 to 5 year interval and changes in the overall condition of streams in a region evaluated. These studies will also be used to evaluate differences in BMP's. For example, if streams on state lands consistently have poorer conditions than on federal lands, then state land use practices could be reevaluated.

Finally, these studies will be used to set more appropriate biological water quality standards. Regionally based biological standards are in development for DEQ to implement over the next five years. This sampling, particularly as linked to salmon core areas (see below), will play an important role in setting and applying biological standards.

Recommendations: Expand existing program to include the following.

- Index of Biologic Conditions

- 100 Sites within "core and index areas"; 30 to 35 sampled annually
- 300 stratified probability selected sites; 75-100 sampled annually (resampling at 3-5 year intervals)

- Ambient Water Quality

- 100 sites sampled 8 times per year
- 20 Intergravel Dissolved Oxygen monitoring sites: 10 from core areas and 10 stratified probability selected.
- 20 diurnal survey sites using continuous monitoring equipment for pH,

dissolved oxygen, temperature, and conductivity.

- Juvenile salmonid sampling would be coordinated with ODFW, federal, and private OCSRI participants to be done at the same sites identified above.

Progress: Implementation of this program is included in ODEQ budget proposals and details of monitoring projects are included in the State Agency Measures Section. Results from ambient water quality sampling will be shared with planning efforts focused on channel restoration. Priorities for instream work will be adjusted according to these results.

Coordination/Related Programs:

- Water Resources gauging station installations, points of diversion, groundwater studies, artificial barriers monitoring, and hydrographic training.
- Oregon Department of Forestry stream temperature monitoring.
- EPA EMAP Program will conduct 74 site visits to coastal streams using protocols compatible with the water quality and biotic assessments described above.
- GWEB young citizens monitoring teams.
- Watershed associations: fisher programs.
- Soil and Water Conservation Districts

Cost:

Index of Biological Condition - 130 sites per year (260 per biennium)
\$520,000 per biennium (2xNRS3 and 2xNRS2 positions)
Ambient Water Quality - \$320,000 per biennium
Intergravel Dissolved Oxygen - \$40,000 per biennium
Diurnal Continuous Monitoring - \$50,000 first year for equipment, \$40,000 per biennium for personnel.

Time frame:

Index of Biologic Condition - Currently funded through Federal Grants. 1996 is the last year for Coast Range funding. Continued funding is proposed in ODEQ's CSRI budget.

Ambient Monitoring - Currently funded at 50 sites per year (300 samples). Will need increased funding to expand program to 80 samples per year.

Intergravel Dissolved Oxygen and Diurnal Continuous Monitoring are new programs.

Task 3: Juvenile Salmon Abundance Sampling. Annual summer surveys for juvenile coho are proposed to assess utilization of freshwater habitat. Summer juvenile surveys provide an estimate of the level of seeding and utilization of habitat potential. A proposed

benchmark for full seeding for coho is 1.5 fish/m² of appropriate stream habitat within a basin. Additional juvenile sampling will allow evaluation and refinement of this benchmark relative to habitat conditions characteristic of different natural disturbance and management regimes. Determining the relative seeding level is an important component of evaluating the effectiveness of habitat restoration projects. Combined with adult sampling, juvenile surveys enable better predictions of recruitment rate and reduce the reliance on highly variable and uncertain egg to parr survival rates.

Summer juvenile surveys provide context and apply to other issues, including life history and genetic variability, and water quality. For example, we know that the run of coho into the Rogue basin consists of a fairly small number of fish in relation to the size of the basin. Aquatic habitat surveys suggest that there are many miles of rearing habitat available, but the analysis does not account for the fact that many areas may be uninhabitable due to summer water temperatures or other water quality issues. In this case, juvenile abundance may be dependent on factors other than the potential for seeding based on the productive capacity of overwinter habitat.

The summer abundance surveys can provide samples for genetic analysis, avoiding duplication of field work. Patterns of juvenile abundance, studied over time and in the context of, climate, ocean conditions, and disturbance events, provide insights into the importance of life history variability. Understanding genetic variability and monitoring of genetic components of populations is currently impaired by the small sample sizes available for genetic analysis. Patterns of juvenile abundance and examples of life history variability may suggest variable genetic characteristics. Full expression of genetic and life history patterns are likely to be seen only when populations are much higher than present levels. Monitoring juvenile populations is critical to the ability to detect changes in abundance that may signal corresponding changes in genetic and life history potentials.

Summer juvenile surveys are a comparatively inexpensive, broad based method that can provide useful information at several levels. Juvenile sampling efforts have particular value when cutthroat trout and steelhead are considered in addition to coho salmon. A large number of juvenile surveys are currently conducted by ODFW district and research personnel, USFS, BLM, Oregon State University, and privately contracted crews. Locations with long records of abundance sampling (Alsea River Study streams for example) will be identified and prioritized for continued evaluation. Locations for additional surveys will be identified using the Stratified Probability framework. Extra attention may need to be applied to Regions with few existing surveys.

Winter juvenile fish surveys will be conducted in selected streams and reaches to coordinate with intensive habitat evaluations and spawner surveys (see Task 4 and Task 5 below).

Much of the new sampling can be conducted through the addition of seasonal field personnel. However, to assure application of standardized field procedures, quality control, and consistent reporting, a level of supervision and coordination must be developed. Also, this

level of sampling is much greater than presently exists. We recommend that calibrated snorkel counts, conducted at the reach level, be used as a standard approach.

The project leader for juvenile sampling would have responsibility to providing summary data in electronic, geo-referenced form. This project should function as a clearing house for juvenile fish distribution and abundance information collected by all participants in OCSRI. This project could also provide coordination, data sharing, and mapping for the upstream fish distribution surveys conducted by ODFW and ODF. In addition to the need for summer population data to detect abundance trends, this information provides essential support for other components of OCSRI, particularly adaptive approaches to establishing new spawner escapement goals and for fishery management.

Recommendations:

- Identify historical and ongoing juvenile sampling efforts (all OCSRI participants).
- Coordinate with other monitoring tasks to eliminate duplication and to provide technical and field support. For example, \$100,000 savings could be realized in the Index of Biologic Condition budget through coordination with this project.
- Combine with other monitoring tasks to sample approximately 60 reaches in each Region.
- Support one NRS3 project leader, one NRS2 assistant project leader, and seasonal field aides.

Costs: Approximately \$300,000 per biennium for supervision and coordination.
\$200,000 per biennium for additional field crews
Additional contributions from cooperators and voluntary efforts needed

Time frame: Various sampling programs currently conducted by ODFW fish districts, USFS and BLM, and in OSU long-term studies.

- Coordination of these efforts should be completed by spring 1997.
- Selection of all new sites and standardization of methods complete before start of 1997 field season.
- Continued annual sampling.

Task 4: Stream Channel and Habitat Assessments. Primarily conducted by ODFW Aquatic Inventory Project, USFS Region 6 Level II Stream Surveys, and varied BLM protocols, stream channel habitat and riparian surveys provide basic monitoring information at multiple scales of analysis. Quantitative stream habitat information is needed to evaluate habitat quality, estimate juvenile coho seeding levels, develop and calibrate habitat based escapement models, and to expand the applicability of abundance and habitat relationships to all coastal regions. The associated riparian surveys provide assessment of the future contribution of riparian trees to large woody debris, identify areas

that may be important for the maintenance of beaver populations, and areas that may benefit from hardwood conversions. On agricultural lands, riparian surveys identify the contribution of shrubs and trees to stream shade and may be useful in determining the effectiveness of efforts to improve riparian conditions conducted under SB1010.

Between 1990 and 1996, over 6,500 miles of stream habitat surveys have been conducted by ODFW's Aquatic Inventory Program. This information, combined with some USFS Region 6 Level II surveys, has been used to prioritize restoration efforts and was also important in defining salmon "core area" habitats for the OCSRI. This extensive collection of information was made possible by cooperation and support from private landowner associations, other agencies, and groups. Most notably, the Oregon Forest Industries Council, the Umpqua Basin Fisheries Initiative, Oregon's Restoration and Enhancement Program, the Oregon Department of Forestry, and the US Bureau of Land Management provided major support. Additional cooperators include USDA Forest Service PNW Research, Coos Watershed Association, and several soil and water conservation districts.

Despite this large effort, many streams in coastal basins have not been surveyed. An ongoing program of stream channel and riparian condition surveys is needed to:

- Refine the identification and support further analysis of "Index Monitoring" and "Core Area" monitoring sites while continuing to sample populations, habitat, and water quality.
- Provide assessment of land use and habitat relationships in areas underrepresented in the current sampling, especially agricultural lands.
- Develop better understanding of winter habitat characteristics and dynamics.
- Improve sampling design and increase the generality of more intensive monitoring efforts to demonstrate relationships with general characteristics of watersheds.

Application of ODFW Aquatic Inventory and USFS Level II Surveys provide information on fish distribution, assessment of stream habitat condition, and analysis of several key indicators of habitat quality. These stream surveys are particularly suited to evaluate, across several spatial scales (reach, stream, and basin), abundance and quality of large woody debris, surface substrate, pool frequency and quality, off-channel and refugia habitats, floodplain connectivity, and channel condition. Recent surveys also characterize the abundance, size classes, and species distribution of riparian trees. In addition, well documented and geo-referenced surveys allow analysis of the location and potential impact of water diversions, push up dams, natural and anthropogenic barriers to fish migration, and the age and extent of streamside landslides and debris torrents.

Stream channel and habitat assessments are a key component of watershed analysis, are used to help prioritize areas for conservation and restoration, and provide many of the key indicators of habitat quality. Both state and federal assessment programs need to apply additional effort to synthesize stream channel and riparian habitat characteristics at the basin and regional level. Greater coordination between agencies is needed. Pilot

assessments are occurring some basins (ODFW and ODF in the Yaquina for example) and need to be expanded.

Continued stream channel assessments are part of USFS and BLM PACFISH monitoring programs. ODFW continues to support permanent Aquatic Inventory Staff but funding for new field work is contingent on Restoration and Enhancement Board allocations and contract support from ODF, BLM, USFWS, Industrial Forest Landowners groups, and other sources.

Recommendations:

- Stabilize funding for field crews, include winter and summer habitat surveys.
- Prioritize future surveys to support overall monitoring efforts, fill in gaps in coverages, and fit with the Stratified Probability Sampling design.
- Accelerate the integration of stream survey data with geographical analysis.
- Continue to work toward compatible protocols and systems to share data among agencies and interested groups.
- Develop concepts of habitat performance relative to broad scale patterns of disturbance history and management impacts. Consider temporal patterns of habitat quality as discussed in Reeves et al. 1995.

Progress:

ODFW's Habitat Analysis and Restoration Project has completed summaries of key habitat variables for all surveys in coastal basins. Frequency distributions showing the length of stream in different habitat classes provide a comprehensive characterization of current status. Variables plotted include: percent gravel in riffles, percent fines in riffles, shade, abundance of large woody debris, riparian conifer and hardwood size class abundance, width/depth ratio, etc. This information will be used by the Physical Habitat Team of the Monitoring Group to develop quantitative goals for habitat conditions. Combined with ongoing habitat assessments, this approach will monitor changes in habitat condition. Information is summarized at the level of basin, ecoregion (EPA regions and subregions), and gene conservation group. Further explanation of the approach and examples of habitat quality frequency distributions are in Appendix II

Several interagency meetings, directed by OCSRI staff, have led to greater coordination between USFS, BLM, and ODFW survey efforts. USFS Region 6 stream survey protocols for 1997 have several changes that will increase compatibility.

Commitments for continued channel and riparian assessments, including goals for comprehensive stream coverage, including resurveys of monitor trends in habitat factors, are detailed in the State Agency Measures section.

Coordination/Related Programs:

- Several BLM management units coordinate directly with ODFW to contract surveys. Further expansion and coordination of the joint BLM/ODFW is under discussion.
- BLM Properly Functioning Condition assessments.
- Rogue Council of Governments channel assessment and analysis
- OSU Extension Riparian Monitoring Procedure
- Fisher programs in Tillamook, Lincoln, Lane, Douglas, Coos, and Curry counties.

Costs: - Ongoing program in USFS. ODFW currently funds project management and analysis staff.
 - \$400,000 per biennium needed to fund seasonal field crews for ODFW program.

Time frame: Established and ongoing programs. Repeat surveys to identify flood impacts were the emphasis of 1996 field season, results will be included in the 1997 Annual Monitoring Report. Identification of important, unsurveyed streams needs to be completed, particularly in salmon core area subbasins.

Task 5: Spawner Abundance Surveys. Expansion of ODFW Stratified Random Surveys of adult coho abundance in spawning habitat is needed to provide adequate precision for estimates of adult coho abundance at regional, GCG, and basin levels. The present level of effort provides a single estimate for Oregon natural production of coho salmon. It is essential to have the ability to predict escapement levels with confidence in each of the Regions based on coho Gene Conservation Groups.

Although the current program has a strong emphasis on coho salmon, the potential to evaluate steelhead and chinook spawning abundance is inherent in this proposal. Evaluation of these species could be achieved primarily by extending the duration of the survey season and by identifying additional stream reaches appropriate to the spawning requirements of steelhead and chinook.

This expansion of the spawner abundance surveys specifically addressed the need for improved information on coho abundance in the Southern ESU. The recommended expansion will cover the Rogue Basin and other south coast stream systems in the Southern ESU. The expanded survey effort will also support evaluation of chinook salmon in these stream systems.

Based on an analysis of the variability in spawner counts, increasing the number of random spawning surveys from 200 to approximately 430 will increase the precision of adult estimates sufficiently to evaluate both increases or decreases in abundance within each of the GCG Regions and major basins (Oregon Coastal Spawning Surveys, Annual Report, ODFW, 1993). The additional sampling will be directed at sites identified by the Stratified

Probability design (Task 1). Adjustments in sampling effort will be needed based on the need to focus on stream reaches utilized by spawning salmon.

In addition to improved estimates of abundance, the spawning surveys will provide resolution to questions of hatchery straying rates, establishment of habitat seeding benchmarks, and provide samples for genetic analysis.

Recommendations:

- Increase the number of random spawner surveys to approximately 430.
- Distribute effort proportionally to each GCG and ESU
- Maintain Standard Surveys where they contribute to other monitoring efforts.
- Coordinate with "Index Area" and "Core Area" monitoring.
- Fund new biologist positions (NRS2 and NRS1) to help establish new surveys and supervise crews.

Progress: Funding from NMFS allows increased sampling in the Rogue Basin, South Coast GCG for the 1996-1997 spawning season. NMFS also funded additional spawning surveys, scale collection, and analysis for streams in the Tillamook basin. This work will provide additional information on the degree of hatchery-native fish interactions in that basin.

Coordination/Related Programs:

- Supplemental Spawning surveys have been conducted by local ODFW, USFS, and BLM districts, watershed associations, private landowners, and landowner initiative groups such as the North Coast Stream Project.
- Standardized protocols are under development by the Monitoring Group Fish Population Team for use by these and other voluntary efforts. Agreement to use the standardized protocols, combined with a quality assurance program, will allow data from the voluntary efforts to expand the scope of the Spawner Abundance Surveys.
- Fisher programs coordinated through SWCD.

Costs: Approximately \$340,000 per biennium for coho only. Expansion to steelhead and chinook would add approximately \$180,000 per biennium. Costs were included in ODFW's OCSRI budget request.

Time frame: Ongoing program.. Full implementation of expanded sampling will occur in 1997-1998 pending funding.

Task 6: Genetic and Life History Monitoring. We recognize the need for genetic monitoring to support gene conservation strategies. Additional investigations of life

history variability, and factors that limit the capacity to express that variability, are also needed. The objectives of a genetic monitoring program would include the ability to:

- Further refine of ESU and GCG boundaries.
- Investigate the appropriateness GCG boundaries relative to concepts of metapopulation structure and distribution.
- Detect introgression between hatchery and wild populations.
- Detect genetic drift in hatchery populations and small wild populations.
- Test new techniques of genetic evaluation, especially non-lethal approaches tailored to small population units.

Life history investigations would emphasize interactions with variability in ocean conditions and freshwater habitats. This would provide context for interpreting interactions between habitat, marine conditions, and climate change. Genetic and life history patterns, and potential patterns, in coho and other salmon species represent population responses to variability in physical conditions that can be used to provide an integrated perspective on coastal ecosystems throughout the North Pacific.

To a degree, both genetic and life history investigations have significant limitations as they attempt to make inferences based on populations at depressed levels.

ODFW conducted sampling to measure the percentage of hatchery fish in natural spawning populations of the Tillamook Basin. NMFS has provided funds to initiate this program of additional sampling and analysis.

Recommendations:

- Additional benchmarks that monitor phenotypic diversity (life history diversity) of the coho salmon populations should be developed (e.g., Healey and Prince 1995).
- Support investigation coho metapopulation structure through coordination with Tasks 2, 3 & 9 (Biotic Condition, Juvenile Sampling, and Core and Index monitoring) and identification of small populations in marginal habitats.

Coordination/Related Projects:

Ken Currens (WDNR), Carl Schreck (OSU) - genetic and phenotypic variability
Kathryn Kostow (NMFS) - genetic sampling

Dan Bottom (ODFW) - Proposed PNCERS research to characterize life history diversity (freshwater, estuary, and marine) in relation to environmental variability.

Task 7: Fish Propagation Monitoring. ODFW has existing programs that maintain good accountability of hatchery practices and provide records of other efforts (primarily the Salmon and Trout Enhancement Program, STEP) to supplement fish production. Changes in hatchery practices are a key component of ODFW's contribution to the OCSRI strategic plan. This includes hatchery stock selection criteria. Other examples of data

collected include: adult returns to each facility, eggs taken, numbers of juveniles released, size and timing of releases, and stocking and "hatch box" production conducted by STEP volunteers. Records of adults taken and juveniles released are also maintained for private hatcheries.

Reports of propagation status for each facility, particularly documentation of changes in hatchery practices related to OCSRI, will be made to all participants of the monitoring team.

Recommendations: Maintain current program and improve sharing and access to data. A research position that coordinates hatchery information with the coded wire tag recovery database is currently backfilling program leader position and should be reclassified to NRS3 level.

Develop an analysis of spatial patterns of hatchery activities relative to core populations and stock diversity patterns.

Progress: ODFW is developing and improving access to fish propagation databases.

Costs: Fill data management position and reclass research biologist to appropriate level, approximately \$30,000 per biennium.

Timeframe: Ongoing activities. Existing program is in process of reorganization.

Task 8: Harvest Monitoring. ODFW has existing programs that adequately document harvest of salmon and other species, both recreational and commercial. In addition to landing records, the Harvest Management program also monitors encounter rates and provides estimates of hooking mortality. This program provides the estimates of incidental mortality of coho salmon that result from the conduct of other fisheries.

Recreational and commercial troll salmon sampling including effort counts from May 1 through October 31 (seasons may start as early as April 15; some state waters fisheries may continue through November). Probable genetic stock identification sampling of some chinook seasons, localized requests for monitoring of lower estuary chinook and marked coho seasons, and updating the annual report on ocean salmon fisheries.

In 1998, all returning adult hatchery coho will be fin clipped. It is possible that some selective fisheries (or a "test fishery") may be adopted to allow harvest on fin clipped hatchery coho. This would undoubtedly result in increased effort by the fishing community, and would require the use of special sampling equipment (electronic wands) to detect the presence of coded wire tags. The OSM Program would need to increase seasonal sampling staffing to accommodate the new workload. Staffing increases would

be directly related to the season structures outlined in the coming years regulation packages adopted by the Pacific Fishery Management Council.

Research studies are proposed that will identify sport fishing gear and techniques that select for chinook salmon and avoid coho salmon. Other studies will evaluate hook-and-release mortality rates. Contact person: Peter Lawson ODFW/NMFS, Newport OR.

Recommendation: Monitoring aspects of these programs are established in the Marine Program Section of ODFW. Eric Schindler, Ocean Salmon Management (OSM) Program, is the Sampling Project Leader.

Timeframe: Ongoing activities. Existing program is in process of reorganization.

Sub-Basins, Watersheds, and Streams

Within each of the sample regions based on the GCG, and in addition to the distributed sampling activities described above, more intensive monitoring of selected habitats and populations is needed. A combination of index monitoring and core area monitoring covers both "representative" areas and areas with the "best or better" conditions within a GCG Region. This process can identify the sub-basins with the greatest potential for positive responses to restoration efforts. The methods employed at this level comprise essential elements of a watershed assessment process that can be applied to areas with multiple ownership's. Sub-basins, watersheds, and streams are the natural units to apply more intensive monitoring, careful habitat assessments, watershed analysis, and adaptive management. Applying additional effort at this level, and sustaining that effort, will result in the development of a coast wide network of index and reference sites that include estuaries, floodplains, and forest basins.

Task 9: "Core Area" and "Index Area" Monitoring of Habitat and Populations.

These tasks, "Salmon Core Area" and "Index Monitoring" were identified separately in the draft monitoring plan. Further development of these tasks, influenced by the peer review and public comment process, made it apparent many elements were similar. Combining the tasks is intended to create a system of paired watersheds that will become focal points of for intensive evaluation monitoring and research. The link between core or index area monitoring activities and the assessments at regional scales will occur through common data elements collected at each level and by imbedding the core and index areas into a larger system of landscape and watershed analysis (Task 15).

For further discussion of the core area concept, including a description of the ongoing process of revision, see Section 22, Process for Revision of Core Area Maps.

As originally developed, Index Monitoring exhibited strong support for fisheries management needs with less emphasis on characterization of populations and habitats outside of core areas. As the Core Area concept has developed, it has become apparent that an understanding of their relationship to other sub-basins within each GCG is needed. By combining the tasks, but allowing flexibility of emphasis, greater resolution of habitat and population issues should be developed at these spatial scales.

Index area monitoring and core area monitoring are designed to compliment each other and add to the resolution of the overall monitoring effort. Essentially, monitoring these areas will provide an index of population and habitat factors as they integrate the influence of habitat enhancement efforts, adaptive management of riparian areas, ocean conditions, and harvest strategies.

A fundamental component of the emerging OCSRI strategies for salmon restoration is the identification of essential "Core Area" habitats. This process represents an evolution of developing restoration strategies as it incorporates elements of "source" and "recovery" watersheds, "Aquatic Diversity Areas" (Natural Production Committee, Oregon Chapter AFS 1993) Aquatic Conservation Strategy "Key Watersheds" (FEMAT 1993, ROD 1994) and the "Bradbury Process" for prioritizing protection and restoration efforts (Bradbury et al. 1995). As appropriate to each salmon species, these areas provide the best habitat and have the highest relative abundance of salmon within a basin. A description of the core area mapping process and maps of draft core areas within each coastal basin are in a separate section of the OCSRI Science Team Attachment.

The core areas will become the foundation of adaptive management and recovery efforts at a regional level. Draft core areas have been identified for each salmon species, the core areas selected for intensive monitoring in each GCG Region will be chosen using Stratified Probability procedures (Task 1). Comprehensive evaluation of the core areas is essential to evaluate the effectiveness of these activities. Many core areas will be identified in each GCG Region. The following monitoring will be applied to a subset of the core areas, with the level of sampling (number of sites) appropriate to each monitoring activity:

Index monitoring will be conducted at sites chosen to be representative of habitat and fish abundance conditions within each GCG Region. Representative designation will be based on a combination of Stratified Probability sampling and stratification based on habitat and coho abundance. A total of ten will be selected based on Region and drainage area characteristics in each of the five coastal GCS. It is important to sample "representative" habitats to track changes in fish abundance and habitat characteristics both within and between regions, particularly as this information is used to evaluate escapement, juvenile seeding, egg to smolt survival, and ocean survival. The sampling design for index monitoring also provides essential information on freshwater and marine survival rates needed to establish and interpret escapement goals. Monitoring activities include:

Population Evaluation:

- Summer abundance of juvenile salmonids. Used to track general trends in juvenile abundance and to evaluate the seeding level of habitats. Linked to Task 3 - 30 to 60 sites.
- Adult spawner abundance. Intensive application of spawning ground surveys, sufficient to provide meaningful estimate of spawning population within selected core and index areas. Linked to Task 5 - applied to 2-6 paired areas in each GCG Region
- Adult movement. At centralized trapping or weir sites, record movement of all adults into the sub-basin. Supplements spawning ground counts. Two paired areas in each GCG Region.
- Smolt outmigration, production. Smolt trapping. Combined with summer abundance data, provides an estimate of over winter survival. Combined with spawner abundance three years later, provides an estimate of ocean survival. Two paired areas in each GCG Region

Habitat Assessment:

- Summer stream habitat surveys, channel assessment, and riparian evaluation of previously unsurveyed streams. Linked to Task 4, priority assessment for all coho core areas and priorities for stream types underrepresented in Aquatic Inventory and Habitat Analysis Project databases.
- Winter stream habitat surveys. Evaluate winter carrying capacity. Linked to Task 4, applied to 2-6 paired coho areas in each GCG Region.
- Evaluation of instream and riparian restoration and enhancement activities.
- Road and culvert surveys.
- Temperature monitoring.
- Establish permanent channel reference stations. Channel cross section and longitudinal surveys.

Watershed Assessment: Integrated with Task 13, Cumulative Effects Evaluation and Watershed Assessments for Mixed Ownerships

- Pilot watershed assessments targeted on selected core and index areas.
- Evaluate water quality, disturbance, channel condition, and other indicators of habitat condition. Use NMFS draft Matrix of Pathways and Indicators and ODFW's Habitat Factor Analysis and Benchmarks.
- Consider adaptive management options to treat possible problems.
- Maintain selection of core areas as permanent reference sites for continued monitoring and research .

First year expenses for this project will be higher than subsequent years because significant investment in equipment will be needed. Seven to fourteen downstream migrant traps, four or five floating weirs, and snorkeling equipment will be needed. We believe it is essential to incorporate this project into the monitoring plan to track future gains or losses

in coho populations and to assess fish harvest and habitat impacts in watersheds both within and outside the Salmon Core Areas.

This project will fund four biologist positions and seasonal habitat and summer population crews, and seasonal spawning survey and winter habitat crews. The estimate is for startup and implementation costs for the 1997-99 biennium. Salmon population monitoring will continue each year. Habitat, and watershed evaluation and monitoring in subsequent years would be staggered, reevaluating the core areas at 5 to 10 year intervals.

Recommendations:

- Conduct adult spawner surveys with supervision from Stratified Random Survey program staff.
- Establish and fund monitoring in core areas.
- Fund total 2xNRS3 and 3xNRS2, and 3-5 seasonal biologist positions from new programs and by modifying existing programs
- New program elements will fit into context of established monitoring efforts

Progress: Several sampling efforts (smolt and adult trapping, stream channel assessments) have been funded for 1997 through cooperative agreements.

Coordination/Related Projects: Some costs of habitat assessment and watershed assessment will be shared with other monitoring elements. Expansion of program to additional core and index areas possible through cooperative efforts of USFS, BLM, and private landowner groups.

Cost: Minimum costs of approximately \$750,000 first year; \$500,000 in subsequent years. First year funding requested in ODFW's OCSRI budget.

Time frame: Full or "phased in" implementation starting in 1997, contingent on funding.

Task 10: Ocean Conditions. Oregon has very limited capacity to evaluate ocean conditions. Current efforts are comprised of measurements of mean monthly sea temperature at Charleston and the monthly upwelling index for 42° and 45° north latitude as obtained from Oregon Marine Institute of Biology and NMFS, respectively.

Coordination/Related Programs: PNCERS proposal for research and monitoring of coastal ecosystems.

Need to assign lead person to develop links to marine sampling.

Task 11: Estuary and Riverine Wetland Populations and Habitats. Monitoring salmon populations and habitat use in coastal lakes and estuaries, again developed at the level of the Gene Conservation Group, will contribute to the understanding of other factors that influence coho, chinook, and cutthroat abundance. While not definitive themselves, the

estuary studies are important to maintaining a comprehensive approach. River basins and sub-basins associated with coastal lakes and well developed estuary habitats may be important contributors to coho production, particularly when ocean conditions are poor. Information from these studies will help test this observation and provide insight into adaptive salmon life history patterns. This project will; integrate results from estuary evaluations with other monitoring activities, especially core area monitoring, coordinate with existing sampling programs conducted in estuaries and lakes, and develop methods to estimate smolt survival rates from the time they leave natal streams to time of ocean entry.

Recommendations:

- Initiate population evaluations in five coastal lakes and estuaries.
- Reconstruct historic habitat conditions and life history types in selected estuaries and compare with current conditions and life histories
- Monitor the use of selected salt marsh restoration sites by juvenile salmonids. - - Evaluate the efficacy of dike removal as a means for salmonid habitat restoration (i.e. South Slough Estuary Study and Salmon River Estuary Project)
- Obtain wetland inventory information from Oregon Division of State Lands and Department of Land Conservation and Development. Develop sampling protocols to evaluate the effectiveness of restoration actions and projects.
- Assign task to Monitoring Group Issues Team to develop
- Update inventory of coastal wetlands DLCD and DSL

Progress:

Salmon River Estuary Study started with independent grant funds. Study examines biotic and physical responses in a system of estuarine wetlands restored at intervals. Contact, Dan Bottom, ODFW Research Corvallis, OR 541/737-7641.

Coordination/Related Projects:

EPA-Corvallis PNW Ecosystem Research Consortium project "Estuarine Landscape Structure Interaction with Ecosystem Processes, Si Simenstad Univ. Washington 206/543-7185.
Tillamook Bay National Estuary Project
Lower Columbia National Estuary Project
Pacific Northwest Coastal Ecosystem Regional Study (PNCERS)
OSU Extension Sea Grant Program - Jim Good 541/737-3504

Cost: Salmon River Estuary Program is new project. Requires project leader, NRS3, and summer field crews.
Approximate cost: \$160,000 partial funding requested in ODFW memo budget.

Time frame: Salmon River portion may start in 1997, additional sites contingent on funding.

Task 12: Forest Practices Monitoring ODF / NW Forest Plan Aquatic Conservation Strategy Monitoring.

Forest Practices Monitoring - Oregon Department of Forestry

The current Forest Practices Act monitoring program evaluates the implementation of Best Management Practices on state and private forest lands. Focus elements include; sediment and temperature monitoring, assessment of flood effects, and evaluation of riparian management measures.

Oregon Department of Forestry: Forest Practices Monitoring current programs:

- temperature monitoring
- flood impact assessment
- hardwood conversions
- compliance monitoring
- hydrologic changes
- sediment inputs from roads and road drainage systems
- culvert monitoring for fish passage
- long term large woody debris recruitment studies

New proposals for ODF include increasing the authorization to use other funds to cooperatively study issues of small stream protection, mass wasting, and cumulative effects. Increased levels of assessment and monitoring on state forest lands is proposed under the OCSRI budget. Additional details and actions related to forest practices monitoring in Chapters 17B and 17C State Agency Measures and Workplans.

NW Forest Plan Aquatic Conservation Strategy Monitoring

A federal monitoring team is designing a Monitoring Strategy for evaluating the effectiveness of the Aquatic Conservation Strategy (ACS) of the North West Forest Plan. This effort is coordinated with OCSRI and Monitoring Group staff are participating in the development of the ACS Monitoring Strategy.

BLM Medford, Roseburg, Eugene, Salem, and Tillamook Districts.
Have conducted stream channel surveys, watershed analysis, and developed monitoring programs. These administrative units continue to support cooperative assessment efforts with ODFW and other OCSRI participants.

USFS Region 6, Siuslaw, Umpqua, and Rogue National Forests.
Have conducted stream channel surveys, watershed analysis, and developed monitoring programs.

Task 13: Cumulative Effects/Watershed Assessments for Mixed Ownerships

The State is committed to a collaborative process with NMFS and other interests to incorporate scientifically sound cumulative effects methods and considerations into watershed assessment and monitoring efforts. Several existing watershed assessment methods (for example, Forest Service, Washington Dept. of Natural Resources watershed analyses modules, and the NMFS matrix) have been developed that include processes to evaluate possible cumulative watershed effects. These existing methods provide a substantial starting point and initiate an organized approach to learning to understand watershed processes, but also have significant weaknesses in some areas. In particular, existing protocols lack the ability to develop models that integrate the various components of the analysis relative to the underlying context of geology, geomorphic processes, and natural disturbance history.

OCSRI monitoring staff and GWEB staff will coordinate with the state agencies, federal agencies, OSU, watershed councils and interest groups to develop a watershed assessment approach (building upon existing knowledge) that can be applied across mixed ownership and land uses. The assessment approach will be designed to gather information that can evaluate the magnitude of the various factors for decline, assess limiting factors, identify habitat trends, and identify and prioritize restoration opportunities. The overall approach will be one of integrated assessment modules that can be applied at any number of possible scales or land uses and by any interest.

The ongoing efforts of state and federal agencies, watershed councils and landowners have already developed a number of preliminary modules related to:

- condition of roads and sediment risk
- location of unstable areas
- aquatic habitat condition
- riparian condition
- fish population abundance and distribution
- water withdrawals
- fish passage barriers.

The modules and other protocols will be refined and accumulated in a watershed assessment manual. GWEB will hire a contractor to put together an initial watershed assessment manual in consultation with the OCSRI monitoring group. The monitoring group, through its watershed assessment issues team, will be assigned the responsibility of developing and reviewing modules and protocol in coordination with the contractor. It is expected that the initial version of this *Watershed Assessment Guidance Manual for Watershed Councils* will be completed by September 1, 1997. The modules will be designed to determine immediate, intermediate and cumulative effects, off-and on-site as appropriate.

In addition to the modules, broad scale data layers that will be useful to watershed assessment will be developed and made available. These data layers include: stream

temperature, stream discharge, vegetation coverage, road inventories, and disturbance history. The ability to develop comprehensive data layers like these will be considerably enhanced through the Governor's budget. For example, the budget includes \$275,000 within the Department of Forestry to develop GIS data layers useful at the basin scale as well as at broader scales. The combined population and habitat data that are developed will be used to evaluate habitat models, refine escapement goals, and demonstrate adaptive management designed to improve restoration activities.

Industrial and other private landowners have participated in watershed assessments both independently and as part of watershed associations or councils. The watershed assessment package will facilitate this type of assessment, providing support and assistance to non-governmental landowners. This approach acknowledges the experience and expertise of landowners and has the greatest potential for **efficient** data collection. However, as the products of this Task will provide both consistent protocols and format for data reporting, combined with the development of quality control procedures, we expect that such assessments will also be completed more **effectively**, with the results applied to management action.

The State has been concerned that past investments made by federal agencies on watershed assessment have yielded results with limited benefits. However, a new draft regional monitoring strategy for federal lands, developed to evaluate the effectiveness of the Aquatic Conservation Strategy (ACS) of the NW Forest Plan, represents a significant improvement in the utility of federal watershed assessments as applied to monitoring and management. Additional detail and a draft outline of the ACS monitoring approach can be found in Appendix II, Monitoring Program Documentation. This draft ACS monitoring approach is complementary of the process being developed under the OCSRI. Members of the OCSRI monitoring group meet regularly with members of the federal team to develop a coordinated approach and to share expertise. It is expected that the federal agencies will provide support and data gathering to watershed councils, SWCDs and other cooperative efforts whenever possible. As OCSRI watershed assessments are implemented, they will need to consider and integrate federal efforts that are already completed and coordinate with federal efforts that have yet to be started.

In addition, some landowners are pursuing Habitat Conservation Plans (HCPs) with the USF&WS/NMFS. HCPs may include specific requirements for watershed assessment. The OCSRI watershed assessment package is intended to support these landowner efforts. The OCSRI approach to landowners is to provide structure and assistance, acknowledging that alternative methods may also be used. Within this flexible approach, OCSRI is working with landowners to ensure high levels of data compatibility in support of the ability to integrate assessments across ownership boundaries.

Recommendation:

Establish full time monitoring staff position to develop watershed assessment protocols and to coordinate with existing state, private, and federal programs.

Progress:

A Watershed Assessment Issues Team has been formed as part of the Monitoring Group. This team is led by Theresa Valentine (State Center for GIS) and Willa Nelson (USFWS). The team has representatives from NMFS, private industry, and watershed associations, and is open to additional participation. The team has met three times to develop compilation of existing assessment efforts, is working to develop recommendations for the GWEB funded, *Watershed Assessment Guidance Manual for Watershed Councils*.

The Southwest Province Interagency Committee is developing information systems and support for assessments in the Rogue and Umpqua Basins (Appendix II).

Costs: Fund one NRS3 position, supplies and support; \$160,000 per biennium.

Time frame: Development of program completed by September, 1997. Coordination and evaluation of ongoing assessments fully implemented by winter 1998.

Stream Reaches and Sites

A great many activities that are conducted at the stream reach or site level contribute to the OCSRI effort. Many of the actions outlined by agencies in their State or Federal Measures apply at the stream and site level but are collected throughout the coastal region. Examples of these actions include, tracking and compliance monitoring, evaluation of habitat projects, and documentation of culvert replacement or road improvement. A program structure is required to place site and reach level monitoring or assessment into a meaningful context at higher levels of classification.

It is equally important to develop a system to evaluate the negative impact of failures to protect stream habitats and fish populations. Chemical spills, filling of wetlands, road drainage system failures, and other impacts are usually documented by the responsible agencies. An integrated monitoring approach requires shared access to this information.

Another issue is assurance that the information reported to the OCSRI staff either as general information updates, or as specific actions, be accurate, timely, and verifiable. The credibility of all aspects of the monitoring program, compliance, implementation, and effectiveness, will depend on the quality of information provided.

Currently, participating OCSRI agencies make progress reports to the Governor every two weeks. Continued reporting from the agencies should be made to the Monitoring Program Leader for distribution to the Monitoring Issue Teams. Part of the responsibilities of that position will be implement quality assurance procedures that evaluate the reliability of information reported. The program may have elements analogous to those used in contract laboratory settings that do analysis of samples

collected in the field. Checks on both the technical precision of the analysis and on the effectiveness of procedures designed to deal with errors are needed. The importance of quality control is repeatedly stressed in monitoring literature. Simple awareness that some quality assurance program exists is frequently cited as important to the integrity of any monitoring activity.

Task 14: Coordinate and Facilitate Monitoring: Evaluation of Restoration Projects and Actions. The capacity to process and assimilate the input from all the existing and proposed monitoring activities that will be conducted at the stream reach and site level is a fundamental goal of the overall monitoring strategy. A secondary goal is to create an awareness of the scope of efforts among all participants, as well as a shared sense of understanding and accountability.

The following examples of OCSRI management measures have monitoring components that illustrate the need to provide coordinated and reliable information that can be used to evaluate both long term and short term effects. More detail on each of these efforts, and additional measures not listed here, are available in Chapter 17B, State Agency Measures.

Beaver management. Promote the use of beaver to restore coho habitat. Identify the types of stream reaches, riparian habitat, and valley characteristics that support beneficial beaver populations. Need to monitor distributions of beaver and beaver activity, records of beaver harvest, inventory of habitats. Proposed for funding by ODFW

Cooperative habitat restoration efforts. A system to develop and maintain a information system that describes the type, location, and purpose of various habitat restoration projects is needed. ODFW has designed and implemented habitat restoration projects in cooperation with coalitions of landowners and interest groups (North Coast Stream Project), watershed associations, Oregon Department of Forestry, Soil and Water Conservation Districts, county governments, and individual landowners. A systematic accounting of these activities will help to coordinate funding and action, and contribute to evaluation of their effectiveness. Some inventory has been conducted by the Governor's Watershed Enhancement Board, the Oregon Forest Resources Council, and some watershed associations. An integrated system is needed to create a comprehensive record of projects on state, federal and private lands, develop a consistent monitoring protocol, avoid multiple requests for information, and to provide centralized access to the information. (ODFW, ODF, USFS, BLM, watershed councils, private landowners)

Habitat project monitoring. The North Coast Stream Project, project monitoring and evaluation. Funded as a graduate thesis through 1997. (Oregon Wildlife Heritage Foundation, ODFW, University of Washington).

Similar monitoring efforts need to be established for all coastal districts, integrated with watershed plans.

1996 Flood Impact Assessment. Focus on channel morphology, fish habitat, salmonid populations, and upslope processes. Channel assessment includes an evaluation of LWD movement, size, and location and will enable informed management decisions regarding reintroduction of LWD deposited above and away from stream channels. Upslope monitoring includes an evaluation of effectiveness of standards for road design. Channel (ODF, ODFW)

Implementation of *surface water temperature management plans*, 303(D) list priorities for Total Maximum Daily Load (TMDL). (DEQ)

Impacts of *combined animal feeding operations*. (ODA)

Upstream Fish Distribution Surveys. The upstream distribution of fish has been investigated in many coastal subbasins. In general, this assessment has resulted in increased stream protection as new information demonstrates that fish are found higher in drainages than was presumed. A cooperative protocol (ODFW and ODF) has been developed and implemented. Continued funding for this program is in jeopardy.

Fish passage, culvert maintenance and assessment, and prioritization process for culvert replacement. Reconnecting wetland and off channel habitats isolated by road fill. (ODOT, ODFW, ODF)

General authorization for instream work, record of compliance and effectiveness. (Division of State Lands)

Privately funded monitoring and assessment efforts. Several industrial forest landowners have implemented comprehensive monitoring and watershed assessments. These efforts need to be acknowledged, encouraged, and incorporated into the overall monitoring efforts and the information shared.

Irrigation withdraws, screening projects, water right applications. (ODFW, Water Resources Department)

Push-up dams. Identification and mapping. Documentation of removal or resolution of passage issues. OWRD, ODA, ODSL, OSP, and watershed councils.

Riparian protection, development set-backs, *Goal 5 implementation.* Department of Land Conservation and Development. Coastal wetland inventories and status of essential salmonid habitat ODSL.

Senate Bill 1010 implementation and effectiveness of Coastal Zone pilot basins. Oregon Department of Agriculture.

Support for Monitoring Tasks. Some elements of the monitoring plan could be implemented with assistance from Industrial landowners, watershed associations, smaller landowners, and individuals. Opportunities for broad participation and involvement need to be identified. (OCSRI staff)

Other examples and more details on these projects are in Section 13, State Agency Measures.

Improvement in data reporting, development of standardized protocols, and coordination among groups is needed before the pieces of information collected at this level can be combined to give a picture of the cumulative impact on processes at watershed, basin, or regional levels.

Recommendations:

- Include representatives from each agency or group with significant monitoring activities on the Monitoring Team.
- Examine monitoring tasks and determine which elements could be conducted by non-governmental groups or individuals to support and extend the scope of investigations. Explore possibilities to reduce costs.
- Examine the role of Oregon State Police to assist in compliance monitoring.
- Fund NRS4 to coordinate reporting of monitoring activities and to implement quality control measures. This position should be technically oriented, filled by scientist with good understanding of policy.
- Fund additional support staff to (NRS2x2) to collect, coordinate, and report on monitoring efforts. Feed results of this effort directly to Monitoring Group for inclusion in agency efforts to evaluate effectiveness of projects.
- Support research directed at evaluation of project effectiveness for such activities as salmon carcass placement, beaver enhancement, wetland restoration, hardwood conversions, and instream structures.

Cost: Approximately \$220,000 per biennium for OCSRI monitoring staff. Additional staff may be needed depending on extent of distributed efforts.

Time frame: Start immediately concurrent with announcement release of OCSRI comprehensive plan. Shift funds and reassign work to support coordination. Request new funding to maintain program.

Integrated Synthesis and Distribution of Results

Task 15: Collect and Distribute Monitoring Results: Produce Annual Report.

Considerable effort will be needed to provide timely and useful summaries of monitoring data collected by each of the preceding tasks. Analyzing and utilizing the information collected by these proposed activities will require additional management support. Within the participating OCSRI agencies, project leaders assigned to each monitoring task will develop their own summaries, but consistent and structured protocols for reporting to the OCSRI Monitoring staff are also under development.

As stated earlier, there will be an annual monitoring report and conference. This public document and public involvement process will focus on the presentation of results organized by the tasks in the monitoring program as they relate to the factors for decline addressed by management action. Overall, the annual report will evaluate the progress made in reaching the objectives of the management actions.

To support this effort, the members of the OCSRI Monitoring group will work with their respective organizations to develop and maintain digital and geographic databases that have the capacity to develop coherent summaries of all actions, showing their interactions and context. The mechanism used to process and synthesize this information is likely to be provided by geographic information systems (GIS). Most agencies participating in OCSRI have GIS capability. However, because of the amount of new information collected, and because of the need to use this information in the context of regional geomorphic, climate, disturbance, land use, and biologic regimes, GIS capability dedicated to the monitoring effort is needed. This position may reside in any of the participating agencies, but the person in the position must combine GIS expertise with a well developed understanding of all concepts influencing salmon populations.

Much of the basic information used to establish Stratified Probability sampling designs for each Task will also be utilized to interpret and present context for the monitoring results. Sampling design and integrated synthesis will be components of the Quantitative Assessment Program (see Program structure and Organization below).

This task is an essential component of the monitoring proposal. Synthesis and distribution of information is a key function. Also, this task will be highly integrated with Task 13, Cumulative Effects/Watershed Assessments. Capability in GIS and data management exists in most agencies, and some attempts at integration have been made (see Appendix II). Continued support within participating OCSRI agencies, and sufficient funding for the integration component of monitoring program is needed and has been identified in the budget.

In addition to developing basic coverages of geology, climate, historical disturbance, anthropogenic disturbance, and biologic information, the GIS database will also provide a

link to monitoring of ocean conditions. Information on upwelling, oscillation indices, and temperature anomalies, is available and can be used to index ocean productivity.

Recommendations:

- Participate actively in cooperative data sharing and GIS programs.
- Develop a focal point of data access within the monitoring program.
- Develop better access to BLM and Forest Service information.

Progress:

Job assignments and work plans of state and federal participants in the OCSRI Monitoring Group have been adjusted to meet the needs of this task.

The OCSRI Monitoring Group has assembled a list of relevant database and GIS systems. The Monitoring Issue Teams have been given the assignment to begin collecting and organizing this information and will shift focus to production of chapters in the Annual Report with formal adoption of the OCSRI plan.

Western Oregon ecosystem and data management project. Modeled after the Columbia Basin Project, this effort is combining assessments from USFS, BLM, and ODFW stream channel surveys into a common GIS data base. Supported by USFS PNW Research, ODFW Research, and Siuslaw NF.

Contact: Shaun McKinney, Siuslaw NF, Corvallis

Coordination/Related Projects:

Interior Columbia Basin ecosystem and data management reports, Bruce Rieman, Intermountain Research Station, USFS: 208/364-4386.

Coastal Landscape Analysis and Monitoring Study (CLAMS), Warren Cohen, Kelly Burnett PNW Research Station 541/750-7309.

EPA Region 10 Environmental Information Management System, Tom Haad, EPA Seattle, 206/553-6689.

- Costs:
- Use existing computer network and hardware systems to lower start up costs (i.e. OSU, USFS PNW Research, and ODFW investment in GIS/UNIX network)
 - Monitoring staff recommends funding of one GIS position dedicated to this task. A scientist with experience in habitat, evaluation of salmon populations, and Geographic Information Systems is needed.- \$160,000 per biennium.

Program Structure and Organization

The monitoring plan must be both broad enough and flexible enough to incorporate changes based on the full development of Oregon's salmon recovery plan. As participating agencies develop plans and budgets related to OCSRI, these new programs need to be evaluated for their contribution to monitoring efforts. This adaptive approach to monitoring will reflect the larger commitment to adaptive management designed to respond to the needs identified, and direction indicated by the monitoring approach.

Coordination among agencies, landowners, and other groups is essential to adequately and efficiently collect and analyze information. No formal structure currently exists to provide this function. An effective monitoring program must provide leadership, be accessible to all participants, and provide a basis for sustained effort. Support for adaptive management will take the form of reports of key data elements, analysis of trends and interactions, and evaluation of the net effectiveness of restoration activities.

Monitoring Issue Teams will function within the monitoring program. Initially, these groups will focus on protocol development and sampling method design. This work will allow for a more standardized approach to monitoring that will allow broader participation from local groups, yet maintain quality of information and integration of results. Each of these groups (except Fish Population Team) has been formed and are functioning at the time this draft was released. Each team is open for additional participation.

Quantitative Assessment Team

- Sampling Design
- Methods Development
- Database and Geographic Information management
- Integrated synthesis and distribution of results
- methods and protocol development

Fish Population Team

- Stratified Random Spawning Surveys
- Juvenile abundance surveys
- Genetic and life history characteristics
- Artificial Propagation
- Harvest Management

Physical Condition (Habitat) Team

- Stream channel and riparian assessments
- Core Area monitoring
- Habitat restoration project monitoring and evaluation
- Riparian assessments
- Substrate
- Fish Passage

Instream Structures
Methods and protocol development

Watershed Assessment Team
watershed and sub-basin analysis
Methods and protocol development

Water Quality Team
Stream Biotic Condition Ambient Water Quality
Temperature
Turbidity - Sediment
Dissolved Oxygen
Benthic Invertebrate sampling
Methods and protocol development

Water Quantity Team
Streamflow assessment
Precipitation
Diversions and screening
Push-up dams
Methods and protocol development

Distributed Monitoring Program
Reporting of implementation and compliance monitoring
Quality assurance and control
Habitat Restoration Project Database
Benchmarks to Oregon Progress Board
Coordination with cooperators

Regular reports of monitoring activities conducted by all OCSRI participants will be made by panels representing the following groups:

State Agency Representative Panel
Comprised of monitoring coordinator in each participating Oregon state agency (ODFW, ODF, DEQ, etc.)

Federal Agency Representative Panel
Comprised of monitoring coordinator in each participating federal agency (USFWS, USFS, BLM, EPA, Province Teams, etc.)

Non-government Representative Panel
Comprised of monitoring coordinator or other representative from
Participating watershed councils,
Soil and Water Conservation Districts,

OSU Cooperative Extension Service
Landowners
Conservation organizations
Industry representatives

The reports, both from within the OCSRI monitoring program and from other contributing groups, will support the adaptive management effort.

Monitoring Support for Adaptive Management

Development of a coordinated adaptive management approach will be a key task for the participants in the OCSRI monitoring program. The linkage between monitoring and effective adaptive management must be understood and supported at high administrative and policy levels. The National Research Council (NRC) report ("Upstream: Salmon and Society in the Pacific Northwest", 1995) stressed the importance of institutional changes designed to support meaningful adaptive management, particularly the application of a focused, interdisciplinary approach. The report recommends cooperative management organized at the bioregional level that incorporates stakeholder experience and knowledge, provides incentives for learning and change, and balances interests. Monitoring, within this context, becomes the tool for developing and testing hypotheses concerning management alternatives and the mechanism that tests management approaches over both short and long term time periods.

Adaptive management is not simply a passive strategy that relies on the sum of available information to influence management decisions. Instead, under adaptive management, actions are structured to generate needed information. The limited understanding of salmon and the ecosystems they inhabit requires adaptive management applied to conservation and restoration efforts, that in turn are monitored to assess change and contribute to evolving management strategies.

Part of the responsibilities of the monitoring program leadership and OCSRI monitoring participants will be to establish an adaptive management workgroup. This group will have representatives from management and research, scientists and interest groups, federal and non-federal landowners. The Adaptive Management Workgroup will be responsible for framing environmental management questions, identifying practical alternatives for answering these questions, and suggesting the need for appropriate changes in resource management practices. As management options are considered, the workgroup will formulate questions and apply different approaches to test the response of systems. Monitoring of populations and habitats will provide answers to testable hypotheses. The workgroup needs to explicitly state the basis for the hypothesis, explain the rationale behind the management treatment, and maintain a monitoring program that allows feedback for modification of approaches.

Recommendation: Establish Adaptive Management Workgroup

- Include representatives from research and management disciplines
- Include government, non-government, and stakeholder representatives
- Use monitoring information to develop and test management options
- Develop a formal structure to elevate issues identified by monitoring activities to management policy and decision making levels.
- Compile and distribute an annual report on the status of populations and habitats, including progress towards implementation of agency actions and evaluations of effectiveness of actions and policies.
- Incorporate ongoing peer review and the recommendations of the Independent Scientific Review.

Proposed Timeframe:

Start with formal adoption of OCSRI plan by participants.

Develop a Memorandum of Understanding to be signed by affected federal and state agencies. The MOU will indicate a commitment of staff resources to support the Adaptive Management Group as well as describe a process to consider results of the monitoring program and make appropriate changes in management programs.

Conclusions

Whereas significant progress has been made in implementing a coordinated monitoring program, much work is needed to improve the program as it evolves in the future. For example:

- An explicit, written agreement (such as an MOU) would more clearly demonstrate commitment by federal and state agencies to contribute staff resources, standardize sampling protocols, and improve data sharing processes. Cooperation among state and federal agencies has progressed tremendously in the last six months, but much improvement is still needed. Many traditional agency monitoring efforts, sampling protocols, and data processing systems will need to be modified in order to achieve the overall goals of the coordinated monitoring described here.
- An overall program coordinator position is needed to provide leadership to the coordinated monitoring program. This role will require full-time attention; and will require explicit agreement by all the participating agencies to support the direction of the position.
- The inter-agency monitoring group has not been functioning for a sufficient duration to establish a routine working and communication relationship with the various entities that are cooperating within the OCSRI. For example, results of the monitoring program annual report will need to be communicated to the OCSRI Implementation Team, the Salmon Strategy Team, and The Pacific Salmon coordinating Committee, the (proposed) Independent Scientific Review Group, and stakeholders, among others. These relationships are improving over time and may need to be facilitated through explicit processes and time schedules.

The multi-scaled approach outlined in this program is a complicated, ambitious, and necessary effort. The different monitoring intensities and frequencies described are intended to address issues of context and statistically valid interpretations of information balanced against issues of cost and efficiency. No element stands alone. Monitoring of core areas, for example, would be no more than a set of interesting case studies without the broader context of index monitoring, extensive stream habitat studies, indices of stream biologic conditions, and other efforts in adjacent areas. Our ability to develop and test management approaches intended to improve stream habitat, provide functional connection between stream, floodplain, and hillslope processes, and restore salmon populations is dependent on analogous, interconnected, and functional approaches to monitoring.

Operational commitment to adaptive management will be needed to evaluate actions and options across the same spatial, temporal, and biologic scales that define the structure of the monitoring program. A commitment to make policy and management program changes based on adaptive management and monitoring represents the best chance for conservation and restoration of salmon populations and their supporting habitat.

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Table 1. Description of the major tasks comprising the monitoring strategy of the Coastal Salmon Restoration Initiative. Related tasks will share data and may both provide and receive direct support activities specific to the other tasks.

<u>Scale</u>	<u>Task</u>	<u>Activities</u>	<u>Structure</u>	<u>Related Tasks</u>
Coast wide Regional	#1: Stratified Probability Sampling Design	Geographic, biologic, and stream channel stratification Identify locations of sample sites at multiple scales	Inter-agency work group, includes federal and state.	Provides integration and support for all field sampling and monitoring.
Regional	# 2: Stream Biotic Condition and Ambient Water Quality Assessment	Water Chemistry Water temperature Substrate Sampling Invertebrate and vertebrate community analysis Channel geometry	Oregon Department. of Environmental Quality EPA, others. Sites in each of 5 GCG Regions, different sampling levels depending on activity	Juvenile Abundance Spawner Abundance Other measures of water quality.
Regional	#3: Summer Juvenile Abundance	Summer population estimates of coho, steelhead, chinook, and cutthroat.	ODFW, other cooperators Target level: 60 reaches in each of 5 GCG Regions. Some estuary sampling	Spawner Abundance Distribution mapping Seeding estimates Harvest strategies Shared Sampling with Tasks 2, 9, 7 and 10
Regional Basin Watershed	# 4: Stream Channel and Habitat Assessments	Habitat structure and quality Use Aqua. Inv. Proj. Benchmarks and Frequency approach and NMFS Matrix. Identify restoration sites Riparian condition	ODFW, USFS, BLM and others 20-30 streams/year in each GCG Region	Watershed assessments GIS analysis Sampling design Tasks 1, 3, 5, 9,10, and 15

Table 1. (cont.)

<u>Scale</u>	<u>Task</u>	<u>Activities</u>	<u>Structure</u>	<u>Related Tasks</u>
Regional Basin	#5: Spawner Abundance Surveys	Spawning ground surveys and abundance estimates for salmon and steelhead	ODFW currently 200 reaches propose ~430 reaches Northern and Southern ESUs. coho and chinook ODFW, OSU, PNCERS?	Escapement goals Population trends Hatchery/wild interactions Harvest management Tasks 1, 8,9, and 10 Tasks 1, 15
Regional	#6: Genetic and Life History Monitoring	(needs development)		
Regional Basin	# 7: Fish Propagation Monitoring	Adult returns to hatchery Juveniles released Survival estimates	ODFW All coastal, and Columbia River coho hatcheries Ongoing program	Tasks 6, 15.
Regional	#8: Harvest Monitoring	Landing records Encounter rates Estimates of incidental mortality	ODFW Coastal fisheries Ongoing program with expansion	Tasks 5, 15.
Basin Watershed	#9: Salmon Core Area Monitoring and Index Area Monitoring	Smolt trapping Juvenile surveys Adult counts and spawning surveys Habitat and watershed assessment	ODFW OSU, USFS, BLM, DOF, and others Paired core area watersheds in each GCG Five to seven sub-basins distributed in GCG's	Tasks 1,2,3,4,5,6,13,15 Supports new fisheries management strategies, escapement goals Adaptive management
Coast wide	#10: Ocean Conditions	Upwelling, variability in production, temperature, etc.	NOAA, OSU Oceanography, others.	All

Table 1. (cont.)

<u>Scale</u>	<u>Task</u>	<u>Activities</u>	<u>Structure</u>	<u>Related Tasks</u>
Basin	#11: Estuary and Wetland Populations and Habitats	Habitat condition and use Estuary survival	NEP, ODFW, OSU (needs development)	Tasks: 1, 15
Basin	#12: Forest Practices Federal Watershed Assessments	Temperature monitoring Riparian assessment Compliance monitoring Watershed analysis	ODF, USFS, BLM, USFS PNW Research ODFW Research	Tasks: 1,13,14,15
Basin	#13: Cumulative Effects/Watershed Assessment for Mixed Ownerships	Watershed analysis stream channel assessment at basin scale, evaluation of restoration efforts	ODF, ODFW, Federal partners	Tasks: 1, 12, 14, 15
Stream Reaches and Sites	#14: Coordinate and Facilitate Distributed Monitoring - Evaluate Effectiveness of Efforts	Applies to actions conducted by all agencies, landowner groups, watershed associations, and individuals	Governor's Natural Resource Staff, all OCSRI participants	Tasks: 1, 2, 3, 4, 8, 12,15
Regions, Basins, Stream Reaches, Sites	#15: Information Collection and Distribution: Annual Report	Periodic and Annual Reports Database distribution Geographic Analysis	All OCSRI participants	All

Table 2. Organization, status, approximate funding needs, and suggested timeframe for monitoring tasks of Oregon Coastal Salmon Restoration Initiative. Costs are estimates based need on biennium budget and will be modified as proposals are defined. OCSRI and Agency Budget Requests supersede this summary.

<u>Task</u>	<u>Status</u>	<u>Funding</u>	<u>Positions</u>	<u>Timeframe</u>	<u>Approx. Cost</u>
#1: Stratified Probability Sampling Design	New Active	Existing Proposed for some Participants	Existing	Starting with adoption of monitoring plan.	\$70,000.
# 2: Stream Biotic Condition and Ambient Water Quality Assessment	Ongoing Expanding	Stable Proposed	Existing New 2xNRS3	Ongoing Phase in of new sampling, continue at three year intervals	\$150,000 \$900,000
#3: Summer Juvenile Abundance	Ongoing Expanding	Existing Proposed	Existing field supervisors New seasonals	Ongoing New sites starting 1997	\$500,000
# 4: Stream Channel and Habitat Assessments	Ongoing Active	Existing Proposed for field staff	Existing field supervisors New seasonals	Ongoing	\$400,000
#5: Spawner Abundance Surveys	Ongoing Expanding	Existing Proposed for added field personnel and supervision	Existing mgmt. New NRS3, NRS1, and seasonals	Ongoing New Stratified Random Surveys in 1997	\$340,000 (coho) \$520,000 (all species)
#6: Genetic and Life History Monitoring	Expanding	(needs development)	Existing management	(needs development)	?
# 7: Fish Propagation Monitoring	Ongoing	Existing	Lost positions. Upgrade NRS2 to NRS3	Ongoing	\$20,000

Table 2. (continued)

<u>Task</u>	<u>Status</u>	<u>Funding</u>	<u>Positions</u>	<u>Timeframe</u>	<u>Approx. Cost</u>
#8: Harvest Monitoring	Ongoing with Expansion	Existing some new	Existing	Ongoing	No new state funding
#9: Salmon Core Area and Index Monitoring	New program Building on active programs.	Proposed	Change in duties 2x NRS3, 2x NRS2, 3-5 seasonal EBA's Existing	Begin in 1997 Full program by 1998 then sustained	\$750,000 (startup) \$500,000(ongoing)
#10: Ocean Conditions Monitoring	Coordinate with existing programs		Existing		
#11: Estuary and Wetland Populations and Habitats	New programs	Proposed	(needs development)	(needs development)	No new state funding, coordinate with research proposals
#12: Forest Practices/ Federal Watershed Assessments	Ongoing Some expansion	Existing	Additional staff - support in ODF	Ongoing	\$270,000 -ODF GIS development
#13: Cumulative Effects/Watershed Assessment for Mixed Ownerships	New program in monitoring group, coordinate with existing.	Proposed	NRS3 - monitoring	Began with release of Aug. 1996 draft. Ongoing and active.	\$160,000
#14: Coordinate and Facilitate Distributed Monitoring	New program	Proposed	Monitoring Program leader NRS5, staff	Begin with adoption of plan	\$180,000
#15: Info. Collection and Distribution: Produce Annual Report	Expanded, changes in structure	Proposed	Monitoring Scientific Leader NRS4, staff	Begin with adoption of plan	\$160,000 or more