2005 Oregon Native Fish Status Report

Volume I
Species Management Unit Summaries

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Executive Summary

Native Fish Conservation Policy Goals [OAR 635-007-0507]

- **Prevent the serious depletion of any native fish species by protecting natural ecological communities, conserving genetic resources, managing consumptive and nonconsumptive fisheries, and using hatcheries responsibly so that naturally produced native fish are sustainable.**
- **Maintain and restore naturally produced native fish species, taking full advantage of the productive capacity of natural habitats, in order to provide substantial ecological, economic, and cultural benefits to the citizens of Oregon.**
- **Foster and sustain opportunities for sport, commercial, and tribal fishers consistent with the conservation of naturally produced native fish and responsible use of hatcheries.**

This report describes the current conservation status of native fishes in Oregon based on criteria defined in Oregon's Native Fish Conservation Policy. The Native Fish Conservation Policy (NFCP) provides a basis for managing hatcheries, fisheries, habitat, predators, competitors, and pathogens in balance with sustainable natural fish production. NFCP implementation priorities and actions will, in part, be based on assessments of current conservation risks. This report summarizes risk assessments completed for native salmon and steelhead, most native trout, and other selected native fish species using the NFCP interim criteria. Available data through 2004 were compiled for these assessments. Risk, as used in this report, refers to the threat to the conservation of a unique group of populations in the near-term (5-10 years). Conservation is defined as maintaining the sustainability of native fish at levels that provide ecological, economic, recreational and aesthetic benefits to present and future generations.

The NFCP interim criteria provide temporary guidance to ensure the conservation of native fish prior to completion of more detailed conservation plans for each species or group of populations. Risks evaluated based on interim criteria refer to the immediate possibility that a unique group of populations may not be able to provide all societal benefits in the interim until an effective conservation plan can be developed and implemented. The interim criteria do not describe long-term, extinction risks such as continuing downward trends, increasing threats, or extended intervals of unfavorable environmental conditions. Such long-term risks are better assessed with more in-depth analyses than was conducted for this report and will be considered in conservation plans. The interim risk assessment provided in this report will help guide priorities for conservation planning.

This assessment focuses on groups of populations from a common geographic area with similar genetic and life history characteristics called *Species Management Units (SMUs)*. SMUs are the level at which native fish will be managed in Oregon, as directed in the NFCP. The Oregon Department of Fish and Wildlife (ODFW) identified 33 SMUs and 216 populations of salmon and steelhead in Oregon (Table 1). Of these SMUs, 8 (24%) are extinct, 11 (33%) are at risk, 7 (21%) are potentially at risk, and 7 (21%) are not at risk of not providing societal benefits before conservation plans can be developed to address threats. Extinct salmon and steelhead SMUs are concentrated in the upper Snake and Klamath basins where dams have eliminated access. At-risk and potentially-at-risk SMUs occur throughout Oregon coastal and interior Columbia regions. The few SMUs that are not at risk occur mainly on the coast. Salmon and steelhead numbers have increased in many areas during 2000-2004 in response to favorable ocean survival conditions

following an unprecedented series of El Niños in the 1980s and 1990s widely associated with poor ocean survival of salmon. These improvements have somewhat lessened immediate risks to some salmon and steelhead populations suffering from declining long-term trends.

Oregon's native trout species include Oregon Basin redband trout, cutthroat trout, and bull trout. ODFW delineated 27 trout SMUs containing 219 populations (Table 1). The Alvord cutthroat trout is the only trout SMU considered extinct. Of the remaining SMUs assessed, 18 (69%) are at risk, 4 (15%) are potentially at risk, and 4 (15%) are not at risk of not providing societal benefits in the near future. A majority of the SMUs are classified as at risk due to highly fragmented habitats and discontinuous distributions related to both natural and human-related causes. Bull trout and westslope cutthroat trout, in particular, reside in cold headwater streams where access to migratory corridors and rearing habitat exists only seasonally. Oregon Basin redband trout populations fluctuate annually with drought cycles and instream flow. Recent high water years have provided an environment for depressed populations to potentially rebound.

Other native fish populations of concern or interest addressed by this assessment include several minnow, lamprey and sturgeon species. Among these 9 SMUs there are 33 populations. Six of the SMUs are at risk of not providing societal benefits in the near future and three SMU's were not assessed.

This assessment highlights widespread risks to the existence of native Oregon fishes in the face of extensive and continuing habitat changes and other threats. Natural production is the foundation for long-term sustainability of native species, hatchery programs, and fish resource-based economies. Effective management through conservation plans will be critical to ensuring conservation and recovery of Oregon's native fish species.

Not all native fish SMUs were assessed in this report due to constraints of staff and time. ODFW's 1995 Biennial Report on the Status of Wild Fish in Oregon (Kostow 1995) provides the most recent assessment for many of those fish species and SMUs not covered here. A complete list of Oregon native freshwater fish species can be found in Appendix A of Volume II of this report.

Table 1. Species management units for Oregon native fish species.

Species	Number Of Populations	Species Management Units	Status (number of SMUs)				
			Not at risk	Potentially at risk	At risk	Extinct	Not Assessed
Salmon							
Coho	33	5	2	0	1	2	0
Fall Chinook	41	5	2	2	1	0	0
Spring Chinook	42	8	0	2	4	2	0
Chum	20	2	0	0	1	1	0
Sockeye	2	2	0	0	0	2	0
Steelhead							
Winter Steelhead	49	4	1	2	1	0	0
Summer Steelhead	29	7	2	1	3	1	0
Trout							
Redband	49	7	0	2	5	0	0
Cutthroat	85	8	3	1	3	1	0
Bull	85	12	1	1	10	0	0
Other Species of Interests							
Borax Lake Chub	1	1	0	0	1	0	0
Hutton Springs Tui Chub	1	1	0	0	1	0	0
Oregon Chub	15	1	0	0	1	0	0
Foskett Springs Speckled Dace	1	1	0	0	1	0	0
Pacific Lamprey	3	1	0	0	1	0	0
Western Brook Lamprey	3	1	0	0	1	0	0
Green Strugeon	2	2	0	0	0	0	2
Oregon White Sturgeon	7	1	0	0	0	0	1
TOTALS	468	69	11	11	35	9	3

Contents

Introduction

This report describes the current conservation status of many of the native fishes in Oregon based on interim criteria defined in Oregon's Native Fish Conservation Policy [OAR 635-007-0507]. The purpose of the Native Fish Conservation Policy (NFCP) is to ensure conservation and recovery of native fish in Oregon. The policy focuses on naturally-produced fish. Natural production is the foundation for long-term sustainability of native species, hatchery programs, and fish resource-based economies. Naturally-produced native fish are also the primary basis for Federal Endangered Species Act listing and delisting decisions that can have significant impacts on the citizens of Oregon.

The Native Fish Conservation Policy provides a foundation for managing hatcheries, fisheries, habitat, predators, competitors, and pathogens in balance with sustainable natural fish production. Goals of the NFCP are: 1) prevent the serious depletion of native fish species, 2) maintain and restore native fish at levels providing ecological and societal benefits, and 3) ease constraints on fisheries and other resource uses. Implementation of the policy occurs through conservation plans tailored to the needs, opportunities, and constraints of each group of fish populations. Implementation priorities and actions will, in part, be based on assessments of current conservation risks.

Preliminary risk assessments were completed for native salmon and steelhead, most native trout, and other selected native species using interim criteria that are based on biological attributes related to species performance. The interim criteria provide temporary guidance to ensure the sustainability of native fish prior to completion of conservation plans. Once a conservation plan is approved, the interim criteria are superseded by a broader set of measurable primary and secondary criteria (OAR 635-007-0505 (6) & (7)) identified in the plan. Unique groups of populations, or Species Management Units (SMUs), of each species are classified as "not at risk", "potentially at risk", or "at risk" (denoted by green, yellow, and red shading throughout this report). Risk, as used in this report, refers to the threat to the conservation of a unique group of populations (e.g. SMU) in the near-term (5-10 years). Interim criteria help identify priorities for fish management actions and conservation plan completion by flagging cases where conservation risks are acute. Conservation plans will include a more comprehensive assessment of long-term extinction risks and may include additional evaluation criteria.

This report is comprised of two volumes, an SMU summary, and a Methods and Data report. The SMU summary briefly describes the results of the assessment for each species management unit. The second volume documents data and methods used to evaluate individual populations and includes detailed explanations of how each salmon and steelhead population fared in the assessment.

Assessment Methods

Species Management Units

Oregon's Native Fish Conservation Policy calls for fish to be managed at the *Species Management Unit*, or SMU, level. SMUs are groups of populations from a common geographic area that share similar life history, genetic, and ecological characteristics. Populations within an SMU are locally adapted to the specific conditions encountered in their native streams. Because of their shared characteristics, fish from one population within an SMU may be generally representative of other populations in that SMU and respond in a similar manner to conditions encountered throughout the life cycle. Fish trying to inhabit areas outside their own SMU do not typically fare as well as the native inhabitants in any given area. The greater the difference in characteristics between fish from different geographic areas, the greater the average disparity in survival, growth, and productivity. Thus, long-term sustainability depends on preservation of the native characteristics and diversity of each unique group of populations.

Species Management Units are similar in concept to Evolutionarily Significant Units (ESUs) or Distinct Population Segments (DPSs) upon which Endangered Species Act listing decisions by NOAA Fisheries or the U.S. Fish and Wildlife Service are based. ESUs and DPSs include Oregon and non-Oregon stocks, whereas, SMUs are limited to Oregon stocks. Oregon's SMUs generally reflect finer breakdowns of ESU's where ESU's include multiple stocks (e.g. lower Columbia River spring and fall Chinook) or broad geographical regions (e.g. bull trout). Salmon, steelhead and trout populations identified by ODFW within this report are consistent with Biological Reviews prepared by NOAA Fisheries Technical Recovery Teams and the U.S. Fish and Wildlife Service in their listing decisions and recovery planning processes. It is ODFW's intention to re-evaluate the SMU boundaries and population structure used in this report when conservation plans are developed for each SMU.

Risk Classification

This is an interim assessment intended to flag acute problems and help identify priorities for more detailed conservation planning evaluations. Risk, as used in this report, refers to the risk to the conservation of a unique group of populations (e.g. SMU), not the risk of extinction. A conservation risk relates to the ability of the SMU to provide economic, cultural and ecological benefits to the citizens of Oregon. The interim assessment is based only on immediate status and is only intended to ensure that SMUs will be conserved until a conservation plan can be developed. It does not consider long-term risks. For instance, better-than-average ocean conditions might temporarily increase numbers of salmon, but have little effect on long-term risks where other threats remain significant and a species has exhibited a long-term declining trend. Nor does the interim assessment weigh the projected future benefits of recent conservation actions that are not yet fully reflected in recent fish numbers.

Interim criteria were based on six biological characteristics related to species performance (Figure 1). These include existing populations, habitat use distribution, abundance, productivity, reproductive independence, and hybridization. The six criteria are described in more detail below. Each of these attributes was evaluated for every population based on benchmark values related to species viability, persistence probability, and conservation risks. Criteria for individual SMUs were met when at least 80% of existing constituent populations met the standard. In some instances, data were not available to evaluate against a numerical benchmark and inferences from other information were used to determine whether or not the criteria were met. Risk categories were assigned based on the number of interim criteria met by each SMU.

SMUs that met six of the six criteria were classified as “not at risk”. SMUs that met only four or five criteria were “potentially at risk”. SMUs that met three or fewer criteria were classified as “at risk”.

Assessments for each population were based on the best available scientific data which included direct empirical estimates and inferences from other evidence. In most cases where specific point estimates were not available for all criteria, population values could be determined based on inferences from other evidence or values in other representative populations. For instance, habitat use distribution could be inferred from stream accessibility where annual habitat use information was unavailable. Similarly, reproductive independence could be inferred from the size and location of hatchery releases where hatchery spawner data were incomplete. In some cases, those populations that had data available were assumed to be representative of the SMU. In a few populations, information was not adequate to assess a criterion. Treating these missing values the same as criteria failures provided a conservative assessment of risk consistent with the precautionary principles of the Native Fish Conservation Policy. At least some information was available for most populations and so missing values were rare and ultimately did not affect the risk category assigned to an SMU.

The risk assessment for each SMU includes a qualitative evaluation of the uncertainty in the data used to infer risk based on interim criteria. A high level of confidence was identified where extensive and detailed data was available for populations throughout the SMU. A moderate level of confidence was identified where data and other information were generally suitable for assessments of interim criteria for many or most representative populations throughout the SMU. A qualified level of confidence was identified where the assessment was based on limited data sets and inferences from other information for significant populations within an SMU. Qualitative descriptions of uncertainty and detailed descriptions in Volume II of the methodology, inferences, and assumptions for each SMU and population provide the basis for independent evaluation of the accuracy of each risk assessment by the reader.

Interim Criteria are designed to flag near term conservation risks. Indicators are highly interrelated and provide for redundant detection of problems. For instance, declining abundance occurs coincident with reduced productivity and distribution. Significant conservation problems invariably trigger multiple indicators. Thus, while each indicator might suffer from specific limitations of information or interpretation, the suite of indicators provides a robust basis for identifying relative priorities for detailed conservation plans.

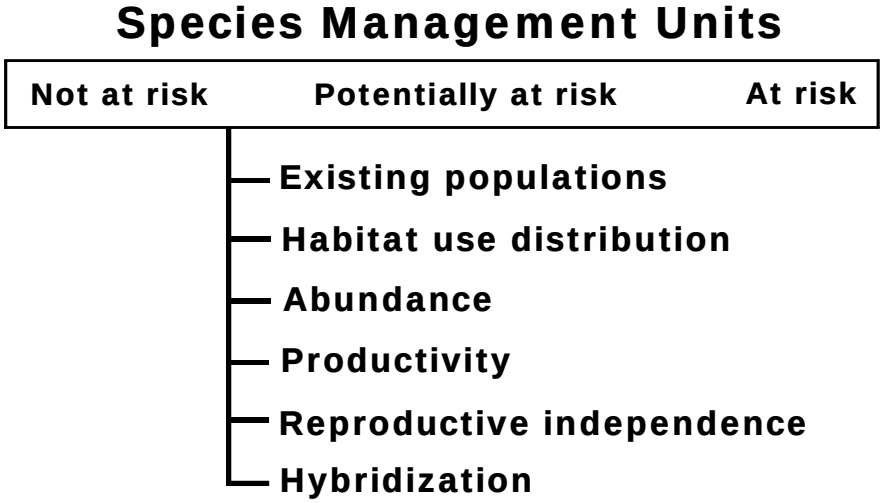

Figure 1. Criteria for assessing conservation risks based on Oregon’s Native Fish Conservation Policy.

Existing Populations

Criteria:	**At least 80% of historical populations are still in existence (i.e. not extinct) *and* not at risk of extinction in the near future.**

The Species Management Unit identifies groups of similar populations that are uniquely adapted to local conditions. A group of diverse populations within a geographic area provides a strong "safety net" for species persistence. The loss of a significant portion of an SMUs' populations inhibits the ability of the SMU to persist over time. Continued persistence is a direct demonstration of a species' performance in the face of historical risks. Conversely, extinction of closely related populations in an SMU is an indicator of problems that may threaten all populations within a region. Many extinct populations occurred in areas that are no longer accessible to anadromous fish (fish that rear in the ocean and return to streams and rivers to spawn), for instance where dams block passage. Other extinct populations were eliminated by a combination of detrimental impacts of land and water use, barriers, fishing, and variable ocean conditions. Extinction occurs when numbers and productivity are no longer sufficient to maintain an independent, self-supporting population. Functional extinction may occur before the last few fish disappear. Small numbers of fish may continue to return in some areas due to sporadic straying from other hatchery or naturally produced populations.

Habitat Use Distribution

Criteria:	**Naturally produced members of a population occupy at least 50% of the historically-used (pre-development) habitat in at least three of the last five years for at least 80% of existing populations.**

Healthy fish populations benefit from access to diverse and abundant habitat. Diverse habitats can sustain a diversity of life-history types within a population. This life-history diversity allows a population to be more resilient to risks. A lack of habitat quantity or diversity makes a population more vulnerable to natural and human-caused disturbances. Fish distribution depends on the amount of habitat that remains accessible and the portion of the accessible habitat that is used in any given year. Passage may be blocked by dams, culverts, or other barriers. Habitat degradation may render some accessible habitats unsuitable for migration, spawning, or rearing. Declining populations may no longer be able to fully seed all suitable remaining areas. Seeding levels may vary considerably from year to year depending on escapement levels. The most robust fish populations are typically those that access all historical areas and use all available areas in most years. This criterion was evaluated using annual distribution data where available and current versus historically-accessible habitat where annual distribution data were lacking.

Abundance

Criteria:	**Number of naturally-produced fish is greater than 25% of average levels in at least three of the last five years for at least 80% of existing populations.**

Fish numbers fluctuate from year to year in response to normal variation in environmental conditions. Extinction typically occurs when weak populations placed at risk by one or more factors "bottom out" during normal periods of low productivity. The interim abundance criterion is based on critical low fish numbers below which normal population dynamics might falter, key population elements begin to be lost, safety factors for chance events or catastrophes are marginal, and recovery cannot be assured. This criterion flags groups of populations where recent numbers have fallen to low levels relative to normal ranges observed for each population

or the existing habitat capacity. Normal ranges were based on long-term average spawner numbers and/or estimates of basin capacity to produce fish.

Productivity

Criteria	**Population replacement rate for at least 80% of existing populations is at least 1.2 naturally-produced adult offspring per parent in three of the last five years when total abundance was less than average returns of naturally-produced fish.**

Productivity refers to a population's ability to replace itself with significant numbers of juveniles and adults in the next generation. Higher productivity generally corresponds to lower extinction risk. Productive populations are better able to withstand years of poor ocean survival and rebound more quickly from low numbers. Productivity is generally related to high habitat quality and high life-history and genetic diversity that allow a population to take maximum advantage of a variety of habitat and environmental conditions. Productivity is best measured at low to moderate population sizes where density-dependent effects are not likely to be strong. As densities increase, competition for habitat begins to reduce the number of offspring per spawner. Replacement rates averaging less than 1.0 indicate a declining population. Replacement rates averaging greater than 1.0 indicate an increasing population. Replacement rates greater than 1.2 indicate a population with strong intrinsic productivity.

Reproductive Independence

Criteria	**90% or more of spawners are naturally produced in at least three of the last five years for at least 80% of existing populations.**

Reproductive independence depends on populations that consist primarily of naturally-produced and not hatchery-produced fish. The effects of hatchery and naturally produced fish interactions are complex and controversial. Hatchery fish can bolster natural population sizes. However, large numbers of highly-domesticated or non-local hatchery fish spawning in the wild can be detrimental to natural population productivity under certain circumstances. Large numbers of hatchery fish also obscure our ability to accurately evaluate the status of the wild population component. This criterion flags cases where significant numbers of hatchery fish potentially interact with or subsidize the natural population. Interim criteria do not distinguish cases where hatchery contributions are intended for conservation or supplementation purposes. Specific cases may then be more fully considered in appropriate conservation plans.

Hybridization

Criteria	**Hybridization with non-native species is rare or nonexistent in three of the last five years for at least 80% of existing populations.**

This criterion highlights specific cases where native species are threatened by hybridization. Hybridization involves interbreeding between related species (cutthroat vs. rainbow trout or bull trout and brook trout) and can lead to reduced productivity and loss of unique genetic characteristics. Hybridization is not typically an issue for anadromous species but can be significant between native and introduced species of trout.