ODFW PREDATION REPORT

Introduction

The co-occurrence of abundant pinnipeds (seals and sea lions) and certain seabird species has been identified as a potentially significant problem in the recovery of some salmonid populations. The purpose of this summary is to present current state of knowledge and understanding of how the population status and feeding behaviors of these predators may affect the recovery of depressed salmonid stocks. This report also describes regulatory programs related to these decline factors and provides an overview of research efforts that have been made to evaluate the affects of predation in a number of areas.

Description of Regulatory and Volunteer Measures

The role of the State of Oregon is primarily to monitor predator populations and to conduct research on interactions of predators with salmonids and other fish and wildlife resources. The ability of the State to carry out this work is determined by funding levels and by staff expertise in specific areas of concern. In the case of pinnipeds and seabirds as predators of salmonids, the federal government has primary jurisdiction and management authority is vested in the National Marine Fisheries Service (pinnipeds) and the U. S. Fish and Wildlife Service (seabirds).

Applicable Federal Legislation

- Marine Mammal Protection Act (pinnipeds and other marine mammals)
- Migratory Bird Treaty Act (seabirds and other migratory bird species)

Options available to state and local government agencies, private individuals or volunteer groups to manage resource conflict issues involving pinnipeds, seabirds, and fishery resources are extremely limited. Under the Marine Mammal Protection Act pinnipeds are protected from disturbance, harassment, hunting or killing. An individual, agency or institution may apply for a federal permit to conduct various research activities, but direct management of resource conflicts such as acting to reduce pinniped predation on state- or federally-listed salmonids would not be permitted under the law. Sound biological data in support of direct management of pinniped populations in an effort to benefit salmonids (or any other fish species) is limited and currently does not exist for these predators and prey in this geographic area.

Seabirds are protected under the federal Migratory Bird Treaty Act. While killing seabirds for research or management purposes may be permitted in some cases, such authority is not easily obtained. As is the case with pinnipeds, sound biological data supporting the management of seabird populations to benefit salmonid stocks is limited. Public opposition to harassing or killing seabirds (or seals and sea lions), even to limit loses to other valued resources, is often quite strong.

Scope of Decline Factors Assessment

Pinnipeds and seabirds occur throughout the coastal coho ESU, the Monitoring Areas, and Population Units at varying local and seasonal abundance levels. Some or all of these predators can be found along the entire Oregon coast, and in most coastal bays, estuaries and lower river systems at many times of the year. However, we can make only general judgments regarding the significance of predation as an effect on the decline or recovery of salmonid populations, and only at the ESU scale. The reasons for this include: 1) the inadequacy or total lack of abundance and food habits data for many of the predator species at any geographic and/or seasonal scale; and 2) the fact that these predators are highly mobile and are able to take advantage of shifts in seasonal and local prey availability over areas greater than the Monitoring Area and Population Unit scales. As a direct result of the general lack of abundance and foraging data, we are unable to assess the significance of the affects of most of these predator species on the decline or recovery of salmonids.

Data Sources

For the past 25 years, the Oregon Department of Fish and Wildlife (ODFW), with funding from the National Marine Fisheries Service (NMFS) has monitored the abundance and distribution of pinnipeds in Oregon on a regular basis (at least annually). The National Marine Mammal Laboratory and Southwest Fisheries Science Center (NMFS) monitor the population status of California sea lions on the breeding grounds in California. ODFW has conducted a small number of studies in recent years to estimate and evaluate the affect of pinniped predation on Oregon salmonids at selected locations (including the Alsea River). This work has been conducted in cooperation with a West Coast Working Group, coordinated by NMFS (Northwest Region), which includes the Washington Department of Fish and Wildlife, the California Department of Fish and Game, and academic researchers from universities in the three West Coast states.

The Oregon Coastal Refuges Office of the U.S. Fish and Wildlife Service (Newport) has surveyed some seabird populations in selected areas over the past 25 years, however summary data for individual species population status or seasonal abundance at the ESU, Monitoring Area or is limited or non-existent. There have been few studies conducted in Oregon to estimate and evaluate the possible affects of seabird predation on salmonid stocks. The largest effort, one that does not directly apply to the coastal coho ESU issue, has been carried out in the lower Columbia River by researchers at the Cooperative Fish and Wildlife Research Unit at Oregon State University (Roby et al. 2003a, 2003b). The Cooperative Fish and Wildlife Research Unit has also conducted limited studies of double-crested cormorant foraging behaviors on smolts in several coastal river systems from Alsea Bay to the Nehalem River (Stahl et al. 2000, Schreck et al. 2002, Clements et al. 2003). From 1994 to 2001 an effort to use non-lethal hazing techniques to reduce seabird (primarily double-crested cormorants) foraging on salmonid smolts took place on the lower Nestucca, Tillamook, Nehalem rivers and estuaries. The Oregon Legislature directed ODFW to provide funds to local citizens to carry out this “smolt protection program”.

Unfortunately due to inadequate or non-existent study design, and non-experimental application of hazing techniques, the data collected by the participants could not be used to evaluate the affect of the hazing efforts on smolt survival.

Analytical Methods

The long-term count database for the Pacific harbor seal population in Oregon is the only pertinent information available for status and trend analysis that ODFW has at this time. These data (by specific location, Population Unit, Monitoring Area, and ESU) are presented in an appendix to this report. A manuscript on harbor seal population trends and status in Oregon, presenting an analysis of these data using exponential and generalized logistic growth models, has been submitted for publication (Brown et al. In press, Marine Mammal Science). A contract report to NMFS on research conducted by ODFW in the Alsea River (Wright et al. 2003) details the sampling design, field data collection procedures, and analytical methods used to estimate and evaluate harbor seal predation on salmonids, with a focus on coho.

The reader is referred to the reports produced by the Cooperative Fish and Wildlife Research Unit for details on analytical methods used to estimate and evaluate predation on salmonid smolts by seabirds (Stahl et al. 2000, Schreck et al. 2002, Clements et al. 2003, Roby et al. 2003a, 2003b).

Results

PINNIPEDS

Counts of pinnipeds in Oregon are conducted at all locations where these animals are known to haul out of the water statewide. Aerial photographic surveys are centered on reproductive periods or at other times when a predictably large portion of the population may be present and available for counting. Pinniped populations have increased in the coastal coho ESU, the Monitoring Areas, and probably most Population Units from the mid-1970s to the present. California sea lions occur in Oregon from late summer through late spring. Their true abundance is not well documented due to their unpredictable behaviors, but approximately 10,000 California sea lions may move through Oregon coastal waters each year. Their numbers here have been increasing as the total breeding population in California has increased at roughly 5% per year since the early 1980s (Forney et al. 2000). Pacific harbor seals occur in Oregon all year and their numbers have also increased at about 5% per year from the mid-1970s to the early 1990s (ODFW data, Brown et al., In press). However, Oregon harbor seal abundance has remained relatively stable since that time, numbering about 10,000 animals statewide.

As part of the NMFS-sponsored West Coast Working Group effort, ODFW conducted studies of harbor seal predation on adult salmonids returning to the Alsea River during the fall of 2000 and 2002. The results from these studies are limited, but they provide some of the first new information on the question of how pinniped predation may affect individual salmonid stocks. For example, in the fall of 2002 it was estimated that harbor seals might have consumed approximately

17% of the adult coho returning to spawn in the Alsea River basin. Simultaneous tagging studies suggested that a relatively small number of seals (<10% of the local population) may have been foraging specifically for salmonids. Predation on salmonids was observed to occur primarily in the lower river (above the estuary to tidewater). The greater proportion of the seals appeared to remain in the estuary and nearshore waters, where little evidence of salmonid predation was documented. While taking some action to deal with the relatively small number of seals focusing on salmon predation would seem to be an obvious approach, under current federal law ODFW has no authority to act in this manner. It is also important to note that while the ODFW pinniped-salmonid predation studies have been underway from the late 1990s to the present, salmonid populations in general and Alsea coho abundance in particular have continued to increase at a healthy pace in spite of the observed predation rates, probably in response to improved ocean productivity conditions and increased ocean survival for salmonids.

SEABIRDS

In general, the populations of some seabird species that are known to prey on juvenile salmonids (e.g. double-crested cormorants) have increased in Oregon following protection provided by federal law and more recent improvements in ocean productivity. However, specific information on predator population trends and foraging behaviors in Oregon at the coho ESU, Monitoring Area, or Population Unit levels are not available. The U. S. Fish and Wildlife Service (Oregon Coastal Refuges) has monitored the abundance of certain seabirds at selected areas along the coast, but these data are probably not useful for analysis at these levels.

Recently a great deal of information on Columbia River smolt consumption by Caspian terns and other seabird species has been obtained (Roby et al. 2003a). Abundance of terns was documented and methods to relocate breeding colonies and reduce predation on salmonid smolts as a result were developed and tested. However, this information does not apply directly to the coastal coho ESU and similar situations do not occur there. The research done on the Nestucca, Tillamook and Nehalem rivers and estuaries (Stahl et al. 2000; Schreck et al. 2002; Clements and Schreck 2003) indicated that cormorants may consume large numbers of salmonid smolts, but the impact appeared to be greatest on fish from hatchery releases. Most of these studies represent one or two point estimates of consumption and so it is not possible to make generalizations across broad areas or to assess trends in predation in any area.

Discussion

In general, natural predation, including that by pinnipeds and seabirds, is not believed to be or to have been a significant factor in the decline of salmonid populations in any area. NMFS determined that “relative to effects of fishing, habitat degradation, and hatchery practices, (disease and) predation are not believed to be major factors contributing to the overall decline of coho salmon in California and Oregon” (Federal Register, 1997). NMFS further stated “It is

unlikely that pinniped predation was significant factor in the decline of coho salmon populations on the west coast".

In a review of seabird and pinniped predation on salmonids, the Independent Multidisciplinary Science Team (established under the Oregon Plan for Salmon and Watersheds) concluded that, "California sea lion, Pacific harbor seal, Caspian tern and cormorant populations along the Oregon coast have all increased in recent years, coinciding with historic lows in salmon abundance". Further they stated that, "Predation by these species may be a factor in the lack of recoveries of some depressed salmonid stocks but there is no compelling scientific evidence that predation has been a primary cause for recent decline of salmonids". Likewise NMFS (1997) concluded, "with reduced salmonid populations and increased pinniped populations, pinniped predation (especially at areas of restricted fish passage) can be a factor affecting the recovery of some salmonid populations".

There is little new evidence available to go beyond the above summary statements made by NMFS and the IMST. As new work (particularly on pinniped predation on salmonids by the NMFS-sponsored West Coast Working Group) is reported and published, more specific conclusions about the affects of predation may be possible in certain areas. However, the results of this work is not likely to change the general conclusion that, while negative affects can occur in specific situations were prey is in unusually low abundance, local predator numbers are high, and restrictions in passage or reduction in habitat quality have all increased predation success, natural predation by pinnipeds or seabirds has not been a significant causal factor in the decline of salmonid stocks at the ESU scale.

References

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Policy for Evaluation of Conservation Efforts (PECE)

Predation by Pinnipeds and Seabirds

Oregon populations of pinnipeds and some seabird species occurring in the coastal coho ESU have increased in recent years. Some of this increase co-occurred with earlier declines in salmonid populations, but more recently many salmonid stocks (including coho) have increased while predator populations have continued to grow or have stabilized. Information that may be used to evaluate the significance of pinniped or seabird predation on the recent decline and current recovery of coho is very limited. However, studies of pinniped predation suggest that, while in certain cases local foraging of abundant pinnipeds may delay the recovery of severely depressed salmonid stocks, in most cases natural predation was not a significant contributing factor to the decline or recovery of coho at the ESU scale. Oregon's role in the management of pinnipeds and seabirds has been to conduct population monitoring programs and research on predator food habits and interactions with salmonids and other important fishery resources. This work has been conducted in direct cooperation and with the support of our federal partners that have primary management authority and responsibility for these species (NMFS and USFWS). From the work we have conducted, and in review of similar research conducted by others (e.g. NMFS-sponsored West Coast Working Group on Pinniped Predation), we believe that natural predation by pinnipeds and seabirds has not been a significant factor in the decline, nor will be a significant factor affecting the recovery of the Coastal Coho ESU.

ODFW plans to continue our pinniped population monitoring and food habits research efforts. For the past 5 years, we have been receiving $150-200K per year in NMFS funds through Pacific States Marine Fisheries Commission (PSMFC) to conduct this work. We are currently funded through FY-05 and hope to be able to maintain the NMFS support for years to come. ODFW contributes in the neighborhood of $100K per year in staff support (1 Program Leader, 1 Biometrician) to this effort, but we would not be able to conduct the necessary field research effort without the NMFS funds. With funding we will continue to address the questions of pinniped predation on salmonids and refine our evaluation of its potential affects on the recovery of individual stocks where possible. As we have in the past, we will continue to work with NMFS, PSMFC, the other West Coast states, our state and federal legislators, constituent groups, and the general public to address the needs for increased and improved management authorities provided to state and federal managers under the Marine Mammal Protection Act. This would be particularly important should our future research suggest that predation by locally abundant pinnipeds might have a negative affect on the recovery of individual coho stocks. We will continue to coordinate with the USFWS Oregon Coastal Refuges Office on seabird issues, however limits in ODFW staff number and expertise will result in minimal efforts in this area.

The principal "conservation effort" that is currently in place to address the questions of predation impacts on salmonid recovery are the actions taken by ODFW to monitor predator population status and, where possible, to measure predation affects on salmonid

stocks. This effort is one that is highly dependent upon the size and capabilities of ODFW program and staff, and on the availability of state and federal funds to support research efforts to evaluate the possible impacts of predation on salmonid stocks. Currently no direct management actions are being undertaken (few are permitted by federal law) to reduce predation levels or to mitigate for any predation losses of coastal ESU coho to naturally occurring predators.

A. The certainty that the conservation effort will be implemented.

1. The conservation effort, the party(ies) to the agreement or plan that will implement the effort, and the staffing, funding level, funding source, and other resources necessary to implement the effort are identified:

ODFW has received direction from the Oregon Plan for Salmon and Watersheds to address the questions of predation impacts on salmon recovery. As part of the NMFS-sponsored West Coast Working Group, ODFW is pursuing this effort (with respect to pinniped predation) at current staffing levels. Funds for this work has been provided by ODFW (staff support, supplies and services funds) and via federal contracts from NMFS (funding for specific research projects to estimate and evaluate predation impacts).

2. The legal authority of the party(ies) to the agreement or plan to implement the formalized conservation effort, and the commitment to proceed with the conservation effort are described:

As the fish and wildlife management agency for the State of Oregon, ODFW has the authority and mandate to carry out the assessment of predation impacts on salmon recovery.

3. The legal procedural requirements (e.g. environmental review) necessary to implement the effort are described, and information is provided indicating that fulfillment of these requirements does not preclude commitment to the effort:

None are required.

4. Authorizations (e.g. permits, landowner permission) necessary to implement the conservation effort are identified, and a high level of certainty is provided that the party(ies) to the agreement or plan that will implement the effort will obtain these authorizations:

ODFW currently holds the necessary federal (NMFS) research permits required to conduct studies of pinnipeds as predators of salmonids. No other procedural requirements are needed during this stage of the conservation effort.

5. The type and level of voluntary participation necessary to implement the conservation effort is identified, and a high level of certainty is provided that the party(ies) that will implement the conservation effort will obtain that level of voluntary participation.

Not applicable to this conservation effort.

6. Regulatory mechanisms (e.g. laws, regulations, ordinances) necessary to implement the conservation effort are in place:

No new or additional regulatory mechanisms are needed to carry out this conservation effort.

7. A high level of certainty is provided that the party(ies) to the agreement or plan that will implement the conservation effort will obtain the necessary funding:

ODFW has committed existing staff and funding levels of the Marine Mammal Research Program to this conservation effort. Federal (NMFS) contract funding has been sought and received annually to date. Continuation of this funding is dependent upon state (biennial) and federal (annual) legislative action, and on ODFW budget decisions.

8. An implementation schedule (including incremental completion dates) for the conservation effort is provided:

Assessment of predator populations and predation impacts is an ongoing process. Population status assessments occur annually and have no completion dates. The scheduling of specific studies aimed at evaluating predation impacts is done annually based on project funding levels for each year. Multiple years of such studies will be needed to incorporate inter-annual variation of numerous factors. Assessments at a variety of locations will be needed in order to accurately describe and evaluate the range of possible predation impacts by species of predator, prey and location.

9. The conservation agreement or plan is approved by all parties to the agreement or plan:

ODFW is the sole Oregon party to this conservation effort. However, the work is conducted cooperatively and in coordination with NMFS and other members of the West Coast Working Group on pinniped predation studies.

B. The certainty that the conservation effort will be effective.

1. The nature and extent of threats being addressed by the conservation effort are described, and how the conservation effort reduces the threats is described:

The threat being addressed here is the question of how currently existing levels of natural predation (particularly by pinnipeds) may affect the recovery of specific salmonid stocks. The principal conservation effort is not aimed at reducing that threat, but at estimating and evaluating the impact of such predation on salmonid recovery. Currently federal law does not permit management activities specifically directed at reducing natural predation by pinnipeds in the coastal coho ESU.

2. Explicit incremental objectives for the conservation effort and dates for achieving them are stated:

ODFW's Marine Mammal Research Program has annual work plans that include ongoing pinniped population status assessments statewide. This effort has no end date. Objectives and products of research projects addressing the question of predation impacts at specific study locations are developed and outlined in contract proposals prepared and submitted to funding agencies on an annual basis. These may change each year depending upon study results, consultations with members of the West Coast Working Group on pinniped predation, and upon annual funding levels.

3. The steps necessary to implement the conservation effort are identified in detail:

ODFW has received specific direction from the Oregon Plan for Salmon and Watersheds to address the questions of predation impacts on salmon recovery. Work plans for individual research projects are developed and submitted to outside funding agencies annually (e.g. NMFS). These work plans identify objectives, tasks, timelines and products for each project. Results are presented in annual contract reports to funding agencies.

4. Quantifiable, scientifically valid parameters that will demonstrate achievement of objectives, and standards for these parameters by which progress will be measured, are identified:

Study approaches, methodologies and analytical procedures for projects aimed at estimating and evaluating pinniped predation impacts on selected salmonid stocks are developed jointly with the NMFS- sponsored West Coast Working Group on pinniped predation. Efforts are made to conduct comparable studies whenever possible. Working Group members critique and contribute to the works of others during planning, implementation and analytical stages of each project in order to insure quality work and meaningful results.

5. Provisions for monitoring and reporting progress on implementation (based on compliance with the implementation schedule) and effectiveness (based on evaluation of quantifiable parameters) of the conservation effort are provided:

Contract funding for studies evaluating pinniped predation impacts requires submission of progress reports and final project reports to funding agencies. NMFS intends to prepare and release a compilation of reports on predation studies conducted by members of the West Coast Working Group. Individual group members have and will continue to prepare study results for publication in peer-reviewed scientific journals.

6. Principles of adaptive management are incorporated:

Although adaptive management is not directly applicable to this conservation effort, one function of the West Coast Working Group is to evaluate and critique the

work of other members and to suggest ways to improve the quality of the research being conducted. Numerous changes in methodologies, data collection, and analytical procedures have been incorporated in many of the Working Group's projects by way of this review process.