

Klamath River Basin



NOAA

2010 Report
to Congress



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Executive Summary

The Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 required the National Marine Fisheries Service (NMFS) to develop a recovery plan for Klamath River coho salmon in 2007 and submit annual reports to Congress beginning in 2009. The Report to Congress addresses a range of topics, including the status of anadromous fish populations in the Klamath River Basin (Basin), the status of recovery plan actions, the status of ongoing restoration and monitoring efforts, and the status of actions for Klamath River Basin salmonid populations in response to recommendations from the National Research Council. This document is the second annual Klamath River Basin Report to Congress. This report updates information presented in the 2009 annual report, including the status of Klamath River Basin salmonids, restoration and recovery efforts in the Basin and funding for these efforts, and ongoing management, research, and monitoring projects in the Basin.

The Klamath River Basin supports ecologically-important Chinook salmon, coho salmon, and steelhead populations. Historically, these populations were robust and resilient, and they supported important commercial, recreational, and tribal fisheries. However, these populations have declined substantially in abundance and the restoration of these populations now conflicts with many competing interests in the Basin. The target stock of the ocean fishery is the Klamath River fall-run Chinook salmon stock. Since the early 1990s, this stock frequently has constrained the ocean salmon fisheries off California and Oregon due to low returns. Only the Klamath River Basin coho salmon stocks are protected under both the Federal and California Endangered Species Acts. Updated abundance data for Klamath coho salmon stocks suggest that populations are not viable; this stock continues to be depressed and at a high risk of extinction. Although limited data are available on steelhead abundance in the Basin, abundance data for summer steelhead suggest these stocks also continue to be at low levels.

Several noteworthy restoration and recovery actions were implemented in 2009. Two were high priority projects aimed at restoring instream and riparian habitat for salmonids for which NOAA received funds under the American Recovery and Reinvestment Act (ARRA) of 2009 - one in several Lower Klamath River tributaries and one in the Shasta River and its tributaries. A third key action was The Nature Conservancy's purchase of 4,136 acres of land that will protect natural cold springs near the Shasta River and the restoration of Big Springs Creek, a tributary to the Shasta River. Other substantial and ongoing management efforts in 2009 included a closure of ocean salmon fisheries south of Cape Falcon, Oregon, to protect Sacramento River fall-run Chinook salmon, a moratorium on gold suction dredging in the Basin, and a new water-quality Total Maximum Daily Loads (TMDLs) proposal for the Klamath River mainstem and the Lost River. Although funding for Klamath River Basin restoration efforts by some Federal and State agencies decreased in 2009, funding from NOAA and the U.S. Fish and Wildlife Service increased. The decrease in funding was partially offset by the new funding from the ARRA.

Also, in early 2010, a major milestone was reached toward the potential removal of four privately-owned dams on the upper Klamath River, and comprehensive restoration of the Klamath River Basin with signature of the Klamath Basin Restoration Agreement and Klamath Hydroelectric Settlement Agreement. Teams are currently working on studies and environmental review in support of a Secretarial Determination to occur by March 2012 regarding whether dam removal will advance restoration of the salmonid fisheries of the Klamath Basin and is in the public interest. Scientists from NMFS are engaged in a wide range of research projects, including providing technical support for the Secretarial Determination on Klamath River dam removal, ocean salmon fisheries management, and the recovery of Klamath River Basin salmon and steelhead stocks.

Introduction

Purpose of this Report

The Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (Magnuson-Stevens Reauthorization Act or MSRA)¹ of 2006 was signed into law on January 12, 2007, amending the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act or MSA)². The MSRA required the National Marine Fisheries Service (NMFS) to prepare a MSA Klamath River Coho Salmon Recovery plan in 2007 and submit annual reports to Congress starting in 2009.³ The recovery plan was completed in July 2007⁴ and the first annual report to Congress was submitted in 2009⁵. This document is the second annual Report to Congress and provides updated information on: 1) the status of Klamath Basin salmon and steelhead, 2) restoration and recovery actions in the Klamath Basin, 3) ongoing management efforts in the Klamath Basin, and 4) research and monitoring activities in the Klamath Basin.

Status of Species

Chinook Salmon

Populations of Klamath Basin Chinook salmon upstream of the Klamath-Trinity confluence are composed of the Upper Klamath and Trinity River Chinook Salmon Evolutionary Significant Unit (ESU). Populations downstream of the confluence are a component of the Southern Oregon and Northern California Coastal Chinook Salmon ESU. Neither of these ESUs are listed under the Endangered Species Act (ESA). Also, the Klamath River Basin includes both fall-run and spring-run

¹ Public Law No. 109-479.

² Public Law No. 94-265.

³ See MSRA Section 113(b)

⁴ NMFS Southwest Region. The Magnuson-Stevens Reauthorization Act Klamath River Coho Salmon Recovery Plan. 10 July 2007. Available at: http://swr.nmfs.noaa.gov/salmon/MSRA_RecoveryPlan_FI_NAL.pdf

⁵ NMFS Southwest Region. NOAA Klamath River Basin 2009 Report to Congress. Available at: <http://www.nmfs.noaa.gov/pr/pdfs/klamath2009.pdf>

Chinook salmon populations. Chinook salmon continues to be the most abundant salmonid species present in the Klamath Basin and supports important commercial, recreational, and tribal fisheries.

The abundance of fall-run Chinook salmon adult escapement to the Klamath Basin is highly variable across years. Exhibit 1 illustrates the estimated abundance of fall-run Chinook salmon adult returns to the Klamath Basin during 1978-2009, the abundance of Chinook returns that spawned in natural areas and hatcheries, and the abundance of Chinook harvests in tribal and in-river recreational fisheries. In 2009, despite almost total closure of the ocean fisheries south of Cape Falcon, Oregon, the estimated return was average compared to the estimated return during 1978-2009.

The limited data for Klamath Basin spring-run Chinook salmon suggest that adult spawner abundance has been highly variable since 1980. Recent adult spawner abundance estimates have been lower than levels observed in the late 1980s and early 2000s. Dam construction eliminated a substantial amount of the historical spawning and rearing habitat for spring-run Chinook salmon. In addition, dam construction was partially responsible for the extirpation of at least seven spring-run Chinook populations. Two spring-run Chinook natural populations remain: the Salmon River population and the South Fork Trinity River population. Exhibit 2 shows the estimated abundance of spring-run Chinook salmon adults in the Salmon River during 1980-2009. Similar to Klamath Basin fall-run Chinook, the abundance of Salmon River spring-run Chinook spawners varies substantially from year to year. In 2009, despite almost total closure of the ocean fisheries south of Cape Falcon, Oregon, the estimated return was average compared to the estimated return during 1978-2009.

Coho Salmon

Coho salmon in the Klamath Basin and the Rogue River (Oregon) are a component of the Southern Oregon and Northern California Coast (SONCC) coho salmon ESU, which was listed as threatened in 1997 under the ESA. All nine coho salmon

populations within the Klamath basin have declined dramatically in abundance relative to historical levels, and dam construction, beginning in the early 20th century, has substantially reduced the historic habitat of the two uppermost populations. All of the Basin's coho salmon populations are considered to be at high risk of extinction, based on the most recently available estimates of adult spawning abundance derived from numerous sources (Exhibit 3).⁶

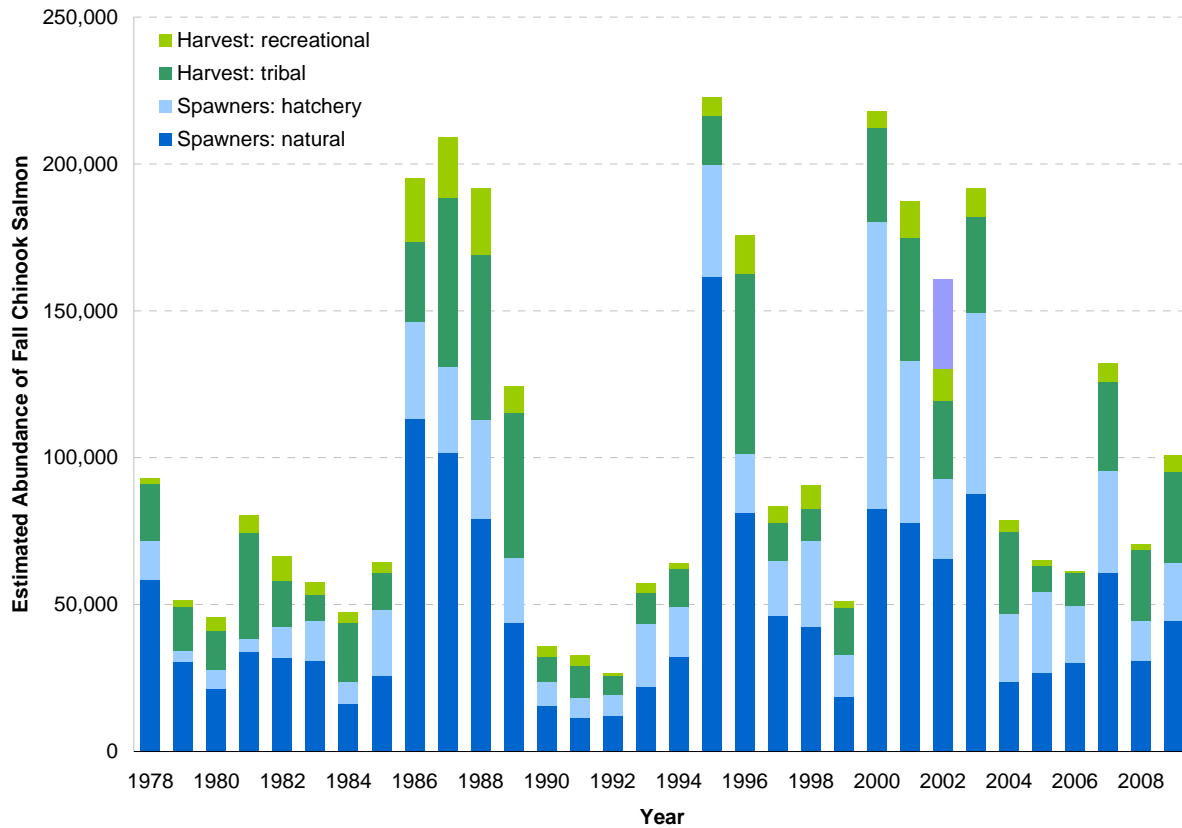
Steelhead

Steelhead populations in the Klamath Basin are part of the Klamath Mountains Province steelhead ESU. This ESU is not listed under the ESA. Steelhead in the Klamath River Basin are widely distributed and include both winter and summer steelhead populations. However, dam construction has substantially reduced the overall habitat for steelhead in the Klamath Basin. Winter steelhead abundance is not well known, but it is thought to be stable. Summer steelhead are generally considered to be less viable than winter steelhead.⁷ Salmon River summer steelhead has achieved average spawning abundance during the last few years, compared to the average spawning abundance during 1980-2009 (Exhibit 4).

⁶ T.H. Williams, B.C. Spence, W. Duffy, D. Hillemeier, G. Kautsky, T.E. Lisle, M. McCain, T.E. Nickelson, E. Mora, T. Pearson. Framework for Assessing Viability of Threatened Coho Salmon in the Southern Oregon/Northern California Coast Evolutionarily Significant Unit. NOAA Technical Memorandum NMFS-SWFSC-432. December 2008. Available at: http://swfsc.noaa.gov/uploadedFiles/Divisions/FED/Endangered_Species_Act/Salmon_TRTs/TM%20432%20%20Williams%20et%20al_2008.pdf

⁷ NMFS 2001 Reevaluation of the Status of Klamath Mountains Province Steelhead. Prepared by the West Coast Steelhead Biological Review Team, March 14.

Exhibit 1: Estimated Abundance of Fall-Run Chinook Salmon Adult Returns to the Klamath River Basin, Abundance of Chinook Returns Spawning in Natural Areas and Hatcheries, and Fall-Run Chinook Harvest in River Recreational and Tribal Fisheries, 1978-2009.^{A,B,C}

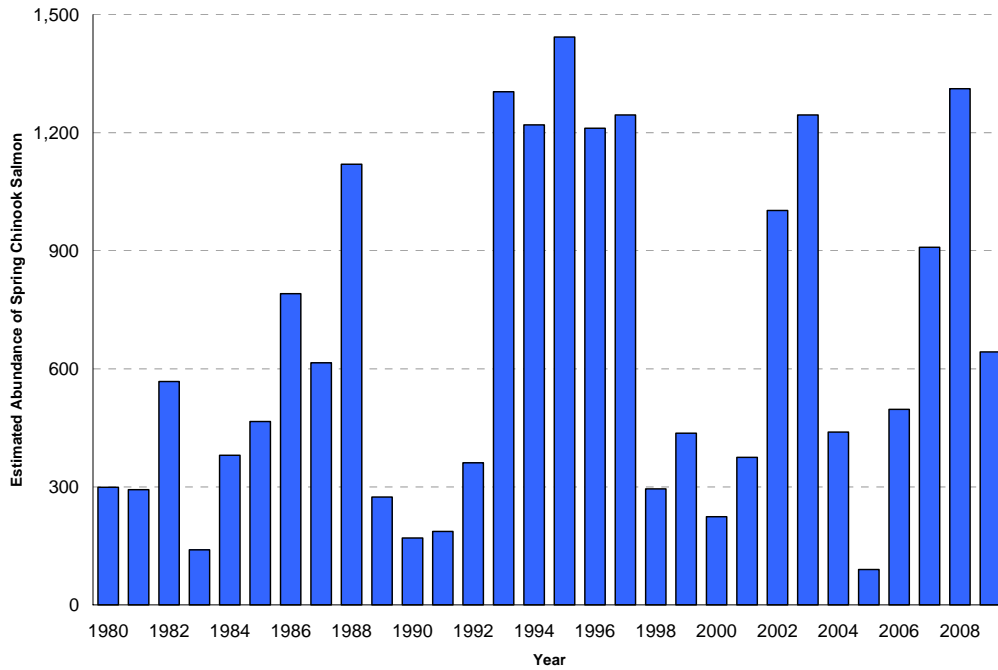


A) Source: California Department of Fish and Game. 2010. Klamath River Basin fall-run Chinook salmon spawner escapement, in-river harvest and run-size estimates, 1978-2009. Available from W. Sinnen, CDFG, 5341 Ericson Way, Arcata, CA 95521.

B) Harvest includes non-catch fishery mortality. Because these estimates are based on return spawners, estimates of Chinook harvest in commercial and recreational ocean fisheries are not included.

C) Upper-most category in 2002 represents fish die-off (U. S. Fish and Wildlife Service. 2003. Klamath River Fish Die-Off September 2002: Causative Factors of Mortality. Report number AFWO-01-03. Arcata Fish and Wildlife Office, Arcata, California. 29 p).

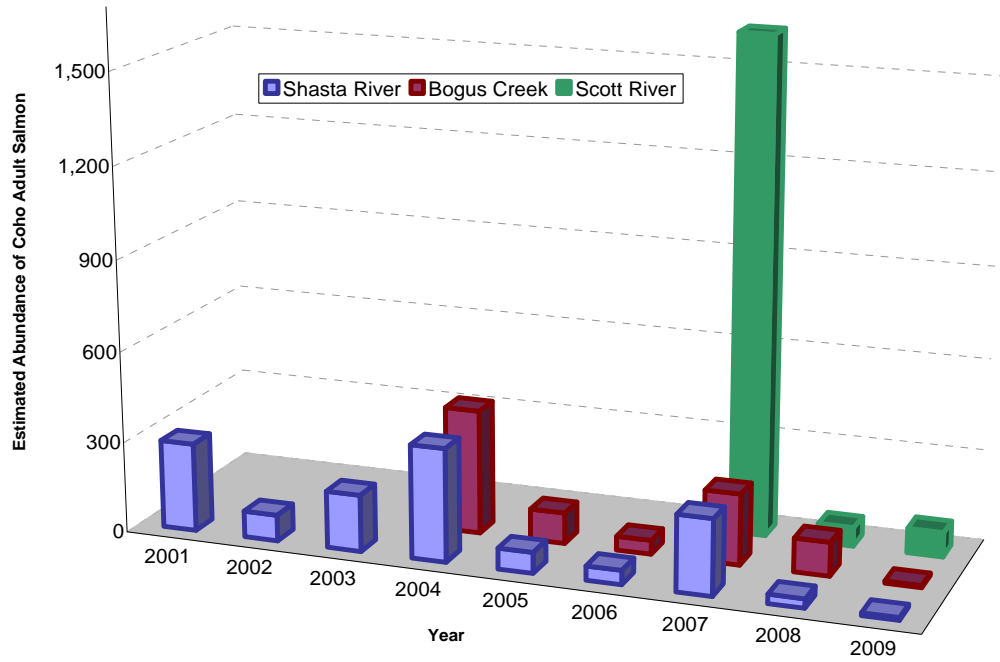
Exhibit 2: Estimated Abundance of Spring-Run Chinook Salmon Adult Spawners in the Salmon River, 1980-2009.^{A,B}



A) Source: Data collected by the Salmon River Restoration Council (<http://www.srrc.org>) using snorkel census techniques.

B) 2006 spawner abundance is an estimate (wildfires prevented survey access to 35% of the Salmon River). Because these estimates are based on return spawners, estimates do not include Chinook harvests.

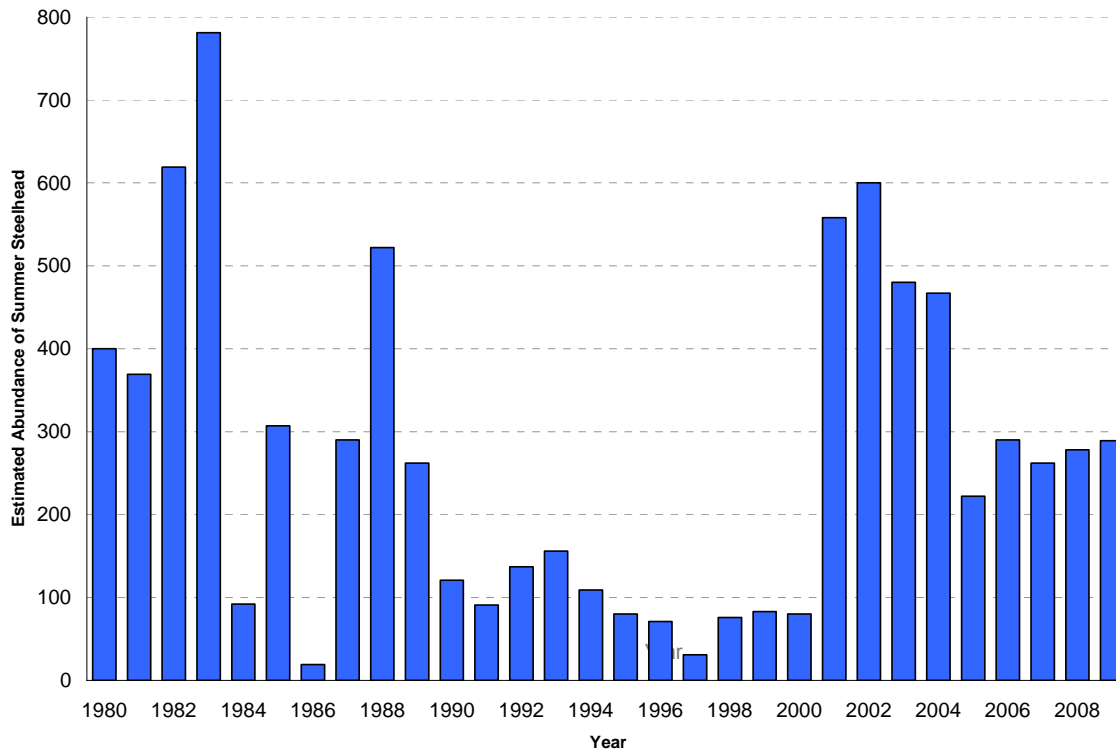
Exhibit 3: Estimated Abundance of Coho Adult Salmon Derived from Weir Counts in the Shasta River, Bogus Creek, and Scott River, 2001-2009.^{A,B}



A) Source: California Department of Fish and Game, Northern Region, Yreka. Data obtained as part of the Klamath River Project (KRP), which funds video fish-counting facilities and cooperative spawning ground surveys.

B) Bogus Creek and Scott River weir data are not available prior to 2004 and 2007, respectively.

Exhibit 4: Estimated Abundance of Summer Steelhead in the Salmon River, 1980-2009.^{A,B}



A) Source: Data collected by the Salmon River Restoration Council (<http://www.srrc.org>).

B) 2006 count is an estimate (wildfires prevented survey access to 35% of the Salmon River).

Restoration and Recovery

2009 American Recovery and Reinvestment Act Funds

In February 2009, NOAA received \$167 million from the American Recovery and Reinvestment Act (ARRA) of 2009 to restore coastal habitat and help jumpstart the nation's economy. Following an extensive review of numerous proposals from around the country, NOAA announced on June 30, 2009 that it was funding two high priority projects in the Klamath River Basin in the total amount of \$2,173,691.

The “Lower Klamath Riparian Restoration and Tribal Plant Nursery” received \$527,950 in ARRA funds to improve nine acres of in-stream and riparian habitat on the Lower Klamath River tributaries, Terwer Creek and McGarvey Creek. This project benefits threatened coho salmon,

Chinook salmon, steelhead, and cutthroat trout. Project activities include restoring riparian buffers and in-stream complexity along these tributaries, and expanding native plant propagation. This project also includes creating two off-channel ponds that will provide crucial overwintering habitat for coho salmon.

The “Big Springs Shasta River Restoration” received \$1,645,741 in ARRA funds to improve more than 11 miles of important salmon spawning and rearing habitat along the Shasta River and its tributaries by excluding cattle from 11 miles of creek, supporting natural revegetation of 70 acres of riparian habitat, and planting 20 acres of riparian vegetation. Additional activities include irrigation improvements to protect cold water springs, enhance cold water flows, and restore aquatic habitat critical for Chinook salmon, coho salmon, and steelhead in the Shasta River. The Shasta River is a crucial watershed for salmonid recovery in the basin (Exhibit 5).

Exhibit 5. This reach of the Shasta River at Oxbow Bend has benefited from planting of native riparian vegetation using ARRA funds, installing a permanent fence to exclude livestock, and improving irrigation management. Photo taken by Bridget Besaw.



Shasta Big Springs Ranch Purchase

In March 2009, The Nature Conservancy paid \$14.2 million to acquire a 4,136-acre property (the former Louie Ranch) that includes the main spring sources of the Shasta River and renamed it the Shasta Big Springs Ranch. The acquisition includes a majority of the Big Springs complex, and first priority use of water to ensure cold spring water remains in the creek.

The restoration of riparian habitat along Big Springs Creek is well underway and is part of an ambitious effort to recover the Shasta River's Chinook salmon, coho salmon, and steelhead populations. Irrigation tail water inputs back to streams on the Ranch already have been reduced by 80-90% through intensive water management, as well as some modest irrigation system improvements. Development, implementation, and monitoring of a comprehensive water-efficiency plan should reduce further agricultural diversion of

ranch water, potentially resulting in more water to benefit downstream fisheries in the Shasta River.

In collaboration with the NOAA Restoration Center, The Nature Conservancy has installed permanent electric cattle exclusion fencing along all 7.5 miles of streams on the ranch. This action has resulted in an impressive restoration of aquatic emergent vegetation in Big Springs Creek, which provides substantial cover and thermal protection for rearing salmonids (Exhibits 6, 7).

Exhibit 6. Big Springs Creek after being grazed by livestock during winter 2008. Photo taken by Carson Jeffres in March 2008.



Exhibit 7. Big Springs Creek after livestock grazing exclusion during spring-summer 2008. Photo taken by Carson Jeffres in September 2008.



Funding Updates

Federal and State stakeholders in the Klamath River Basin are continuing to commit funding and personnel resources toward restoration activities largely recommended in the Klamath River coho recovery plan (see Exhibit 8).

Although some funding declined substantially in 2009, funding from NOAA and the U.S. Fish and Wildlife Service increased. The ARRA also was an important source of funding in 2009. In addition, the Pacific Coastal Salmon Recovery Fund has also been a substantial and consistent source of funds supporting Klamath River Basin restoration priorities.

Exhibit 8: Annual Funding in the Klamath River Basin by NOAA and Other Federal and State Agencies, 2000-2009.^{A, B, C}

Fiscal Year	NOAA			State of California		Other Federal Agencies			
	Pacific Coastal Salmon Recovery Fund	NMFS ^A	NOAA Restoration Center	Department of Fish and Game	Coastal Conservancy	US Fish and Wildlife Service	Klamath National Forest	Bureau of Reclamation	Natural Resources Conservation Service
2000	\$2,477,000	\$500,000	\$36,000	\$3,208,300	\$100,000	\$347,600	\$629,000	\$342,300	NA
2001	\$5,948,000	\$500,000	\$100,000	\$491,800	\$100,000	\$311,800	\$1,352,000	\$339,700	NA
2002	\$4,453,000	\$600,000	\$20,000	\$3,202,800	NA	\$464,100	\$1,273,000	\$883,500	\$189,200
2003	\$2,398,300	\$600,000	\$32,000	\$1,931,000	\$600,000	\$339,000	\$1,959,000	\$3,493,600	\$1,130,800
2004	\$3,154,400	\$750,000	\$100,000	\$978,900	\$140,000	\$297,700	\$4,798,000	\$1,812,200	\$1,539,800
2005	\$2,391,800	\$675,000	\$125,000	\$1,930,300	\$300,000	\$349,300	\$2,110,000	\$8,234,300	\$1,662,900
2006	\$951,000	\$1,000,000	\$117,000	\$11,565,100	\$375,800	\$525,900	\$2,264,000	\$5,426,100	\$1,079,100
2007	\$1,380,000	\$1,050,000	\$370,000	\$784,600	\$580,000	\$1,016,800	\$1,267,000	\$8,290,700	\$926,800
2008	\$1,363,000	\$3,000,000	\$345,000	\$467,700	\$128,000	\$880,200	\$1,352,000	\$5,284,600	\$1,397,600
2009	\$1,551,800	\$3,000,000	\$2,173,691 ^C	\$434,900	\$50,000	\$2,451,071	NA	\$398,876 ^B	\$419,199
Total	\$26,068,000	\$11,675,000	\$3,418,691	\$24,995,400	\$2,373,800	\$6,983,471	\$17,004,000	\$34,107,000	\$8,345,399

A) 2006 funding does not include an additional \$60,340,000 for Klamath River Basin disaster relief.

B) This amount does not include the Trinity River Restoration Program.

C) This amount is attributed to ARRA funding.

Ongoing Management

Fisheries Management

The Federal ocean salmon fishery off the coasts of California, Oregon, and Washington is managed under the Pacific Coast Salmon Fishery Management Plan (Salmon FMP), in accordance with the MSA. Pursuant to the MSA, the Pacific Fishery Management Council (PFMC), which includes state representatives, provides fishery management recommendations to the Secretary of Commerce (Secretary) through NMFS. If the PFMC recommendations are consistent with the MSA and other applicable laws, the Secretary will implement the measures into regulation.

To protect ESA-listed Klamath Basin coho salmon encountered in the ocean fishery, regulations are developed consistent with a 1999 NMFS biological opinion⁸, which prohibits the retention of coho in these fisheries off California.

In 2008 and 2009, Klamath stocks experienced reduced ocean fishing pressure due to the poor status of Sacramento River fall-run Chinook (SRFC) salmon. Because salmon stocks co-mingle in the ocean, ocean harvest is constrained by the weakest stock(s). In 2008, SRFC salmon experienced a sudden collapse and the status of many West Coast coho salmon stocks was also poor. As a result, the PFMC adopted the most restrictive salmon fisheries measures in the history of the West Coast. Chinook fisheries south of Cape Falcon, Oregon, were closed and only a limited fishery for 9,000 hatchery coho salmon was allowed off Oregon.

In 2009, SRFC salmon was forecast again to fall short of its conservation objective. As a result, all commercial Chinook salmon fishing south of Cape Falcon was prohibited. Recreational ocean salmon fisheries were greatly restricted: only a limited 10-day recreational season for Chinook salmon was permitted north of Cape Mendocino, CA; and a similar 10-day season was permitted around Brookings, OR. Because both hatchery and natural coho salmon stocks increased in abundance, more

opportunity for coho salmon fishing was available off Oregon.

During 2004-2006, Klamath River fall-run Chinook salmon (KRFC) failed to meet its conservation objective floor of 35,000 natural area adult spawners, triggering concern about the stock's abundance. Therefore, since 2008, to enhance the probability of achieving spawning escapements at or above the conservation objective floor in the short term and to promote more precautionary fishery management during this time of extended concern, the PFMC has been designing the fishery to achieve an escapement of at least 40,700 natural area adult spawners. Escapement exceeded 40,700 natural area adult spawners in 2007 and 2009, though it failed to achieve 35,000 natural area adult spawners in 2008.

Gold Suction-Dredging Moratorium

On August 6, 2009, Governor Arnold Schwarzenegger signed California Senate Bill (SB) 670 into law, establishing an immediate moratorium on suction dredging, a commercial and recreational method to mine for gold. Miners use suction dredging to vacuum up river bed in search of gold. Approximately 3,500 permits had been issued annually, with an anticipated increase in number of permits issued due to the increase in the value of gold.

The moratorium stems from a State court order issued in a lawsuit that granted relief to the Karuk Tribe, which is located in the Klamath River Basin. The Court order provided the California Department of Fish and Game (CDFG) with a deadline of June 20, 2008, to conduct an environmental review and, if necessary, to write new rules pertaining to suction dredging that would protect listed fish. CDFG did not meet this deadline, resulting in a Court-ordered injunction that barred the spending of state general funds on the issuance of suction dredging permits. The SB 670 moratorium invalidated any existing permit on private, state, or Federal lands and will continue to bar suction dredging until CDFG completes its environmental review and establishes new rules that adequately protect fish and human health. Among the concerns for fish are that suction dredging releases sediment and heavy metals, particularly methyl mercury, and destroys spawning habitat.

⁸ NMFS Supplemental Biological Opinion and Incidental Take Statement. The Pacific Coast Salmon Plan and Amendment 13 to the Plan. NMFS, Protected Resources Division. April 28, 1999.

Total Maximum Daily Loads (TMDLs)

In accordance with the Federal Clean Water Act and the California Porter-Cologne Water Quality Control Act, acceptable pollutant loading levels are being determined for water bodies that have been identified as impaired, which includes the Klamath River and its major tributaries. The TMDL development team for the Klamath River (mainstem) and Lost River include the California North Coast Regional Water Quality Control Board (Regional Water Board), Oregon Department of Environmental Quality (ODEQ), U.S. Environmental Protection Agency (U.S. EPA) Regions 9 and 10, and technical

contractor Tetra Tech, Inc. TMDLs for the Klamath River's major tributaries (Lost, Scott, Shasta, and Trinity Rivers) have already been established. The draft TMDL for the mainstem Klamath River (including an implementation plan for the already approved Lost River TMDL) is currently in review at the State and is expected to be approved by U.S. EPA Region IX by the end of 2010. Impairments addressed by the TMDLs that will apply to the Klamath River mainstem are listed in Exhibit 9. Once implemented, the TMDLs and the associated Implementation Plans are expected to improve water quality, reduce stress on salmonids from pollution, and contribute to their recovery.

Exhibit 9: Proposed TMDLs in the Klamath River mainstem in Oregon and California.

TMDLs	Water Quality Parameters covered under Oregon TMDLs	Water Quality Parameters covered under California TMDLs
Klamath Mainstem	Dissolved Oxygen, pH, Ammonia, Temperature, Chlorophyll-a (ODEQ)	Low Dissolved Oxygen / Organic Enrichment, Nutrients, Temperature, Microcystin (Regional Water Board)

Research and Monitoring

NMFS Southwest Fisheries Science Center

Research activities by the NMFS Southwest Fisheries Science Center (SWFSC) have recently expanded in the Klamath River Basin. Specific projects were initiated in direct response to ESA-listed coho salmon recovery needs and in support of the March 2012 Department of Interior (DOI) Secretarial decision concerning dam removal. In addition, the SWFSC is continuing its long history of providing ocean harvest management support for Klamath River fall-run Chinook salmon.

Economic Analysis Support for the Klamath Secretarial Determination

The Economics Team of the SWFSC is also co-chairing an economics subteam that is preparing a cost-benefit analysis to inform the DOI's Secretarial Determination regarding the removal of four dams on the Klamath River. The subteam includes economists from several DOI agencies, as well as three SWFSC economists. The economics subteam is working closely with other multi-agency subteams (e.g., biology, engineering, water-quality, tribal, real estate, recreational), as well as SWFSC biologists and ecologists, to ensure that the wide-ranging effects of dam removal are reflected accurately in the economic analysis. The analysis will address issues such as dam removal costs, benefits to fish populations and fisheries, foregone hydropower, foregone reservoir and whitewater recreation, agricultural, real estate

and tribal/cultural effects, non-use value to the public, and effects on county-level income, employment and tax revenue.

Production Modeling Support for the Klamath Secretarial Determination

The Landscape Ecology Team of the SWFSC is collaborating with the biology subteam in preparing work to support a cost-benefit analysis for four dam removals on the Klamath River mainstem. These teams are developing population dynamics models that will predict future abundance of Klamath River fall-run Chinook salmon during 2010-2060 under dams-out and status-quo scenarios. The models incorporate observed population dynamics of fall-run Chinook salmon populations in the Klamath River Basin, past and predicted future hydrologic and water-quality information, and estimates of spawning and rearing habitat quantity and quality throughout the basin.

Impacts of Fish Disease on Klamath River Fall-Run Chinook Salmon Population Dynamics

The Salmon Assessment Team of the SWFSC is engaged in the construction and analysis of space- and stage-structured models to evaluate the effects of the parasite *Ceratomyxa shasta* on the short- and long-term population dynamics of Klamath River fall-run Chinook salmon. The nature and spatial extent of the disease transmission between intermediate pathogen hosts and fall-run Chinook salmon are relatively well understood, as is the disease lethality when a fish is infected. However, research conducted to date has not evaluated the significance of these factors on overall stock dynamics. The results will characterize the level of risk disease posed for these fish by providing reasonable sideboards.

Fish Health Workshop

In March 2009, NOAA sponsored the annual Klamath River Fish Health Conference to provide a forum for the exchange of current information on fish disease in the Klamath River. The Klamath River Fish Health Conference was successful in bringing together agencies, tribes, stakeholders, and the public, and providing a forum for sharing information

on fish health issues of the Klamath River Basin. Information primarily focused on research related to the critical disease outbreaks that have caused significant mortality in juvenile salmon in the Klamath River downstream of Iron Gate Dam. Presentations focused on the disease pathogens *Ceratomyxa shasta* and *Parvicapsula minibicornis*. High rates of infection were observed in the spring and early summer of 2008. Participants in the conference expressed the ongoing concern that fish health research and monitoring should be adequately funded.

Klamath River Fall-Run Chinook Salmon Stock and Fishery Assessment

The SWFSC Salmon Assessment Team leads efforts in conducting the annual stock assessment of Klamath River fall-run Chinook salmon. The data collected are used by NMFS in reporting the stock's status to Congress; and by the PFMC and the CDFG to develop ocean commercial and recreational salmon fishery regulations off the coasts of California and Oregon, and river tribal and recreational fishery regulations in the Klamath River Basin. The assessments are used to determine the current status of Klamath River fall-run Chinook salmon and forecast stock abundance, fishery impacts, and spawning escapements in the coming year as a function of prospective fishery management measures.

Genetic Population Structure and Stock Identification-Based Estimation of Klamath River Basin Salmonid Contribution in Ocean Fisheries

The Molecular Ecology and Genetic Analysis Team of the SWFSC has several projects intended to provide a better understanding of Klamath/Trinity River Basin salmon and steelhead population structure. The Team is engaged in extensive evaluations of population structure for Chinook and coho salmon in the entire basin below Iron Gate and Lewiston dams, as well as above and below both dams for steelhead/rainbow trout. The Chinook salmon data are also used to enhance the coast-wide baseline dataset for Genetic Stock Identification (GSI). These projects are conducted in collaboration with Humboldt State University, CDFG, Oregon Department of Fish and Wildlife, and the Hoopa Valley Tribe. In addition, the Team is evaluating the

contribution of Klamath and Trinity River Chinook salmon stocks to ocean fisheries through GSI analysis of port samples. Port samples are collected from recreational fisheries with associated location data, in a unique collaboration with the commercial salmon fleet.

Monitoring of Salmon and Steelhead Populations in the Klamath River Basin

The recent signature of the Klamath Basin Restoration Agreement (KBRA) and Klamath Hydroelectric Settlement Agreement (KHSA) underscores the need to be able to detect changes in the status and trends of Chinook salmon and coho salmon and steelhead populations in the Klamath River Basin. The SWFSC is currently involved in efforts to establish an integrated basin-wide salmonid monitoring plan. Integrated monitoring is essential to being able to assess the viability of Klamath River salmonid populations and to understand the effectiveness of habitat restoration actions. The focus of this effort is the development of a basin-scale data management system, which will lead to consistent data collection, improved data quality, and wider data assessment. In addition, SWFSC has provided support to current monitoring efforts on the Scott and Shasta River (e.g., video weir sites). The results of all of these efforts will provide a more rigorous and comprehensive evaluation of Klamath River salmonid populations, including the ESA-listed coho salmon.

Klamath River Stream Temperature Modeling and Use of Thermal Refugia by Salmonids

Late summer and early fall water temperature regimes are critical to the persistence of salmon and steelhead populations in the Klamath River. Water temperatures critically influence fish physiology in numerous ways and understanding water temperature dynamics is a prerequisite to assessing acute and chronic thermal impacts on salmonids. Currently, the temperature dynamics of the Klamath River mainstem are not well understood at the appropriate scales necessary for fisheries management decisions. The presence and duration of cold water refugia may be a key factor for salmonid survival, yet little is known about the spatiotemporal dynamics of these refugia. The SWFSC is addressing these issues

through a combination of a high-resolution stream temperature and fish mortality models of the Klamath River mainstem, and fish tracking studies to evaluate the associated spatial response of salmonids in and around selected thermal refugia. This model is driven by recently developed NASA satellite-derived climate data. The model will provide hindcasts and forecasts (including various climate change scenarios) of the Klamath River mainstem at sub-hourly intervals for every one kilometer of stream reach. These data will be used as inputs to spatially explicit fish energetic models in order to evaluate the temperature impacts on salmonids at sub-adult life stages. Finally, the SWFSC will measure fine-scale spatiotemporal use of the thermal refugia and mainstem by salmonids through radio tracking of individual fish.

Historic Klamath Hydroelectric Settlement Agreement (KHSA) and Klamath Basin Restoration Agreement (KBRA)

In 2004, PacifiCorp filed an application with the Federal Energy Regulatory Commission (FERC) for a new 50-year license for its Klamath Hydroelectric Project, which includes dams on the mainstem Klamath River. PacifiCorp's application did not include provisions for volitional fish passage. Under its Federal Power Act authorities, NMFS and the U.S. Department of the Interior issued modified prescriptions for fishways that would result in volitional fish passage of coho salmon, Chinook salmon, and steelhead past the project, which currently blocks fish passage at the lowest project dam on the river. Under a new license, PacifiCorp would be required to retrofit its dams with fishways, including fish ladders and downstream fish passage facilities.

PacifiCorp's relicensing efforts also brought together a diverse group of interests that had a history of long-standing conflicts over limited supplies of water resources in the Klamath Basin. Counties, farmers and ranchers, Tribes, conservation and fishing organizations, and Federal and state agencies worked tirelessly together to craft comprehensive agreements that will help provide stability to Klamath Basin communities, while restoring the health of the Klamath watershed.

On February 18, 2010, over 30 parties, including PacifiCorp, came together to sign the KHSA and

KBRA. The KBRA is intended to: (1) restore and sustain natural fish production and provide for full participation in ocean and river harvest opportunities of fish species throughout the Klamath Basin; (2) establish reliable water and power supplies which sustain agricultural uses, communities, and National Wildlife Refuges; and (3) contribute to the public welfare and the sustainability of all Klamath Basin communities. The KHSA lays out a process for additional studies, environmental review, and a determination by the Secretary of the Interior by March 31, 2012 regarding whether removal of four dams owned by PacifiCorp: (1) will advance restoration of the salmonid fisheries of the Klamath Basin; and (2) is in the public interest. Subject to an affirmative determination by the Secretary, removal of the dams is targeted for 2020 in order to provide for planning, permitting, and ratepayer funding. The KHSA and KBRA together represent the largest dam removal project and river restoration effort in U.S. history. While federal agencies cannot execute all the programs of the KBRA until Congress has provided appropriate authorization, Federal agencies have committed to implementing certain programs agreed to by the parties and identified in the KBRA for which authorization, funding, and capacity currently exist.

Under the KHSA, prior to the Secretarial Determination, the Secretary of the Interior, in cooperation with the Secretary of Commerce, shall conduct certain actions, including review under the National Environmental Policy Act and further appropriate studies as necessary to determine whether to proceed with Facilities Removal. Based on those actions, the Secretary of the Interior, in cooperation with the Secretary of Commerce, shall use best efforts to determine by March 31, 2012, whether, in his/her judgment, specific conditions have been satisfied; and “Facilities Removal (i) will advance restoration of the salmonid fisheries of the Klamath Basin, and (ii) is in the public interest, which includes but is not limited to consideration of potential impacts on affected local communities and tribes.” If the Secretary of the Interior makes an affirmative determination related to these conditions, the Secretary must designate a Dam Removal Entity (DRE), subject to provisions regarding concurrence by the States of Oregon and California related to the Secretarial Determination and the designation of the DRE. The DRE must complete a plan for Facilities Removal and perform Facilities Removal in accordance with applicable permits and other requirements. Facilities Removal is scheduled to occur in 2020, subject to listed assumptions and conditions related to funding. Finally, the KHSA

includes detailed actions for the operation of the dams prior to removal of the dams, which include interim measures specifically for the protection and enhancement of coho salmon as well as other measures for habitat and water-quality improvement.

Summary

NOAA is committed to strengthening conservation program partnerships for the recovery of salmonid populations within the Klamath River Basin. Habitat restoration and conservation, along with improved scientific knowledge of the threats to population viability, are furthering efforts to recover and restore anadromous salmonids in the Klamath River Basin. Continued commitment to these activities is imperative to restoring the Klamath River ecosystem and the communities that depend on it for their livelihood and cultural heritage. Future progress on these efforts will continue to be reported annually to Congress.

