30. Illinois River Population

Interior Rogue River Stratum

Core, Functionally Independent Population

High Extinction Risk

Population likely above depensation threshold

11,800 Spawners Required for ESU Viability

400 mi^2 watershed (82% Federal ownership)

590 IP-km (367 IP-mi) (47% High)

Dominant Land Uses are Agriculture and Urban/Residential/Commercial Development

Key Limiting Stresses are ‘Altered Hydrologic Function’ and ‘Degraded Riparian Forest Conditions’

Key Limiting Threats are ‘Roads’ and ‘Dams/Diversions’

Highest Priority Recovery Actions

• Increase large woody debris (LWD), boulders, and instream structure • Improve suction dredging practices • Re-connect floodplains, wetlands, and off-channel habitat	• Improve agricultural practices • Improve timber harvest practices by revising Oregon Forest Practices Act • Reduce road-stream hydrologic connection

30.1 History of Habitat and Land Use

From 1780 to 1840, trappers swept Oregon coastal rivers, including the Rogue River basin, reducing the robust beaver population to remnant levels (Oregon Department of Fish and Wildlife (ODFW) 2005b). Beaver ponds provide excellent rearing habitat for coho salmon, and thus beaver trapping was likely the first negative effect of European settlers on coho salmon. Gold mining in the Illinois Valley began in the 1850s (U.S. Bureau of Land Management (BLM) 2003). Flood terraces were turned over, which disrupted riparian areas and in some cases unleashed large quantities of sediment (U.S. Forest Service (USFS) 1999a).

The first agricultural development arose to support the community of miners. After the gold rush, agriculture continued to expand in the fertile lowlands surrounding the river. Meadows and valley bottom forests were converted to pasture where thousands of cows grazed, and more than 100,000 sheep occupied upland meadows of the Illinois sub-basin and other watersheds in Siskiyou Mountains (USFS 1999a).

Timber harvest on a large scale began in the Illinois Valley after World War II (USFS 1997a, USFS and BLM 2000), when there were few restrictions on harvesting near streams or using stream beds to skid logs. Channel damage from the 1964 flood was widespread and exacerbated by timber harvest and road building activities. Affected areas included the East Fork Illinois River and its tributaries Chicago and Dunn creeks (USFS and BLM 2000), and Sucker Creek and its tributaries Grayback, Cave, Tannen creeks (USFS 1997a).

Less ground-disturbing methods of timber harvest were used by the USFS and U.S. Bureau of Land Management (BLM) in the 1970s and 1980s, but many landslides still occurred as a result from failures on steep harvested slopes (USFS 2000b) and extensive road networks (BLM 1997, USFS 1998c). This triggered another sediment pulse that compounded adverse effects to habitat.

Alluvial valley reaches near the mouth of the Illinois River that strongly overlap with extensive high IP (>0.66) coho salmon habitat (Williams et al. 2006) were formerly winding channels with complex wetlands and likely numerous beaver ponds (BLM 2005a). These reaches would have had substantial groundwater and surface water connections (Oregon Department of Environmental Quality (ODEQ) 2008) as well as slow water habitats suitable for both summer and winter rearing of coho salmon juveniles. These mainstem summer and winter refugia for coho salmon juveniles have been largely lost.

Although federal ownership covers 81 percent of the Illinois River population, the vast majority of stream reaches on USFS and BLM lands are too steep or otherwise unsuitable for coho salmon. Both the USFS and BLM have adopted new timber harvest practices which are less detrimental to salmonid habitat. Forests are now being thinned to meet conservation and recreation objectives (USFS 2007), rather than cleared for timber sale. Aquatic habitat on federal lands in the Illinois River sub-basin is recovering in response to these land use changes.

Rural residential growth in the watershed has followed a pattern similar to other areas of Josephine and Curry counties, with related increased demand on surface and groundwater (Southwest Oregon Resource Conservation and Development Council (SORC&D) 2003).

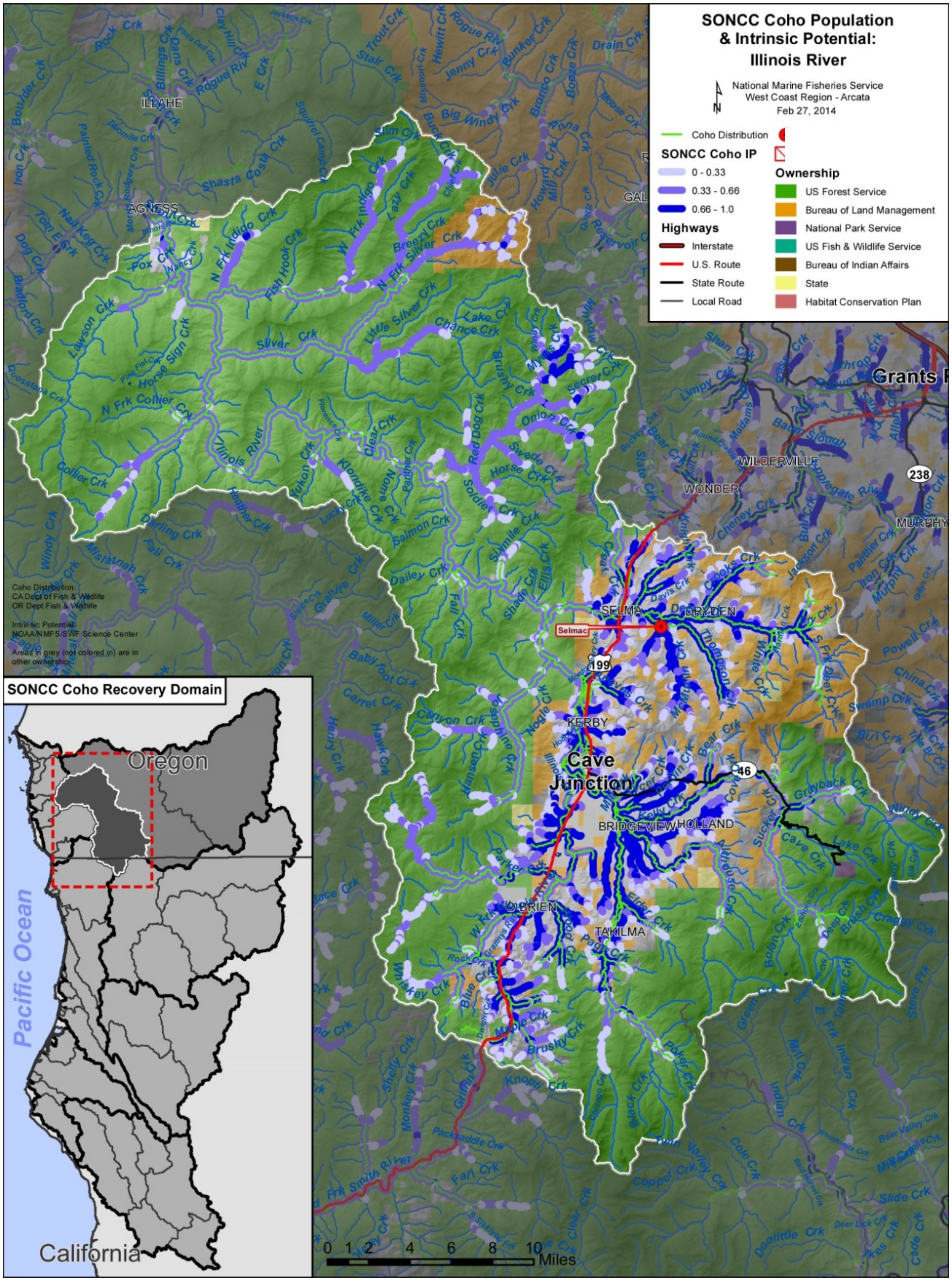

Figure 30-1. The geographic boundaries of the Illinois River coho salmon population. Figure shows modeled Intrinsic Potential habitat (Williams et al. 2006), land ownership, coho salmon distribution (ODFW 2013a), and location within the Southern-Oregon/Northern California Coast Coho Salmon ESU and the Interior Rogue River diversity stratum (Williams et al. 2006). Grey areas indicate private ownership.

30.2 Historic Fish Distribution and Abundance

Historically, coho salmon were widely distributed in the Illinois River watershed; however most of the high intrinsic potential (IP >0.66) coho salmon habitat (Williams et al. 2008) is in low gradient tributaries in the upper portion of the sub-basin (Figure 30-1). Coho salmon production potential is limited in other areas. Tributaries of the lower Illinois River sub-basin, such as Silver, Lawson, and Indigo creeks, are too steep and confined for coho salmon to flourish. High IP coho salmon habitat occurs on a bench in the upper North Fork of Silver Creek (Figure 30-1) but coho salmon access to that reach is blocked (BLM 2004a) by a series of culverts; natural falls downstream are additional potential impediments to passage. Briggs Creek Valley near the headwaters of Briggs Creek contains high IP habitat (Figure 30-1), but is inaccessible to coho salmon due to a longstanding natural barrier. That barrier is a steep boulder canyon with at least two 6-foot falls located approximately 0.7 miles from the mouth (Siskiyou Research Group 2003). A substantial portion of the western Illinois River sub-basin has serpentine soils that naturally support sparse riparian conditions (USFS 2000b) that likely result in warm stream temperatures. Therefore, streams that flow from this terrain, such as Rough and Ready and Josephine creeks, are unsuitable for coho salmon. This profile focuses on the upper Illinois River sub-basin where tributaries with high IP coho salmon habitat exist: the mainstem Illinois River, East Fork Illinois River, West Fork Illinois River, Althouse Creek, Sucker Creek, and Deer Creek.

A cannery operated at the mouth of the Rogue River beginning in 1876. Records from that cannery were used to estimate an annual run size of approximately 114,000 adult coho salmon in the late 1800s (Meengs and Lackey 2005). There is no way to know how many of these fish were returning to the Illinois River sub-basin, rather than elsewhere in the 5,600 square mile Rogue River basin. The Illinois River sub-basin contains 25 percent of the basin-wide IP kilometers of habitat (Williams et al. 2008), suggesting possible returns of 28,500 fish during the time of cannery operation if fish were distributed in proportion to IP kilometers.

Table 30-1. Tributaries with high IP reaches (IP > 0.66) in the Illinois River (Williams et al. 2006).

Watershed	Stream Name	Watershed	Stream Name
West Fork Illinois	Brushy Creek	**Mainstem and East Fork Illinois**	Althouse Creek
	Dwight Creek		Althouse Slough
	Elk Creek		Bear Creek
	Gilligan Creek		Chapman Creek
	Logan Creek		Democrat Gulch
	Mendenhall Creek		Elder Creek
	Trapper Gulch		Free and Easy Creek
	West Fork Illinois River		George Creek
	Whiskey Creek		Grayback Creek
	Woodcock Creek		Holton Creek
Deer Creek	Anderson Creek		Horse Creek
	Clear Creek		Kelly Creek
	Crooks Creek		Khoeery Creek
	Davis Creek		Little Elder Creek
	Deer Creek		Long Gulch
	Draper Creek		Mill Creek
	Haven Creek		Myers Creek
	McMullin Creek		North Fork Silver Creek
	North Fork Deer Creek		Page Creek
	Potter Gulch		Poker Creek
	Salt Gulch		Reeves Creek
	South Fork Deer Creek		Senior Gulch
	Thompson Creek		Scotch Gulch
	Whites Creek		Skagg Creek
			Sucker Creek
			Tycer Creek

30.3 Status of Illinois River Coho Salmon

Spatial Structure and Diversity

ODFW (2005a) surveys from 1998 to 2004 confirmed that coho salmon still migrate to Illinois River tributaries in an extensive area, but rearing is concentrated in small patches in upper reaches of Illinois Valley streams, just below federal land. Comparatively high densities of juvenile coho salmon have been found in Deer, Sucker, and Althouse creeks as well as the East and West Forks of the Illinois River (Figure 30-2). During the 2004 to 2009 run years, on average about 70 percent of sites were occupied by adult coho salmon with an estimated average of 25 spawners per mile (hatchery or wild origin unstated) (Lewis et al. 2009). In most cases, coho salmon are naturally absent from steep lower Illinois River tributaries and those that drain the serpentine bedrock area of the western part of the sub-basin (e.g., Rough and Ready and Josephine creeks).

Population Size and Productivity

ODFW (2011b) estimated the abundance of wild adult coho salmon from 2002 to 2008 in the Illinois River (Figure 30-3). Wild adult coho salmon spawner abundance for the Illinois population was estimated to be 2,117 in 2007 and 745 in 2008 (Figure 30-3). Data were not collected in 2005, 2009, and 2010 which complicated efforts to track the strength of year classes. The lowest three-year running average of the number of spawners was 1431. Therefore, the Illinois River population of coho salmon is at moderate risk of extinction with regard to the spawner abundance because the spawner abundance is above the depensation threshold of 590 but below the low risk threshold of 11,800 adults.

The number of adult coho salmon is estimated using a seine-recapture method at Huntley Park in the Lower Rogue River (river mile 8). These data provide the most robust and precise estimates of adult coho salmon abundance in the Rogue River (ODFW 2013b). It is impossible to determine, with existing information, how many of the estimated coho salmon at Huntley Park were returning to the Illinois River, but if the trend in abundance is assumed to reflect trends in the Illinois River, the data can inform whether the population is at high risk of extinction due to the population decline criterion (Williams et al. 2008). The number of spawners at Huntley Park has declined at an annual rate of 11 percent over the last 12 years (Figure 30-4), greater than the 10% decline associated with a high risk of extinction (Williams et al. 2008). Therefore, the population is likely at high risk of extinction due to its sharply declining productivity.

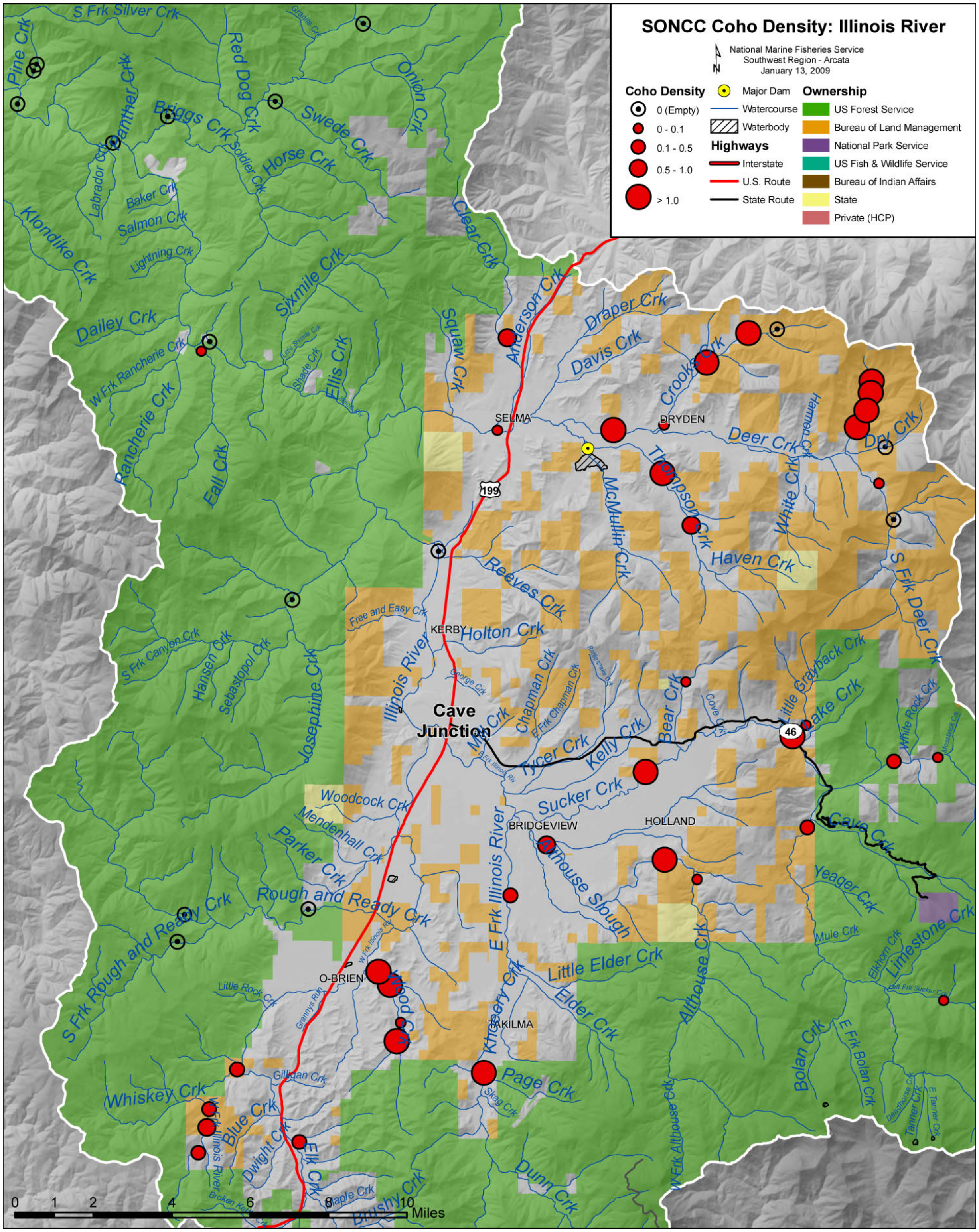

Figure 30-2. Upper Illinois River juvenile coho salmon survey results. Data are from 1998 to 2004 and show presence, absence and density of fish per square meter. (ODFW 2005a).

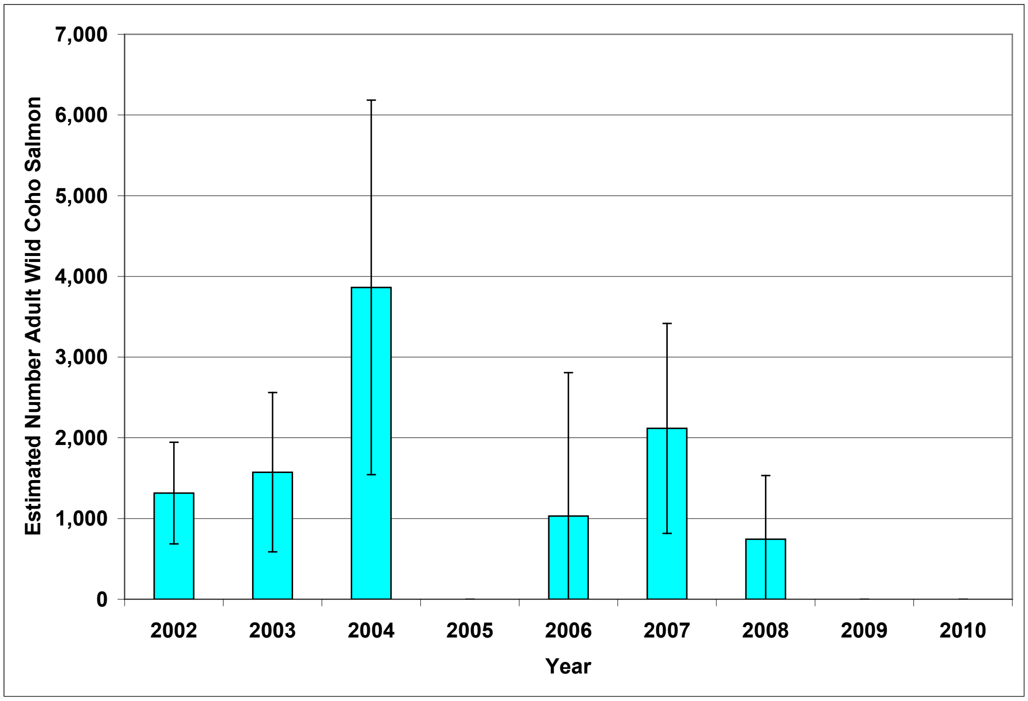

Figure 30-3. Estimated number of wild adult coho salmon in the Illinois River, from 2004 through 2010. No sampling occurred in 2005, 2009, or 2010 (ODFW 2011).

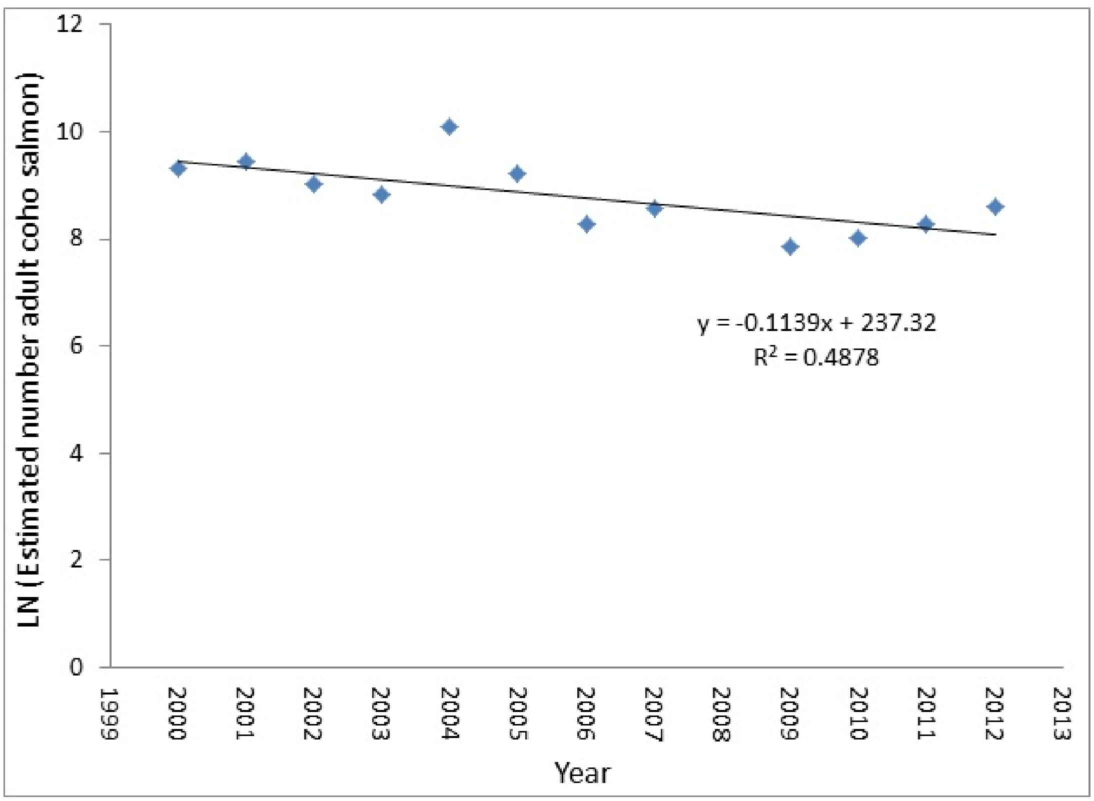

Figure 30-4. Rate of decline of estimated population abundance at Huntley Park (data from ODFW 2013b).

Using seine mark-recapture data from Huntley Park, ODFW (2005c) calculated productivity for wild adult coho salmon in the Illinois, Middle, and Upper Rogue populations aggregated together for each year from 1980 to 2000. Recruits per spawner were less than replacement levels in eight of the years, indicating low productivity during those years (Figure 30-5).

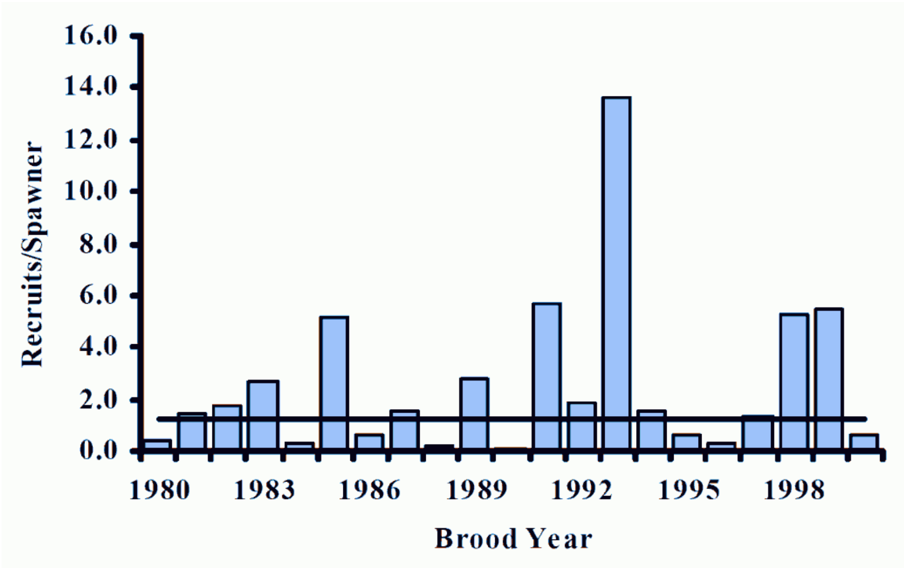

Figure 30-5. Recruit per spawner for brood years 1980 through 2000. Data are for the Rogue River, which includes the Middle Rogue, Upper Rogue, and Illinois River populations. Figure from ODFW 2005c.

Extinction Risk

The Illinois River population is at high risk of extinction. The ratio of the three consecutive years of lowest abundance within the last twelve years to the amount of IP-km in a watershed is greater than one; however, the population declined at a rate of ≥10% per year over the last two-to-four generations (both criteria described by Williams et al. (2008)). NMFS' determination of population extinction risk is based on the viability criteria provided by Williams et al. 2008 (Table 3, p. 17). These viability criteria are related to population size and rate of decline. As Williams et al. (2008) provided no viability criteria for assessing moderate and high risk based on spatial structure and diversity, spatial structure and diversity were not considered in NMFS' determination of population extinction risk.

Role in SONCC Coho Salmon ESU Viability

The Illinois River population is a core, Functionally Independent population within the Interior Rogue River diversity stratum; historically having had a high likelihood of persisting in isolation over 100-year time scales, and with population dynamics or extinction risk over a 100-year time period that are not substantially altered by exchanges of individuals with other populations (Williams et al. 2006). To contribute to stratum and ESU viability, the Illinois River core population needs to have at least 11,800 spawners. Sufficient spawner densities are needed to maintain connectivity and diversity within the stratum and continue to represent critical components of the evolutionary legacy of the ESU. Besides its role in achieving demographic goals and objectives for recovery, as a core population the Illinois population may serve as a source of spawner strays for other populations in the Rogue River basins: the Lower Rogue, Middle Rogue/Applegate, and Upper Rogue river populations.

30.4 Plans and Assessments

U.S. Forest Service, Rogue River-Siskiyou National Forest

Sucker Creek Watershed Aquatic Restoration Plan (USFS 2007)

This plan proposes to improve aquatic habitat in the Sucker Creek watershed through placing instream large wood, planting disease resistant Port Orford cedar, riparian thinning, increasing beaver supplementation populations, replacing culverts, and upgrading and decommissioning roads.

Sufficiency Assessment: Forest Service and Bureau of Land Management Programs in Support of SONCC Coho Salmon Recovery (USFS and BLM 2011)

The USFS has adopted a Watershed Condition Framework assessment and planning approach (USFS and BLM 2011). The Watershed Condition Framework (WCF) is a comprehensive approach for proactively implementing integrated restoration on priority watersheds on national forests and grasslands. The WCF provides the Forest Service with an outcome-based performance measure for documenting improvement to watershed condition at forest, regional, and national scales. As part of the WCF, Middle Sucker Creek, Grayback Creek, and Dunn Creek were identified as high priority 6th field sub-watersheds in Rogue-Siskiyou National Forest (USFS and BLM 2011). Watershed Restoration Action Plans (WRAPs), which update existing watershed analyses, are part of the WCF and were completed for each priority sub-watershed. USFS and BLM (2011) summarizes these WRAPs and describes, for each sub-watershed: the rationale for its priority status, key issues, essential projects, and partnership opportunities.

U.S. Bureau of Land Management (Medford District)

Lower East Fork Illinois Watershed Water Quality Restoration Plan (BLM 2006)

West Fork Illinois Watershed Water Quality Restoration Plan (BLM 2007)

These plans describe base flow, riparian condition, and channel condition in the watersheds and identify goals, objectives, and proposed management measures to improve water quality.

State of Oregon

Expert Panel on Limiting Factors for Oregon's SONCC coho salmon populations

ODFW (2008b) convened a panel of fisheries and watershed science experts as an initial step in their development of a recovery plan for Oregon's SONCC coho salmon populations. Deliberations of the expert panel provided ODFW with initial, strategic guidance on perceived limiting factors and threats to recovery. Based on the input of panel members, ODFW (2008b) summarized the concerns for the Illinois River are as follows:

Key concerns were related to loss of over-winter tributary habitat complexity and access and over-summer water temperatures and habitat access. Over-winter tributary habitat, especially in the lowlands, has been impacted by past and current agricultural practices and an interruption in the transport and presence of large wood. Access to habitat has been limited by road crossings. Summer habitat is limiting because high water temperatures have resulted from land management actions in the riparian zone and straightening of channels and water management actions for agricultural purposes. Water withdrawals and diversions have also limited the amount of, and access to, summer habitat and thermal refuge.

Secondary concerns spanned a number of life history stages and locations. Unscreened diversions and non-criteria screens at diversions affect fry, summer parr, and out-migrating smolts. Summer juvenile habitat has been impacted by a loss of tributary habitat complexity, especially in the lowlands, caused by past and current agricultural practices and an interruption in the transport and presence of large wood. Access to summer thermal refuge habitat by juveniles has also been affected by road crossings. Non-native vegetation is a secondary factor contributing to higher water temperatures affecting summer parr by limiting native riparian vegetation. A reduction in floodplain connectivity has affected winter parr. Access to spawning habitat by returning adults is limited by road crossings and diversion structures. Finally, reduced estuarine habitat for smolts due to past and current forestry practices and rural residential development is another impact.

Oregon Plan for Salmon and Watersheds
http://www.oregon.gov/OPSW/about_us.shtml

The state of Oregon developed a conservation and recovery strategy for coho salmon in the SONCC and Oregon Coast ESUs (State of Oregon 1997). The Oregon Plan for coho salmon is comprehensive and includes voluntary actions for all of the threats currently facing coho salmon in these ESUs and involves all relevant state agencies. Reforms to fishery harvest and hatchery programs were implemented by ODFW in the late 1990s. Many habitat restoration projects have occurred across the landscape in headwater habitat, lowlands, and the estuary. The action plans, implementation, and annual reports can be found at the web site.

ODFW Coastal Salmonid Inventory Project

ODFW has monitored coho salmon in the Illinois River as part of their Coastal Salmonid Inventory Project. From 1998 to 2004, ODFW conducted dives to count juvenile coho salmon in the Illinois Valley (ODFW 2005a) (Figure 30-2). ODFW also estimated the abundance of adult coho salmon in the Illinois River from 2002 to 2004 and from 2006 to 2008 (ODFW 2011).

Southwest Oregon Salmon Restoration Initiative

The Southwest Oregon Salmon Restoration Initiative (Prevost et al. 1997) was created to help fulfill a memorandum of understanding between ODFW and the National Marine Fisheries Service (NMFS) to recover coho salmon. The initiative provides the framework for recovery in southwest Oregon and helped foster formation of watershed councils. The initiative designated

Sucker/Grayback Creek, East Fork Illinois, Althouse Creek, Elk Creek/Broken Kettle Creek, and Dunn Creek as "core areas" in the Illinois River watershed that are the highest priority for restoration in the Oregon component of the SONCC coho ESU.

Water Requirements of Rogue River Fish and Wildlife

ODFW fisheries biologists (Thompson and Fortune 1970) conducted widespread surveys of the Rogue River basin to assess water flow and its effect on fish habitat and carrying capacity for salmonids. The study was designed to inform the Oregon Water Resources Board so that a "beneficial water use program" could be developed. Thompson and Fortune (1970) contains comprehensive flow tables for all major coho salmon producing tributaries in the Rogue River basin, including recommended minimum flows. It also provides a summary of the Rogue River basin fish community, including the Illinois River. The report identified flow depletion as a major cause of stress, disease, and predation to Pacific salmonids.

Illinois River Total Maximum Daily Load Reports

Total Maximum Daily Load (TMDL) reports have been completed for lower (ODEQ 2002c) and upper Sucker Creek (ODEQ 1999). In addition, a TMDL for the remainder of the Illinois and Rogue River basin was recently completed (ODEQ 2008).

Illinois Valley Watershed Council

Rogue River Watershed Health Factors Assessment

The Rogue Basin Coordination Council (RBCC) produced the Rogue River Watershed Health Factors Assessment on behalf of the watershed councils within the basin (RBCC 2006). The assessment rates aquatic health and watershed conditions, including wildfire risk. Key problems in different Rogue River watersheds are identified and potential solutions are proposed. Recognized problems in the Illinois River sub-basin are related to low stream flows and high summer water temperature.

30.5 Stresses

Table 30-2. Severity of stresses affecting each life stage of coho salmon in the Illinois River. Stress rank categories, assessment methods, and data used to assess stresses are described in Appendix B.

	Stresses	Egg	Fry	Juvenile[1]	Smolt	Adult	Overall Stress Rank
1	Altered Hydrologic Function[1]	Medium	Very High	Very High[1]	Very High	High	Very High
2	Degraded Riparian Forest Conditions[1]	Medium	Very High	Very High[1]	Very High	Very High	Very High
3	Lack of Floodplain and Channel Structure	Medium	High	Very High	High	High	Very High
4	Impaired Water Quality	Low	High	Very High	High	Low	High
5	Altered Sediment Supply	High	High	High	Medium	High	High
6	Impaired Estuary/Mainstem Conditions	-	High	High	Very High	High	Very High
7	Barriers	-	Medium	High	High	High	High
8	Adverse Hatchery-Related Effects	Medium	Medium	Medium	Medium	Medium	Medium
9	Increased Disease/Predation/Competition	Low	Medium	Medium	Medium	Low	Medium
10	Adverse Fishery- and Collection-Related Effects	-	-	Low	Low	Medium	Low

[1]Key limiting stresses and limited life stage.

Limiting Stresses, Life Stages, and Habitat

The juvenile life stage is most limited and quality winter rearing habitat, as well as summer rearing habitat, is lacking. Juvenile summer rearing habitat is impaired by deficient floodplain and channel structure, high temperatures resulting from degraded riparian conditions, and altered hydrologic function from water withdrawals. Furthermore, degraded riparian forests inhibit future potential input of large wood and cannot provide bank stability that assists in a stable and complex channel. Finally, barriers throughout the sub-basin limit access to rearing habitat. These findings are consistent with those of the Oregon Expert Panel (ODFW 2008b) (Section 30.4).

Altered Hydrologic Function

Hydrologic function in the Illinois River sub-basin is severely altered by water diversion. The USFS (1999a) noted that Reeves Creek, a tributary with high IP habitat, was dry in three of five reaches surveyed in 1994, likely due to diversion. Thompson and Fortune (1970) assessed flows in 1967 and found that sections of the Illinois River system become seriously low and warm, or even dry, during the summer when irrigation diversions were particularly active and runoff was low. The extent to which these conditions persist is unknown.

High road density and widespread clear cutting, especially in rain-on-snow terrain, have somewhat altered peak flows (USFS 1997a, BLM 2004b). Base flows may decrease when dense stands of young trees that consume large amounts of water are established after clear cuts (Murphy 1995).

Lake Selmac, on Deer Creek tributary McMullin Creek, blocks several miles of coho salmon habitat (Figure 30-6). Channelization in portions of Deer and Thompson has resulted in disconnected floodplains in areas known to support juvenile coho salmon. Filling of wetlands and elimination of beaver caused loss of water storage capacity and reduced the areas of contact between surface water and groundwater.

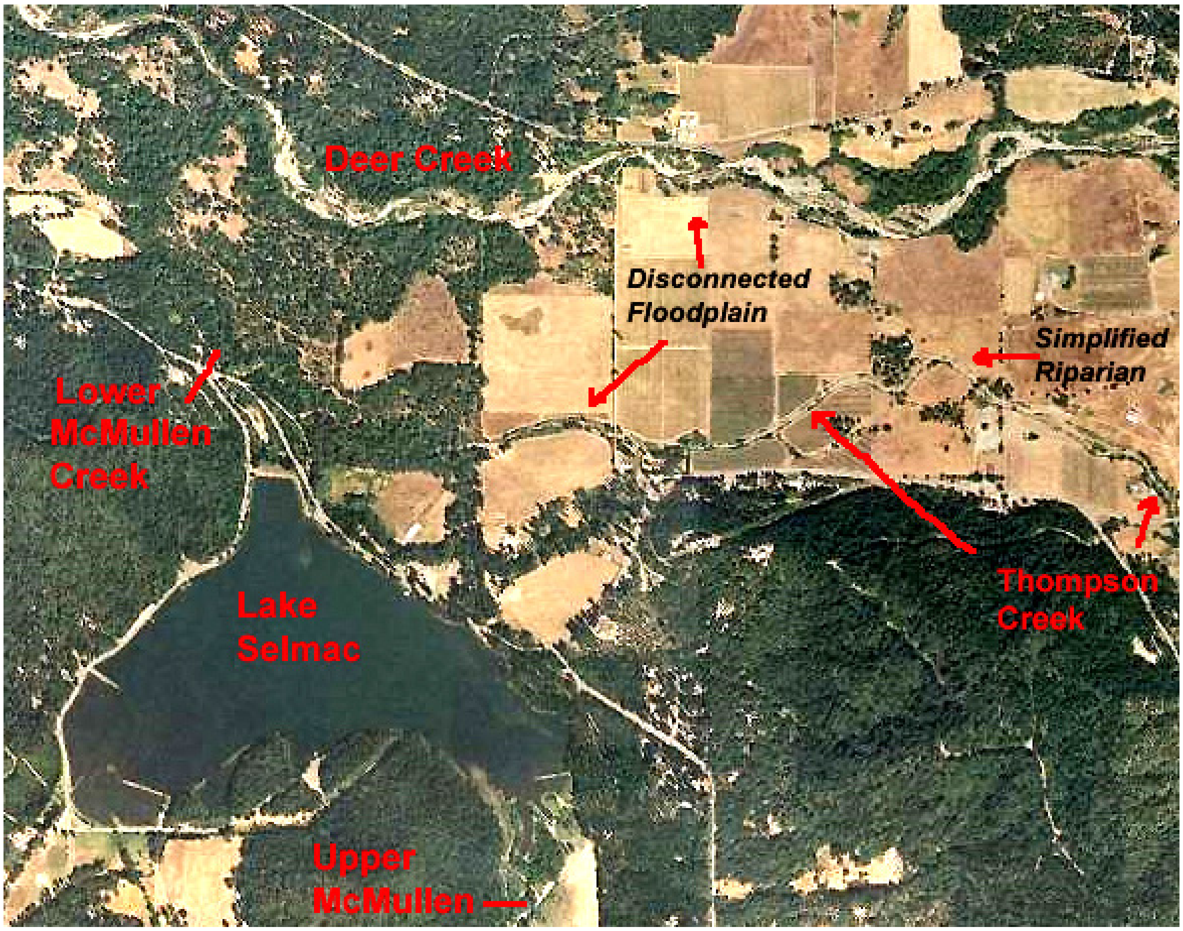

Figure 30-6. Lake Selmac blocks access to high IP coho salmon habitat. The habitat is in upper McMullin Creek. Hydrologic alteration is apparent in Thompson and Deer creeks, which have simplified channels disconnected from floodplains. June 2005.

Degraded Riparian Forest Conditions

Degraded riparian forest condition is one of the most significant stresses affecting coho salmon recovery in the Illinois River watershed. Reduction of riparian trees and gallery forests that once covered the alluvial valley floor led to reduced pool frequency and habitat simplification, has increased bank erosion, and contributed to stream warming by widening the waterways (BLM 1997, 2006, USFS 1997a). ODFW surveyed extensive reaches of coho salmon-bearing Illinois River reaches and tributaries (e.g., East Fork Illinois, West Fork Illinois, Deer, Sucker, Althouse, Elk) and found poor conifer density with fewer than 75 trees (>36” dbh) per 1000 feet. Only one upper Sucker Creek reach and the lower North Fork Deer Creek had 75 to 125 trees of this size, which rates as fair riparian conditions. Recent aerial photos show very simplified conditions in both tributary and mainstem Illinois River riparian zones. The riparian zones have been cleared or substantially modified along the mainstem Illinois River and at the mouth of Free and Easy Creek. Overall, there is a very low amount/volume of large wood in channels throughout the Illinois River sub-basin (USFS 1997a, BLM 2005a).

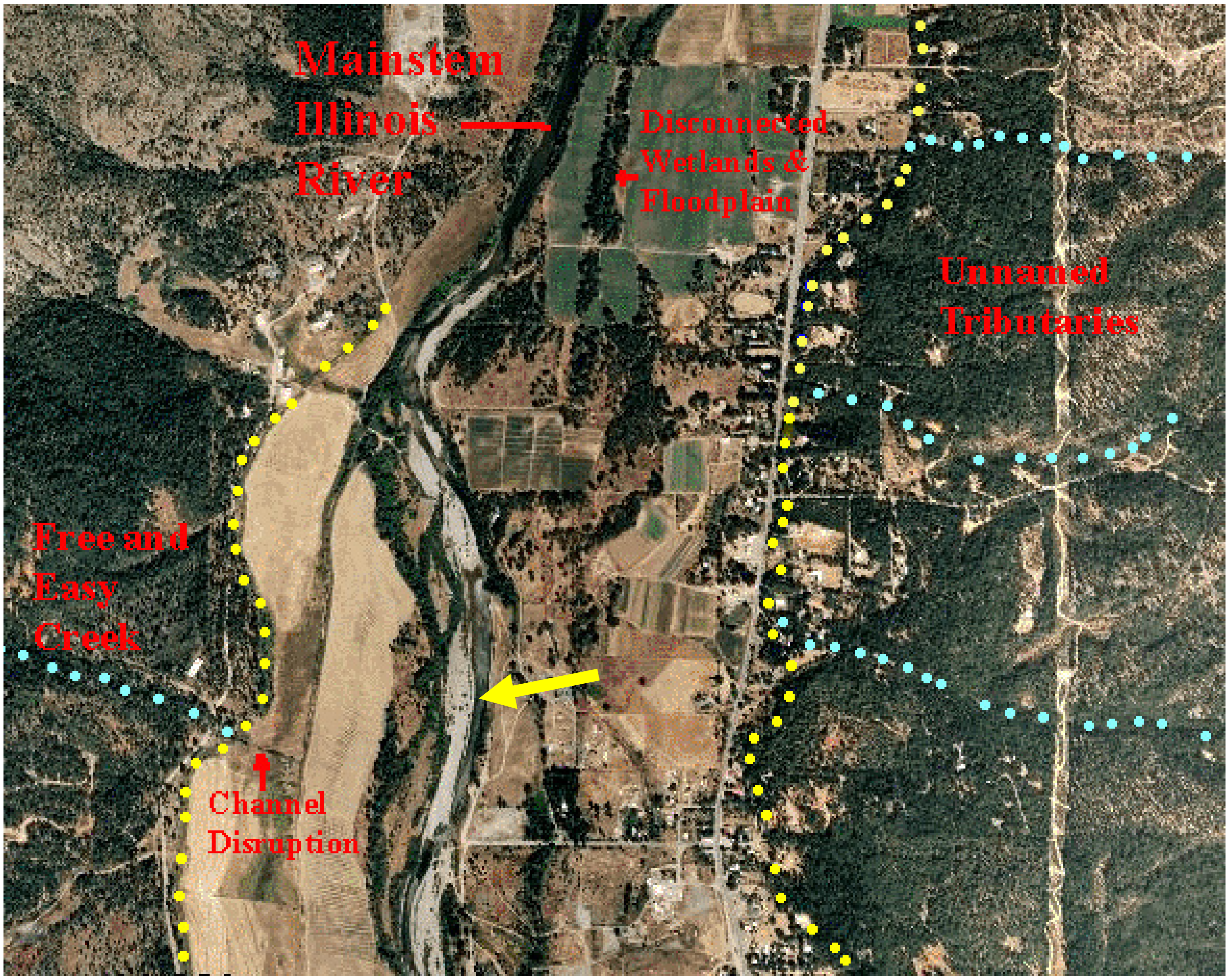

Figure 30-7. Aerial photo of Mainstem Illinois River. Free and Easy Creek (at left) appears to flow subsurface or into a ditch as it crosses the flood terrace. Wetlands and the floodplain of the mainstem are disconnected and there are few riparian trees (shown by large arrow at bottom of photograph). Dots aligned in an east/west configuration are USGS (1984) streams, and dots aligned in a south/north configuration are ditches.

Lack of Floodplain and Channel Structure

The straightening and simplification of streams has reduced the amount of slow, cool edgewater habitats where coho salmon fry and juveniles thrive (ODEQ 2008). Beaver have been greatly reduced along with the pools they create (ODFW 2005b). Although there are patches of functional coho salmon habitat, many Illinois River reaches and tributary channels do not support coho salmon (BLM 1997, USFS 1997a). Channelization of the mainstem Illinois River has disconnected it from much of its floodplain, reducing the physical processes that form coho salmon rearing and spawning habitat. These processes include side channel formation, accumulation of large wood jams, formation of slower water velocities, formation of pools, and lower shear stress. Smaller alluvial valley tributaries that cross the Illinois River floodplain have been channelized, which increases bed shear stress, causes down cutting, and can also trigger upstream gully erosion.

ODFW habitat surveys indicate poor wood levels (< 1 key piece per 100 meters) in most surveyed areas of the Illinois River watershed. Exceptions are Sucker Creek below Grayback Creek and headwater stream reaches, mostly on USFS or BLM lands, such as South and North Fork Deer, Bear, Elk, Crooks, Draper and White creeks. USFS large wood surveys found relatively higher wood levels in some lower and middle Illinois River watersheds; however, these reaches lack high IP habitat, In the upper portion of the Illinois River sub-basin, USFS surveys indicate higher levels of wood in much of Grayback, Left Fork Sucker, Sucker, and Bolan creeks, as well as the upper East Fork Illinois and its tributary Poker Creek. While the December 1996 storms washed out some large wood habitat improvement structures, natural large wood recruitment increased (USFS 1998c).

Impaired Water Quality

While the Illinois River has better ambient water quality than many other Rogue River sub-basins, it has widespread temperature impairment (ODEQ 1999, 2002c, 2008). Low summer flows contribute to warming as well as stagnation, algae blooms, elevated pH, and depressed dissolved oxygen (Thompson and Fortune 1970, ODEQ 1996). Pesticides and herbicides have the potential to harm coho salmon (NMFS 2008), but data are lacking for the Illinois River sub-basin. Poor water quality is a high stress to juvenile coho salmon and a low stress to adults.

Sixty-two percent of 126 stream miles surveyed by ODEQ failed to meet water quality standards (SO RC&D 2003). Headwaters streams in the Illinois River watershed often flow from federal lands where cool water temperatures allow high densities of coho salmon in the summer. ODEQ maximum weekly maximum temperature (MWMT) data shows that when streams cross onto private land they generally become too warm for coho salmon rearing within a short distance and can rise to nearly lethal temperatures as they are progressively dewatered. Variations between locations in streams like lower Sucker Creek show that temperatures are cooler where flows are replenished by springs or tributaries, then warm again as flows are diverted by downstream land owners. This pattern is also apparent in Deer Creek, Althouse Creek and the upper East and West forks of the Illinois River. Cold groundwater contributions may also be reduced or eliminated by groundwater pumping, but groundwater withdrawals have not been quantified (BLM 2004b).

Altered Sediment Supply

Sediment contribution from landslides and erosion occurs naturally in the Illinois River basin; however, roads, timber harvest, and bank erosion following removal of riparian vegetation have elevated fine sediment input. Excess fine sediment directly impacts egg viability and can reduce food for fry, juveniles and smolts. Key reaches of the West and East Fork Illinois River, Sucker Creek, Anderson and Draper creeks all have poor scores for fine sediment (<1 mm) in ODFW habitat surveys because spawning gravels have greater than 17 percent fines (Appendix B).

Extensive reaches of Deer Creek, Crooks Creek, lower Sucker Creek, and Althouse Creek have very good fine sediment scores (<12 percent fines) (Appendix B), indicating suitable coho salmon spawning conditions. Poor pool frequency and depth throughout the Illinois River sub-basin are likely due to elevated levels of fine sediment partially filling pools, a lack of scour-forcing obstructions such as large wood, and in some reaches diminished scour due to channel widening (Appendix B).

Impaired Estuary/Mainstem Function

Modification of the Rogue River estuary resulted in a loss of much of its historic function. Some portion of coho salmon fry and juveniles migrate out of their stream of origin in search of viable habitat patches, and these fish opportunistically use estuarine and slough habitats (Miller and Sadro 2003, Koski 2009). The lack of rearing habitat in the estuary limits the potential productivity of the entire Rogue River basin and NMFS ranked Impaired Estuary/Mainstem Function as an overall very high stress for coho salmon. The Lower Rogue River population profile contains a discussion of the causes of reduced estuarine function.

Barriers

The high level of stress caused by barriers to migration in the Illinois River basin is a result of high numbers of road stream crossings (i.e., as shown in Bredensteiner et al. 2003 maps); small, temporary agricultural dams (Prevost et al. 1997); permanent diversion structures; and large mainstem diversion dams. The Illinois River Watershed Council has worked cooperatively with diverters in the Illinois River sub-basin to decrease use of "push-up" gravel dams to divert irrigation water, which often blocks adult and juvenile movement (Prevost et al. 1997). In addition, unscreened diversions and non-criteria screens at diversions affect fry, juveniles, and smolts (ODFW 2008b). Pomeroy Dam, used to divert water just below the convergence of the East and West forks of the Illinois River, was identified as a fish passage barrier at some flow levels (USFS 1999a). Road stream crossings that prevent juvenile and adult access to habitat are also a concern (ODFW 2008b).

Adverse Hatchery-Related Effects

Cole Rivers Hatchery is located upstream of the Illinois population area in the Upper Rogue River sub-basin, and produces approximately 200,000 coho salmon smolts annually in addition to millions of hatchery spring Chinook, winter steelhead, and summer steelhead (ODFW 2008d). Straying into the Illinois River is thought to be uncommon (Good et al. 2005). From 1996 to 1998, none of the adults observed in spawner surveys of the Illinois River were of hatchery origin (Jacobs et al. 2002). Adverse hatchery-related effects pose a medium risk to all life stages, due to the presence of Cole Rivers Hatchery in the Rogue River basin (Appendix B).

Increased Disease/Competition/Predation

Salmonids in the Rogue River basin, including the Illinois River, had higher incidences of the fish diseases *furunculosis* and *columnaris* in reaches that were warm due to flow depletion (Thompson and Fortune 1970). Largemouth bass and other warm water species are stocked in Lake Selmac and private farm ponds (USFS 1999a). These fish can escape and pose the risk of competition with, and predation on, salmonids in the mainstem Illinois River (USFS 1999a).

Umpqua pikeminnow, are present in the lower reaches of Sucker Creek (USFS 1999a) as well as other warm, low-elevation streams of the Illinois River, and prey upon coho salmon. Exotic redside shiners also occur in these streams. Japanese knotweed, an invasive plant, has also been documented in the basin (Oregon Department of Agriculture 2010). Port Orford Cedar root-rot is a disease which is negatively impacting this important riparian species region-wide (Frissell 1992).

Adverse Fishery- and Collection-Related Effects

Based on estimates of the fishing exploitation rate, as well as the status of the population relative to depensation and the status of NMFS approval for any scientific collection (Appendix B), these activities pose a medium stress to adults and a low stress to juveniles and smolts.

30.6 Threats

Table 30-3. Severity of threats affecting each life stage of coho salmon in the Illinois River. Threat rank categories, assessment methods, and data used to assess threats are described in Appendix B.

Threats		Egg	Fry	Juvenile[1]	Smolt	Adult	Overall Threat Rank
1	Roads[1]	High	Very High	Very High[1]	Very High	Very High	Very High
2	Dams/Diversion[1]	Low	Very High	Very High[1]	Very High	High	Very High
3	Mining/Gravel Extraction	High	Very High	Very High	High	High	Very High
4	Agricultural Practices	Medium	High	High	High	High	High
5	Timber Harvest	High	High	High	High	Medium	High
6	Channelization/Diking	Medium	Medium	High	High	High	High
7	Climate Change	Low	Low	High	High	Medium	High
8	Road-Stream Crossing Barriers	-	Low	High	High	High	High
9	Hatcheries	Medium	Medium	Medium	Medium	Medium	Medium
10	Urban/Residential/Industrial Dev.	Low	Medium	Medium	Medium	Medium	Medium
11	High Severity Fire	Low	Medium	Medium	Medium	Medium	Medium
12	Invasive and Non-Native/Alien Species	Medium	Medium	Medium	Low	Low	Medium
13	Fishing and Collecting	-	-	Low	Low	Medium	Low

[1]Key limiting threats and limited life stage.

Key Limiting Threats

The two key limiting threats, those which most affect recovery of the population by influencing stresses, are roads and dams/diversions.

Roads

Road density is high in many areas of the Illinois River sub-basin. Roads were built to support timber harvest, residential and urban development, and highway systems. An extensive network of small, unpaved roads exists in many areas of the Illinois River watershed (Figure 30-8 and Figure 30-9). Many of these roads run alongside streams, and are known to yield chronic fine sediment and to pose elevated risk of catastrophic failure on steep slopes (USFS 1998c). NMFS (1995) recommended a road density limit of 2 miles of road per square mile of watershed (mi/sq. mi) to protect anadromous salmonids in interior Columbia River basins to limit sediment and cumulative watershed effects. Road density in the Illinois River sub-basin (Figure 30-10) is typically 2 to 4 mi/sq. mi on federal land (Prevost et al. 1997, USFS and BLM 2000, BLM 2005a), but may be higher than 8 mi/sq. mi on private timberlands and over 10 mi/sq. mi in rural residential areas (BLM 1997). Landslides triggered by roads during the November and December 1996 storms resulted in extensive sedimentation in Sucker and Grayback creeks (USFS 1998c). Damage resulted from road crossing failures and diversion of streams onto roadways, which increased fine sediment delivery to levels 2 to 3 times higher than unaffected watersheds (USFS 1998c).

Hydrologic effects of extensive road networks persist even when the roads are no longer used, because roads often continue to contribute fine sediment to streams and alter hydrology by intercepting ground water, channelizing water and transporting sediment down inboard ditches, or both. Erosive geology may require lower road density targets in some watersheds. For example, upper Sucker Creek has decomposed granitic soils that are prone to landsliding as well as chronic gully and surface erosion (USFS 1998c).

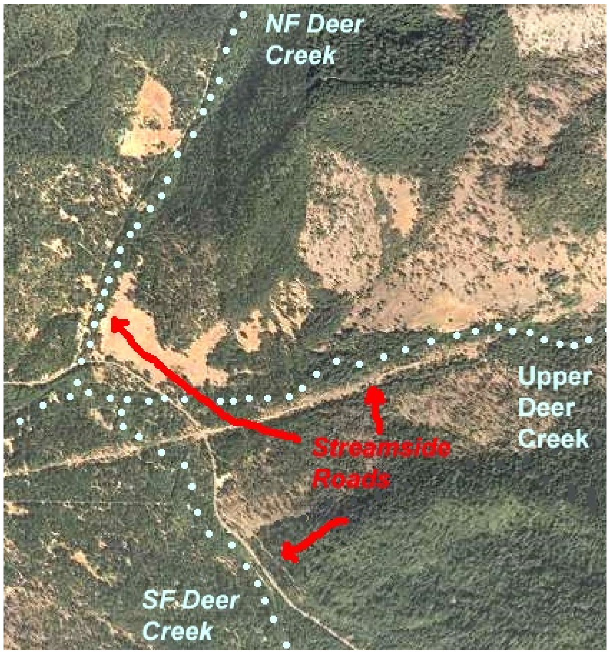

Figure 30-8. Aerial photo showing stream side roads. Roads parallel upper Deer Creek as well as the NF and SF. These roads chronically leach fine sediment into Deer Creek. Dots are USGS (1984) stream courses (1:24 K). Photo from 2005.

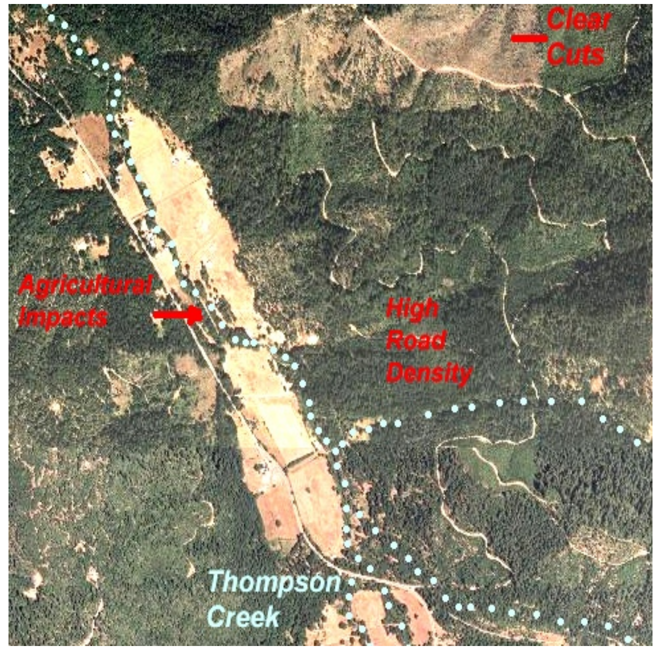

Figure 30-9. Aerial photo showing very high road densities in upper Thompson Creek. All of upper Deer Creek, which includes Thompson Creek, has a road density of 4 mi./sq. mi. Photo from 2005.

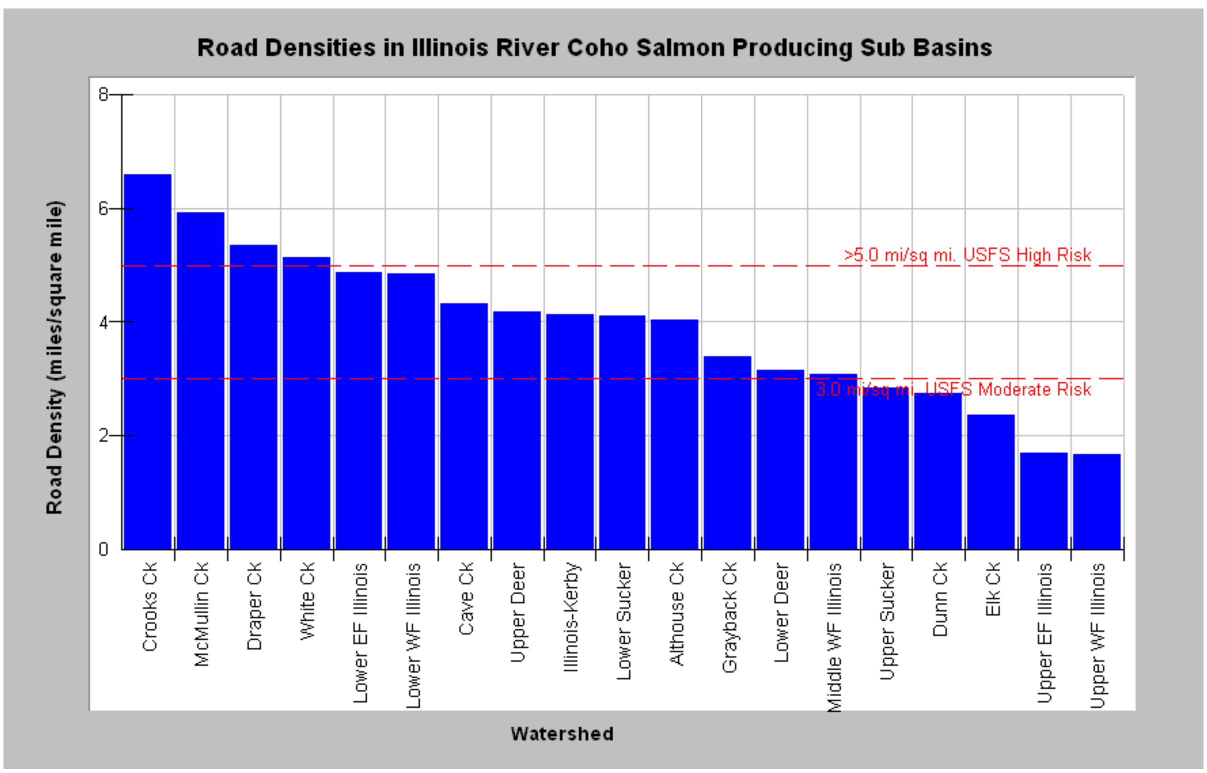

Figure 30-10. Road density in Illinois River coho salmon producing watersheds.

Dams/Diversions

Dams and diversions pose a very high threat to Illinois River coho salmon. Many diverted streams have the potential of drying during low flow periods (Thompson and Fortune 1970). Dry reaches were documented in Illinois River tributaries in late summer and fall 1967 including Deer, Anderson, Thompson, Elder, Little Elder, and Parker creeks. Many stream reaches still go dry annually. Figure 30-11 shows Deer Creek, which falls within high IP coho salmon habitat, running dry. Studies of the Illinois River watershed conclude that flows are the most limiting factor for fisheries, coho salmon habitat continues to be dewatered, and water quality impairment continues as a result of flow depletion (Thompson and Fortune 1970; USFS 1997a, 1999a; BLM 2004b, 2005, 2006, 2007).

The two large dams in the Illinois River sub-basin are at Lake Selmac (Figure 30-6) and the Pomeroy Diversion Dam approximately 0.5 miles below the convergence of the East Fork and West Fork Illinois. Pomeroy Dam is known to hinder salmonid migration in some seasons, particularly for downstream migrating juveniles (USFS 1999a). While passage has been improved, some small diversions still pose the risk of entraining juvenile coho salmon and smolts.

Figure 30-11. A high IP coho salmon reach of Deer Creek, a tributary to the Illinois River. Photo taken September 22, 2009.

Mining/Gravel Extraction

Potential impacts of mining on Illinois River salmonids may alter the ecological integrity of the area (Bredensteiner et al. 2003). The majority of the occupied IP in the Illinois River watershed occurs on federal lands (Figure 30-1), where mining access is permitted under the 1872 Mining Law. Gold mining on federal lands often occurs on those lower gradient stream reaches that are located just upstream of private lands; these reaches are very important to coho salmon and they represent the best low gradient habitat available. The USFS alone has 385 active mining claims within one mile of SONCC coho salmon critical habitat (USFS 2013), the impacts of which will continue into the future for at least the next ten years. There are two gold mining claims under consideration on lower gradient federal lands in Sucker Creek, an area with high IP that currently supports juvenile coho salmon (Section 30.3). The location of such mining contributes to the severity of the threat to coho salmon in the Illinois River. Gravel mining has intensified along the mainstem East Fork Illinois River and pits that can capture juvenile coho salmon, coho salmon smolts, and adult coho salmon during high flows events have been excavated in the floodplain. Most of these stranded fish perish could perish if no outlet is available when flows recede.

Agricultural Practices

The extent of agriculture, while not large, coincides with broad alluvial valleys associated with high IP (>0.66) coho salmon habitat (Williams et al. 2008). Agricultural impacts include water diversion (BLM 1997, USFS 1997a), grazing, wetland filling, channelization and diking, riparian removal, channel simplification, and chemical application. It is likely that pesticides known to harm salmonids (NMFS 2008) are used in the region. However, information regarding pesticide and herbicide use in the Illinois River sub-basin and the SONCC coho salmon ESU is unavailable (Riley, S., pers. comm. 2009). Herbicide use in the nearby Upper Rogue sub-basin has resulted in fish kills that included coho salmon (Ewing 1999). The USFS and BLM have permitted grazing allotments in the Illinois River population area and grazing occurs on private lands as well.

Timber Harvest

Timber harvest levels were estimated to be between 10 to 25 percent on USFS and BLM lands in the East Fork Illinois River and Sucker, Grayback and Althouse creeks according to Landsat comparisons between 1972 and 1992 imagery. Many Illinois River tributaries are surrounded by harsh terrestrial conditions, such as decomposed granitic soils in upper Sucker Creek (USFS 1997a), that make re-establishing forests problematic. Timber harvest in these types of locations can lead to very dry soil conditions if duff is removed or burned. Failure to re-establish forest cover can lead to increased fine sediment delivery to streams for decades. In addition, the Independent Multidisciplinary Science Team (IMST 1999) concluded that the Oregon Forest Practice Rules for riparian protection, large wood management, sedimentation, and fish passage are not adequate to recover depressed stocks of wild salmonids. Approximately 81 percent of the land in the Illinois River population area is managed by the federal government; therefore, the threat from ongoing and future timber harvest on these lands will likely decrease over the next ten years. However, the vast majority of stream reaches on USFS and BLM lands are too steep or otherwise unsuitable for coho salmon. Most habitat with potential to support coho salmon is privately owned and managed under Oregon's Forest Practices Act, which NMFS' analysis determined has the lowest score for watershed protection measures of all management methods evaluated (Appendix B). Therefore, although much of the habitat in the Illinois River is federally owned, the future threat of timber harvest in the next ten years is high because much of the habitat with the best potential to support coho salmon will be harvested using less protective management actions than those used on Federal lands.

Channelization/Diking

Channelization and confinement of mainstem and tributary reaches of the Illinois River is widespread. Disconnecting high IP coho salmon streams from their floodplains and constricting their channels into straight, narrow stream courses greatly diminishes their summer and winter habitat carrying capacity (BLM 1997). These activities also tend to reduce surface-groundwater connections that help maintain cool stream temperatures (ODEQ 2008).

Climate Change

The current climate is generally warm and modeled regional average air temperature suggests a large increase over the next 50 years (see Appendix B for climate change threat ranking methodology). Average air temperature could increase by over 2 ^{o}C in the summer and by 1 ^{o}C in the winter. Annual precipitation in this area is predicted to stay within the natural range of current variability; however seasonal patterns in precipitation may change (Mote and Salathe 2010). Van Kirk and Naman (2008) documented decreasing snow pack below 6,000 feet over the last 20 years in the Klamath Mountains. If this trend continues, the water supply will be affected in watersheds such as Deer, Grayback and Sucker creeks, and the upper East and West Fork Illinois rivers. Coho salmon juvenile and smolt rearing and migratory habitat are most at risk to climate change. Rising sea level may affect the quality and extent of wetland rearing habitat. Adult Illinois River coho salmon will be negatively affected by ocean acidification and changes in ocean conditions and prey availability (see Independent Science Advisory Board 2007, Portner and Knust 2007, Feely et al. 2008).

Road-Stream Crossing Barriers

Road densities in portions of the Illinois River sub-basin are very high and stream-side roads are common. Culverts under road-stream crossings may block upstream migration for adults or passage for juveniles and smolts during low flow periods.

Hatcheries

Hatcheries pose a medium threat to all life stages of coho salmon in the Illinois River. The rationale for these ratings is described under the “Adverse Hatchery-Related Effects” stress.

Urban/Residential/Industrial Development

Rural residential development is expanding and may have a substantial impact on water supply in the Illinois River sub-basin. Each landowner may use surface water from nearby streams or drill a well, which may in some cases be connected to, and deplete, surface flows (BLM 2004b). Rural residences can also contribute to pollution due to extensive road networks, leakage from septic systems, and the use of pesticides and herbicides.

High Severity Fire

The potential for fire is great due to high summer air temperatures and degraded forest conditions. Early seral stage forests lead to dry site conditions and increased fire risk (SO RC&D 2003). Recent extensive fires include the 1987 Silver Fire and the 2002 Biscuit Fire, which was the largest fire in Oregon history and burned a great deal of the western part of the watershed (Azuma et al. 2004). Much of the area that burned is serpentine terrain within the Kalmiopsis Wilderness, which has frequent fires due to sparse vegetation and dry site conditions resulting from naturally poor soils (USFS 1999a). However, the shallow soil depth and low topographic relief in this terrain lessen risk of mass wasting and sediment pulses to streams below. Coho salmon are not commonly found in serpentine watersheds, so fires in those watersheds do not directly impact the species.

Invasive Non-Native/Alien Species

Thompson and Fortune (1970) documented widespread presence of introduced warm water game fish in the Rogue River basin. Lake Selmac and private agricultural ponds in the Illinois River sub-basin are noted as sources of these fish and ponds may be increasing in number with continued residential development (USFS 1999a). Competition or predation on juvenile coho salmon by most non-native warm water species is likely limited in the winter because warm water species are washed downstream by high winter flows. However, in the summer, warm water conditions created by flow depletion give these introduced species a competitive advantage over salmonids. Umpqua River pikeminnow have been documented in lower Sucker Creek (USFS 1999a). This species is of particular concern because it is adapted to swift rivers and may pose a risk of competition and predation on coho salmon smolts during spring out-migrations. A similar situation occurs in the Eel River basin in California where the introduction of the Sacramento pikeminnow has caused major ecological problems (Brown and Moyle 1990).

Fishing and Collecting

Based on estimates of the fishing exploitation rate, as well as the status of the population relative to depensation and the status of NMFS approval for any scientific collection (Appendix B), these activities pose a medium threat to adults and a low stress to juveniles and smolts.

30.7 Recovery Strategy

The most immediate need for habitat restoration and threat reduction in the Illinois River sub-basin is in those areas currently occupied by coho salmon in the following watersheds: West Fork Illinois River, Wood Creek, East Fork Illinois River, Althouse Creek, Sucker Creek, and Deer Creek. Currently unoccupied habitat must also be restored to provide sufficient habitat to achieve coho salmon recovery.

The degraded condition of habitat in the Illinois River sub-basin, combined with the depressed coho salmon population size and distribution, increases the risk of extinction of this inland coho salmon population which is expected play a critical role in recovery of the Interior Rogue River diversity stratum. The most important factor limiting recovery of coho salmon in the Illinois River is a deficiency in the amount and distribution of suitable rearing habitat for juveniles. The processes that create and maintain such habitat must be restored by restoring flow, increasing habitat complexity within the channel, restoring off-channel rearing areas, and reducing identified threats to instream habitat. The effects of fishing on this population’s ability to meet its viability criteria should be evaluated.

Table 30-4 on the following page lists the recovery actions for the Illinois River population.

Table 30-4. Recovery action implementation schedule for the Illinois River population. Recovery actions for monitoring and research are listed in tables at the end of Chapter 5.

Action ID	Target	KLS/T	Strategy	Action Description	Area	Priority
Step ID	*Step Description*					
SONCC-IllR.7.3.52	Riparian	No	Improve agricultural practices	Improve regulatory mechanisms	Population wide	1
SONCC-IllR.7.3.52.1	*Determine the best way to revise the Agricultural Water Quality Management Act (AWQMAP) so that it does not limit recovery of SONCC coho salmon and recommend appropriate revisions*					
SONCC-IllR.7.3.52.2	*Ensure basin rules are specific and linked to implementing AWQMAP recommendations, including developing specific standards for riparian buffers*					
SONCC-IllR.7.3.52.3	*Ensure that AWQMA plans address both impaired areas and proactive prevention of water quality impairment*					
SONCC-IllR.7.3.52.4	*Adopt interim buffers equal to the buffer standards NMFS is recommending in Washington state until the state establishes its own buffers*					
SONCC-IllR.7.3.52.5	*Develop a process in the AWQMA Program that tracks and evaluates implementation*					
SONCC-IllR.7.3.52.6	*Change the complaint-based compliance monitoring process to a focused compliance program*					
SONCC-IllR.7.2.53	Riparian	No	Improve timber harvest practices	Improve regulatory mechanisms	Population wide	1
SONCC-IllR.7.2.53.1	*Determine how to revise Oregon Forest Practice Rules so that they do not limit recovery of SONCC coho salmon and make appropriate revisions*					
SONCC-IllR.7.2.53.2	*Adopt rules for fish-bearing streams sufficient to protect both water quality and fish habitat*					
SONCC-IllR.7.2.53.3	*Adopt rules to increase protection of non-fish-bearing streams that address practices that adversely impact water quality and fish habitat*					
SONCC-IllR.7.2.53.4	*Ensure management measures for landslide prone areas include protection of water quality and fisheries habitat*					
SONCC-IllR.7.2.53.5	*Until more permanent regulatory mechanisms can be put in place, immediately adopt interim rules that increase protection for salmon habitat in forested areas, including increased natural recruitment of large wood on perennial and intermittent streams, increased shade on perennial streams, and protective buffers on intermittent streams*					
SONCC-IllR.3.1.4	Hydrology	Yes	Improve flow timing or volume	Improve regulatory mechanisms	East and West Forks of the Illinois, Deer, Sucker, Elk, Althouse creeks, and all streams where coho salmon would benefit immediately	2a
SONCC-IllR.3.1.4.1	*Quantify groundwater withdrawal and determine maximum amount available for use without significantly reducing instream flows*					
SONCC-IllR.3.1.4.2	*Quantify groundwater withdrawal and ensure urban/residential/industrial development does not limit recovery of SONCC coho salmon*					
SONCC-IllR.3.1.5	Hydrology	Yes	Improve flow timing or volume	Improve regulatory mechanisms	East and West Forks of the Illinois, Deer, Sucker, Elk, Althouse creeks, and all streams where coho salmon would benefit immediately	2a
SONCC-IllR.3.1.5.1	*Establish a comprehensive groundwater permit process*					

Action ID	Target	KLS/T	Strategy	Action Description	Area	Priority
Step ID	*Step Description*					
SONCC-IllR.3.1.77	Hydrology	Yes	Improve flow timing or volume	Improve regulatory mechanisms	Population wide	2b
SONCC-IllR.3.1.77.1	*Quantify groundwater withdrawal and determine maximum amount available for use without significantly reducing instream flows*					
SONCC-IllR.3.1.77.2	*Quantify groundwater withdrawal and ensure urban/residential/industrial development does not limit recovery of SONCC coho salmon*					
SONCC-IllR.3.1.79	Hydrology	Yes	Improve flow timing or volume	Improve regulatory mechanisms	Population wide	2b
SONCC-IllR.3.1.79.1	*Establish a comprehensive groundwater permit process*					
SONCC-IllR.3.1.46	Hydrology	Yes	Improve flow timing or volume	Increase instream flows	All streams with ODFW water rights for fish and all streams where coho salmon would benefit immediately	2a
SONCC-IllR.3.1.46.1	*Secure adequate instream flows to fulfill ODFW water rights for fish*					
SONCC-IllR.3.1.78	Hydrology	Yes	Improve flow timing or volume	Increase instream flows	Population wide	2b
SONCC-IllR.3.1.78.1	*Secure adequate instream flows to fulfill ODFW water rights for fish*					
SONCC-IllR.2.1.9	Floodplain and Channel Structure	Yes	Increase channel complexity	Improve suction dredging practices	All streams where coho salmon would benefit immediately	2a
SONCC-IllR.2.1.9.1	*Assess the impacts of suction dredging and develop suction dredging regulations that minimize or prevent impacts to coho salmon. Consider special closed areas, closed seasons, and restrictions on methods and operations*					
SONCC-IllR.2.1.72	Floodplain and Channel Structure	Yes	Increase channel complexity	Improve suction dredging practices	Population wide	2b
SONCC-IllR.2.1.72.1	*Assess the impacts of suction dredging and develop suction dredging regulations that minimize or prevent impacts to coho salmon. Consider special closed areas, closed seasons, and restrictions on methods and operations*					
SONCC-IllR.2.1.34	Floodplain and Channel Structure	Yes	Increase channel complexity	Increase LWD, boulders, or other instream structure	All streams where coho salmon would benefit immediately	2a
SONCC-IllR.2.1.34.1	*Assess habitat to determine beneficial location and amount of instream structure needed*					
SONCC-IllR.2.1.34.2	*Place instream structures, guided by assessment results*					

Action ID	Target	KLS/T	Strategy	Action Description	Area	Priority
Step ID	*Step Description*					
SONCC-IllR.2.1.71	Floodplain and Channel Structure	Yes	Increase channel complexity	Increase LWD, boulders, or other instream structure	Population wide	2b
SONCC-IllR.2.1.71.1	*Assess habitat to determine beneficial location and amount of instream structure needed*					
SONCC-IllR.2.1.71.2	*Place instream structures, guided by assessment results*					
SONCC-IllR.2.2.7	Floodplain and Channel Structure	Yes	Reconnect the channel to the floodplain	Construct off channel habitats, alcoves, backwater habitat, and old stream oxbows	All streams where coho salmon would benefit immediately	2a
SONCC-IllR.2.2.7.1	*Assess habitat to determine where potential exists for floodplain reconnection. Prioritize sites and determine best means for reconnection at each site using tools such as hydrologic analysis*					
SONCC-IllR.2.2.7.2	*Implement restoration projects that improve off channel habitats to create refugia habitat, as guided by assessment results*					
SONCC-IllR.2.2.74	Floodplain and Channel Structure	Yes	Reconnect the channel to the floodplain	Construct off channel habitats, alcoves, backwater habitat, and old stream oxbows	Population wide	2b
SONCC-IllR.2.2.74.1	*Assess habitat to determine where potential exists for floodplain reconnection. Prioritize sites and determine best means for reconnection at each site using tools such as hydrologic analysis*					
SONCC-IllR.2.2.74.2	*Implement restoration projects that improve off channel habitats to create refugia habitat, as guided by assessment results*					
SONCC-IllR.2.2.64	Floodplain and Channel Structure	Yes	Reconnect the channel to the floodplain	Improve regulatory mechanisms	Population wide	2a
SONCC-IllR.2.2.64.1	*Improve protective regulations for beaver and develop guidelines for relocation that are practical for restoration groups*					
SONCC-IllR.2.2.8	Floodplain and Channel Structure	Yes	Reconnect the channel to the floodplain	Increase beaver abundance	All streams where coho salmon would benefit immediately	2a
SONCC-IllR.2.2.8.1	*Develop a beaver conservation plan that includes education and outreach, technical assistance for landowners, and methods for reintroduction and/or relocation of beaver as a last resort*					
SONCC-IllR.2.2.8.2	*Implement education and technical assistance programs for landowners, guided by the plan*					
SONCC-IllR.2.2.8.3	*Reintroduce or relocate beaver if appropriate, guided by the plan*					
SONCC-IllR.2.2.75	Floodplain and Channel Structure	Yes	Reconnect the channel to the floodplain	Increase beaver abundance	Population wide	2b
SONCC-IllR.2.2.75.1	*Develop a beaver conservation plan that includes education and outreach, technical assistance for landowners, and methods for reintroduction and/or relocation of beaver as a last resort*					
SONCC-IllR.2.2.75.2	*Implement education and technical assistance programs for landowners, guided by the plan*					
SONCC-IllR.2.2.75.3	*Reintroduce or relocate beaver if appropriate, guided by the plan*					

Action ID	Target	KLS/T	Strategy	Action Description	Area	Priority
Step ID	*Step Description*					
SONCC-IllR.28.1.1	Roads	Yes	Reduce sediment delivery to streams	Reduce road-stream hydrologic connection	All basins with road densities greater than 3 mi/sq. mi	2a
SONCC-IllR.28.1.1.1	*Assess and prioritize road-stream connection, and identify appropriate treatments*					
SONCC-IllR.28.1.1.2	*Decommission roads, guided by assessment*					
SONCC-IllR.28.1.1.3	*Upgrade roads, guided by assessment*					
SONCC-IllR.28.1.1.4	*Maintain roads, guided by assessment*					
SONCC-IllR.28.1.76	Roads	Yes	Reduce sediment delivery to streams	Reduce road-stream hydrologic connection	Population wide	2b
SONCC-IllR.28.1.76.1	*Assess and prioritize road-stream connection, and identify appropriate treatments*					
SONCC-IllR.28.1.76.2	*Decommission roads, guided by assessment*					
SONCC-IllR.28.1.76.3	*Upgrade roads, guided by assessment*					
SONCC-IllR.28.1.76.4	*Maintain roads, guided by assessment*					
SONCC-IllR.3.1.67	Hydrology	No	Improve flow timing or volume	Increase instream flows	All streams where coho salmon would benefit immediately	2a
SONCC-IllR.3.1.67.1	*Identify and cease unauthorized water diversions*					
SONCC-IllR.3.1.69	Hydrology	No	Improve flow timing or volume	Increase instream flows	All streams where coho salmon would benefit immediately	2a
SONCC-IllR.3.1.69.1	*Identify diversions in tributaries that have subsurface or low flow barrier conditions during the summer*					
SONCC-IllR.3.1.69.2	*Reduce diversions using a combination of incentives and enforcement measures*					
SONCC-IllR.3.1.80	Hydrology	No	Improve flow timing or volume	Increase instream flows	Population wide	2b
SONCC-IllR.3.1.80.1	*Identify and cease unauthorized water diversions*					
SONCC-IllR.3.1.81	Hydrology	No	Improve flow timing or volume	Increase instream flows	Population wide	2b
SONCC-IllR.3.1.81.1	*Identify diversions in tributaries that have subsurface or low flow barrier conditions during the summer*					
SONCC-IllR.3.1.81.2	*Reduce diversions using a combination of incentives and enforcement measures*					
SONCC-IllR.3.1.6	Hydrology	Yes	Improve flow timing or volume	Educate stakeholders	Population wide	2b
SONCC-IllR.3.1.6.1	*Develop an educational program about water conservation programs and instream leasing programs*					

Action ID	Target	KLS/T	Strategy	Action Description	Area	Priority
Step ID	*Step Description*					
SONCC-IllR.28.2.50	Roads	Yes	Reduce pollutants and stormflow	Increase regulatory oversight	Population wide	2b
SONCC-IllR.28.2.50.1	*Strengthen city and county ordinances to minimize new impervious surfaces and require treatment to current standards*					
SONCC-IllR.28.2.50.2	*Strengthen city and county ordinances to require treatment to current standards when existing impervious surfaces are expanded, reconditioned, reconstructed or replaced*					
SONCC-IllR.28.2.50.3	*Develop local regulatory mechanisms that limit development and reduce amount of total impervious area through incentives*					
SONCC-IllR.28.1.2	Roads	Yes	Reduce sediment delivery to streams	Improve regulatory mechanisms	Population wide	2b
SONCC-IllR.28.1.2.1	*Develop grading ordinance for maintenance and building of private roads that minimizes the effects to coho*					
SONCC-IllR.2.3.43	Floodplain and Channel Structure	Yes	Reduce sediment mobilization and effects to channel morphology	Improve placer mining practices	Population wide	2b
SONCC-IllR.2.3.43.1	*Educate miners regarding the ESA, coho salmon, and effects to habitat from proposed placer mining activities*					
SONCC-IllR.2.3.43.2	*Revise regulations applicable to placer mining to minimize effects to SONCC coho salmon, including consideration of regulations specific to moderate and high IP streams*					
SONCC-IllR.7.1.47	Riparian	No	Improve wood recruitment, bank stability, shading, and food subsidies	Improve grazing practices	Private lands where coho salmon would benefit immediately	2b
SONCC-IllR.7.1.47.1	*Assess grazing contribution to sediment delivery, pollutants, and impaired riparian conditions*					
SONCC-IllR.7.1.47.2	*If problems are identified, develop and implement grazing management strategy that decreases delivery of sediment and pollutants to streams and improves riparian condition*					
SONCC-IllR.7.1.47.3	*Monitor effectiveness of grazing management to ensure grazing does not limit recovery of SONCC coho salmon*					
SONCC-IllR.7.1.83	Riparian	No	Improve wood recruitment, bank stability, shading, and food subsidies	Improve grazing practices	Population wide	2c
SONCC-IllR.7.1.83.1	*Assess grazing contribution to sediment delivery, pollutants, and impaired riparian conditions*					
SONCC-IllR.7.1.83.2	*If problems are identified, develop and implement grazing management strategy that decreases delivery of sediment and pollutants to streams and improves riparian condition*					
SONCC-IllR.7.1.83.3	*Monitor effectiveness of grazing management to ensure grazing does not limit recovery of SONCC coho salmon*					
SONCC-IllR.26.1.68	Low Population Dynamics	No	Increase population abundance	Rescue and relocate stranded juveniles	Population wide	2b
SONCC-IllR.26.1.68.1	*Survey coho-bearing tributaries and relocate juveniles stranded in drying pools*					

Action ID	Target	KLS/T	Strategy	Action Description	Area	Priority
Step ID	*Step Description*					
SONCC-IllR.7.1.48	Riparian	No	Improve wood recruitment, bank stability, shading, and food subsidies	Improve grazing practices	Federal lands	2d
SONCC-IllR.7.1.48.1	*Monitor effectiveness of grazing management to ensure grazing does not limit recovery of SONCC coho salmon*					
SONCC-IllR.7.1.11	Riparian	No	Improve wood recruitment, bank stability, shading, and food subsidies	Increase conifer riparian vegetation	Grayback, Sucker, Elk, Althouse, Deer Creeks, Federal forest lands	2d
SONCC-IllR.7.1.11.1	*Develop an appropriate timber harvest management plan for benefits to coho salmon habitat*					
SONCC-IllR.7.1.11.3	*Plant conifers, guided by the plan*					
SONCC-IllR.2.2.51	Floodplain and Channel Structure	Yes	Reconnect the channel to the floodplain	Re-connect channel to existing off-channel ponds, wetlands, and side channels	Mainstem Illinois River and all streams where coho salmon would benefit immediately	3a
SONCC-IllR.2.2.51.1	*Develop a plan to remove levees and reconnect priority channelized stream reaches to historic side channels and wetlands*					
SONCC-IllR.2.2.51.2	*Remove levees, guided by the plan*					
SONCC-IllR.2.2.51.3	*Reconnect historic side channels and wetlands, guided by the plan*					
SONCC-IllR.2.2.73	Floodplain and Channel Structure	Yes	Reconnect the channel to the floodplain	Re-connect channel to existing off-channel ponds, wetlands, and side channels	Population wide	3b
SONCC-IllR.2.2.73.1	*Develop a plan to remove levees and reconnect priority channelized stream reaches to historic side channels and wetlands*					
SONCC-IllR.2.2.73.2	*Remove levees, guided by the plan*					
SONCC-IllR.2.2.73.3	*Reconnect historic side channels and wetlands, guided by the plan*					
SONCC-IllR.5.1.16	Passage	No	Improve access	Remove barriers	All streams where coho salmon would benefit immediately, not including BLM lands	3b
SONCC-IllR.5.1.16.1	*Assess and prioritize barriers using the ODFW fish passage barrier database*					
SONCC-IllR.5.1.16.2	*Remove barriers, guided by the assessment*					
SONCC-IllR.5.1.36	Passage	No	Improve access	Remove barriers	BLM lands	3b
SONCC-IllR.5.1.36.1	*Evaluate and prioritize barriers for removal*					
SONCC-IllR.5.1.36.2	*Remove barriers, based on evaluation*					
SONCC-IllR.5.1.82	Passage	No	Improve access	Remove barriers	Population wide	3d
SONCC-IllR.5.1.82.1	*Assess and prioritize barriers using the ODFW fish passage barrier database*					
SONCC-IllR.5.1.82.2	*Remove barriers, guided by the assessment*					

Action ID	Target	KLS/T	Strategy	Action Description	Area	Priority
Step ID	*Step Description*					
SONCC-IllR.10.7.66	Water Quality	No	Restore nutrients	Add marine-derived nutrients to streams	All streams where coho salmon would benefit immediately	3b
SONCC-IllR.10.7.66.1	*Develop a plan to supply appropriate amounts of marine-derived nutrients to streams (e.g. carcass placement, pellet dispersal)*					
SONCC-IllR.10.7.66.2	*Supply marine-derived nutrients to streams guided by the plan*					
SONCC-IllR.10.7.70	Water Quality	No	Restore nutrients	Add marine-derived nutrients to streams	Population wide	3d
SONCC-IllR.10.7.70.1	*Develop a plan to supply appropriate amounts of marine-derived nutrients to streams (e.g. carcass placement, pellet dispersal)*					
SONCC-IllR.10.7.70.2	*Supply marine-derived nutrients to streams guided by the plan*					
SONCC-IllR.1.2.35	Estuary	No	Improve estuarine habitat	Improve estuary condition	Rogue River Estuary	3d
SONCC-IllR.1.2.35.1	*Implement recovery actions for Lower Rogue River population that address estuary habitat*					
SONCC-IllR.7.1.10	Riparian	No	Improve wood recruitment, bank stability, shading, and food subsidies	Improve long-range planning	Population wide	3d
SONCC-IllR.7.1.10.1	*Review General Plan or City Ordinances to ensure coho salmon habitat needs are accounted for. Revise if necessary*					
SONCC-IllR.7.1.10.2	*Develop watershed-specific guidance for managing riparian vegetation. Consider larger riparian buffers in coho occupied habitat*					
SONCC-IllR.7.1.33	Riparian	No	Improve wood recruitment, bank stability, shading, and food subsidies	Improve timber harvest practices	BLM lands	3d
SONCC-IllR.7.1.33.1	*Manage timber harvest (and associated activities) on Federal lands in accordance with the Aquatic Conservation Strategy of the NWFP, or with the updated ACS guidance contained in newly revised Resource Management Plans or Land and Resource Management Plans, in order to achieve riparian and stream channel improvements for coho salmon*					
SONCC-IllR.7.1.49	Riparian	No	Improve wood recruitment, bank stability, shading, and food subsidies	Increase regulatory oversight	All coho salmon bearing streams	3d
SONCC-IllR.7.1.49.1	*Strengthen city and county ordinances to limit development within the 100 year channel migration zone*					
SONCC-IllR.7.1.49.2	*Strengthen city and county ordinances to limit development within the 50 year flood elevation*					
SONCC-IllR.16.1.17	Fishing/Collecting	No	Manage fisheries consistent with recovery of SONCC coho salmon	Incorporate SONCC coho salmon VSP delisting criteria when formulating salmonid fishery management plans affecting SONCC coho salmon	SONCC recovery domain plus ocean; from shore to 200 miles off coasts of California and Oregon	3d
SONCC-IllR.16.1.17.1	*Determine impacts of fisheries management on SONCC coho salmon in terms of VSP parameters*					
SONCC-IllR.16.1.17.2	*Identify level of fishing impacts that does not limit attainment of population-specific viability criteria*					

Action ID	Target	KLS/T	Strategy	Action Description	Area	Priority
Step ID	*Step Description*					
SONCC-IllR.16.1.18	Fishing/Collecting	No	Manage fisheries consistent with recovery of SONCC coho salmon	Reduce fishing impacts to levels that do not limit recovery	SONCC recovery domain plus ocean; from shore to 200 miles off coasts of California and Oregon	3d
SONCC-IllR.16.1.18.1	*Determine actual fishing impacts*					
SONCC-IllR.16.1.18.2	*If actual fishing impacts limit attainment of population-specific viability criteria, modify management so that fishing does not limit attainment of population-specific viability criteria*					
SONCC-IllR.16.2.19	Fishing/Collecting	No	Manage scientific collection consistent with recovery of SONCC coho salmon	Incorporate SONCC coho salmon VSP delisting criteria when formulating scientific collection authorizations affecting SONCC coho salmon	SONCC recovery domain plus ocean; from shore to 200 miles off coasts of California and Oregon	3d
SONCC-IllR.16.2.19.1	*Determine impacts of scientific collection on SONCC coho salmon in terms of VSP parameters*					
SONCC-IllR.16.2.19.2	*Identify level of scientific collection impact that does not limit attainment of population-specific viability criteria*					
SONCC-IllR.16.2.20	Fishing/Collecting	No	Manage scientific collection consistent with recovery of SONCC coho salmon	Reduce impacts of scientific collection to levels that do not limit recovery	SONCC recovery domain plus ocean; from shore to 200 miles off coasts of California and Oregon	3d
SONCC-IllR.16.2.20.1	*Determine actual impacts of scientific collection*					
SONCC-IllR.16.2.20.2	*If actual scientific collection impacts limit attainment of population-specific viability criteria, modify collection so that impacts do not limit attainment of population-specific viability criteria*					
SONCC-IllR.10.2.13	Water Quality	No	Reduce pollutants	Educate stakeholders	Population wide	3d
SONCC-IllR.10.2.13.1	*Develop an educational program that promotes Salmon Safe methods for agricultural operations and Integrated Pest Management for rural residents*					
SONCC-IllR.10.2.45	Water Quality	No	Reduce pollutants	Increase regulatory oversight	Population wide	3d
SONCC-IllR.10.2.45.1	*Increase application of Low Impact Development (LID) techniques through education and incentives*					
SONCC-IllR.10.2.45.2	*Incorporate LID in Clean Water Act permits for projects that result in stormwater discharge*					
SONCC-IllR.10.2.41	Water Quality	No	Reduce pollutants	Reduce pesticides	Population wide	3d
SONCC-IllR.10.2.41.1	*Develop a pesticide management plan*					
SONCC-IllR.10.2.41.2	*Implement pesticide management plan and technical assistance program*					
SONCC-IllR.14.2.15	Invasive, Non-native Species	No	Reduce predation and competition	Manage non-native species	Population wide	3d
SONCC-IllR.14.2.15.1	*Assess feasibility and benefits of eradicating non-native fish species and develop a plan*					
SONCC-IllR.14.2.15.2	*Manage non-native fish species, guided by the plan*					