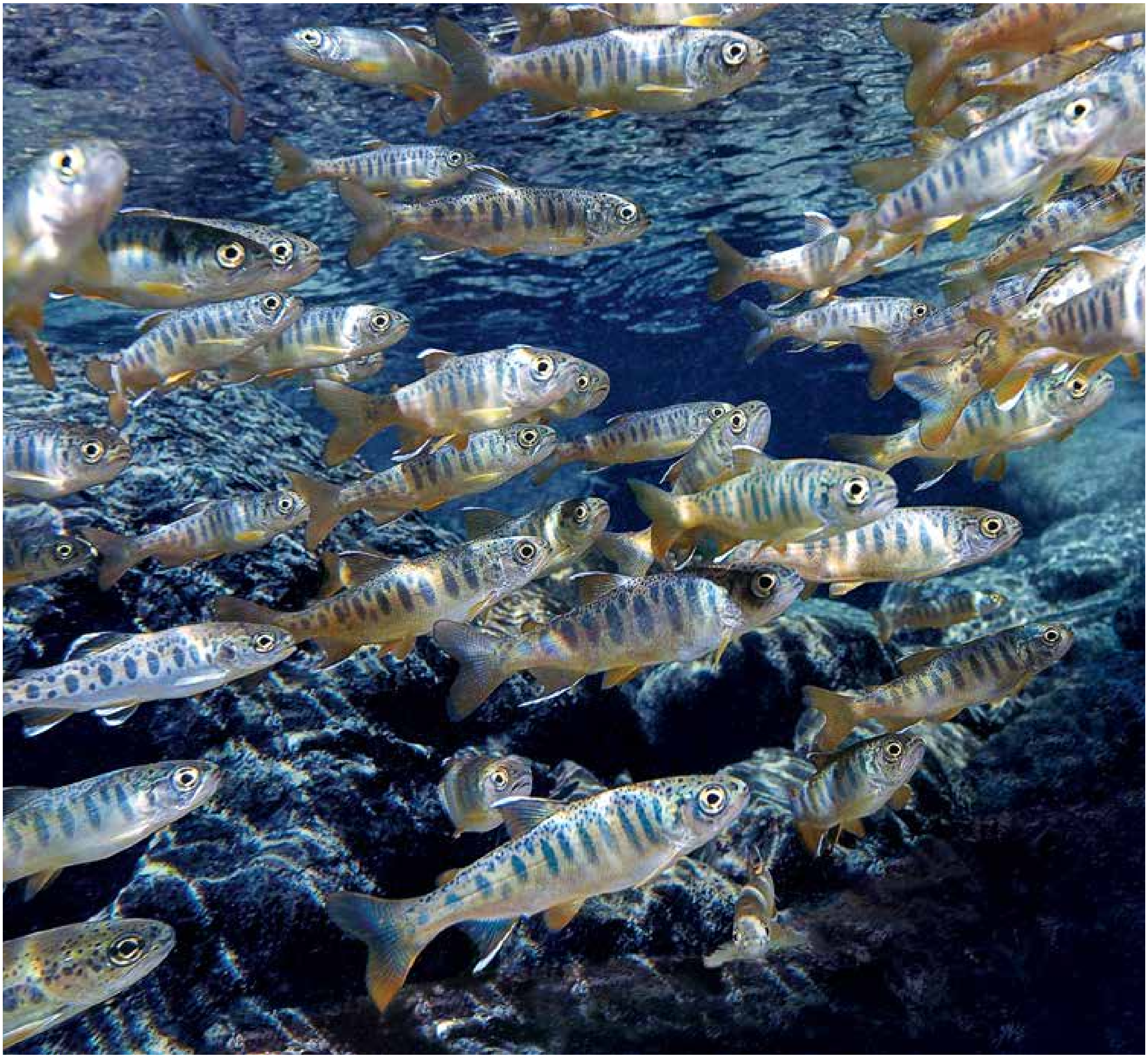
Strategic Action Plan for Coho Salmon Recovery

~ The Elk River ~


Juvenile coast coho by John McMillan. Cover photos: coho by Tom & Pat Leeson; Elk River by Tim Palmer. Back cover by Alamy.

Contributors and Acknowledgments

The Elk River Coho Partnership is a committed group of public and private partners dedicated to the recovery of the Elk River coho salmon population. This Strategic Action Plan (SAP) was developed by a "core team" of these partners, including:

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The core team would also like to thank the funders of both the planning effort – the Oregon Watershed Enhancement Board (OWEB) and Oregon Community Foundation – and the first partners that stepped up to support implementation – the National Fish and Wildlife Foundation (NFWF) and the NOAA Restoration Center.

This plan represents a cooperative effort on behalf of all of these partners to assimilate, focus, and build on the vast body of knowledge available on the Elk River watershed to accelerate the strategic protection and restoration of critical coho habitats. The team deeply appreciates the hard work of those who preceded us in this effort, who dedicated their careers to better understanding the Elk River watershed and to conserving its ecological value and singular beauty.

Acronyms

AQI	Aquatic Inventories Project
BLM	Bureau of Land Management
BMP	Best Management Practice
CAP	Conservation Action Plan
CIS	Conservation Implementation Strategy
CFS	Cubic Feet per Second
CWA	Clean Water Act
CWP	Curry Watersheds Partnership
DEQ	Oregon Department of Environmental Quality
EDRR	Early Detection, Rapid Response
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
GAG	Gorse Action Group
IP	Intrinsic Potential
KAS	Kalmiopsis Audubon Society
KEA	Key Ecological Attribute
LSR	Late Successional Reserve
MDN	Marine Derived Nutrients
NFWF	National Fish and Wildlife Foundation
NGOs	Non-governmental Organizations
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRCS	National Resources Conservation Service
OAHP	Oregon Agricultural Heritage Program
OC	Oregon Coast
ODA	Oregon Department of Agriculture
ODFW	Oregon Department of Fish and Wildlife
OWEB	Oregon Watershed Enhancement Board
OWRD	Oregon Water Resources Department
RM	River Mile
SAP	Strategic Action Plan
SOD	Sudden Oak Death
SONCC	Southern Oregon/Northern California Coast
SWCD	Soil and Water Conservation District
TMDL	Total Maximum Daily Load
TNC	The Nature Conservancy
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
WRAP	USFS Watershed Restoration Aquatic Action Plan
WRCA	Wild Rivers Coast Alliance
WRLT	Wild Rivers Land Trust
WSC	Wild Salmon Center

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Executive Summary

In 2015, the Wild Rivers Land Trust (WRLT) convened a planning process with several south coast partners to produce a Strategic Action Plan (SAP) for the recovery of the Elk River population of wild coho (*Oncorhynchus kisutch*). Working through a broader coast-wide recovery effort known as the "Coast Coho Business Plan," the Elk River Coho Partnership's (Elk Partnership) goal in developing the SAP was to prioritize habitat restoration work in the watershed through a transparent, science-driven process. In addition, the Elk Partnership sought to coordinate the work of local, state, and federal partners engaged in restoring the watershed in order to leverage more funding and accelerate the implementation of on-the-ground habitat restoration projects.

The Elk Partnership approached this effort guided by a vision to assess habitat restoration needs and emerging threats in the context of local social and economic priorities. This approach recognized the inextricable link between watershed health and the economic and social well-being of local residents and landowners. Accordingly, this plan proposes to restore those habitats that can provide the greatest return on investment, while preventing further habitat loss. Two essential objectives of this prevention strategy are to: 1) incentivize landowner stewardship and 2) stop the conversion of working agriculture and timber lands to uses that are less compatible with coho recovery. Ultimately, this plan is intended to be a guide for the community to showcase how investments in resource conservation can serve the needs of communities and wild salmon.

While watershed-scale plans increasingly move away from a single-species approach, this SAP focuses on coho recovery for several reasons. First, coho salmon are considered a "keystone" species, which numerous other plant and animal species rely on during some part of their life cycle. Second, coho spend over a year in freshwater, making them an excellent indicator of the health of the watershed year-round. Third, they are listed as a "threatened" species under the federal Endangered Species Act (ESA), which provides an opportunity to leverage state and federal funding in support of locally-led conservation efforts.

Young coast coho salmon spend roughly eighteen months in freshwater before migrating to the sea. During this freshwater residency, they rely heavily on instream pools and off-channel habitats that are connected to mainstem and tributary channels. These off-channel habitats include alcoves, beaver ponds, side channels, and tidal and freshwater wetlands. In addition to providing food resources, these habitats generate clean, cool water in the summer, and serve as refuge areas from high velocity flows in winter.

The watershed processes that produce and maintain these habitats have undergone significant changes since European settlement of the region began in the mid-19th century. Resource extraction activities like unsustainable timber harvesting, road building, and agricultural and residential development in floodplains have altered the 'key ecological attributes' (KEAs) of the watershed that are essential to the production of high-quality coho habitats. The modified KEAs that most severely limit coho production in the Elk River include: reduced large woody debris delivery and recruitment; reduced lateral connectivity between stream channels and their floodplains; reduced channel migration; reduced riparian (streamside) function; altered flows and bedload transport; and impaired water quality in the Elk's tributaries and mainstem (most notably elevated summer temperatures and sediment loads.)

The Elk River coho population is one of 19 functionally independent populations that comprise the Southern Oregon/ Northern California Coast (SONCC) coho salmon "evolutionarily significant unit" (ESU). The loss of habitats that have occurred in the Elk River watershed reflect broader losses that have taken place across the range of SONCC coho over the last 150 years. Ongoing declines in coho abundance and productivity throughout southwest Oregon and northern California led to the listing of the ESU under the Endangered Species Act in 1997. In 2014, the National Marine Fisheries Service (NMFS) completed a recovery plan for the ESU.

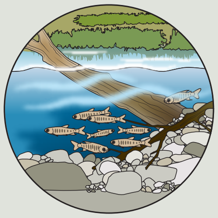
Ecological & Socio-economic Goals

The Elk Partnership drafted this SAP to advance both ecological and sociological goals in a manner that aligns with both local priorities and the federal recovery plan.

ECOLOGICAL & SOCIO-ECONOMIC GOALS	
1	Increase the technical assistance available to private landowners in the Elk River, promoting stewardship and the viability of working lands.
2	Reduce habitat fragmentation and sediment delivery from upland sources.
3	Increase the quality and extent of instream habitat in the mainstem and tributaries, while improving lateral connectivity with floodplain and off-channel habitats.
4	Improve water quality (temperature, sediment, and nutrient loads) by improving riparian (streamside) function along mainstem, tributary, and off-channel habitats.
5	Develop sufficient monitoring capacity for community partners to track the status and trends of critical indicators adopted in the SAP.

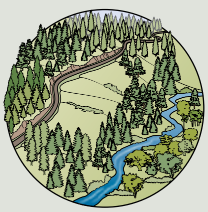
The Elk Partnership included a variety of projects in this SAP to achieve these goals. Collectively the projects advance a coordinated conservation strategy that seeks to: 1) restore watershed function in the long term, 2) reduce the primary limiting factors to coho production in the short term, and 3) continually prevent mounting ecological and

By 2033, the Elk Partnership will achieve the following restoration objectives:

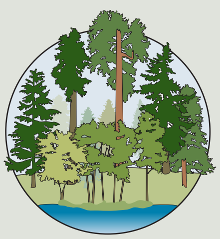


Instream Restoration:
Add large wood to **6 miles** of tributaries in the upper watershed.

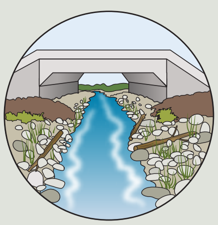
Re-meander and/or add large wood to **10.4 miles** of main-stem and tributary channels in the lower watershed.



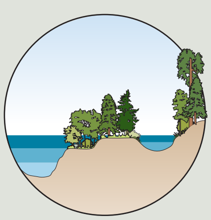
Sediment Reduction:
Stormproof / stabilize **45 miles** of forest roads.



Forest Riparian:
Plant **100 acres** of Port Orford Cedar in the upper Elk River watershed, and enhance **19.7 miles** of riparian vegetation along the middle and lower Elk River.



Tributary Reconnection:
Restore fish passage to **2.6 miles** of high-priority tributaries.



Floodplain Reconnection:
Reconnect the floodplain along **6.25 miles** of the lower mainstem and estuary.

Artwork by Elizabeth Morales.

By reaching these objectives, the Elk Partnership seeks to triple wild coho salmon abundance by 2036, while strengthening the viability of local working farm and forest lands.

economic threats that could lead to further habitat loss. The primary types of on-the-ground projects presented in this plan include: restoring the connection between tributaries and associated floodplains, off-channel areas, and tidal wetlands (known as lateral connectivity); installing large woody debris; enhancing riparian function; and upgrading working lands infrastructure (culverts, roads, etc.). In addition, the plan proposes a range of community development projects to ensure that conservation funds help incentivize landowner stewardship and promote the viability of working lands.

Projects contained in this plan rely on the voluntary participation of willing landowners, both public and private. While maps contained in this plan identify instream and upland habitats on some private lands as a high priority for conservation, implementation of actions on these lands is entirely at the discretion of the landowner. None of the actions contained in this plan calls for new regulations or modifications to existing ones.

The project locations identified in this plan represent those areas where need and opportunity converge. The Elk Partnership included only those project locations that will have a high ecological return on investment, while in many cases also advancing local landowner goals. All of the projects contained in this plan are expected to be implemented within a 15-year time horizon. In summary, the on-the-ground projects contained in this SAP propose to:

- Increase structural complexity in 6 miles of tributaries in the upper watershed;
- Increase instream complexity in 10.4 miles of the lower mainstem and tributaries;
- Stormproof / stabilize 45 miles of forest roads;
- Restore 100 acres of vegetation along the upper mainstem and tributaries;
- Enhance 19.7 miles of riparian zones to

increase stream shading and other riparian functions on agricultural and rural residential lands;

- Restore fish passage to 2.6 miles of high-priority tributaries; and
- Reconnect the floodplain along 6.25 miles of the lower mainstem and estuary.

This SAP does not propose any new regulations or the modification of existing regulations. Implementation of this plan is entirely voluntary.

The projects focused on habitat protection propose to:

- Provide working lands easements or leases to agricultural and timber landowners;
- Promote economic viability in the agricultural community through financial and technical support to implement BMPs and other stewardship measures; and
- Acquire or provide easements/leases to landowners on parcels with a high-risk of landslide.

The Elk Partnership estimates the costs of all of these protection and restoration projects to total $10.7 million over 15 years.

The SAP concludes with a monitoring plan that calls for the Elk Partnership to continually evaluate the pace and effectiveness of SAP implementation. "Implementation monitoring" will be led by the Wild Rivers Land Trust and Curry Watersheds Partnership and will track whether projects are being implemented as projected in this plan. In addition, the Elk Partnership will monitor the extent to which SAP implementation is having the intended effects. Chapter 7 presents a suite of indicators which partners will track as part of this long-term "effectiveness monitoring" program.

The Elk Partnership may revise the priorities contained in this SAP as monitoring and future research help us better understand watershed processes and the system's response to ongoing habitat protection and restoration. The plan calls for future research and monitoring to determine with greater precision:

- potential and current sources of sediment loading;
- sources of elevated water temperature;
- areas of cold water refugia in tributaries;
- baseline habitat conditions, especially the presence of large wood;
- road surface data; and
- sudden oak death detection and response.

All of the community development initiatives and habitat protection, restoration, and monitoring projects presented in this SAP have been deemed worthy of funding by the Elk Partnership. While the SAP provides an overview of the relative importance of different conservation strategies watershed-wide (chapter 6), project funders are encouraged not to forgo opportunities to support projects that are deemed lower importance when the window of opportunity opens to implementation. Many variables influence a project's readiness including landowner willingness, community support, funding, permitting and other considerations. Funders are encouraged to recognize that all of the projects contained in this SAP are worthy of funding and recognize that when opportunities to implement projects contained in this SAP are not acted on, the opportunity may be lost.

Chapter 1

Introduction: A Vision of Working Lands and A Cold, Clear River

Coho salmon (*Oncorhynchus kisutch*), also known as silver salmon, are native to the Elk River, with runs returning like clockwork each fall to spawn in the Elk River's cold, clear tributaries. While the Elk River watershed has never produced coho in numbers like the Rogue or Coquille Rivers, it maintains a core population within the region. Unfortunately, the Elk River coho population has declined in recent decades to a level that now threatens its long-term existence.

Actions taken in recent years, including improved fishery and land management, have slowed this decline, but if coho are to survive over the long term efforts now must focus on restoring lost and degraded habitats, and preventing loss in the future. Although much of the habitat loss in the watershed can be traced back to historic practices, threats persist today that must be addressed.

This Strategic Action Plan (SAP) describes a suite of actions to recover coho by both repairing the mistakes of the past and preventing them in the future. While the actions presented here aim squarely at conserving coho habitat, they were generated through a process that gave strong consideration to the social, cultural, and economic values that unite the Elk River community. Accordingly, the actions in this plan aim to not only conserve the Elk River watershed and rebuild its population of coho, but also protect the working lands base that has helped sustain a vibrant local economy for generations.

Our Vision of our community, stated here, has guided development of this plan for the past two years and informed the social, economic, and ecological outcomes that we hope to achieve through its implementation.

We have come to know that our community, livelihoods, quality of life, and legacy depend on a healthy environment and a variety of landscapes to sustain biodiversity and diverse economic opportunities, including the ability to make a living from the land, rivers, and ocean.

Our vision is an Elk River watershed and surrounding community that includes:

- self-sustaining habitats and fish and wildlife populations;
- healthy forests, streams, ranches, farms, and fisheries;
- a high quality of life for residents, workers, and visitors;
- a diverse economy anchored in the sustainable use of natural resources, which can adapt to 21st century needs and opportunities;
- a community in which families can make a living, children do not have to leave to find jobs, and elders can enjoy a fulfilling life; and
- a culture that embraces the interdependence of ecology, economy, and community.

1.1 Why Coho?

Coho have never returned to the Elk River in numbers like Chinook – and they certainly don't bend the rod or fill the freezer like their bigger, stronger cousins – so why is so much effort being put forth to recover them? The answer lies in both economics and ecology.

Economic Benefits.

First, jobs. A University of Oregon study (Davis et al 2011) found that restoration investments in Coos and Curry County between 2001 to 2010 supported an average of 73 local jobs per year, which is one of every 300 nonfarm jobs in Curry and Coos counties. In addition, according to the study, "restoration investments have resulted in more than $32 million in economic output on the South Coast."

Second, local businesses. The public spends a great deal of money to fish for salmon in the Elk River, and that spending puts local residents to work. A study conducted by the state in 2008, showed that spending on travel related to fishing, hunting, and wildlife viewing contributed over $20 million to the Curry County economy (Dean Runyon and Associates 2009). Roughly 90% of this spending came from out of county visitors. Unfortunately, because coho numbers are so low in the region, fishing for them – and the spending that goes with it – has been eliminated. **A restored run represents an opportunity to re-establish the recreational coho fishery and the economic benefits that it once generated.**

Figure1-1. Restoration Investment in Oregon (Davis et al 2011).

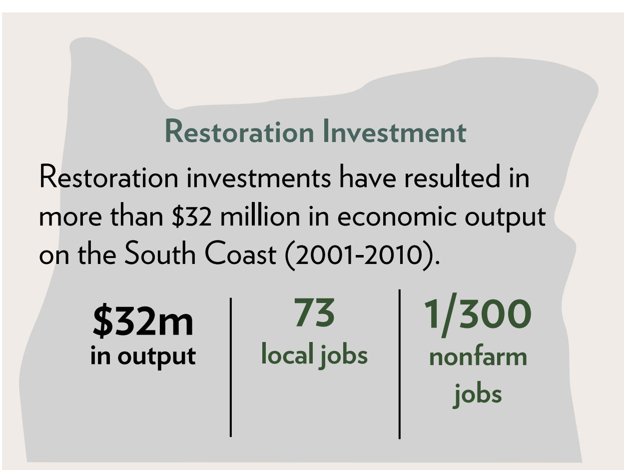



Photo: Steve Miller

A restored coho run represents an opportunity to re-establish the recreational coho fishery and the economic benefits that it once generated.

Third, less regulation. The Elk River population is part of a broader collection of populations – known as an evolutionarily significant unit (ESU) – that was listed as "threatened" in 1997 under the federal Endangered Species Act (ESA). Coho populations in the Southern Oregon/ Northern California Coast (SONCC) ESU spawn in coastal streams from Cape Blanco in southern Oregon to Punta Gorda in northern California. The National Marine Fisheries Service (NMFS) listed SONCC coho – and later Oregon Coast (OC) coho to the north

Coho and other wild salmon are a "keystone species," which means, numerous plant and animal species rely on them to survive. Photo: WSC.

– following scientific reviews that found declining abundance and productivity, as well as reduced distribution and diminishing life history diversity. The ESA listing places actual and potential economic burdens on Elk River landowners and local industries. By recovering the Elk River population, this plan advances the broader ESU-wide recovery effort, which will hopefully one day lead to the de-listing of SONCC coho, thereby reducing burdens on the local community.

Ecological Benefits.

In addition to the economic benefits of coho conservation, there are several important ecological drivers. First, **coho have a unique life history** among Pacific Salmon that makes them an excellent indicator of watershed health. Adult coho return from the ocean to the river each fall, spawning in the clean gravels of the upper Elk River and its lower tributaries. The resulting offspring emerge from the gravel the following spring, then – unlike other salmon – spend a full year in freshwater growing large enough to migrate to the ocean. This extended freshwater residency requires a watershed that is functioning sufficiently to maintain a variety of habitat types throughout the year, especially cold "off-channel" areas such as beaver ponds, oxbows, and side channels. These habitats allow juvenile coho to find areas with cool water temperatures when the mainstem heats up in the summer, and calm waters in the winter when peak flows threaten to sweep them downstream. If a watershed can generate enough of these critical off-channel habitats to sustain a viable coho population, the system is likely capable of producing services that communities rely on such as clean drinking water and flood control.

Second, **restoring coho habitats benefits other species.** Coho habitats are created by watershed processes like hydrology, sediment delivery, biological processes, riparian (streamside) and floodplain interactions. By protecting and restoring these processes for coho, we help the watershed produce and maintain habitats for Chinook, steelhead trout, and a range of plant and animal species.

In addition, coho are a **"keystone species,"** which numerous plants and animals rely on at some point during their lives. All life stages of coho (egg, fry, smolt, and adult) are directly consumed by aquatic and terrestrial organisms ranging from otter and black bear, which consume returning adults, to the smallest aquatic invertebrates that shred the carcasses of decaying fish after they have spawned. In short, a watershed is a system that has evolved for eons with coho and other salmonids as key parts of it.

Wild salmon deliver the nutrients derived from their ocean journey back to their natal watersheds, nourishing the ecosystem. Photo: WSC.

Decomposing salmon feed riparian forests. Research on two watersheds in Alaska found that trees and shrubs near spawning streams derive an estimated 22-24 % of their foliar nitrogen (N) from spawning salmon. Photo: Alamy.

Forest and plant communities also directly benefit from the decaying fish. Adult coho return to the watershed after taking up phosphorous, nitrogen, and other nutrients from the ocean. After they spawn, they decompose, and release these critical "marine-derived nutrients" (MDN) into the ecosystems where they become available to grasses, shrubs, trees, and other plant life. Studies on MDN have not been conducted in the Elk specifically, but according to Merz and Moyle (2006), "research over more than three decades has shown that the annual deposition of salmon-borne MDN is important for the productivity of freshwater communities throughout the Pacific coastal region." Helfield and Naiman (2001) found "that trees and shrubs near spawning streams derive ~22-24% of their foliar nitrogen (N) from spawning salmon." Subsequent research by Naiman et al (2002) suggests that even in highly modified watersheds in northern California, "robust salmon runs continue to provide important ecological services with high economic value…. Loss of Pacific salmon can not only negatively affect stream and riparian ecosystem function, but can also affect local economies where agriculture and salmon streams coexist."

The final major ecological reason for restoring Elk River coho is the population is deemed a **"core independent population"** within the SONCC coho ESU. An independent population supports other populations around it because of **"straying."** While Pacific Salmon are genetically programmed to spawn in the same river that they were born in, a small number of individuals within a population typically stray from their natal watersheds to spawn in neighboring rivers. Straying supports nearby **"dependent"** populations that are not large enough to maintain a self-sustaining run. For example, the independent Elk River population contributes to the dependent Brush Creek and Mussel Creek populations to the south.

Independent Population: A collection of one or more local breeding units whose population dynamics or extinction risk over a 100-year period is not substantially altered by exchanges of individuals with other populations (migration). Functionally independent populations are net donor populations that may provide migrants for other types of populations. This category is analogous to the independent populations of McElhany et al. (2000).

Dependent Population: A collection of one or more local breeding units who are not large enough to maintain a self-sustaining run as a species.

Straying: Individuals within a population that do not return to their natal watersheds but spawn in neighboring rivers. This builds diversity and resilience into neighboring populations.

Benefits of Straying:

- ensures that population areas that are destroyed or degraded – by either natural or man-made events – can be re-colonized, and
- delivers new genetic material to a population (whether dependent or independent), increasing its diversity.

Genetic diversity is essential to a population's capacity to persist as watershed conditions change over time. This unique adaptive capacity of coho and other Pacific Salmon is essential to the species' survival in the face of climate change.

Straying by a core independent population also ensures that population areas that are destroyed or degraded – by either natural or man-made events – can be re-colonized. In addition, straying can deliver new genetic material to a population (whether dependent or independent), increasing its diversity. Genetic diversity is essential to a population's capacity to persist as watershed conditions change over time. This unique adaptive capacity of coho and other Pacific Salmon is essential to the species' survival in the face of climate change.

Today, the Elk River continues to produce a relatively small – but important – coho population. Implementation of this SAP will protect and restore critical coho habitats in the Elk River watershed, increasing the Elk coho population, and strengthening the health of neighboring populations. These outcomes substantially increase the likelihood that we can recover the species across its range (the SONCC ESU).

1.2 The SONCC Coho Recovery Plan and the Elk River Coho Population

To guide the recovery effort, NMFS released a recovery plan for the SONCC coho salmon ESU in 2014 (NMFS 2014). The recovery plan is NMFS' road map for recovering the fish to a sustainable level so that the ESU can be removed from the ESA list. The recovery plan describes each coho population in the SONCC, identifies the factors that led to their impairment, describes current watershed conditions, and lays out a strategy to rebuild each population.

The NMFS considers Elk River coho to be a "core" functionally independent population for recovery of the SONCC coho salmon ESU because of its potentially significant contribution to the genetic viability of dependent populations in neighboring coastal streams, its potential for recovery, and the extent of potential habitat. The goal stated in the SONCC Recovery Plan for the Elk River coho population is to return it to a level of low extinction risk, which requires achieving a minimum threshold of 2,400 returning Elk River spawners. Reaching this spawner abundance, which is roughly 10 times recent estimated coho runs in the Elk River, will help maintain connectivity and diversity among other local populations, strengthening the ESU's northern coastal stratum. This role is currently limited due to the Elk River population's low spawner abundance.

According to NMFS, loss and degradation of critical coho habitat due to land management practices contributed significantly to the listing. Scientists in NMFS' West Coast Regional office determined that while there have been some improvements in freshwater and estuarine habitat conditions in recent years, extensive habitat protection and restoration actions are required to bring the ESU to a viable status (NMFS 2016).

1.3 Role of the SAP in Recovery Plan Implementation

While the SONCC Recovery Plan recommends a suite of strategies to recover each of the populations, it stresses that recovery can only be achieved through the strategic planning of locally convened, multi-stakeholder partnerships. Decisions on where and how actions are implemented are best made in locally convened forums, so the input of the landowner community and other stakeholders can be fully integrated into the project selection process. This SAP seeks to meet this need for the Elk River community. It is one of three pilot SAPs being developed for the Nehalem, Siuslaw River, and Elk River watersheds with funds provided by the Oregon Watershed Enhancement Board (OWEB).

These three pilot SAPs were initiated by the "Coast Coho Partnership" (Coho Partnership) under an initiative known as the Coast Coho Business Plan (Business Plan). The Coho Partnership is a small group of public and private agencies and NGOs that assembled to determine the best ways to support locally-led implementation of Oregon's two coast coho recovery plans. Partners include NMFS, the NOAA Restoration Center, Oregon Department of Fish and Wildlife (ODFW), OWEB, and Wild Salmon Center (WSC). The National Fish and Wildlife Foundation (NFWF) was also a founding partner. These partners convened to achieve two goals:

1. establish and facilitate a replicable model to assist local teams in prioritizing habitat protection and restoration actions for Oregon's coast coho populations; and
2. coordinate public and private funders to increase the resources available for locally-led implementation of completed plans.

To achieve these goals, the Coho Partnership adopted a "Business Plan" model developed by the National Fish and Wildlife Foundation. The model assists local partners in developing watershed-scale plans and then markets selected projects from these plans through a regional conservation Business Plan. As described by the Coho Partnership, the "Coast Coho Business Plan" initiative advances three strategies, which are ultimately designed to leverage implementation funding for locally-led partnerships.

1. Promote recovery of coast coho in Oregon, and describe the essential role of voluntary habitat protection and restoration efforts.
2. Identify the highest priority projects required at the population (watershed) scale to advance regional recovery goals.
3. Aggregate the cumulative costs and anticipated benefits of these projects to clearly describe what funders can expect to gain from their restoration investments.

Actions contained in the Coast Coho Business Plan are derived from population-scale SAPs like this one. In close collaboration with the Coho Partnership, staff from WSC facilitates and manages development of both the SAPs and the Business Plan. Development of these plans is supported by the full Coho Partnership.

Chapter 2

The Elk River Coho Partnership and Scope of the SAP

In rural, resource-dependent southwest Oregon, watershed conservation and species recovery require the establishment of strategic partnerships in which a variety of public and private stakeholders work together towards a common vision of community health. As described in chapter 1, this Vision must meld economic, ecological, and social goals and align the limited social and financial capital available in the region towards solutions that promote sustainable watershed and community health. The Elk River Coho Partnership (Elk Partnership) is one such effort. It seeks to bring together local stakeholders to develop and implement coho habitat recovery actions that also protect and nurture the long-term viability of working farms and forests.

The Elk Partnership, which was convened by the Wild Rivers Land Trust (WRLT), prioritized the Elk for development of one of the three pilot SAPs because of the opportunity to coalesce several widely held community goals, including: whole-watershed ("summit to sea stacks") restoration; close partnership with local landowners; the protection of currently intact habitats (including recognition of the sensitivity of remaining habitat to inappropriate management); and promotion of the watershed's regional economic and ecological importance.

Elk River partners have a long history of working to directly restore coho habitats. Among other restorative approaches, their past and current work focuses on improving instream complexity, controlling invasive species, improving riparian areas, and repairing roads that contribute sediment to streams. This restoration directly improves the health of key habitats in the Elk, including estuaries, mainstem rivers, tributaries, off-channel areas, and upland forests. Protection projects include permanent protection of critical private inholdings in the headwaters portions of the U.S. Forest Service (USFS)-owned areas and the protection of other critical habitats in the watershed through acquisition, lease, and other voluntary stewardship strategies.

2.1 The Elk River Coho Partnership Core Team

The Elk Partnership includes several federal, state, local, and NGO partners, including the following.

Cape Blanco Challenge is an informal group of landowners dedicated to preserving sustainable agriculture on private lands on Cape Blanco, within the Sixes and Elk watersheds.

Curry County Soil and Water Conservation District (Curry SWCD) partners with the South Coast Watershed Council to protect and enhance natural resources on private lands through voluntary programs and technical advice. The landowners of the Sixes and Elk River watersheds are some of the SWCD's most proactive and valued partners in conservation. Curry SWCD is governed by an elected board of Curry County landowners who have a deep commitment to stewardship and an economy based upon the sustainable use of the area's natural resources.

National Marine Fisheries Service (NMFS) considers the Elk River population to be a core, functionally independent population within the northern coastal diversity stratum of the SONCC and a potential source of stray spawners for other nearby coastal populations. NMFS seeks to support efforts that promote sufficient spawner densities in Elk River coho to maintain the long-term productivity, connectivity, and diversity of coho populations within the stratum and ESU.

Oregon Department of Environmental Quality (DEQ) has listed water quality concerns on the Elk River including temperature, habitat modification, and several biological criteria. A planned Sixes/Elk Total Maximum Daily Load (TMDL) process and updated monitoring data will improve informed management decisions affecting water quality in the Elk River watershed. DEQ has provided water quality data and input on limitations and applicability of various restoration project types in the Elk and its tributaries to ensure that selected projects address the most pressing water quality constraints on the river.

Oregon Department of Fish and Wildlife (ODFW) is a central partner in the Elk Partnership and recognizes the essential role that the Elk River coho population plays in the regional coho recovery effort. The agency advises partners on long-term strategic priorities as well as the short-term selection and implementation of habitat restoration projects. ODFW's mission is to protect and enhance Oregon's fish and wildlife and their habitats for use and enjoyment by present and future generations.

Oregon Watershed Enhancement Board (OWEB), a state agency, provides grants to help Oregonians take care of local streams, rivers, wetlands and natural areas. It provided funding for the pilot SAPs and Business Plan. OWEB's financial support allows community members and landowners to use

Bald Mountain Creek. Photo: Jerry Becker.

scientific criteria and consensus-based processes to determine the restoration nexus among local ecological, economic, and social priorities.

South Coast Watershed Council (Council) works with voluntary private landowners to restore habitats on private lands using priorities for the watershed established in its 2007 Action Plan. Working closely with Curry SWCD, the Council has put more than 1,200 cooperative restoration projects on the ground in Curry County and continues to engage private landowners in voluntary conservation throughout the county. Through the Elk River SAP, the Council seeks to build on this legacy of collaboration with the private landowner community. A priority is to increase the resources available to private landowners to respond to the threat of converting working landscapes and productive habitats to uses that are less compatible with watershed health.

The Nature Conservancy (TNC) identified the Cape Blanco area as an important place for the conservation of biodiversity in the Pacific Northwest coast ecoregion in 2006. In 2008, TNC developed the "Cape Blanco Site Conservation Action Plan (CAP)." As part of an overarching conservation strategy "to support conservation and restoration-based working landscapes and seascapes," TNC's CAP identifies and assesses ecosystems from the nearshore marine environment to the mature late successional forest of the upper Elk River watershed.

U.S. Fish and Wildlife Service's (USFWS) Coast Program (Coast Program) provides information about and support for endangered species and their habitats, including the shifting dune complexes being restored at the mouth of the Elk River. The Coast Program is one of the USFWS's most effective resources for restoring and protecting fish and wildlife habitat on public and privately owned lands.

U.S. Forest Service (USFS) manages nearly 80 percent of the Elk River basin, which is classified as a "Key Watershed" due to the high value of anadromous fisheries in the watershed. The Rogue-Siskiyou National Forest selected the Upper Elk River as a

Photo: Kate Harnedy

priority watershed based on significant aquatic resources and the high restoration potential relative to other National Forest System lands. To leverage the strong restoration interests and partnership opportunities across the entire watershed, USFS expanded the scope of priority areas in the 2012 Watershed Restoration Aquatic Action Plan (WRAP) to include both the Upper and Lower Elk subwatersheds.

Wild Rivers Coast Alliance (WRCA) is a grant-making arm of Bandon Dunes Golf Resort. WRCA provides financial assistance on Oregon's south coast to foster community collaboration that preserves and respects the health and integrity of the region's natural resources and local community values.

Wild Rivers Land Trust (WRLT) is a conservation organization working to preserve our natural environment, including river corridors, coastal ecology, watersheds, estuaries, forests and working ranches and farms along Oregon's southern coast. WRLT was the convener of the Elk River Coho SAP process.

Wild Salmon Center (WSC) facilitated development of the Elk River Coho SAP (and other SAPs) and works with the Coast Coho Partnership to leverage funds for its implementation. This Oregon-based effort advances the organization's stronghold approach, which builds alliances with local and regional partners to protect the North Pacific's richest, strongest salmon rivers.

2.2 SAP Implementation Timeline: Long-Term Outcomes & Short-Term Goals

The Elk Partnership projects the implementation of this plan – including new projects identified through the adaptive management process (see chapter 8) – to run through 2036. Such a long implementation horizon will be necessary to achieve the plan's outcomes, in part because of the time required for the system to respond to restoration treatments (for example, trees planted in a riparian zone take more than a decade to begin providing sufficient shade to improve water temperatures.) In addition, the planning team recognized that it will take many years for a sufficient number of projects to be implemented to demonstrate an improvement in both watershed function and in coho abundance. The year 2036 allows implementation to take place over six coho cohorts.

This SAP establishes five goals to generate these long term outcomes.

LONG-TERM OUTCOMES	
1	The Elk River community has prevented the loss/degradation of both aquatic habitats and working lands in the watershed, ensuring that a net gain can be realized from ongoing investments in salmon habitat restoration.
2	Financial and technical support is sustained for the stewardship of working lands at a level sufficient to achieve SAP habitat goals and maintain the viability of working lands.
3	By 2036, the Elk River community has protected and restored enough high-quality summer and winter rearing habitat in the Elk River watershed to triple wild coho salmon abundance.


Photo: Tim Palmer

15-YEAR GOALS	
1	Increase the technical assistance available to private landowners in the Elk River, promoting stewardship and the viability of working lands.
2	Reduce habitat fragmentation and sediment delivery from upland sources.
3	Increase the quality and extent of instream habitat in the mainstem and tributaries, while improving lateral connectivity with floodplain and off-channel habitats.
4	Improve water quality (temperature and nutrient loads) by improving riparian function (species complexity, age, width, extent) along mainstem, tributary, and off-channel habitats.
5	Develop sufficient monitoring capacity for community partners to track the status and trends of critical indicators adopted in the Elk River SAP.

2.3 Scope of this Strategic Action Plan

The Elk Partnership initiated the SAP planning process to identify and prioritize the on-the-ground habitat protection and restoration projects that can most effectively recover the Elk coho population. To this end, the plan proposes a variety of conservation strategies to employ in specific, identified locations. Proposed projects range from protecting sensitive habitats (through acquisition, easement, lease, etc.) to upgrading roads to installing large wood in streams.

These and other projects contained in this plan rely on the voluntary participation of willing landowners, both public and private. While maps contained in this plan identify instream and upland habitats on some private lands as a high priority for restoration, implementation of actions on these lands is entirely at the discretion of the landowner. None of the actions contained in this plan calls for new regulations or modifications to existing ones.

The restoration projects described in this SAP focus on reducing the stresses on habitats that have emerged over more than a century of resource use in the Elk River watershed. While reducing these stresses is essential, it is probably not sufficient on its own to recover coho. The threats (the human activities that allow stresses to emerge and persist) must also be considered. Through a process summarized in chapter five, the planning team undertook a threats assessment which underscored the capacity challenges faced by south coast landowners, governments, and conservation partners. In short, the limited technical and financial resources available in Curry County undermine landowners' interest in, and ability to implement, conservation measures that can also enhance ranch or farm operations. In addition, limited resources undermine the region's ability to combat the conversion of working lands to second home and recreational development. Chapter six recommends several projects that can increase local conservation capacity and address the threats that may undermine ongoing restoration efforts.

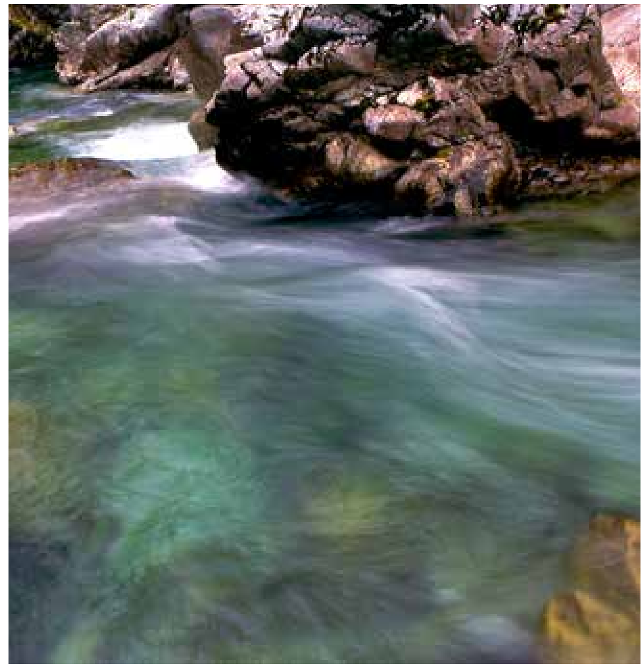
Oregon Coast coho. Photo: Seth Mead.

Chapter 3

The Elk River Watershed

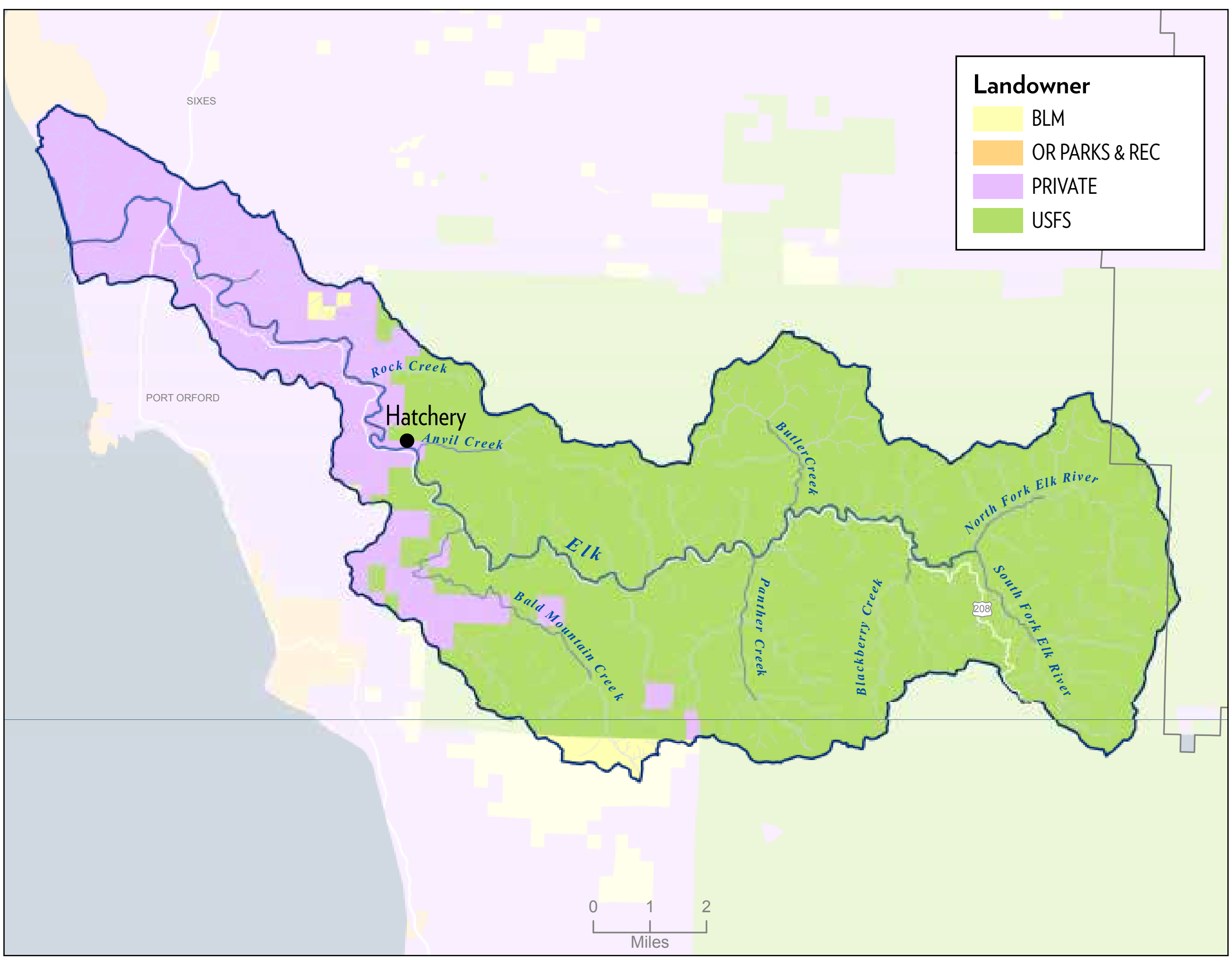
The Elk River flows out of the Klamath Mountains and Coast Range and across the coastal lowlands to meet the Pacific Ocean just north of the town of Port Orford, Oregon. Extending about 40 linear miles and draining 92 square miles, the Elk River lies almost entirely within Curry County, an area of southwest Oregon that was relatively isolated until the early 20th century and is still mostly rural in character today.

Known for its clear, blue-green waters, the Elk River and its tributaries gather rain and snowmelt from elevations as high as 4,000 feet in the headwaters of the North and



Extending about 40 linear miles and draining 92 square miles, the Elk is one of the largest coastal drainages on the southern Oregon coast. Photo: Tim Palmer.

Figure 3-1. Types of land ownership in the Elk River watershed.

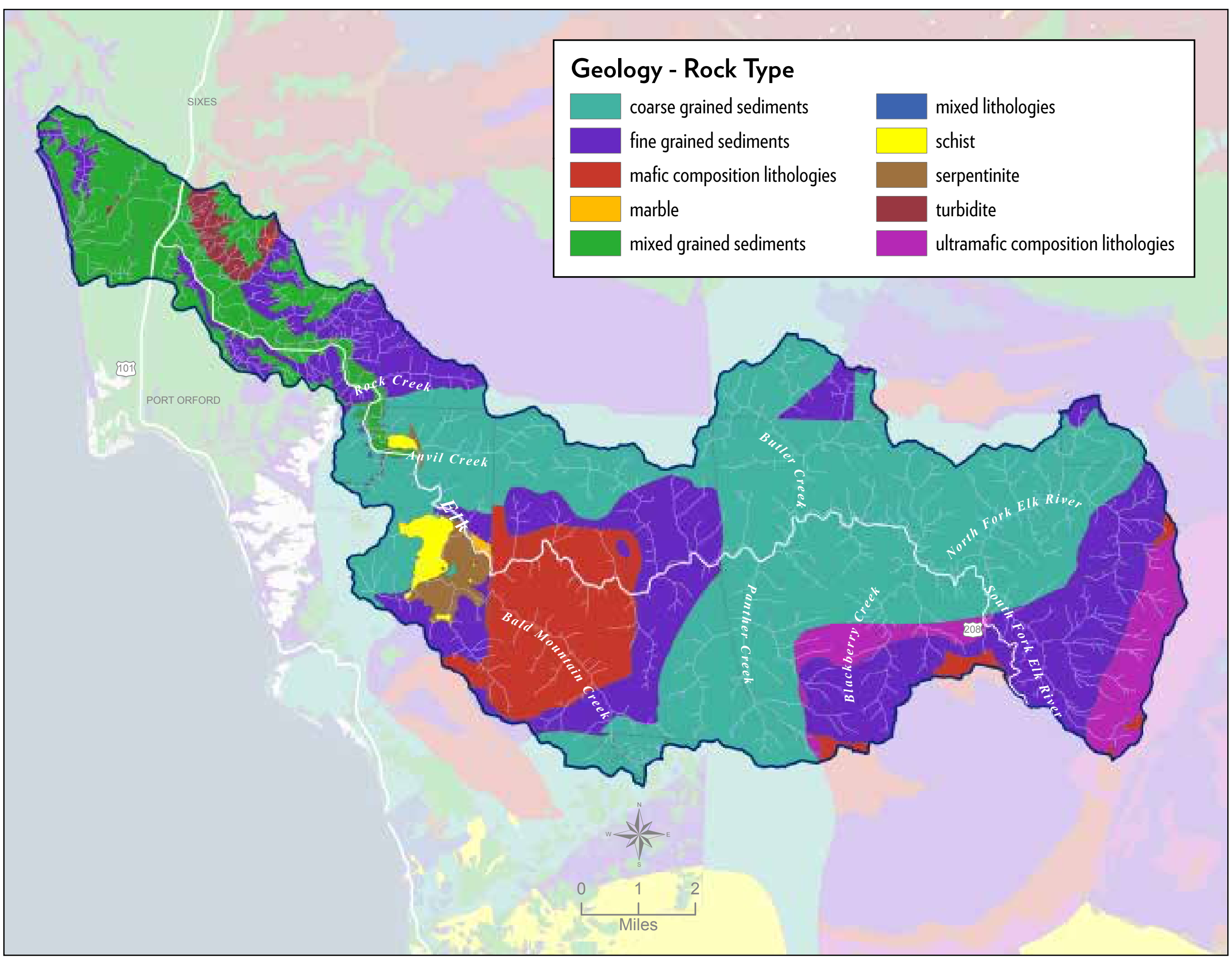


South Forks. Most of the watershed lies at lower elevations, however, with less than five percent of the watershed between 2,400 and 4,000 feet in elevation (USDA 1998).

As described in the USFS Elk River Watershed Analysis (1998), "....recent and ongoing uplift has created rugged, steep terrain with inner gorges adjacent to streams. Where streams downcut along steep slopes underlain by resistant rock types, including sandstones/conglomerates and diorite, the inner gorges are steepest [especially those locations] underlain by conglomerate bedrock. Slopes are more gentle and soils tend to be deeper in faulted areas along contacts and on Galice meta-sediments." Figure 3-2 presents this geology while Figure 3-3 shows the relative steepness of the upper Elk watershed.

Stream flows in the Elk River watershed reflect the area's coastal climate and strong marine influence combined with steep gradients in the upper watershed. The area receives an average of 100-120 inches of precipitation annually, ranging from about 70-80 inches per year in the lowlands to 170 inches per year in the upper elevations. Most of this precipitation comes as rainfall from October to April. The rains create high amounts of runoff in the river system, with streamflow levels rising in the fall with storm activity, remaining high with winter rains, and slowly declining during the dry summer months. Fog-drip captured in the steep forested areas is an important source of precipitation in the summer (Isaac 1946), which helps maintain base flows in the dry summer months.

Figure 3-2. Geology of the Elk River watershed.



3.1 The Upper Elk Watershed

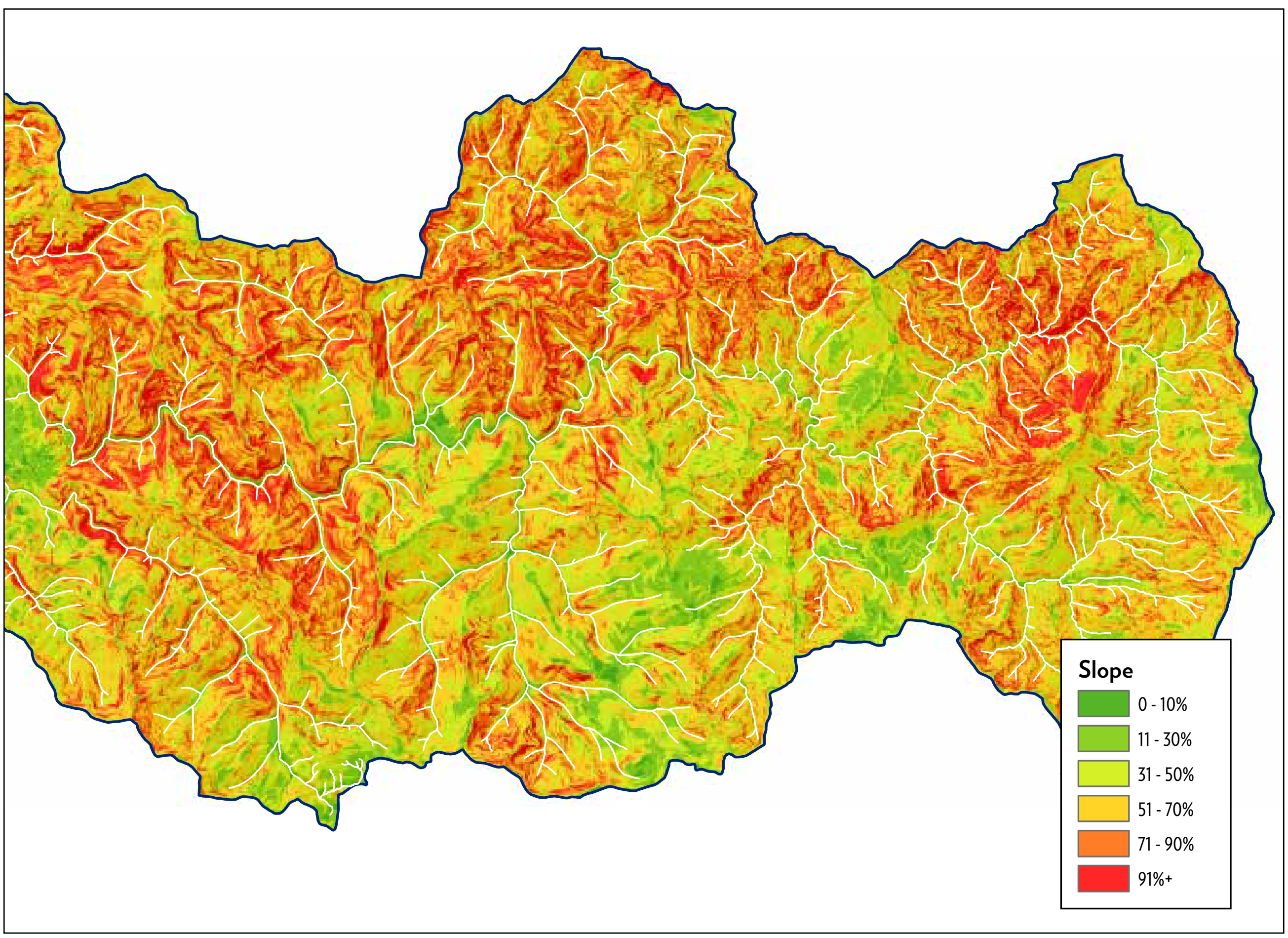
> **A "6th Field"** is a geographic scale established under a hierarchical classification system developed by the USGS that divides river basins into hydrologic unit codes or "HUCs." Commonly referred to as a "sub-watershed," a 6th field HUC is typically between 10,000-40,000 acres or 15-60 square miles.

The Elk River drainage contains two 6th field watersheds, the Upper Elk and Lower Elk subwatersheds.

The upper 90% of the Elk River watershed is located within the Southern Oregon Coastal Mountains ecoregion. A rugged, mountainous landscape defines this ecoregion, with narrow stream valleys and moderate to very steep forested slopes that are prone to landslides. The region also receives, albeit less frequently, stand-replacing fires, extreme flood events, and severe windstorms, all of which are capable of destroying large swathes of mature trees.

The geomorphology of the Elk River watershed – including how it transports sediment and debris, migrates across the landscape, and cuts into stream banks – defines the system's capacity to create diverse and inter-connected habitats for coho and other salmonids. The Elk River is a gravel-rich, very dynamic river system characterized by relatively frequent mass wasting events along the steep forested reaches high in the system. The Upper Elk River contains entrenched bedrock channels, which – according to the Rosgen classification system – are classified as "A" channel types with low sinuosity and high gradient. The upper

Figure 3-3. Degree of slope in the Upper Elk River watershed. The upper 90% of the Elk River watershed is located within the Southern Oregon Coastal Mountains ecoregion.



reaches of the North and South Forks of the Elk River have been identified as "B" channel types with low sinuosity and moderate gradient (Rosgen 1994). Sediment and large wood from these upper watersheds move quickly through the river and tributaries during storms to depositional reaches lower in the system. The crystal blue-green water of the upper Elk River becomes cloudy during such events, but the river clears quickly as streamflow and sediment levels decline.

Most of the Upper Elk watershed lies within the Rogue River-Siskiyou National Forest. Historically, the area was dominated by a patchwork of mature (88% late seral) western hemlock, Douglas-fir, and Port Orford cedar, which covered approximately 39% of the watershed and was interspersed with mature oak-madrone forests. These USFS lands were accessed for timber harvest beginning in the 1950s, leading to an expanding road system. The timber industry became economically important locally in the latter half of the 20th century, with more than 300 million board feet of timber harvested between 1954 and 1989. Now only 15% logged, the majority of USFS lands in the Elk River watersheds are still in native condition and contain the oldest age classes in the forest. Currently, the Elk River is

The majority of USFS lands in the Elk River watersheds are still in native condition and contain the oldest age classes in the Rogue River-Siskiyou National Forest. Only 15% is logged. Iron Mountain. Photo: Steve Miller.

Road and harvest-related landslides between 1952-1986 delivered 2.2 times more fine sediment volume in the basin than naturally-occurring landslides (USFS 1998). Photo: Tim Palmer.

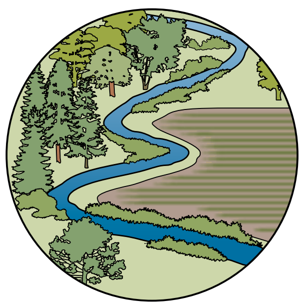
recognized as a Key Watershed under the Northwest Forest Plan (USDA and USDI 1994), and much of the USFS land is managed as Late Successional Reserve (LSR) or as part of the Copper Salmon and Grassy Knob Wilderness Areas.

Debris flows in the upper reaches of the mainstem and its tributaries contribute abundant gravel to the Elk River system. The high background level of landslide-derived sediment, which is characteristic of the ecoregion, has increased in the Elk River watershed due to the forest road network and harvest operations. Between 1952 and 1986, road and harvest-related landslides within the basin delivered 2.2 times more fine sediment volume than naturally-occurring landslides (USFS 1998). Instream large wood has decreased, reducing the number and depth of instream pools and the capacity of the upper watershed to retain gravel.

Riparian areas along the Upper Elk River mainstem and tributaries were heavily impacted in the 1950s and 1960s by road building and timber harvest. The Elk River Road, which parallels the mainstem, was constructed in the riparian area on the south bank in 1954. Severe flooding a year later generated massive road failures, which resulted in a major loss of several miles of riparian vegetation on the south bank. Today, the riparian vegetation adjacent to the road still does not provide adequate shade along many reaches of the mainstem Elk River during the summer. Lack of shading and changes to the stream's morphology have contributed to increasing stream temperatures in the Elk River mainstem, limiting juvenile migration and rearing capacity, especially in the summer.

3.2 The Lower Elk Watershed

The Lower Elk River system is generally a depositional zone containing "C" channel types (sinuous, low gradient). **As the river drops its load of upland gravels in the lower elevations, its natural tendency to carve new channels in a broad, meandering band across its floodplain is now mediated by artificial stabilization and historic channelization.** These conditions protect longstanding agricultural operations, roads, and rural residential properties. Today there is generally a surplus of sediment and a lack of large wood in the watershed, especially in the lower part of the system. These conditions limit the creation of complex habitat-forming processes that generate pools, sort gravel, and create the off-channel areas that juvenile coho rely on to rear.



The lower 10.5% of the Elk River watershed displays the mostly gentle terrain of the Coastal Lowlands ecoregion. The area supports a mix of private and public lands and is characterized by estuarine marshes, meandering valley streams, shallow coastal lakes, marine terraces, and sand dunes. Streams in this part of the Elk watershed are generally low gradient and historically meandered widely across the floodplain. They are generally a depositional zone containing sinuous, low gradient "C" type channels (Rosgen 1994). Lowland geology is dominated by

Today there is generally a surplus of sediment and a lack of large wood in the watershed, especially in the lower part of the system. Photo: Steve Miller.

terrace deposits, sands and alluvium, and deep loamy soils. Natural erosion is low on depositional stream reaches.

In the lower watershed below the USFS boundary, private lands were developed to support timber harvest, agricultural activities (primarily grazing), and rural residential development. The lower watershed contains a younger and more homogeneous Douglas-fir forest than the older, more diverse stands found on USFS lands upstream.

In the upper end of the Lower Elk watershed ("the middle Elk"), swathes of riparian forests in the lower river valley and along tributaries have been largely converted to farm and rural residential uses. Where present, vegetation along the river valley consists primarily of shrubs and lower growing hardwoods that provide little riparian shade. Historically, the riparian habitat in this area generally consisted of vegetation common to the southern Oregon coast range, including Douglas-fir, red alder, big leaf maple, western hemlock, Port Orford cedar, Oregon myrtle, Pacific yew, tanoak, and vine maple.

In the lower reaches of the lower Elk River, riparian zones were historically dominated by large conifers, which were part of a complex system of Sitka spruce/western hemlock-dominated wetlands and

Douglas-fir/tanoak forest. Much of this lowland has been converted to open pasture, and tree/shrub vegetation is now dominated by hardwoods and invasive non-native species, especially gorse and Himalayan blackberry. Emergent wetlands have decreased considerably.

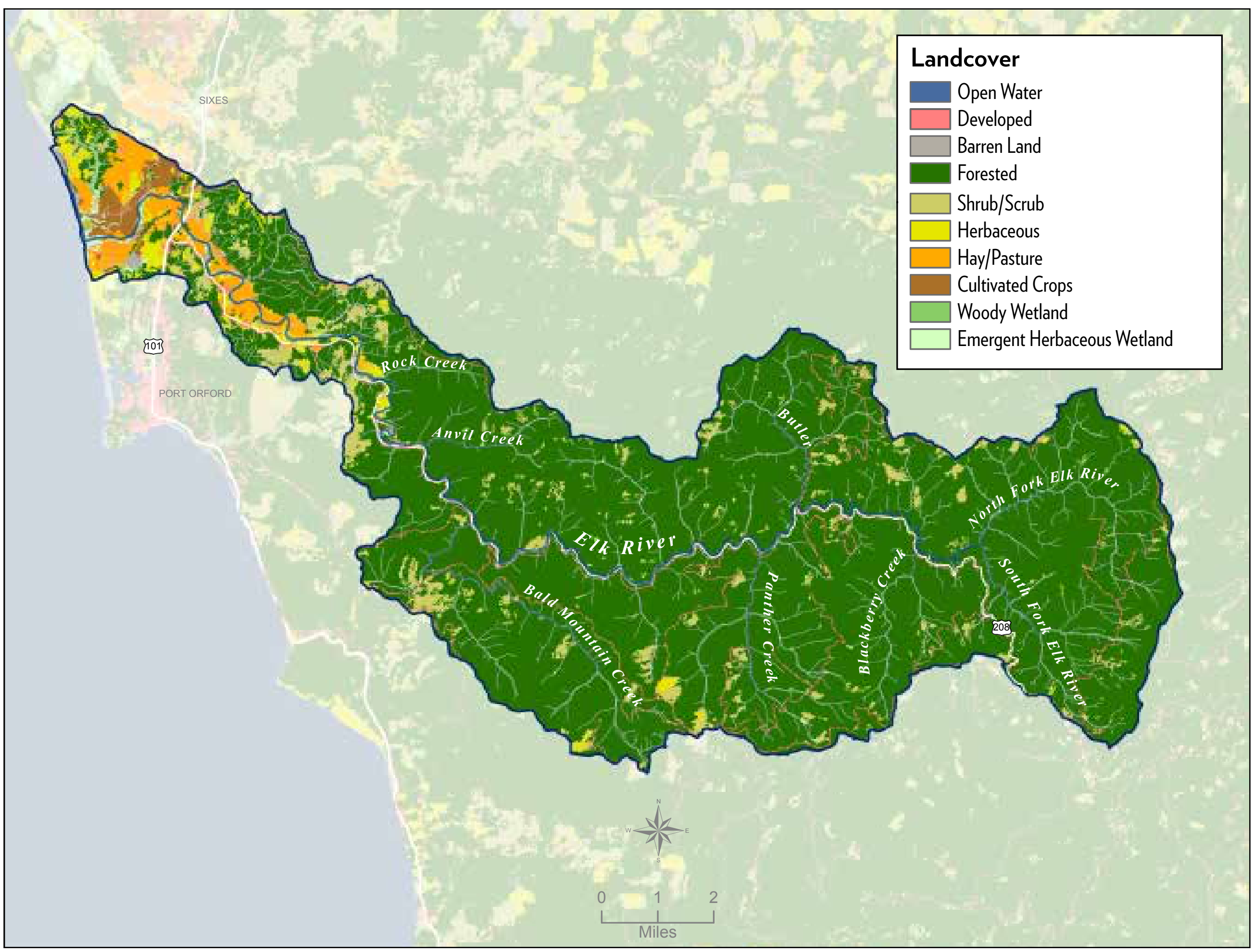
In the last two decades, cranberry farming has expanded into lower tributary watersheds, driving the construction of water storage reservoirs. According to the SONCC Recovery Plan, cranberry farming has contributed to the loss of high Intrinsic Potential (IP) coho salmon habitat in three low gradient tributaries. Residential development has also increased in the lower basin.

The lowest 2.5 miles of the Elk River flow through a tidally influenced area, the lower mile of which is considered the estuary.

Riparian forests in the lower river valley and along tributaries have been largely converted to farm and rural residential uses. Photo: Tim Palmer.

Intrinsic Potential is a quantitative assessment of a stream or stream reach's capacity to provide high quality habitat for a selected salmonid species. It assesses habitat potential based on mean annual flow, channel gradient, and valley constraint.

Figure 3-4. Land cover in the Elk River watershed.



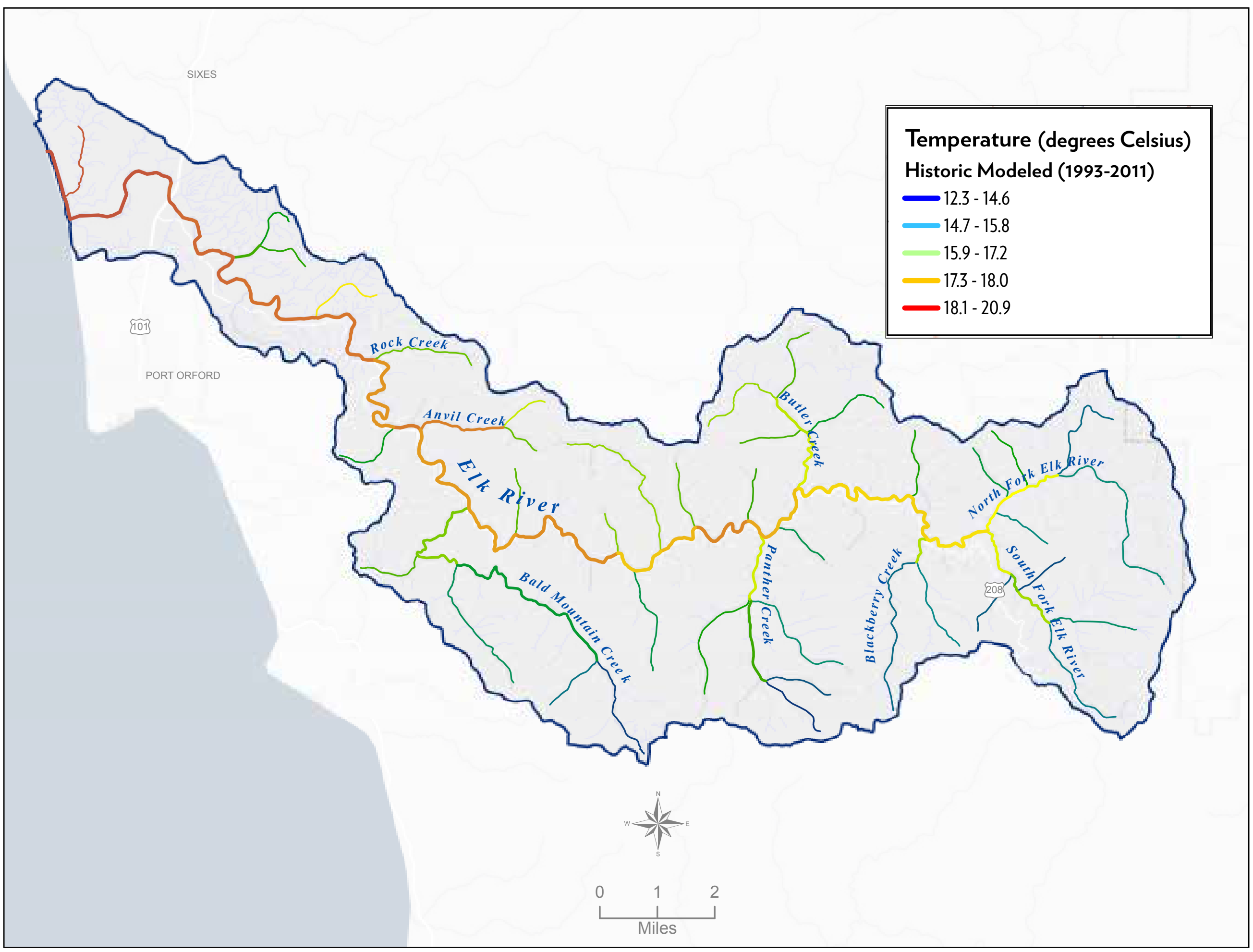
Habitat conditions in this area are vital to the coho population because this is where the fish transition between fresh water and salt water. At its mouth, the Elk River empties into the Pacific Ocean south of the tip of Cape Blanco through a dune complex. This dune complex has been stabilized with imported European beach grass, reducing open sand habitat for western snowy plover and specialist plant species such as pink sand verbena and silvery phacelia. The complex is slowly being restored to a more dynamic beach/dune system through the eradication of the European beach grass and other invasive plants such as gorse. Near its mouth, the Elk River is often seasonally bar-bound.

303(d) is a section of the federal Clean Water Act (CWA) that requires states to identify and list impaired and threatened waters (e.g. stream/river segments, lakes). Impairment means that water quality does not meet the minimum standards set forth to support beneficial uses like drinking, recreation, or salmon habitat.

3.3 Water Quality and Allocation of Water Resources

The Elk River and several tributaries have been identified as water quality limited under the Clean Water Act (CWA). The mainstem is included on the Oregon Department of Environmental Quality's (DEQ) 303 (d) list for year-round water temperatures and habitat modification from its mouth to the confluence with the North Fork and South Fork Elk River, a distance of approximately 30 miles. Three tributaries to the Elk River – Bald Mountain Creek, Cedar Creek, and Swamp Creek – are also listed by DEQ due to high water temperatures and habitat

Figure 3-5. Modeled average annual temperatures in the Elk River watershed (1993-2011).



modification. DEQ also notes Butler Creek's temperature as a potential concern.

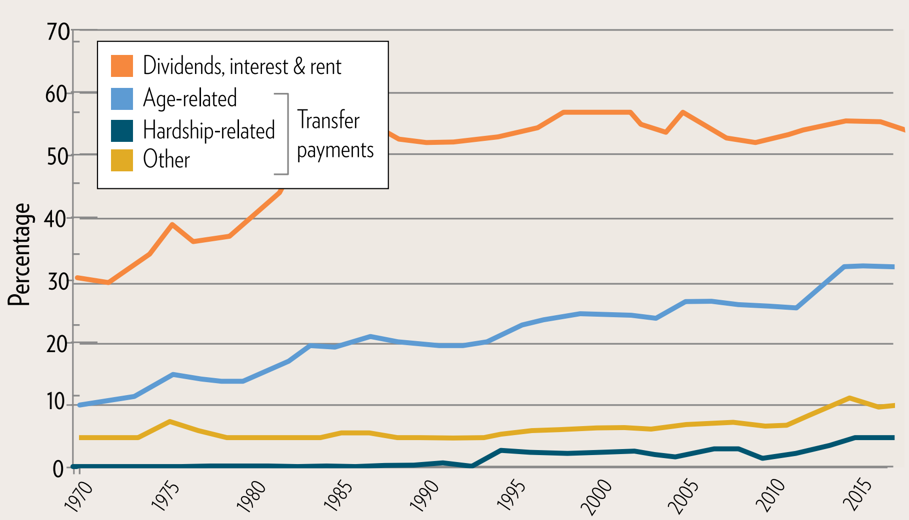
About 75 permitted water diversions from Elk River support agricultural, hatchery, and domestic uses. Most of the diversions are located on the lower mainstem downstream of River Mile (RM) 13 at the hatchery, where a USGS gauge monitored flow levels until 2014. Since 1980 ODFW has reserved an instream water right of 45 cubic feet per second (CFS) to support fish habitat, which has normally been available at the gauge. Overall, flow levels in the Elk River and its tributaries are generally sufficient to support fish production, except in some areas where low flows contribute to high water temperatures. Elk River flows are now being monitored near real time by the Oregon Water Resource Department (OWRD), which is recording mean daily flow and instantaneous stage measurements. **Additional monitoring is needed to determine the relationship of flow levels to temperatures in the lower mainstem downstream of the hatchery.**

3.4 Local Communities and Commerce

The economy of Curry County was founded on timber, fishing, and agriculture, with shorter-term contributions from mineral extraction. Today, the local economy still depends on the area's natural resources, though no longer relying heavily on logging in the Elk River watershed. Employment in logging and commercial fishing has declined from past highs, but continues to feed the local economy. Outdoor recreation and tourism have increased, as has the share of Curry County's income from pensions and other transfer payments. Curry County's population has grown slowly from 393 residents in 1860 to 22,483 in 2015. The area has attracted many retirees due to its mild climate, sparse population, and natural setting. Consequently, according to the Census Bureau, 32 percent of Curry County's population is over 65 years of age. Average per capita income, which relies heavily on transfer payments, was about 87 percent of Oregon's statewide average in 2013. Curry County's poverty rate is high, and high school graduation rates are low compared to Oregon state-wide averages (US Census Bureau 2017).

Port Orford. About three miles south of the Highway 101 Elk River crossing, 1,135 people reside in the historic fishing, shipping and timber town of Port Orford, one of only

Figure 3-6. The change in the share of the Curry County economy generated by non-labor income (1970-2016). (Headwater Economics 2017).



From 1970 to 2016, non-labor income in Curry County grew from $86.5 million to $543.7 million (in real terms), a **529% increase.**

In 1970, non-labor income in Curry County represented **32%** of total personal income. By 2016 non-labor income represented **59%** of total.

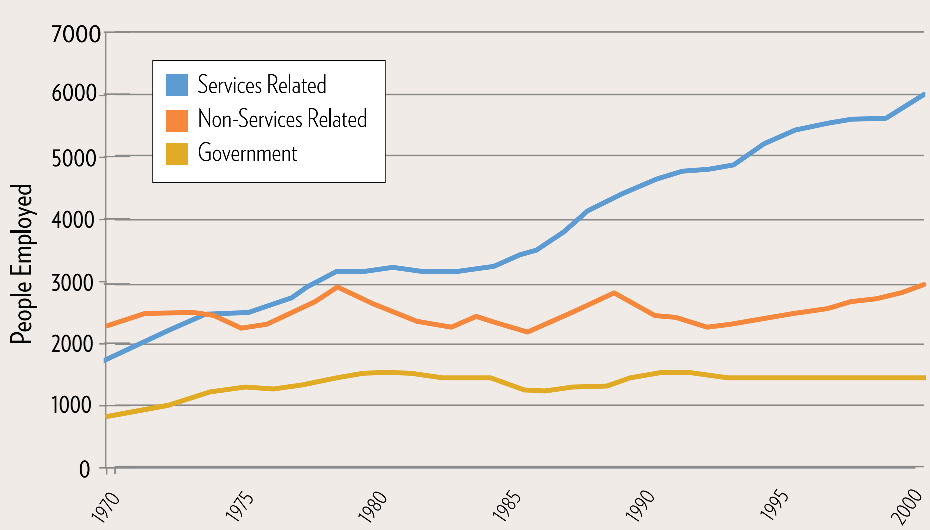
32% of Curry County's population is **over 65 years of age.**

three incorporated cities in Curry County. The town's economy has been hit hard by declines in commercial fishing and timber, becoming more reliant on recreation, tourism, transportation, transfer payments, and government sector jobs. The Port of Port Orford supports about 100 fishing industry-related jobs, and is highly valued within the community for its contribution to the town's unique character. Port Orford is dedicated to protecting its rustic small-town ambiance and its heritage as a fishing port. In the interest of sustainable fisheries and biological diversity, area fishermen have created the Port Orford Ocean Resources Team, designating a Community Stewardship Area encompassing both ocean resources to the three mile limit and adjacent watersheds.

Cape Blanco. Crossed by the lower Elk River and estuary, and with easy access to Hwy. 101, the rugged beauty of the westernmost point in Oregon attracts new recreation and home site developers every year. The bluffs of Cape Blanco are an important feature of Oregon's "dark coast," where the lights of coastal development all but disappear from the view of ships at sea for nearly 20 miles. Most of the private land on Cape Blanco is currently managed as open pasture and for cranberry production, and has retained significant habitat values. The potential for continued habitat restoration is high, with an engaged agricultural community and proactive "working landscapes" conservation partnerships aiming to preserve the economic base of the area while restoring habitat. Long-time landowners facing inter-generational transfers and agricultural market pressures, however, increase the likelihood of division and conversion of large tracts of undeveloped open space as real estate and development values rise. The 1,900 acre Cape Blanco State Park is essential to the local economy, attracting 269,160 visitors in 2017.

Port Orford is historically a fishing, shipping and timber town. Photo: Alamy.

Figure 3-7. Curry County employment by major industry category (1970-2000). (Headwater Economics 2017).



From 1970 to 2000, jobs in services related industries grew from 1,829 to 6,120, a **235% increase.**

From 1970 to 2000, jobs in non-services related industries grew from 2,280 to 2,741, a **20% increase.**

From 1970 to 2000, jobs in government grew from 916 to 1,348, a **47% increase.**

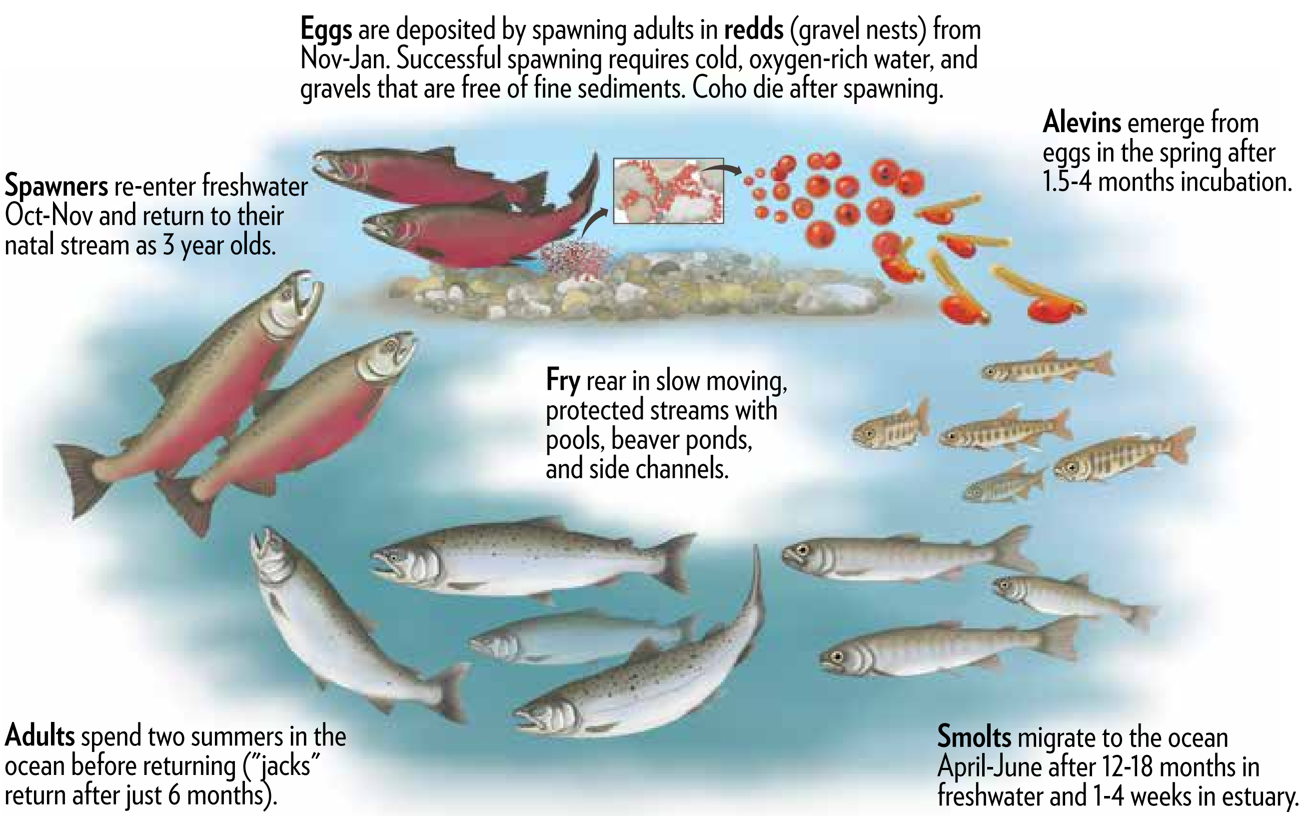
Elk River Coho and their Habitats

4.1 The Coho Life Cycle

Like most other populations in the SONCC ESU, Elk River coho generally return to the Elk River from the Pacific Ocean as three-year old adults, arriving at the river's mouth from October to February (with a peak between November and December), and migrating to their natal streams. The returning coho typically spawn in small tributary streams between November and January before dying. They lay their eggs in gravel nests, known as "redds," in reaches with suitable substrate and water velocity, depth, and temperature.

Spring marks the beginning of a new coho life cycle. After an incubation period of 38 to 48 days depending on water temperature (Shapovalov and Taft 1954), "alevins" (newly hatched fry still attached to a yolk sac) emerge from the gravel between March and May. Most coho remain in their natal stream through their first year, feeding largely on insects. During their freshwater juvenile life stage, the fish seek out quiet areas such as side channels, alcoves, and scour pools resulting from log jams and boulders, and backwater pools created by beaver dams. The shelter and calm water provided by these and other off-channel areas is particularly important for the survival of juvenile coho in the winter, when high water flows and velocities are common and food supplies limited (ODFW 2007). These complex habitats also provide critical cold-water refuge in the summer months, when low water and high stream temperatures are prevalent in many parts of the system. In summary, the distribution of low gradient stream reaches with suitable flow, temperature, cover, and forage is essential for the survival of juvenile coho (NMFS 2016).

Figure 4-1. The coho salmon life cycle. Artwork by Elizabeth Morales.



Most juvenile coho begin moving to the estuary and ocean after 12 to 18 months in freshwater rearing areas, typically migrating in the spring from as late as March into June. The coho smolts typically reside in lower mainstem and estuarine reaches for a period of days or several weeks, feeding, growing and adapting to saltwater, before moving to the nearshore ocean environment (NMFS 2016).

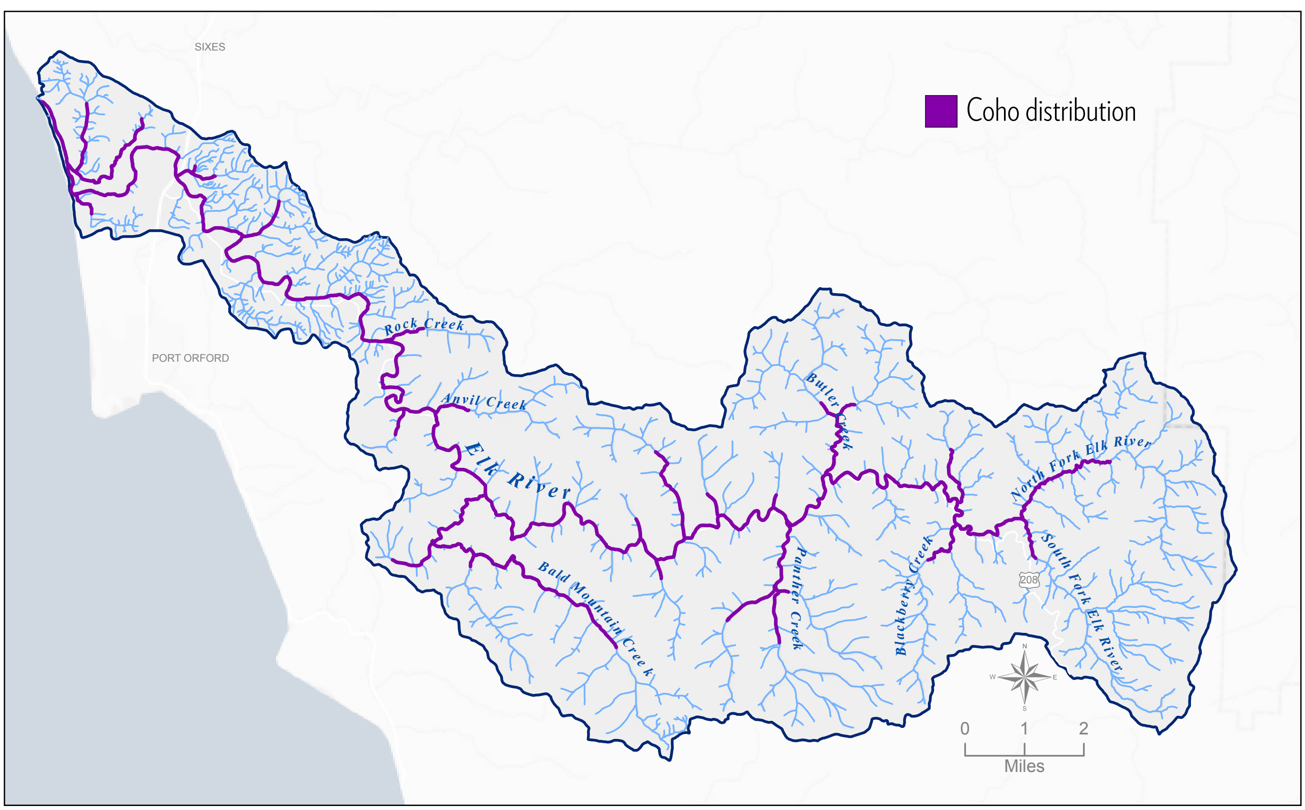
It's important to note that not all coho follow this general life-history strategy. Research shows that substantial numbers of coho leave their natal streams much earlier (as fry) and emigrate downstream into tidally influenced lower river wetlands and estuary habitats (Chapman 1962; Koski 2009; Bass 2010: in NMFS 2016). A NMFS biological review team of scientists reported at least three discrete life-history strategies involving coast coho fry and presmolt migrations into lower river habitats, including:

1. late fall migration from mainstem summer rearing habitats into side-channel or pond habitats along lower mainstem reaches,
2. lower mainstem and estuarine summer rearing followed by upstream migration for overwintering, and
3. lower mainstem and estuarine rearing followed by sub-yearling outmigration to ocean (Stout et al. 2012).

A smolt is a juvenile salmon undergoing physiological changes to adapt from freshwater to a saltwater environment. Photo: Seth Mead.

These alternative life-history pathways contribute to the species' resilience and ability to adapt to changing environments (Stearns 1976).

Figure 4-2. Coho distribution in the Elk River watershed.



While in the lower rivers, these "nomads" seek out tidal wetland habitats with many of the same qualities as those rearing areas found in the upper watershed—quiet areas that provide cold water, shelter, and abundant food. Small freshwater tributaries in the lower watershed may also be particularly important to support the diverse life-history strategies. When the mainstem corridors heat up in the summer, small cold-water seeps and tributaries become life boats where juveniles can escape potentially lethal high water temperatures in the mainstem and larger tributaries.

Once SONCC coho salmon enter the Pacific Ocean, they typically follow the California current south to feed and grow in the highly productive waters off the coast of California. According to the SONCC Recovery Plan, "compared with other coho salmon populations, the SONCC coho salmon ESU has a comparatively small marine distribution …[because of the] high productivity associated with upwelling areas off the coast of California…." The growth and survival of adult coho salmon is closely linked to marine productivity. Growth associated with feeding opportunities at sea is rapid, and most fish can double their length and increase their weight more than tenfold in their first summer.

The return of coho spawners to the Elk River starts in October, coinciding with fall freshets that trigger upriver movement.


Chinook. Photo: John McMillan.

Selected fish supported by the freshwater and estuarine reaches of the Elk River system.

- Fall Chinook salmon
- Coastal cutthroat
- Winter steelhead trout
- Pacific lamprey
- Eulachon (ESA-listed as "threatened")
- Surf smelt, Pacific herring, redtail surfperch, striped surfperch, and starry flounder are also commonly found in the estuary

Additional species that use the Elk River's diverse terrestrial habitats.

- At least 70 mammal species (two ESA-listed as species of concern)
- 12 reptiles
- 16 amphibians
- 194 birds (eight ESA-listed as species of concern)

4.2 Other Biota in the Elk River Watershed

In addition to coho, the freshwater and estuarine reaches of the Elk River system support several other fish species, including fall Chinook salmon, coastal cutthroat and winter steelhead trout, Pacific lamprey, and eulachon, which is ESA-listed as "threatened." Surf smelt, Pacific herring, redtail surfperch, striped surfperch, and starry flounder are also commonly found in the estuary. Additionally, at least 70 mammal species, 12 reptiles, 16 amphibians, and 194 bird species use the Elk River's diverse terrestrial habitats. Two mammals and eight birds are ESA listed or species of concern. Of the non-listed birds, 14 are migratory species of interstate and international interest.

4.3 Watershed Components

As indicated in section 4.1, coho salmon seek out different habitat types during their various life stages. The specific habitats that coho require result from a complex, inter-connected system of watershed "components." The common framework defines these components, which are used throughout this plan, as follows:


Photo: Steve Miller

- **The Mainstem River** includes portions of rivers above head of tide (Coastal and Marine Ecological Classification Standard [CMECS] definition); typically 4th order, downstream of coho spawning distribution, non-wadeable. The mainstem river component also includes associated riparian and floodplain habitats. Mainstem areas support upstream migration for adults and downstream migration for juveniles.


Keystone Preserve Wetland. Photo: Steve Miller.


Photo: Tim Palmer

- **Tributaries** include all 1st to 3rd order streams with drainage areas > 0.6 km2. This includes fish-bearing and non-fish-bearing, perennial and intermittent streams, and the full aquatic network including headwater areas, and riparian and floodplain habitats. Tributaries support spawning, incubation and larval development, fry emergence, and juvenile rearing.


Freshwater wetlands, lower river. Photo: Jerry Becker.

- **Freshwater Non-Tidal Wetlands** include those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support – and under normal circumstances support – a prevalence of vegetation typically adapted for life in saturated soil conditions. Habitats include depressions, flat depositional areas that are subject to flooding, broad flat areas that lack drainage outlets, sloping terrain associated with seeps, springs and drainage areas, bogs, and open water bodies (with floating vegetation mats or submerged beds). This component is restricted to those wetlands that are hydrologically connected to coho streams. (Estuarine associated wetlands are addressed in the estuarine section.) Wetlands are essential to capturing sediment and other contaminants before they enter surface waters, and to maintaining and regulating cold water flows.

Keystone Preserve Wetland. Photo: Steve Miller.

- **Off-channel areas** include locations other than the main or primary channel of mainstem or tributary habitats that provide velocity and/or temperature refuge for coho. Off-channel habitats include alcoves, side channels, oxbows, and other habitats off of the mainstem or tributary. As described above, these off-channel habitats are essential to the survival of juvenile coho, providing refuge from high flows in winter and high water temperatures in summer.

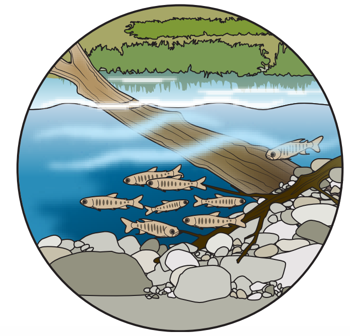
Rock Creek: Photo: Tim Palmer.

- **Estuaries** include areas historically available for feeding, rearing, and smolting in tidally influenced lower reaches of rivers that extend upstream to the head of tide and seaward to the mouth of the estuary. Head of tide is the inland or upstream limit of water affected by a tide of at least 0.2 feet (0.06 meter) amplitude (CMECS). This includes tidally influenced portions of rivers that are considered to be freshwater (salinity <0.5 ppt). Estuaries are considered to extend laterally to the uppermost extent of wetland vegetation (mapped by CMECS). Habitats include saltmarsh, emergent marsh, open water, subtidal, intertidal, backwater areas, tidal swamps, and deep channels. This includes the ecotone between saltwater and freshwater and the riparian zone.

Mouth of the Elk River. Photo: Jerry Becker.

- **Uplands** include all lands that are at a higher elevation than adjacent water bodies and alluvial plains. They include all lands from where the floodplain/riparian zones terminate, and the terrain begins to slope upward forming a hillside, mountain-side, cliff face, or other non-floodplain surface.
- **Lakes** include inland bodies of standing water. Habitats include deep and shallow waters in the lakes, including alcoves, and confluences with streams.

Figure 4-3. Components of a Watershed. The map below is a conceptual illustration (not a map of the Elk) intended to show: 1) the major "habitat components" of a coastal watershed; and 2) selected "key ecological attributes" (KEAs) that are critical to the health of these components. This is not intended to provide an in-depth explanation of the habitat needs of coast coho, but simply highlight several KEAs that this plan is focused on restoring.

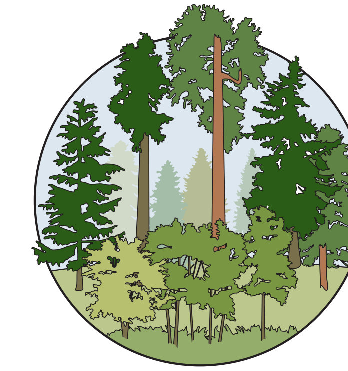


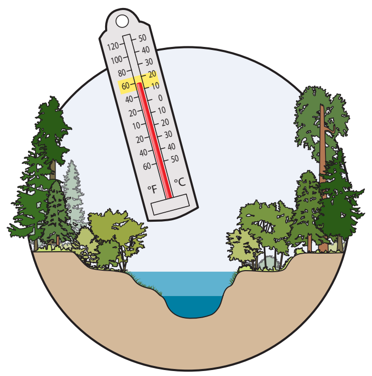
Instream Complexity:

The primary limiting factor to Elk River coho is a lack of winter rearing habitat, which is driven largely by the loss of instream complexity. Instream complexity refers to a suite of instream and off-channel features – like large wood, pools, connected off-channels, alcoves, and beaver ponds – that provide high quality rearing habitat for juveniles.

Structural Diversity:

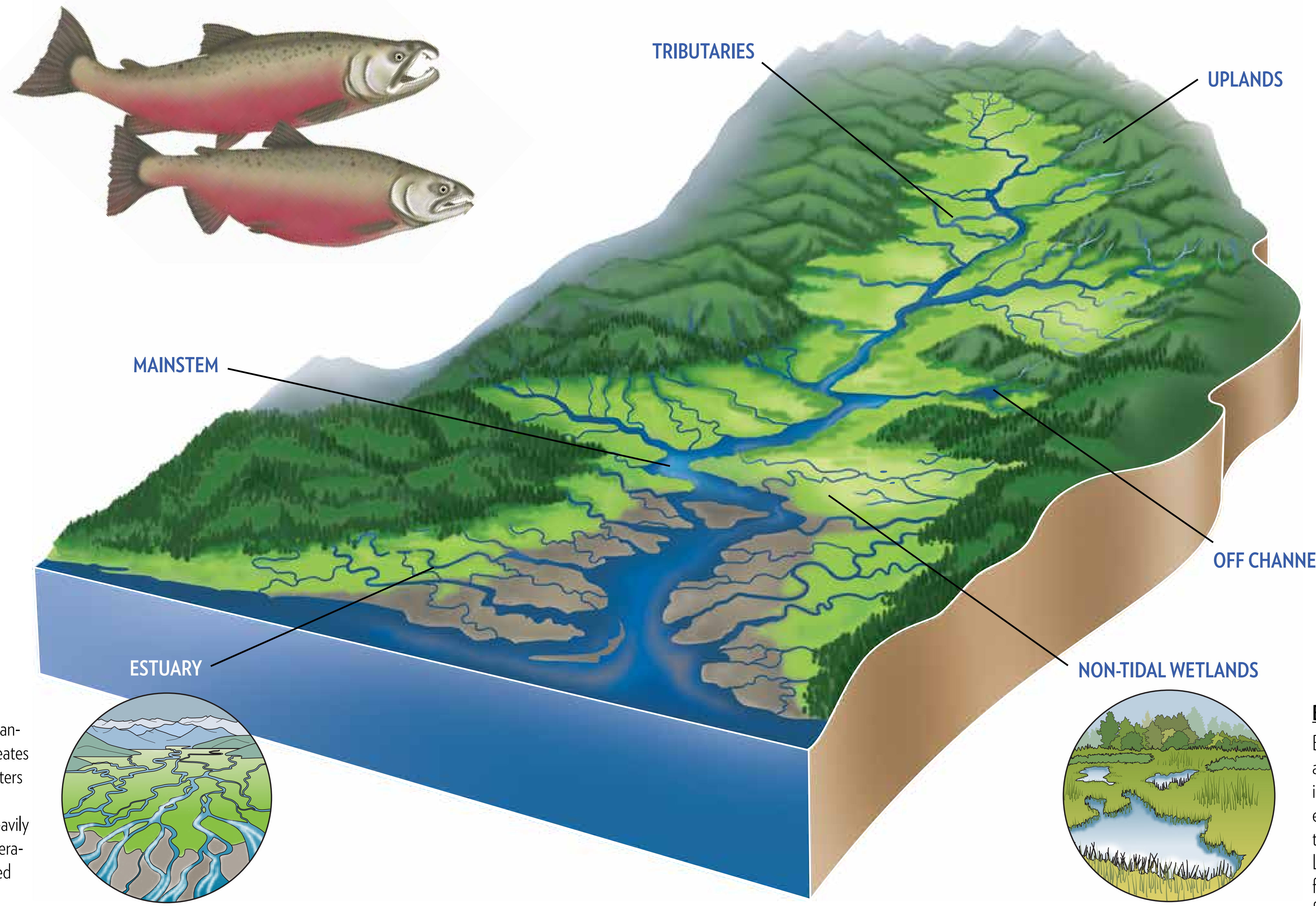
Healthy upland forests contribute large wood, gravel, and other inputs to streams, which enhances the channel's biological and structural complexity. The range and distribution of forest stand size, type, age, and composition determines the extent to which forests can provide the inputs to streams that build coho habitat.

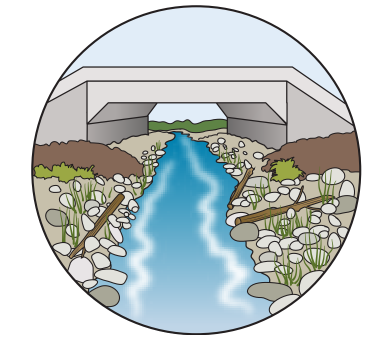




Water Quality:

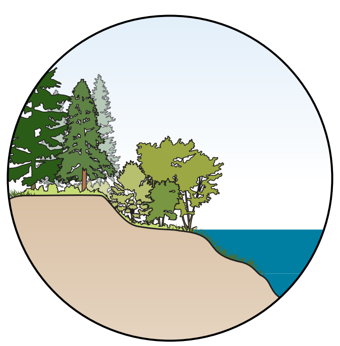
Lack of summer rearing is the secondary limiting factor to Elk coho production. Elevated water temperatures in tributaries, off-channel areas, and especially in the mainstem Elk impede the movement of juveniles through the system, reducing access to critical summer rearing habitats.





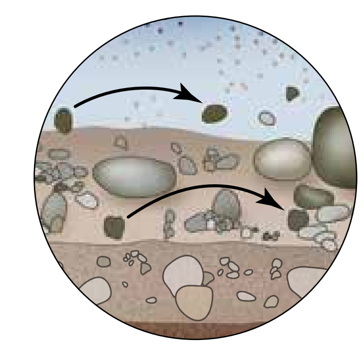
Longitudinal Connectivity:

Culverts in tributaries beneath roads often restrict adult coho access to prime spawning grounds and juveniles' access to critical rearing areas. Longitudinal connectivity refers to the degree to which coho are able to migrate unimpeded up and down stream channels.



Riparian Function:

Streamside vegetation along tributaries, off-channel areas, wetlands, and mainstem channels creates shade, provides food and cover for juveniles, filters out pollutants, and provides large wood to the channel. Riparian function in the Elk River is heavily degraded contributing to elevated water temperatures, reduced instream complexity, and reduced lateral connectivity. Removing invasive species like Gorse presents a major challenge to restoring riparian function in the Elk River.



Bedload Transport:

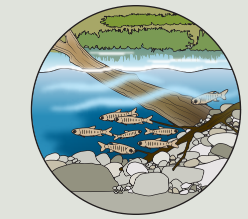
Bedload transport is the natural process of boulders and gravel moving downstream. Landslides resulting from historic clearcuts and road building have elevated bedload in the Elk. As it moves through the system (expedited by the historic removal of LWD), excessive bedload fills pools that are critical for rearing. In addition, insufficiently maintained forest roads generate pulses of fine sediment that fill off-channel areas and spawning gravels.

Artwork by Elizabeth Morales.

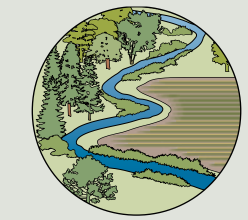
Figure 4-4. The Elk River Watershed.

Elk River coho are deemed a **"core independent population"** within the Southern Oregon Northern California Coast (SONCC) coho Evolutionarily Significant Unit (ESU). An independent salmon population like Elk River coho supports dependent populations around it because individual salmonids "stray." **Straying** is a natural trait in salmonids in which individuals born in one population area end up spawning in another. In addition to adding abundance to the receiving population, this dynamic also increases its genetic and life history diversity, which builds greater resilience into that receiving population. This is particularly important in small dependent populations like Brush Creek coho and Mussel Creek coho, which would probably not be able to persist without contributions from the Elk River population.

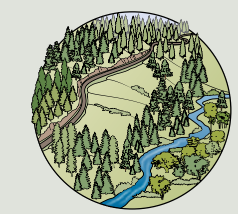
By 2033, the Elk River Partnership will achieve the following restoration objectives:



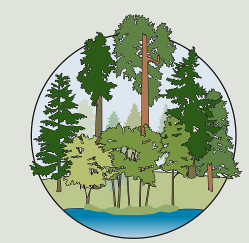
Instream Restoration: Add large wood to **6 miles** of tributaries in the upper watershed.



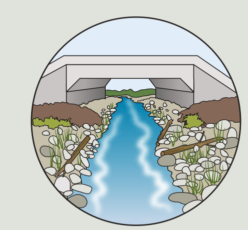
Re-meander and/or add large wood to **10.4 miles** of mainstem and tributary channels in the in the lower watershed.



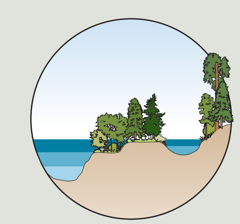
Sediment Reduction: Stormproof / stabilize **45 miles** of forest roads.



Forest & Riparian Enhancement: Plant **100 acres** of Port Orford Cedar in the upper Elk River watershed, and enhance **19.7 miles** of riparian vegetation along the middle and lower Elk River.



Tributary Reconnection: Restore fish passage to **2.6 miles** of high priority tributaries.



Floodplain Reconnection: Reconnect the floodplain along **6.25 miles** of the lower mainstem and estuary.

By reaching these objectives, the Elk Partnership seeks to triple wild coho salmon abundance by 2036, while strengthening the viability of local working farm and forest lands.

4.4 Conservation Need: Degraded Coho Habitats and Impaired Watershed Processes

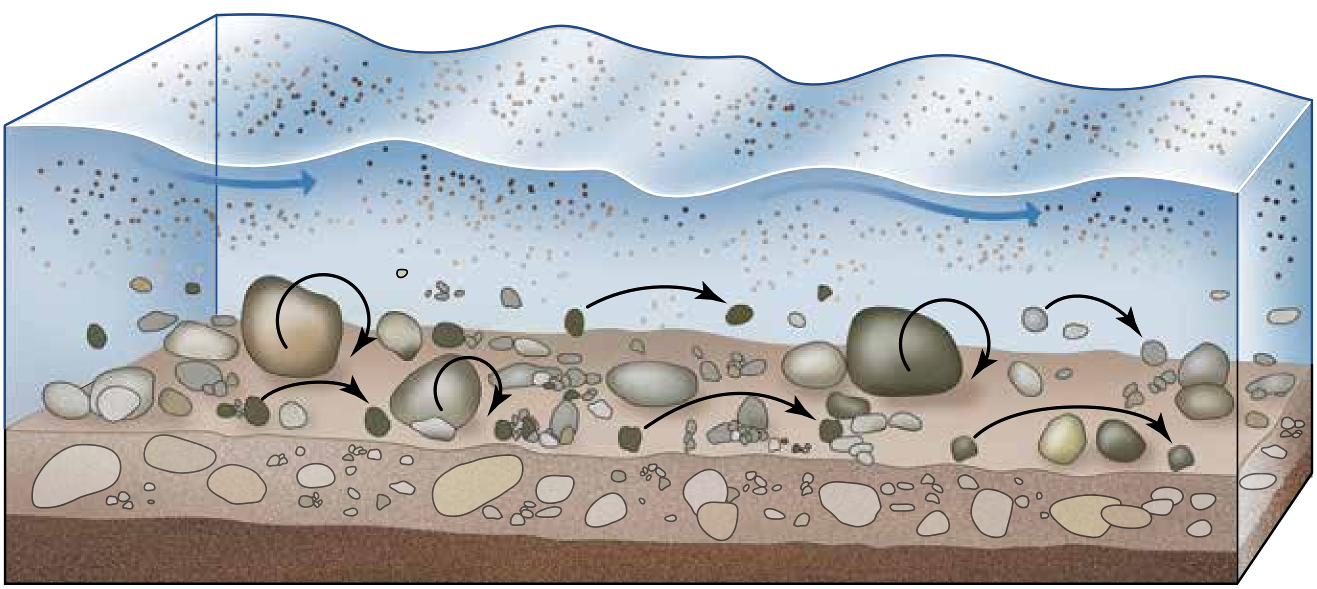
Each of these watershed components is characterized by key ecological attributes (KEAs), many of which are essential to the viability of the population. Loss and degradation of KEA's in Oregon's coastal watersheds have resulted in coho abundances that are 11-19% of historical estimates (Meengs and Lackey 2005). According to Lestelle (2007) several KEAs (or "physical biological features" as described by Lestelle) typically form high-quality coho habitats, including: stream corridors with unimpeded passage; connected side channels; connected floodplains; off-channel habitats (overflow channels, tidal marshes and swamps, alcove or ponds); groundwater channels; seasonally flooded wetlands; low gradient pool/riffle sequences; suitable-sized gravel substrate free of excess fine sediment; backwater pools and beaver ponds; abundant large wood; extensive riparian vegetation armoring streambanks and providing shade to maintain cool summer stream temperatures; suitable streamflows and duration; excellent water quality; and abundant forage, including aquatic invertebrate and fish species that support growth and maturation.

These and other KEAs result from a complex interaction of numerous watershed processes. In the Elk watershed, the planning team identified the restoration of several impaired processes as priorities for coho recovery, including:

- Bedload transport
- Riparian function
- Channel migration
- Floodplain interaction
- Flows
- LWD delivery and recruitment

Coarse sediment (bedload) transport has increased from its naturally high level due to timber management activities incompatible with erosion-prone geology and slopes, filling in pools throughout the watershed and increasing instability in the lower reaches. In the upper watershed, juvenile coho currently congregate in low-gradient reaches of

Figure 4-5. Bedload transport is the natural process of boulders and gravel moving downstream. Landslides resulting from historic clearcuts and road building have elevated bedload in the Elk River. As it moves through the system (expedited by the historic removal of LWD), excessive bedload fills pools that are critical for rearing. In addition, insufficiently maintained roads generate pulses of fine sediment that fill off-channel areas and clog spawning gravels. Artwork by Elizabeth Morales.



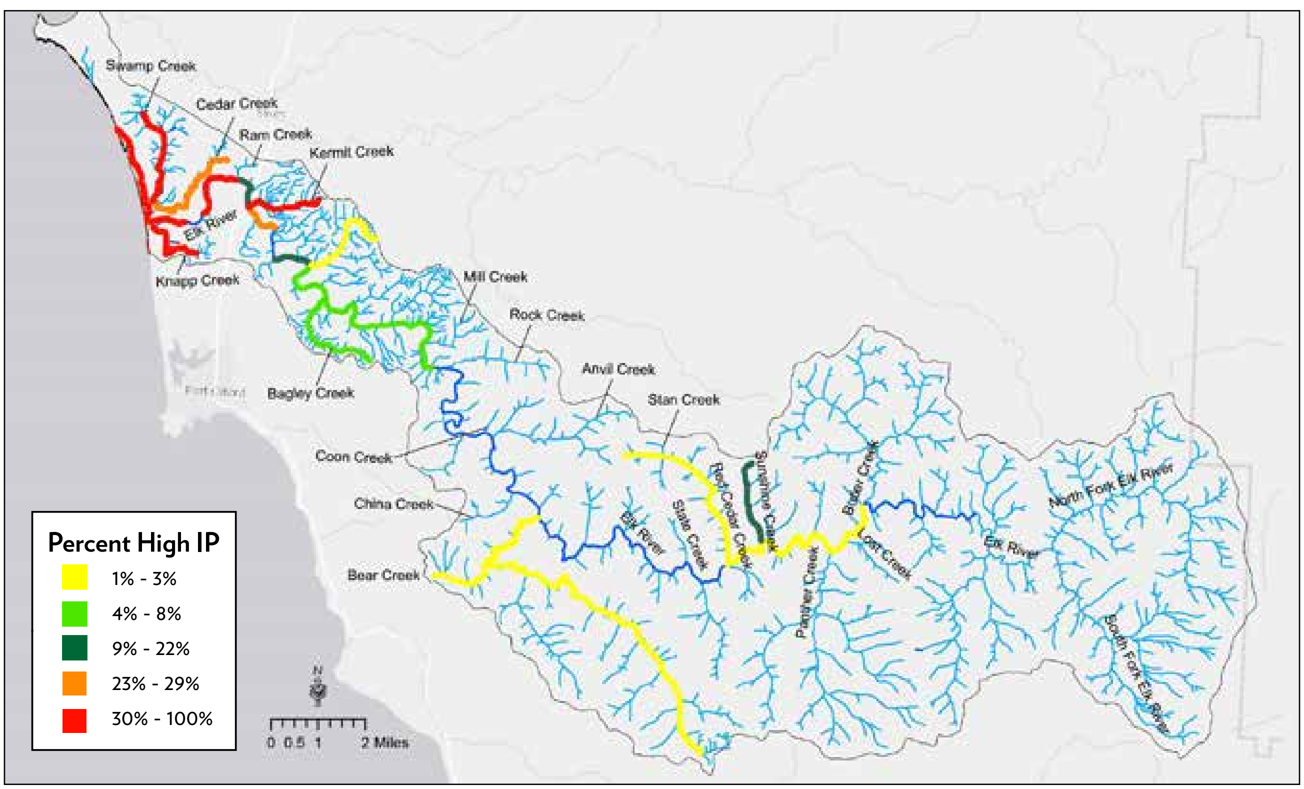
confined tributaries, where habitat is especially vulnerable to alteration from landslides and other disturbance. Fine sediment from insufficiently maintained roads; a legacy of mining; deferred road maintenance; and incompatible road-building practices continue to burden the system with pulses of elevated sediment that compromise spawning gravels and interstitial rearing spaces.

Loss of riparian function due to clearing for rural-residential development and agricultural production has reduced shade, beaver habitat, and large wood inputs; altered channel morphology; and increased bank erosion in the Elk River watershed. The introduction of invasive vegetation (especially gorse) and a reduction in forest diversity has altered the instream food web and reduced large wood inputs to the system, resulting in a loss of instream habitat complexity and pool habitat.

Channel migration has been severely altered in the Elk River due to both historic and more recent channelization, as well as tributary dredging to protect agriculture and residential infrastructure. These interventions have resulted in channel simplification and incision, especially in the Elk River's lower reaches. Undersized culverts on residential, forest, and ranch access roads, as well as small legacy dams on smaller tributaries, also

Bagley Creek channelized stream course. Photo: Steve Miller.

Figure 4-6. The percentage of stream length in the Elk River mainstem and tributaries with high Intrinsic Potential (IP). Areas showing no highlights contain no high IP reaches.



impair channel migration while often limiting adult and juvenile fish migration.

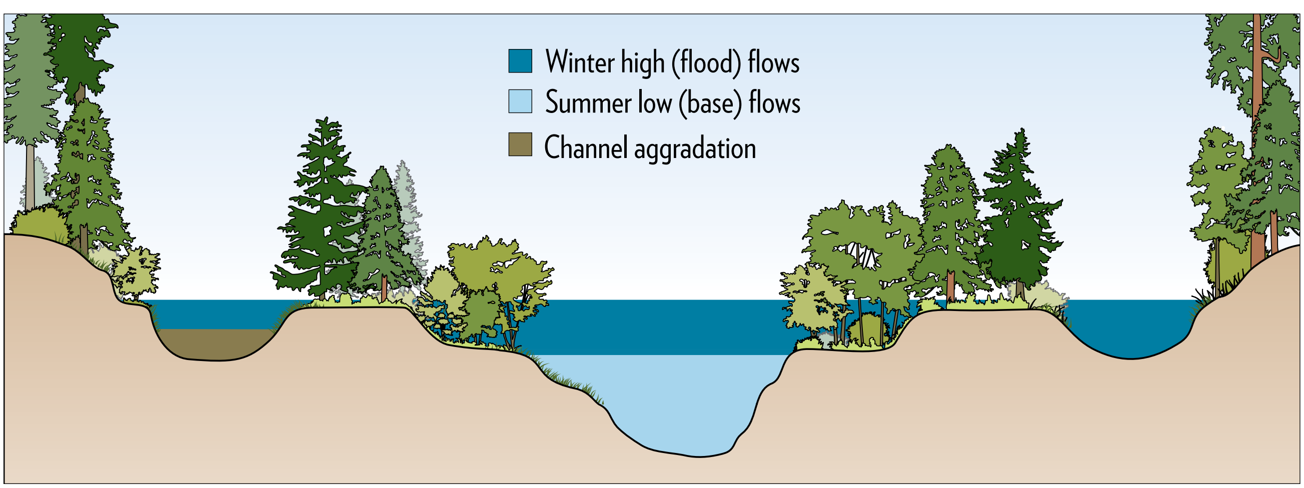
Channel simplification and incision have reduced the capacity of the channel to **interact with its floodplain,** while reducing the extent of forested and emergent wetlands. The removal of beavers from the landscape and extraction of LWD from tributaries and the mainstem have also significantly contributed to diminished floodplain connectivity. This loss of lateral connectivity has severely reduced overwintering habitat for juvenile coho. The off-channel and wetland habitats associated with connected floodplains provide key refugia in winter from peak storm flows, which sweep juveniles downstream. These off-channel habitats also often provide refuge from high summer temperatures found in the mainstem and several tributaries. Collectively, historic and ongoing alterations to these and other watershed processes have significantly reduced the quality, extent, and connectivity of coho spawning and rearing habitat. The loss of these habitats has limited the health of the population. The SONCC Recovery Plan states that "the juvenile life stage is most limited and quality winter rearing habitat, as well as summer rearing habitat, is lacking for the population. Lack of floodplain and channel structure and impaired water quality are the two most limiting stresses. Juvenile summer rearing habitat is impaired by high temperatures resulting from degraded riparian conditions and water withdrawals. Winter rearing habitat has been reduced by channelization, diking, and filling of wetlands."

4.5 The Threat of Conversion

Much of the habitat loss in the Elk River watershed can be attributed to a time when the conservation of aquatic resources was not viewed as a priority, and the ways in which watersheds produced and maintained salmon habitats were nascent and poorly understood concepts. While historic timber and agricultural practices degraded coho habitats and impaired watershed function, many areas in the Elk River and its watershed are healing. Substantial forestland protection in the upper

Conversion represents changes in land management or development to practices and uses that are less compatible with healthy salmon ecosystems.

Figure 4-7. Floodplain Function and Channel Interaction. Historically, the floodplain along the lower Elk River contained secondary channels and other off-channel areas that were activated in high flows. These inundated areas provided critical over-wintering habitats for juvenile coho seeking to escape the high water velocities that occur in winter floods. Many of these floodplain/off-channel habitats have been lost in the lower Elk River. Reconnecting them, where possible, provides an excellent opportunity to restore historic coho habitat. Re-meandering tributaries provides similar benefits. Artwork by Elizabeth Morales.



watershed coupled with steadily improving land management along the lower river promote passive restoration of key habitats. Equally important, these conservation strategies have created the conditions for active (human-led) restoration to significantly accelerate coho habitat gains.

We are not out of the woods though, as threats do persist today. Some ongoing management activities associated with timber and agriculture continue to degrade salmonid habitats and impair water quality. Likewise, rural residential landowners often seek to maximize their property's connection to the river and open-water views, leading to altered riparian zones and reduced water quality.

A more immediate and impactful threat than the management of privately owned properties in the Elk watershed is the potential conversion of its working lands base. "Conversion" represents changes in land management or development to practices and uses that are less compatible with healthy salmon ecosystems. Conversion may be viewed as a spectrum, with intact and functioning ecosystems on one end and heavily modified areas (such as urban areas, industrial feedlots etc.) on the other. As conversion takes place and lands move down this spectrum, watershed health declines due to increased impervious surfaces, altered flow regimes and stream structure, increased pollutant and effluent loading, and/or other adverse impacts to habitat and water quality. Conversion typically reduces both the extent and quality of habitats, while impairing the processes that can restore and create them.

As landowners and managers continue to invest in Best Management Practices (BMPs) and the restoration of critical habitats, it is essential that functioning habitats are not compromised due to conversion (Burnett et al. 2007). The outcomes desired from this plan cannot be attained if new and incompatible land uses are allowed to erase the benefits of ongoing restoration efforts. By maintaining a strong and economically viable working lands base, the rural character of the watershed can be preserved, while ensuring that habitat restoration is given the time it needs to pay off. Strategies to prevent conversion are presented in Chapter 6.

As landowners and managers continue to invest in Best Management Practices and the restoration of critical habitats, it is essential that functioning habitats are not compromised due to conversion. Photo: Steve Miller.

Chapter 5

Development of the Elk River SAP

With facilitation support provided by Wild Salmon Center and other members of the Coast Coho Partnership, the Elk Partnership conducted a locally-led, science-driven process to develop the Elk River SAP. The process included the following steps.

5.1 Visioning

The Elk River SAP process began with a discussion of shared partnership values and priorities to guide the planning process and inform development of a long-term vision statement for the Elk Partnership. The exercise explored ways in which coho conservation aligns potentially competing social, economic, and ecological priorities among local stakeholders. In addition to a vision statement, the discussion yielded guiding principles for the planning process, as well as a suite of outcome statements to clearly define the Partnership's long-term coho conservation priorities. The discussion also led to the development of outreach documents for team members to share when describing the planning process to landowners, stakeholder groups, and the general public.

5.2 The Elk River Framework

As part of the Business Plan, the Coast Coho Partnership developed a "common framework" to establish a consistent language that could be used in both the SAPs and other coast coho conservation efforts. Per the Business Plan model, the Elk Partnership reviewed and tailored the framework to recognize any social and ecological conditions that are unique to the Elk River watershed.

LIMITING FACTORS FOR ELK RIVER COHO

The **primary** limiting factor for Elk River coho is a lack of *winter rearing habitat,* which is driven largely by the **loss of instream complexity.** Instream complexity refers to a suite of instream and off-channel features – like large wood, pools, connected off-channels, alcoves, and beaver ponds – that provide high-quality rearing habitat for juveniles.	The **secondary** limiting factor for Elk River coho production is a lack of *summer rearing habitat.* **Elevated water temperatures** in tributaries, off-channel areas, and especially in the mainstem Elk River impede the movement of juveniles through the system, reducing access to critical summer rearing habitats.

The Elk River Framework classifies habitat types (called "components"); identifies the "key ecological attributes" (KEAs) of each component for Elk River coho; describes potential indicators for each KEA; and lists the stresses and threats that could undermine population viability over the long term. Terminology adopted through this framework is included throughout this plan. The full Elk River Framework is contained in Appendix 1.

5.3 Stress Assessments

Following a review of – and agreement with – the primary and secondary limiting factors presented in the SONCC Recovery Plan for the Elk River coho population, the Elk Partnership then evaluated the major habitat stresses limiting coho production in the watershed's two sixth field drainages (referred to in this plan as the upper and lower HUCs). The planning team reached consensus on the major stresses in each HUC by evaluating ecosystem function according to the critical KEAs selected for the Elk River coho population from the common framework. These assessments relied on existing information that included habitat and water quality data, salmonid population data, and watershed plans and assessments. The team also relied on interviews conducted with ODFW, other agency field staff, and various nonprofit and governmental restoration practitioners. Much of this information is summarized in the Literature Review in Appendix 2. The Annotated Bibliography in Appendix 3 describes the source documents used in the sub-watershed assessment process.

5.4 Project Identification, Selection, and Prioritization

With the major stresses and primary limiting factors agreed upon for each HUC, the Elk Partnership undertook a multi-step process to determine site-specific protection and restoration actions. The first step was an expert opinion review process in which the team was asked to further narrow down the stresses from the HUC scale down to the tributary scale, and then describe the conservation strategies required to restore the most impaired KEAs in each. Facilitators then projected maps and aerial images of the watershed and "walked" participants down each perennial tributary and mainstem reach in the HUC. Team members who were uniquely familiar with the sub-watershed discussed protection and restoration priorities and opportunities along each reach. Where there was consensus among the team, facilitators recorded project recommendations, which were described at either the tributary or reach scale depending on participants' knowledge of the system.

Note: this step did not consider whether a project was socially feasible and/or had the support of the landowner(s). The purpose was simply to identify in which locations limiting factors and specific stresses could/should be addressed through a protection or restoration project. The planning team was uniquely qualified for this exercise as several participants had decades of on the ground experience in the watershed. As experts recommended projects, they were also able to

Common Framework Terminology

Key Ecological Attribute: Key Ecological Attributes, or "KEAs", are characteristics of watersheds and specific habitats that must function in order for coho salmonids to persist. KEAs are essentially proxies for ecosystem function. If KEAs like habitat connectivity, instream complexity, water quality, riparian function, and numerous others are in good condition then sufficient high-quality habitats likely exist within a watershed to maintain viable coho populations.

Stresses: Stresses are impaired attributes of an ecosystem. They are equivalent to altered or degraded KEAs and represent physical challenges to coho recovery, such as decreased flows or reduced lateral connectivity. Stresses are sometimes referred to as "limiting factors". However, while stresses may limit coho production, typically the term "limiting factor" refers to the one stress that represents a bottleneck to production. The limiting factor is often referred to in rather general terms (e.g. "reduced instream complexity"), while the stress is more specific ("reduced gravels, reduced wood, reduced pools" etc).

***Threats*:** Threats are the human activities that have caused, are causing, or may cause the stresses that destroy, degrade, and/or impair KEAs. The common framework includes a list of threats with definitions and commonly associated stresses. This list is based on threats listed (sometimes using different terms) in existing coho recovery plans. The definitions are based on previous classifications (IUCN 2001; Salafsky et al. 2008) with minor modifications reflecting the work of the Coho Partnership.

Habitat Components: Habitat components are the types of habitats that are essential to support the (non-marine) life cycle of coho salmon. The Elk River common framework identifies and defines these habitat types, which are presented in Chapter 4.

draw upon existing plans or assessments, most importantly, a Watershed Condition Framework completed by USFS for the upper and lower HUCs in 2012.

Prioritization Criteria. The process above yielded roughly 50 projects across the two 6th field watersheds. Projects advanced five conservation strategies that were identified as the priorities to address existing stresses. These included enhancing instream complexity, restoring fish passage, reconnecting floodplains (including restoring off-channel habitat), enhancing riparian function, and protecting critical habitats through land acquisitions and easements.

Once compiled, the Elk Partnership prioritized projects using several criteria that evaluated: 1) the relative importance of the location in which the project is to be implemented, and 2) the relative importance/ benefit of the project. Criteria included the following:

- Criteria to determine the importance of the location where restoration is occurring included the number of life stages utilizing the site and the extent of high IP habitat available to generate coho (measured by the percentage of a tributary that has high IP). Additional "bonus" points were also provided to any sites that contained unique conditions or habitat types (e.g., a tidal spruce swamp) or that was a known source of cool water temperature refugia.
- Criteria used to evaluate the importance of a proposed project included: the limiting factor(s) being addressed (primary, secondary, or other); the number of watershed processes that benefited from the project; the anticipated longevity of the project; and assurance of success. Bonus points were given to any projects that: 1) benefited working agriculture or timber lands, 2) advanced an innovative conservation practice, or 3) completed ("buttoned up") the work required in a tributary.

Appendix 4 presents the scoresheet used to apply these criteria, along with a worksheet used to quantify the ecosystem processes benefited by different project types. Project scores by criteria and other project information are shown in the Elk River SAP Project Summary and Rankings spreadsheet contained in Appendix 5.

In addition to using this scoresheet to prioritize actions generated for this SAP, the Elk Partnership will also use the scoresheet as a tool to evaluate future project opportunities and their consistency with the goals of this SAP.

Netmap as a Tool to Test and Refine Project Locations. Following the prioritization, WSC commissioned TerrainWorks to use its Netmap tool to model the optimal locations for numerous restoration strategies. Netmap develops a "virtual watershed" using a LiDAR digital elevation model (DEM) (with 10m DEMs where LiDAR is unavailable). The virtual watershed enumerates multiple aspects of watershed landforms and processes, and human interactions within them over a range of scales (Benda et al. 2016, Barquin et al. 2015). NetMap's virtual watershed contains six analytical capabilities to facilitate optimization analyses, including: 1) delineating watershed-scale synthetic river networks using DEMs; 2) connecting between river networks and terrestrial environments, and with other parts of the landscape; 3) routing of watershed information downstream (such as sediment) and upstream (such as fish); 4) discretizing landscapes and land uses into facets of appropriate scales to identify interactions and effects; 5) characterizing landforms; and 6) attributing river segments with key stream and watershed information.

There were three goals for this exercise. The first was to provide an objective evaluation of the locations prioritized for restoration by the planning team. The TerrainWorks' analyses included a range of outputs that were considered by the planning team, including prioritized sites for riparian restoration, beaver re-introduction, thermal refugia protection, road maintenance/decommissioning, and fish passage improvement. In effect, the Netmap analyses provided a check on "at-the-table bias" and provided further justification for selected project locations.

The second goal of running Netmap was to provide managers with modeled priority sites in cases where information or participant expertise was limited, and team members were unable to recommend one location over another. An example is the challenge in determining which tributary nodes (locations where tributaries empty into the mainstem) present the greatest opportunity for and benefit from floodplain reconnection.

The third goal of using Netmap was to provide a long-term modeling tool and data layers for future prioritization exercises. The USFS and SWC both retain a license to use the Elk River Netmap data as well as access to the Netmap software. The complete Elk River Netmap analysis can be found in Appendix 7.

Projects resulting from the process described in this section are presented in Chapter 6 under Goals 2, 3, and 4.

5.5 Threats Assessment

As described in the vision developed at the outset of this process, the Elk Partnership sought to use the SAP process to not only generate a list of restoration projects but also to evaluate the social and economic conditions that allow habitat loss to continue. This process began by identifying the "threats" (the human decisions that lead to habitat stresses) most commonly associated with the loss and degradation of Elk River coho habitats. In a two-day workshop facilitated by an expert in Open Standards, the team developed: 1) conceptual models to describe – and more fully understand – the highest priority threats, and 2) results chains to explain how selected strategies can address the identified threats. Projects resulting from this process focus largely on building the community's conservation capacity and are presented in Chapter 6, under Goal 1.

Photo: Tim Palmer.

Appendix 6 contains the conceptual models, results chains, and a narrative summary of the three primary threats identified.

5.6 Monitoring and Indicators

Development of the Coast Coho Business Plan and its constituent SAPs (like this one) were driven in part by increasing concern that current restoration efforts did not appear to be generating improvements to critical habitats at a meaningful scale. While implementing restoration projects, partners could show improvements at a reach level but demonstrating change at the sub-watershed scale or population scale remains elusive. During development of the "Elk River framework" the Elk Partnership identified a list of indicators that they seek to improve through implementation of the SAP. This list was winnowed down throughout the process to the version now found in Chapter 7. The summary table there presents the final list of indicators for the Elk River SAP. These indicators assess both the rate at which the SAP is being implemented and the extent to which implementation is improving critical KEAs.

5.7 SAP and Project Cost Estimates

The Elk River Coho Partnership's final step in drafting the Elk River SAP was to estimate the anticipated costs of projects selected for the plan. Costs were generated by reviewing the OWEB Oregon Watershed Restoration Inventory (OWRI) database and by reviewing costs from projects that have been implemented in the Elk River area by local partners. The OWRI database was queried to focus on projects that were implemented within the Oregon Coast Coho ESU from 2010 to 2014. These costs were reviewed and modified for use in the Elk watershed by partners with extensive experience in implementing projects on the south coast. Project costs are presented in Chapter 8.

Photo: NRCS

5.8 Community Outreach

The Elk Partnership includes local, state, and federal partners, and NGOs. Throughout the SAP development process, participants on the core planning team maintained consistent communication with the boards and managers of the groups that they represented in the process. Equally important, managers who work with private landowners provided periodic updates to landowners and industry representatives. This ongoing outreach ensured that questions and concerns raised by local stakeholders were considered by the Elk Partnership and acted upon during plan development.

Photo: NRCS

Chapter 6

The Elk River Coho Recovery Strategy

According to the SONCC Recovery Plan, coho in Oregon's Elk River system face a risk of extinction due in large part to the loss and degradation of freshwater habitat for summer and winter rearing. As described in other areas of this SAP, increasing human activity in the Elk River watershed since the mid-1800s has degraded upland, instream, off-channel, riparian, wetland, and estuarine habitats, leading to impaired watershed function and reduced coho habitat. Collectively the projects included in this chapter advance a coordinated restoration strategy that focuses on restoring watershed function in the long term, while reducing the primary stresses (to coho production) in the short term. Table 6-1 provides a quick overview of the stresses and threats identified by the Elk Partnership as the highest priority to engage to recover the Elk River coho population.

Table 6-2 at the conclusion of this chapter contains a visual representation of the strategic priorities agreed upon by the Elk Partnership, providing a relative ranking of project types in the lower, middle, and upper parts of the watershed. Generally, in the lower part of the watershed (downstream of the Hwy. 101 bridge) the Elk Partnership emphasizes the need to halt the conversion (loss) of working agricultural and timberlands to development, while reconnecting and restoring off-channel habitats that are critical to rearing coho. In the middle part of the watershed (the Hwy. 101 bridge up to the fish hatchery) highest

Photo: Tim Palmer.

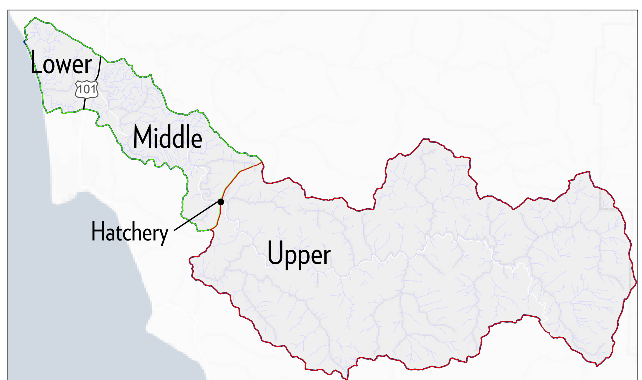


Table 6-1. Primary stresses and threats to coho habitat in the Lower, Middle, and Upper Elk River.

Primary Stresses and Threats	Lower Elk (Estuary – Highway 101)	Middle Elk (Hwy 101 to ODFW Hatchery)	Upper Elk (above ODFW Hatchery)
Primary Stress on Coho Production	• Temperature	• Lack of off-channel rearing	• Sediment
Primary Threat(s)	• Conversion (loss) of working lands (timber, ag) • Lack of economic security for working landowners	• Loss and conversion of riparian vegetation on rural residential lands	• Lack of road maintenance

priority is given to protecting and restoring riparian (streamside) vegetation. In the upper watershed (above the hatchery), which is largely protected, the highest priority is on reducing sediments resulting from erosion of the road network on USFS lands.

This chapter organizes projects to address these and other priorities according to several goals developed by the Elk Partnership. Goal 1 recommends actions that will reduce and may one day eliminate the threats (human activities) that allow long-standing stresses to persist and new ones to emerge. Goals 2, 3, and 4 contain an assortment of on-the-ground protection and restoration projects that will enhance watershed function while directly targeting habitat stresses identified at the reach scale. Goal 5 focuses on the community's capacity to track the benefits of SAP implementation and is presented in Chapter 7: Evaluation and Adaptive Management.

6.1 Summary of Long-Term Outcomes and Short-Term Goals

At the outset of the process, the Elk Partnership agreed on three desired long-term outcomes from the implementation of this SAP.

LONG-TERM OUTCOMES	
1	The Elk River community has prevented the loss/degradation of both aquatic habitats and working lands in the watershed, ensuring that a net gain can be realized from ongoing investments in salmon habitat restoration.
2	Financial and technical support is sustained for the stewardship of working lands at a level sufficient to achieve SAP habitat goals and maintain the viability of working lands.
3	By 2036, the Elk River community has protected and restored enough high-quality summer and winter rearing habitat in the Elk River watershed to triple wild coho salmon abundance.

The following section is built around five goals intended to generate these long term outcomes.

15-YEAR GOALS	
1	Increase the technical assistance available to private landowners in the Elk River, promoting stewardship and the viability of working lands.
2	Reduce habitat fragmentation and sediment delivery from upland sources.
3	Increase the quality and extent of instream habitat in the mainstem and tributaries, while improving lateral connectivity with floodplain and off-channel habitats.
4	Improve water quality (temperature and nutrient loads) by improving riparian conditions (species complexity, age, width, extent) along mainstem, tributary, and off-channel habitats.
5	Develop sufficient monitoring capacity for community partners to track the status and trends of critical indicators adopted in the Elk River Strategic Action Plan.

Upper Elk. Photo: Steve Miller.

6.2 The SAP Action Plan

GOAL 1

Increase the technical assistance available to private landowners in the Elk River watershed, promoting stewardship and the viability of working lands.

Section 3.4 describes a local economy on the south coast that was built on farming, forestry, and fishing. While these industries remain major contributors to the Curry County economy, a service industry has emerged over the last 25 years to support a growing recreation and tourism industry, as well as an influx of retirees. These and other economic and demographic shifts have impacted the county's ability to provide services that ensure the conservation of local natural resources.

During development of the SAP, the Elk Partnership evaluated the threats (policies, management decisions, and other human activities) that most frequently lead to the loss and degradation of coho habitats. The top three included the conversion of working forestry and agricultural lands to development; and timber and agricultural management practices that are incompatible with watershed health. These threats currently cannot be adequately addressed in Curry County due to a lack of government services, and limited technical support and stewardship incentives available to the owners and managers of local working lands.

For example, the county planning department, which is responsible for comprehensive land use planning and administering the county's land use ordinances, recently maintained less than one full-time equivalent staff planner position. This level of staffing is insufficient to administer critical ordinances that protect against the loss of riparian vegetation, wetland and slough habitats, and other watershed resources. Equally important, this level of staffing is not adequate for

Outlet from the Bagley Creek fire pond. Photo: Steve Miller.

> ***Partnerships with local non-profits and resource agencies have helped me not only support Elk River salmon recovery, but also made my operation more profitable. The technical and financial support these partners offer is essential to conserving local working lands.***

the long-range planning needed to maintain the county's farm and forest lands (a core principle of the state land use planning program.)

Decreases in state and federal technical staff support also contribute to the south coast's capacity challenges. In recent years in Curry County, Oregon Department of Forestry eliminated a Service Forester and a Stewardship Forester position; the USFS eliminated two fish biologist positions; ODFW eliminated a Habitat Restoration biologist position. Because of these and other cuts to field staff, the landowner community has reduced access to government services. These services are essential to support the implementation of best management practices (BMPs), which can both improve operational efficiency and promote resource stewardship.

The actions listed below include specific measures intended to address the capacity issues faced in the Elk River watershed and the south coast region.

Objective 1.1: Provide working lands easements or leases to agricultural and timber landowners.

Actions

- 1.1 – A: Work with the Governor's Office and state legislators to establish a state fund to leverage federal and private investment in conservation easements.
- 1.1 – B: Secure working lands (legacy) easements to complement SAP restoration projects for willing landowners.

Objective 1.2: Promote economic viability in the agricultural community through financial and technical support to implement BMPs and other stewardship measures.

- 1.2 - A: Work with willing agricultural landowners to convert 300 acres of gorse and other invasive plants to pasture and/or habitat.
- 1.2 – B: Develop a one-stop-shop (or a local ombudsman) through the SWCD, WC, or WRLT for landowners to support permitting, resource assessments, operational assessments, cultural resource surveys, funding for BMP implementation, and to serve as a conduit to the Oregon Agricultural Heritage Program (OAHP) (for succession and estate planning).
- 1.2 – C: Establish a landowner forum to facilitate tech transfer among agricultural landowners in the Elk and neighboring watersheds, and share information with and support for new producers (topics: economics of ranching; grazing management; a lease program to support the entry of young agricultural and timber producers into the industry; the restoration economy; ecosystem service values of riparian vegetation and wetlands; local successes/demonstration projects; available grant programs; and guidance for permitting).
- 1.2 – D: Partner with local Oregon Small Woodlands Chapter to investigate carbon offset incentives for forest conservation.
- 1.2 – E: Partner with ODA and NRCS to establish the Elk River as a focus area (SWCD-ODA) and a Conservation Implementation Strategy (CIS) target area to increase stewardship funds available to local agricultural landowners.

GOAL 2

Reduce habitat fragmentation and sediment delivery from upland sources.

Sediments originating from upland sources create long-lasting effects on instream and off-channel habitats in the Elk River watershed and negatively impact coho in both the upper and lower watersheds (Maguire 2001). Fine sediments increase stream turbidity before depositing (and potentially filling) in slow moving pools and off-channel habitats that are essential for rearing juveniles. "Fines" may also smother incubating eggs. Coarse sediments such as gravel, cobble, and even boulders travel down the system for decades. This material, known as "bedload," fills pools, reducing available habitat for both juvenile coho and adult spawners.

Photo: Tim Palmer

Much of the sediment load above background levels originates from forest roads that have not been hydrologically disconnected from the stream network. This makes the USFS road system the primary source of sediments in the upper watershed, and insufficient funding for road maintenance a pressing threat to the recovery of Elk River coho. Sedimentation in surface waters come from three processes: landslides and washouts, road runoff, and the interception of sub-surface flows by ditches. The most long-lasting impacts come from mass failure, large landslides, and washouts triggered or exacerbated by roads built in unstable and erosion-prone terrain. These events send excessive loads of both fine and coarse sediments downstream. A chronic example of this mass failure problem may be seen along the 5544 road in the headwaters of Middle Fork and East Fork Panther Creek.

Forest roads are the primary source of fine sediments in the Elk River watershed. Greater investment in road maintenance on USFS lands could address many of the most chronic sediment sources. Photo: Alamy.

While much of the Upper Elk watershed is permanently protected, extensive storm-proofing of forest roads is needed on USFS lands. Side cast material should be pulled back from the edge, under-sized or failing culverts replaced, unstable areas addressed by rerouting water, and bio-swales created in appropriate places. Figure 6-1 presents the planning team's consensus on the most pressing road segments in need of maintenance. The Netmap tool described in Chapter 5 includes a road maintenance optimization module that the USFS is encouraged to consider as it designs and upgrades drainage features in these and other areas.

In addition to road improvements, potential timber harvest on inholdings and other private lands threatens to contribute additional sediments into the Elk River and its tributaries, particularly where timber access roads and harvests are conducted on steep slopes or landslide-prone geology. Similarly, in the lower Elk, headwall failures threaten to deliver significant pulses of sediments into critical spawning and rearing areas for coho. The Elk Partnership has invested and will continue to invest heavily in the restoration of low-gradient tributaries favored by coho (see Goal 3). These potential headwall failures and the resulting debris flows threaten to undermine the value of ongoing restoration efforts by choking (with sediment) large wood that has been added to the system, and, more generally, reducing the complexity of instream habitats. As described by one member of the core planning team, "if we cannot prevent sediment loading from headwall failure, the benefits of restoration downstream will be short lived." Failure of water impoundments that support cranberry operations and other industrial uses represents a similar threat. Accordingly, the actions below recommend working collaboratively with willing landowners to evaluate the potential for both headwall and reservoir failures.

To address existing and potential sediment-related stresses on key coho habitats, the planning team has stated three objectives for sediment abatement in the upper and lower watersheds: 1) stormproof / stabilize 45 miles of USFS forest roads, 2) acquire or place easements or leases on high-risk landslide areas in need of larger buffers; and 3) evaluate actual and potential sources of sedimentation in the upper and lower HUCs.

Objective 2.1: Stormproof / stabilize 45 miles of forest roads including full disconnection of the road system from the tributary network.

Actions

- 2.1 - A: Promote the Elk River watershed as the highest priority for USFS spending on road maintenance in southwest region.
- 2.1 - B: Use the Netmap road maintenance optimization tool as needed to determine optimal maintenance designs on road segments identified in Figure 6-2.
- 2.1 – C: Stormproof the following roads (in order of priority): Panther Creek, Mainstem Butler to Red Cedar (5325), Bald Mountain Creek, Upper Blackberry Creek 295 (5544-110 and 5502-240, 295), North and South Forks (3353), Butler Creek, and Rock Creek (5105).

Objective 2.2: Acquire or place easements or leases on high-risk landslide areas in need of larger buffers, and other high potential sediment source areas.

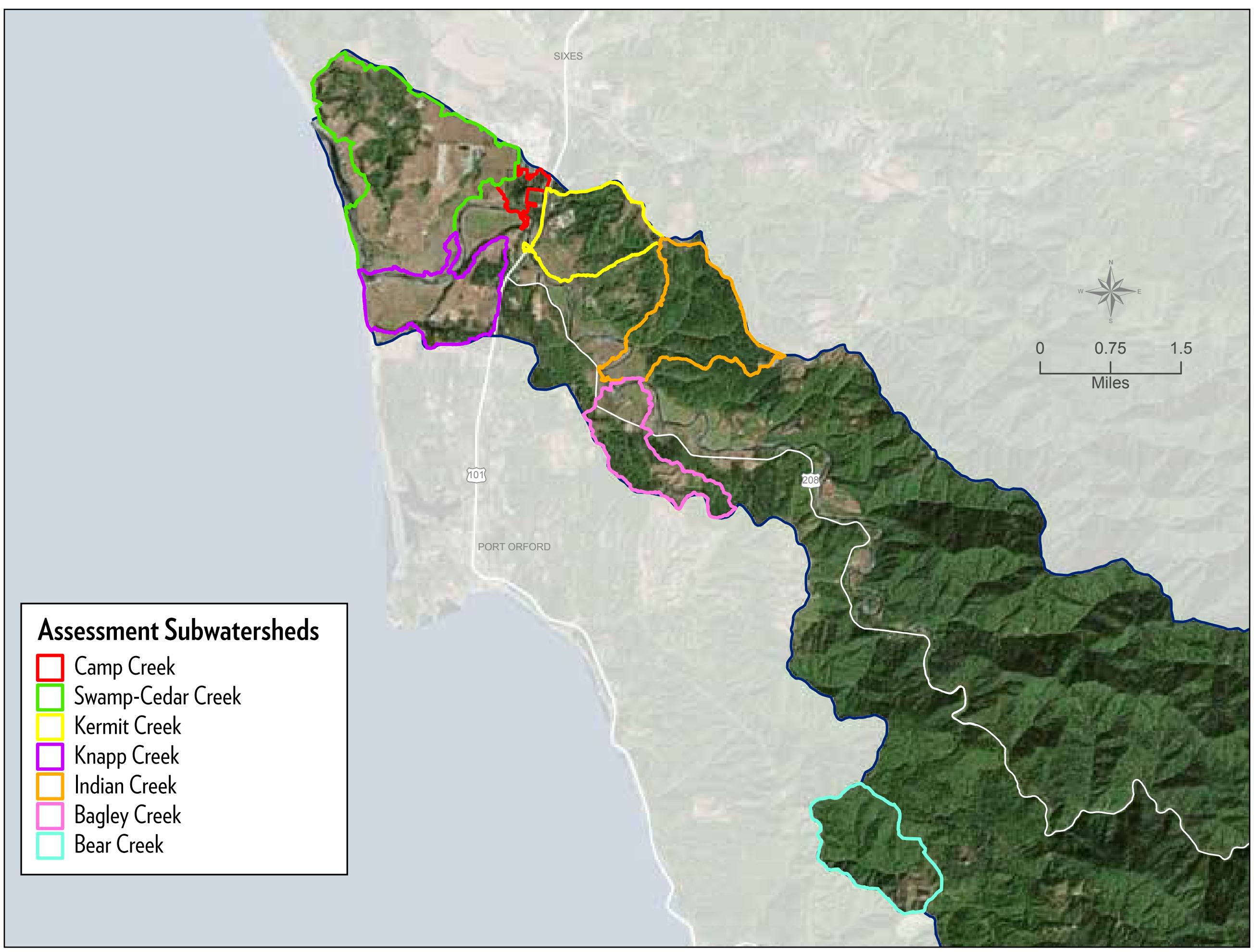
- 2.2 - A: Secure acquisitions, easements, or leases on USFS inholdings, including parcels in: Rock Creek, Bear Creek, China Creek, the South Fork Bald Mountain Creek, Bald Mountain Creek, Purple Mountain Creek, West Fork Panther Creek, and Keystone Nature Preserve.
- 2.2 - B: Secure acquisitions, easements, or leases on upland parcels with the highest risk of headwall failure or other sediment delivery risk, including parcels in: Upper Bear Creek, Indian Creek, Camp Creek, Cedar Creek, Kermit Creek, and Dan Creek.

Objective 2.3: By 2021, evaluate actual and potential sources of sedimentation in the upper and lower HUCs.

- 2.3 - A: Conduct an assessment of potential headwall failure in: Swamp Creek, Indian Creek, Camp Creek, Cedar Creek, Knapp Creek, Kermit Creek, Bagley Creek, Bear Creek.
- 2.3 - B: Conduct a road system analysis on USFS land.
- 2.3 - C: Complete an inventory of privately owned roads in need of storm proofing and other maintenance.
- 2.3 – D: Evaluate water impoundment areas in cooperation with willing landowners to assess potential for catastrophic failure.

Bagley Creek. Photo: Steve Miller.

Figure 6-1. Priority sub-watersheds for sediment assessments.



GOAL 3

Increase the quality and extent of instream habitat in the mainstem and tributaries, while improving lateral connectivity with floodplain and off-channel habitats.

Their long stay in the watershed makes coho particularly susceptible to changes in watershed conditions, exposing them to the effects of land modifications that may degrade habitat conditions and access. Juvenile coho require cool, slow-moving reaches and off-channel habitats such as those found in backwater pools, alcoves, ponds, and side channels. Lateral connectivity with floodplains, which is often created by large wood complexes, beaver dams, and other instream structures, is particularly important for juvenile coho as these areas provide refuge from high winter flows that can sweep them downstream.

State and federal partners recognize this loss of winter rearing habitat as the primary factor limiting coho production in the Elk River. Accordingly, the actions proposed below focus on restoring instream complexity and floodplain connectivity (two essential elements of winter rearing habitats) in the Elk River mainstem and its tributaries. Restoration strategies that will improve these KEAs include the installation of large wood, reconnection of freshwater wetlands and other floodplain habitats, and replacing culverts to restore longitudinal (upstream-downstream) connectivity. The majority of the projects presented below will also include riparian (streamside) planting to further enhance the project site's long-term habitat quality. Riparian enhancement will provide shade, capture fog drip, recruit wood, and provide other benefits to the site. Priority areas for riparian enhancement are presented under Goal 4.

The addition of large wood in selected tributaries of the Elk River could substantially increase over-winter survival of juvenile coho. Among other benefits, large wood helps form slow-moving pools that coho thrive in. Pictured: enhancement restoration on Rock Creek. Photo: Steve Miller

Objective 3.1: By 2024, increase structural complexity in six miles of tributaries in the upper HUC by adding LWD to key overwintering areas.

Actions

- 3.1 – A: Add LWD to the West Fork of Panther Creek and for ½ mile of mainstem Panther Creek.
- 3.1 – B: Add LWD to the East Fork of Butler Creek.
- 3.1 – C: Add LWD to Blackberry Creek (becomes highest priority if culvert removed).

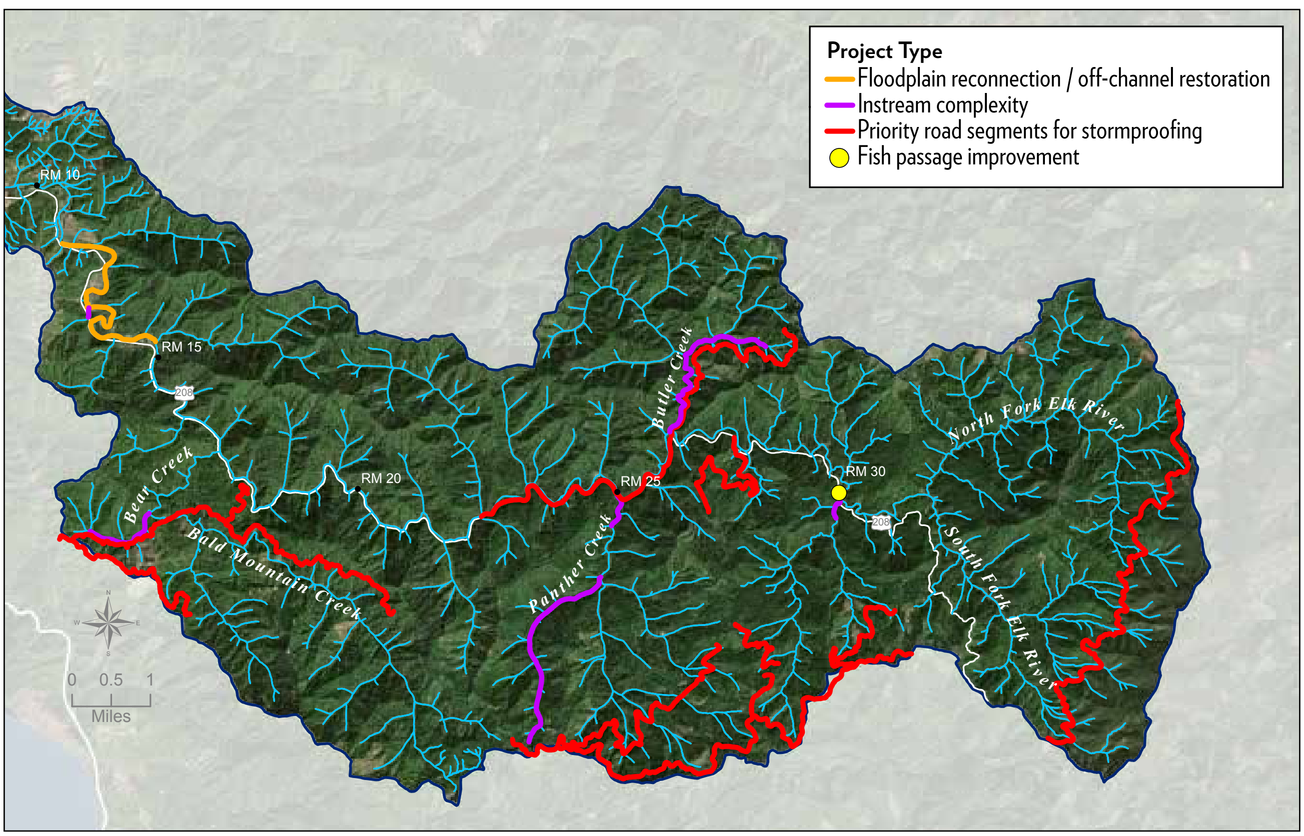
Objective 3.2: By 2022, increase instream complexity in 10.4 miles of lower mainstem and tributaries.

- 3.2 – A: Re-meander Knapp Creek.
- 3.2 – B: Add LWD to Cedar Creek.
- 3.2 – C: Add LWD to Indian Creek.
- 3.2 – D: Add LWD to lower 3/4 mile of Bear Creek.
- 3.2 – E: Add LWD to mainstem (below Camp Creek and above two small tribs).
- 3.2 – F: Re-meander Bagley Creek and add LWD (pending acquisition).

Objective 3.3: Reconnect the historic floodplain along 6.25 miles of the lower mainstem and estuary, supporting the re-establishment of historic Spruce bogs and associated tidally influenced freshwater wetlands.

- 3.3 – A: Reconnect lower 1/4 mile of Indian Creek floodplain.
- 3.3 – B: Reconnect floodplains in lower Swamp Creek (includes LWD and riparian).
- 3.3 – C: Restore off-channel rearing habitat on the mainstem between Kermit and Camp Creeks.
- 3.3 – D: Create wetlands ("fish hotels") along Cedar Creek.
- 3.3 – E: Reconnect the Kermit Creek floodplain from the BPA/ranch access road down to the mouth.

Figure 6-2. Priority locations for road improvement and instream habitat restoration in the middle and upper Elk River watershed.



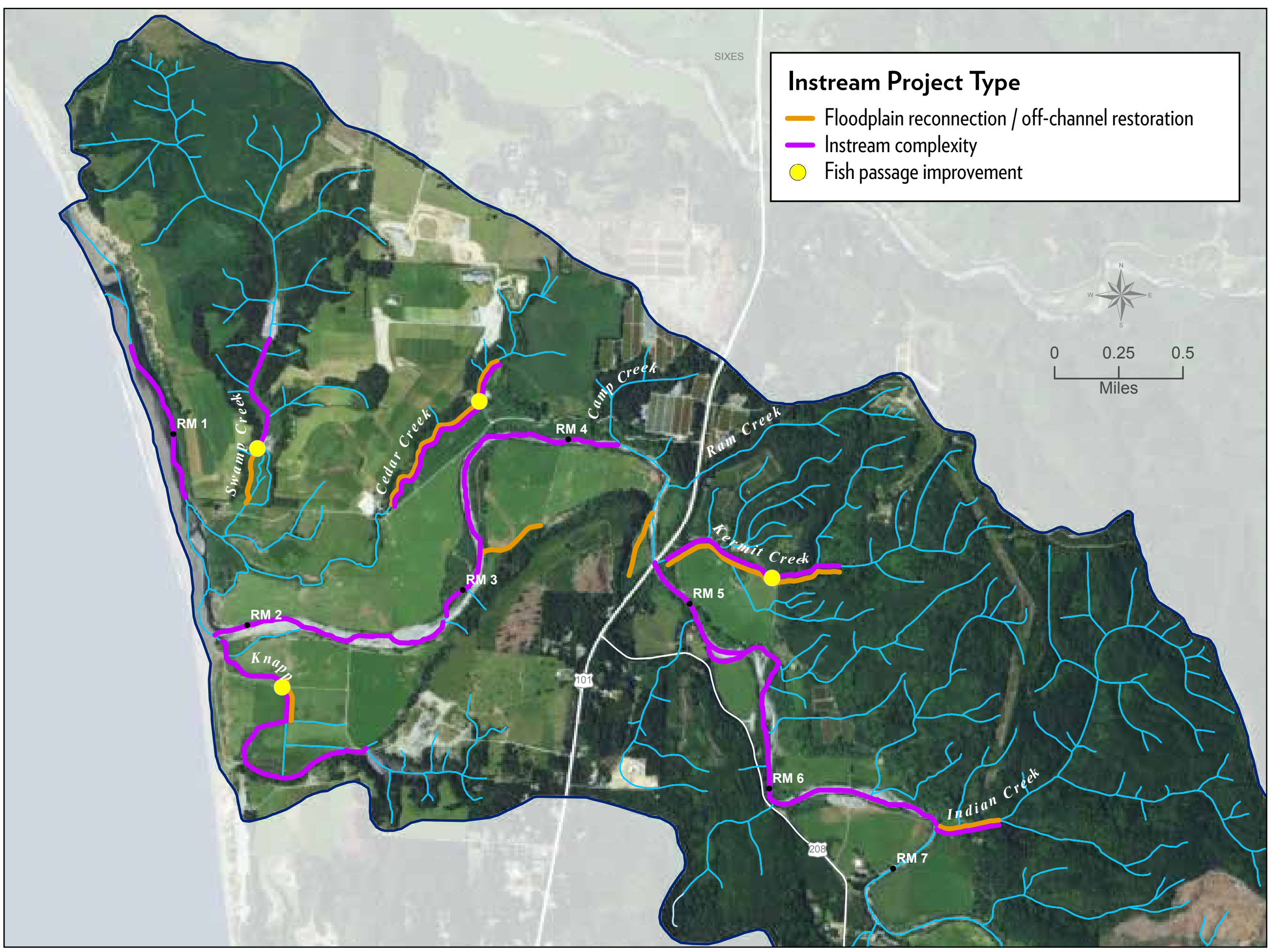
A "fish hotel" constructed on an Elk River sheep ranch. Photo: Bennet Wahl.

- 3.3 – F: Reconnect off-channel habitats on mainstem, just below Rock Creek.
- 3.3 – G: Reconnect floodplains in lower mainstem tidal zones (LWD in the mainstem and slough channels entering estuary).

Objective 3. 4: Increase longitudinal connectivity in high-priority tributaries, restoring fish passage to 2.6 miles of instream habitat.

- 3.4 – A: Replace culvert on Kermit Creek.
- 3.4 – B: Replace Blackberry Creek culvert.
- 3.4 – C: Install by-pass channel(s) on lower reservoir in Swamp Creek.
- 3.4 – D: Replace two culverts on Bagley Creek (pending acquisition) and construct a fish ladder/bypass channel into the fire pond.
- 3.4 – E: Enhance floodway capacity and replace culverts along ditched channel on Knapp Creek.

Figure 6-3. Priority locations for habitat restoration in the lower Elk River watershed according to project type.



GOAL 4

Improve water quality (temperature and nutrients) by improving riparian function (species complexity, age, width, extent) along mainstem, tributary, and off-channel habitats.

Both the upper and lower Elk River mainstem are listed as impaired on the state 303(d) list due to elevated year-round water temperatures (DEQ 2012). In the upper Elk watershed, historic timber harvest and road building have altered channels and decreased the amount of shade trees bordering the river (Massingill 2001). This channelization and reduced riparian shade has contributed to increased summer stream temperatures by several degrees on the Elk River mainstem. Several major tributaries are also 303(d) listed as impaired for temperature, including Bald Mountain Creek (in summer), Cedar Creek (year round), and Swamp Creek (year round). Lack of riparian function is the primary contributor to elevated temperatures.

In the lower watershed, conversion of the Elk River floodplain to rural residential development and agriculture (primarily grazing) has severely diminished riparian function. Riparian zones in the lower Elk watershed, which were historically dominated by large conifers, are now mostly composed of shrubs and lower growing hardwoods that are infiltrated with gorse and Himalayan blackberry (USFS 1998, Maguire 2001). In addition, two thirds of the lower mainstem is in immature pioneer and brush communities that offer very little stream shade, overhanging shelter, or large wood. Water in the lower Elk River mainstem warms three to four degrees Fahrenheit in the approximately 6.5 miles between the National Forest Boundary (just above the hatchery) and Bagley Creek (Massingill & Hoogesteger, 2002). Land use here is shifting away from forestry and grazing to rural residential development for river-front home sites.

In addition to maintaining cooler water temperature through cool microclimates and stream shade, healthy riparian vegetation also captures atmospheric moisture from fog, and enhances the infiltration of precipitation to recharge ground and surface water. Functional, diverse riparian zones also supply leaf litter to support the insects and other macroinvertebrates at the base of the instream food web. By furnishing the channel and surrounding floodplain with LWD, functional riparian vegetation promotes complex channel structure and the development of undercut banks. LWD facilitates channel interaction with the floodplain, allowing juveniles to access off-channel refugia when flows spike in the mainstem and spill into the floodplain. Like off-channel areas, undercut banks provide important shelter in the summer when temperatures rise and fish seek thermal refugia and shade.

Increases in water temperature constitute a critical stress on Elk River coho habitats and drive the lack of summer rearing habitat, which NMFS identified as the secondary limiting factor for coho production in the watershed. The actions below present the priorities for riparian enhancement and protection in the Elk River watershed, along with other actions that reforest upland areas and remove invasive species. Collectively these projects are intended to return water temperatures to levels that do not limit coho production in the summer, while also promoting long-term channel complexity.

Objective 4.1: Restore 100 acres of vegetation in high-priority reaches along the upper mainstem and tributaries.

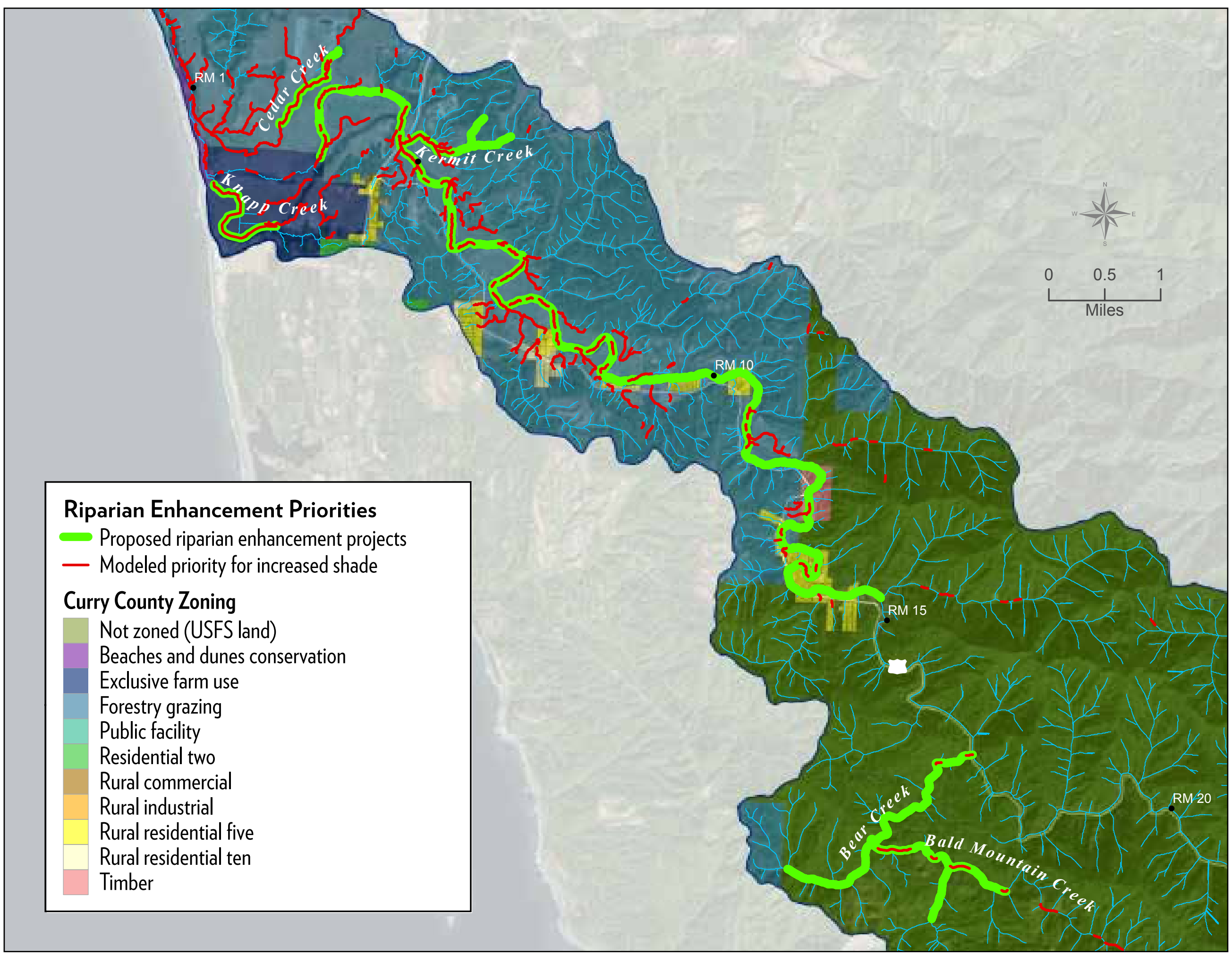
Actions

- 4.1 – A: Interplant Port-Orford-cedar and other native species in upper mainstem (Blackberry to Butler).
- 4.1 – B: Enhance riparian habitats on Bald Mountain Creek.

Objective 4.2: Enhance 19.7 miles of riparian zones to increase stream shading and other riparian functions on agricultural and rural residential lands.

- 4.2 – A: Enhance riparian habitat on the mainstem between Kermit and Camp Creeks.
- 4.2 – B: Enhance riparian habitat on Camp Creek.
- 4.2 – C: Enhance riparian habitats on Kermit Creek.
- 4.2 – D: Enhance riparian habitats (including new fencing) on the mainstem from Anvil to Indian Creeks.
- 4.2 – E: Enhance riparian habitats along Ram Creek.
- 4.2 – F: Enhance riparian habitats on Cedar Creek.
- 4.2 – G: Enhance riparian habitats on Knapp Creek.
- 4.2 – H: Convert gorse to native vegetation on bars in the lower mainstem below Camp Creek.

Figure 6-4. Proposed locations for riparian enhancement projects overlaid on modeled priority sites and county zoning designation.



6.3 A Note to Funders on Strategic Priorities and Project Sequencing

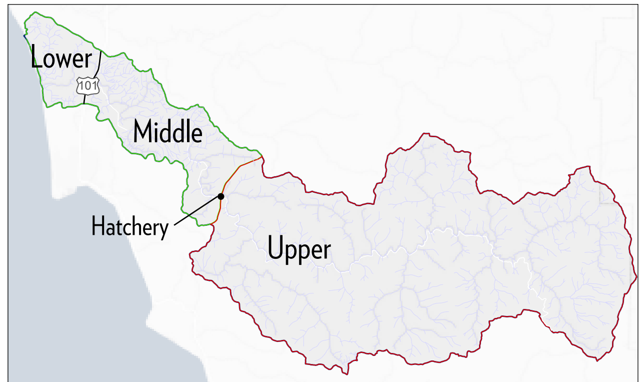
The project locations identified in the previous section represent areas where habitat protection and restoration projects are expected to generate a substantial ecological benefit while also having a high likelihood of implementation within a reasonable timeframe (10-15 years). These projects directly address the primary factors limiting coho production (as well as mounting threats that could lead to the persistence of these limiting factors), while also providing potential benefits to local landowners, which increases the likelihood of implementation. In short, the project types and locations shown in this chapter represent those areas where need and opportunity converge.

While the Elk River Coho Partnership prioritized the projects presented in the chapter (see chapter 5 for a summary of the prioritization process), the core planning team recognizes that projects may not be implemented in order of their ecological priority due to real world constraints like funding and landowner readiness. The team also recognizes that over time project opportunities may emerge that were deemed infeasible during development of this plan; e.g. the stream reaches below the areas highlighted on Swamp and Cedar Creek have high restoration potential but opportunities are unlikely to emerge in the foreseeable future. The following table is intended to provide a general overview of the relative priorities of different conservation strategies undertaken in different areas of the watershed. This table is intended to help guide implementation of projects contained in this SAP, while also providing an initial filter for emerging project opportunities.

It is important to note for funders of this SAP that all of the project types presented in the table are deemed to be important for Elk coho recovery, and rankings indicated for each strategy are relative to the others contained in the table. Project types identified as "low" or "medium" importance should be viewed only as potentially lower priority investments relative to others in the table. All projects that align with the strategies in the table are worthy of consideration, and, ultimately, each project should be evaluated based on its own merits. The scoring tool contained in Appendix 4 should be used for this purpose alongside table 6-2.

Photo: Tim Palmer.

Table 6-2. Stress, threats, and the relative importance of priority protection and restoration strategies in the lower, middle, and upper Elk River watershed.



Conservation Strategy	Habitat Component	Lower Elk (Estuary to Hwy 101)	Middle Elk (Hwy 101 to ODFW Hatchery)	Upper Elk (above ODFW Hatchery)
Protection Strategies				
Prevent conversion (loss) of private working lands. Provide landowner incentives for BMPs.	All	Highest	Moderate	N/A
Acquisition and easement	Uplands	High	Moderate	Low
	Tributaries	Highest	Highest	Moderate
	Mainstem	Highest	Highest	Moderate
Uphold existing codes	Tributaries & Mainstem (riparian)	High	Highest	Moderate
Restoration Strategies				
Reconnect off-channel / floodplain habitats	Tributaries	Highest	High	Moderate
	Mainstem	Highest	Moderate	Low
Enhance riparian vegetation (including invasives removal and proof of concept re-introduction)	Tributaries	High	Highest	High
	Mainstem	Moderate	Highest	Moderate
Increase instream complexity	Tributaries	High	High	Low-Moderate
	Mainstem	Moderate	Moderate	Low
Improve fish passage	Tributaries	Moderate	Moderate	Low-Moderate
Sediment abatement (road improvement)	Upland	High	Moderate	Highest

6.4 Priorities for Acquisition and Easements

It is the stated intent of the Elk Partnership to promote the stewardship and viability of working lands (see goal 1). The voluntary negotiation of easements with working landowners is an essential tool to maintain the working lands base by ensuring a financial return for landowners who seek to enhance habitat values on their lands.

Priorities for habitat protection through acquisitions and easements mirror the conservation priorities shown in Table 6-2. In the lower and middle watershed, easements will be used for projects that can both: 1) compensate landowners for the stewardship of habitat and water quality (often referred to as paying landowners to grow fish), and 2) abate the threat of conversion by buying out development rights. Acquisitions in the lower and middle watershed will focus on protecting and restoring several key ecological attributes for coho recovery, especially cold water refugia, intact riparian corridors, and connected off-channel habitats.

In the upper watershed, acquisitions will be driven by this plan's goal to reduce sediment production, although other water quality impairments such as thermal and pesticide/herbicide loading will also be considered. Additionally, acquisition priorities in the upper watershed will be driven by the extent to which a site can promote forest species diversity, enhance riparian function, and maximize the capture of fog drip to enhance summer low flows.

The need for funder flexibility, called out in section 6.3, is especially important in the case of acquisition projects, which are difficult to prioritize relative to restoration projects. Acquisition opportunities are fleeting, and once a site containing important habitat value is sold for purposes other than conservation, the opportunity to maximize the habitat value of these lands is highly uncertain. In addition to the opportunity cost of missing restoration opportunities, these lands may exacerbate current limiting factors. For instance, commercial timber investors must typically emphasize economic returns over long-term ecological stability, leading to sediment production as a result of harvests on steep slopes that are not suited to short-rotation clearcutting. In short, the cost of not supporting acquisition opportunities can be very high. When the parcels identified through this plan come up for sale, and restoration projects are ready for implementation, funders must be aware that hesitation may compromise long-term coho habitat restoration progress.

Once a site containing important habitat value is sold for purposes other than conservation, the opportunity to maximize the habitat value of these lands becomes highly uncertain.

Restoration work on the lower Sixes River, which borders the Elk to the north. Photo: Steve Miller.

Chapter 7

Evaluation and Adaptive Management

The Elk Partnership recognizes that an adaptive management approach is essential to the long-term success of this plan. This section presents a monitoring framework that partners will use to evaluate: 1) the rate at which the SAP is being implemented, and 2) whether implementation is generating the anticipated benefits. This section concludes with a list of critical data gaps that, as filled, will also support adaptive implementation of this plan.

7.1 The Monitoring Framework

Table 7-1 below presents a framework for the Elk Partnership to monitor SAP implementation. The framework is constructed around the SAPs four implementation goal statements. Next to each statement, the table defines two types of monitoring that will be conducted.

The first is **implementation monitoring**, which seeks to assess the rate at which the SAP is being implemented. The column on the left side of the goal statement, which is shown in column 2, lists several implementation milestones and project tracking metrics that partners can use to evaluate the degree to which SAP implementation is occurring. Broadly, these metrics are intended to answer the question, "Is the SAP being implemented at the desired pace and scale?"

The second type of monitoring is **effectiveness monitoring**, which aims to assess whether SAP implementation is having the intended effects. The columns to the right of the goal statements show: 1) the KEAs that partners seek to improve in a particular component; 2) the indicator(s) used to assess the KEA; and 3) the partner(s) responsible for the monitoring. In short, evaluation of these KEAs through the selected indicators help answer the question, "Are we moving towards our stated goals and desired outcomes?"

Currently the Elk Partnership's capacity to apply the framework below and conduct effectiveness monitoring is limited. As a result, partners identified a fifth and final goal statement for this SAP.

GOAL 5

Develop sufficient monitoring capacity for community partners to track the status and trends of critical indicators adopted in the Elk River Strategic Action Plan.

The purpose of this chapter is not to present a full monitoring plan, but to suggest a framework in Table 7-1 that aligns with SAP goals and can be selectively developed over time. The core planning team recognizes the considerable limitations on funding now available for monitoring and will develop specific plans for each of the KEAs as priorities dictate and funds allow.

The planning team also recognizes the magnitude of the challenge faced in trying to detect habitat responses at the sub-watershed scale from the implementation of the SAP. As stated in the Oregon Coast Coho Conservation Plan (ODFW 2007), "restoration of ecological processes that support high-quality habitat requires time and is constrained by patchwork landownership patterns, different regulatory structures, and historical land use practices. Even given an expected increase in the level of non- regulatory participation in habitat improvement work, it will take time to: 1) produce detectable improvements in habitat quality, and 2) restore the biological and ecological processes across the ESU." This monitoring framework is intended as a first step toward this lofty – but essential – goal.

Table 7-1. A monitoring framework to assess pace and effectiveness of SAP Implementation.

SAP Monitoring Framework				
Implementation Monitoring – *Are the SAPs being implemented?*		**Effectiveness Monitoring** – *Is SAP implementation having the intended effects? Are we moving towards our stated outcomes?*		
Project Tracking Metric	**SAP Goal statement**	**Key Ecological Attribute (component)**	**Indicator**	**Lead**
• State easement/ acquisition fund created • Local "one stop shop" established • Landowner forum convened • Elk River designated as focus area and/or CIS area	**Goal #1** Increase the technical assistance available to private landowners in the Elk River, promoting stewardship and the viability of working lands.	All	• BMPs implemented • Acres of gorse converted • Acres enrolled under working land easements • Acres of land in timber and agricultural production % of watershed in EFU • Acres of new development in FEMA floodplains	Curry SWCD
• Acres of inholdings protected • Miles of forest roads assessed, storm-proofed, and decommissioned • Water impoundments and headwalls assessed	**Goal #2** Reduce habitat fragmentation and sediment delivery from upland sources.	**Uplands** • Connectivity • Array of Structural Diversity	• Road density • % high risk landslide areas with forest stands in layered or older forest structure	Curry Partnership
• # of instream restoration projects completed (floodplain reconnection, LWD, re-meander etc) • Acres of floodplain reconnected to channel • Acres of wetlands reconnected (inc. "fish hotels") • Acres of tidal wetland / slough reconnected • # of culverts replaced	**Goal #3** Increase the quality and extent of instream habitat in the mainstem and tributaries, while improving lateral connectivity with floodplain and off-channel habitats.	**Mainstem and tributaries** • Habitat complexity • Geomorphic Lateral connectivity **Freshwater wetlands:** • Landscape Array of Habitats	• selected AQI indicators (see below)* • # of logs placed • % of the potential fish use stream length with entrenchment ratio > 2.22* • % total channel area represented by secondary channels and off-channel • Acres of wetland • Frequency and duration of floodplain wetland inundation • Distribution of different wetland types compared to historic (NWI)	ODFW AQI in partnership with Curry Watersheds Partnership

• Acres planted • % of high priority sites planted • Maintained 70% success rate	**Goal #4** Improve water quality (temperature and nutrient loads) by improving riparian conditions (species complexity, age, width, extent) along mainstem, tributary, and off-channel habitats.	Riparian function (mainstem & tributaries) Water Quality: temperature (mainstem)	• Acres of vegetated riparian zones in rural residential areas • Acres of free to grow, adequately stocked riparian stands • % of selected riparian areas with conifers > 20" dbh in 164' buffer • # of conifers >19.7" dbh & # of conifers >35.4" dbh • Total # of days where mainstem monitoring locations meet temperature standards (DEQ 7-day running average max) • # of consecutive days exceeding 18o C in the mainstem	DEQ in partnership with Curry Watersheds Partnership and USFS
All metrics above	**Outcome #3** By 2036, the Elk River community has protected and restored enough high-quality summer and winter rearing habitat in the Elk River watershed to triple wild coho salmon abundance.	N/A	Coho abundance	ODFW (Coastal Chinook Research and Monitoring Program) in partnership with NOAA

* Elk Framework included the following list of AQI metrics:

- Miles of high-quality habitat: produce 2,800 smolts/mile.
- % stream reach that is pool habitat
- % of stream reach that is slack-water pool habitat
- % pools greater than 1 meter in depth
- # of wood pieces per 100m of stream
- # of key wood pieces (>12m long, 0.60 m dbh)
- Volume of LWD per 100 m
- # alcoves per reach

* Entrenchment indicator references:

Aquatic and Riparian Effectiveness Monitoring Program (AREMP) Staff. 2005. Watershed Monitoring for the Northwest Forest Plan, Data Summary Interpretation 2005, Oregon/Washington Coast Province. USDA Forest Service, Pacific Northwest Regional Office; Bureau of Land Management, Oregon State Office; 4077 S.W. Research Way, Corvallis, OR 97333.

http://www.reo.gov/monitoring/watershedEPA Watershed Academy. 2005. Fundamentals of the Rosgen Stream Classification System; Excerpts of copyrighted material used with permission from Rosgen, D.L. and H.L. Silvey. 1996. Applied River Morphology. Wildland Hydrology Books, Fort Collins, CO. http://www.epa.gov/watertrain/stream_class/index.htm

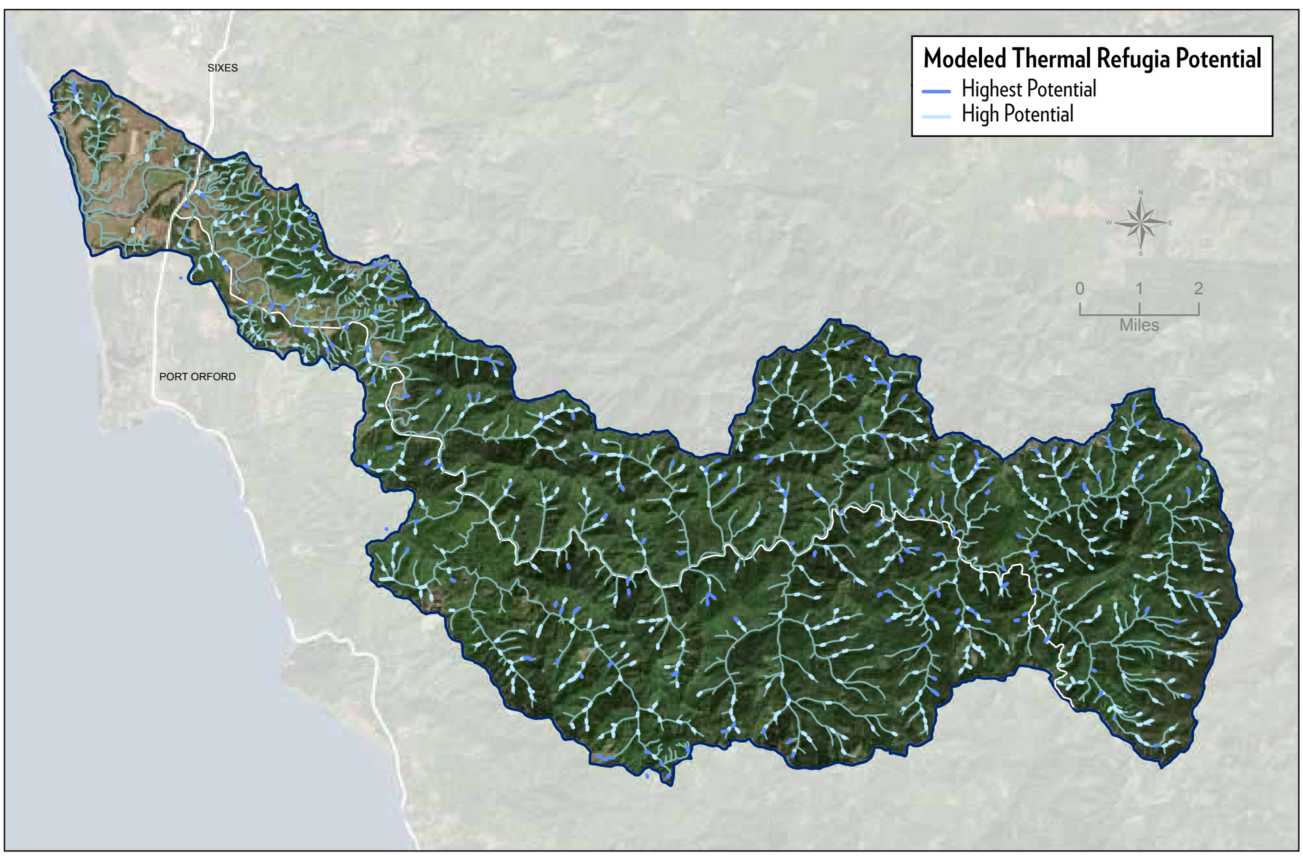
7.2 Data Gaps

The Elk River Coho SAP is a living document that will be updated as new information is generated through the monitoring framework shown in Table 7-1. In addition, the Elk Partnership acknowledges that gaps exist in our collective understanding of the Elk River watershed and its coho population. Accordingly, as new information is generated, partners will update and revise this plan as needed. Primary data gaps recognized during SAP development include the following:

Panther Creek. Photo: Tim Palmer

1. **Sediment sources:** see Objective 2.3.
2. **Temperature:** Targeted monitoring is needed to determine which tributaries (in addition to those now listed on the 303(d) list) provide the greatest temperature increases in the mainstem, and additionally, substantially limit access to high IP areas. Monitoring should also seek to identify areas of cold water refugia (e.g. Ram Creek) in the summer, and measures should be taken to protect corresponding source water areas.
3. **Flows:** Elk River flows are now being monitored near real time by the Oregon Water Resource Department (OWRD), which is recording mean daily flow and instantaneous stage measurements. Additional monitoring is needed to: 1) determine the relationship of flow levels to temperatures in the lower mainstem downstream of the hatchery, and 2) track long-term changes as a result of climate change and/or resource use and development.

Figure 7-1. Netmap modeled cold water refugia in the Elk River watershed.



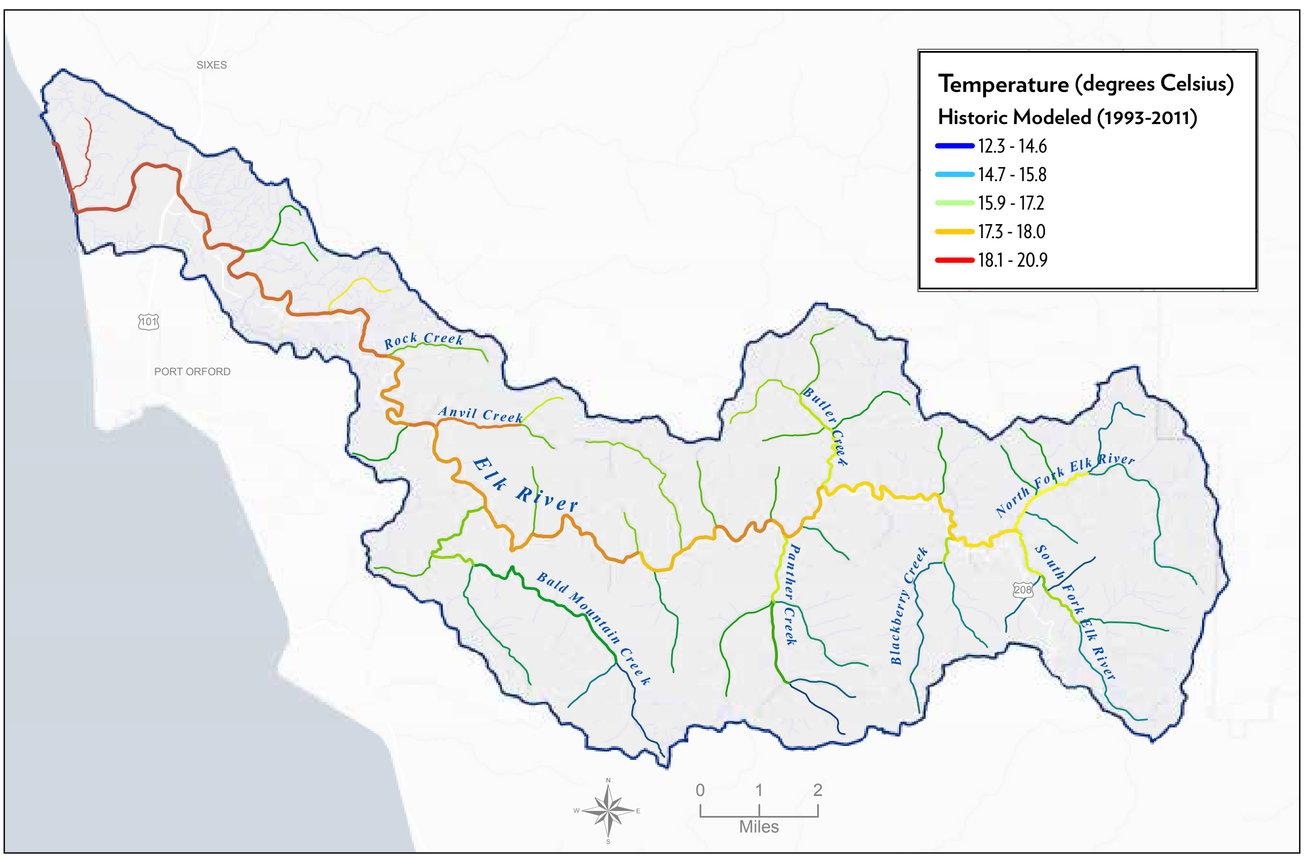
4. **Habitat and LWD assessments:** A lack of habitat surveys in the Elk River has led to inadequate collection of LWD data. As a result, there is limited baseline data on LWD and other habitat features against which to evaluate the benefits of SAP implementation. In addition to an initial LWD survey to establish baseline conditions, long-term monitoring of LWD projects will be needed to assess the degree to which LWD projects are meeting geomorphological objectives, specifically improving instream complexity, channel function, and floodplain connectivity. This monitoring would complement current short-term fish use monitoring requirements associated with LWD installation.

5. **Road surface data:** Data on road surfaces (paved, native, gravel etc) on USFS lands is spotty. Acquiring these data would improve predicted sediment delivery in the upper Elk River watershed. Once road surface data is collected, USFS is encouraged to employ the Netmap tool, which it has license to following the SAP process, to model the optimal locations for road improvements.

Fire Pond at Bagley Creek. Photo: Steve Miller

6. **Sudden Oak Death (SOD):** Sudden Oak Death has not reached the Elk River watershed, but it is getting closer. An Early Detection, Rapid Response system should be developed to track the migration of SOD and prevent it from gaining a foothold in the Elk watershed.

Figure 7-2. Predicted stream temperatures in the Elk River watershed (2040).



Chapter 8

Costs

This chapter estimates the costs associated with executing the projects proposed in Chapter 6. The estimated project costs shown in Tables 8-1 through 8-4 are organized by goal. Table 8-5 summarizes the overall estimated costs in the upper and lower watersheds according to restoration project type.

These costs were generated through a review of the OWEB Oregon Watershed Restoration Inventory (OWRI) database, as well as the costs associated with implementing similar projects in the Elk River area by the Curry County SWCD. The OWRI database was queried to focus on projects that were implemented within the OC Coho ESU from 2010 to 2014. Several data points for maximum costs were left out of the OWRI results because they were not relevant to the Elk River watershed.

Where projects were far enough along in the planning process to have verified cost estimates, these cost estimates were used in the cost summary (see Table 8-5). Where project-specific costs estimates were not available, estimates were made based on project type. For floodplain reconnection and off-channel restoration projects, estimates from other projects with a similar level of complexity were scaled to the size of the proposed project. For instream complexity projects, estimates were generated by multiplying mileage calculated from GIS by an average cost per mile. For riparian enhancement projects, estimates were made by multiplying acreage by a mid-range cost per acre estimate. The riparian enhancement acreages were estimated by multiplying stream miles (calculated using GIS) proposed for treatment times 50 feet, which approximates the average buffer width treated watershed wide over the last several years.

Ferns grow on a wall along the blue-green waters of the Elk River. Photo: Tim Palmer

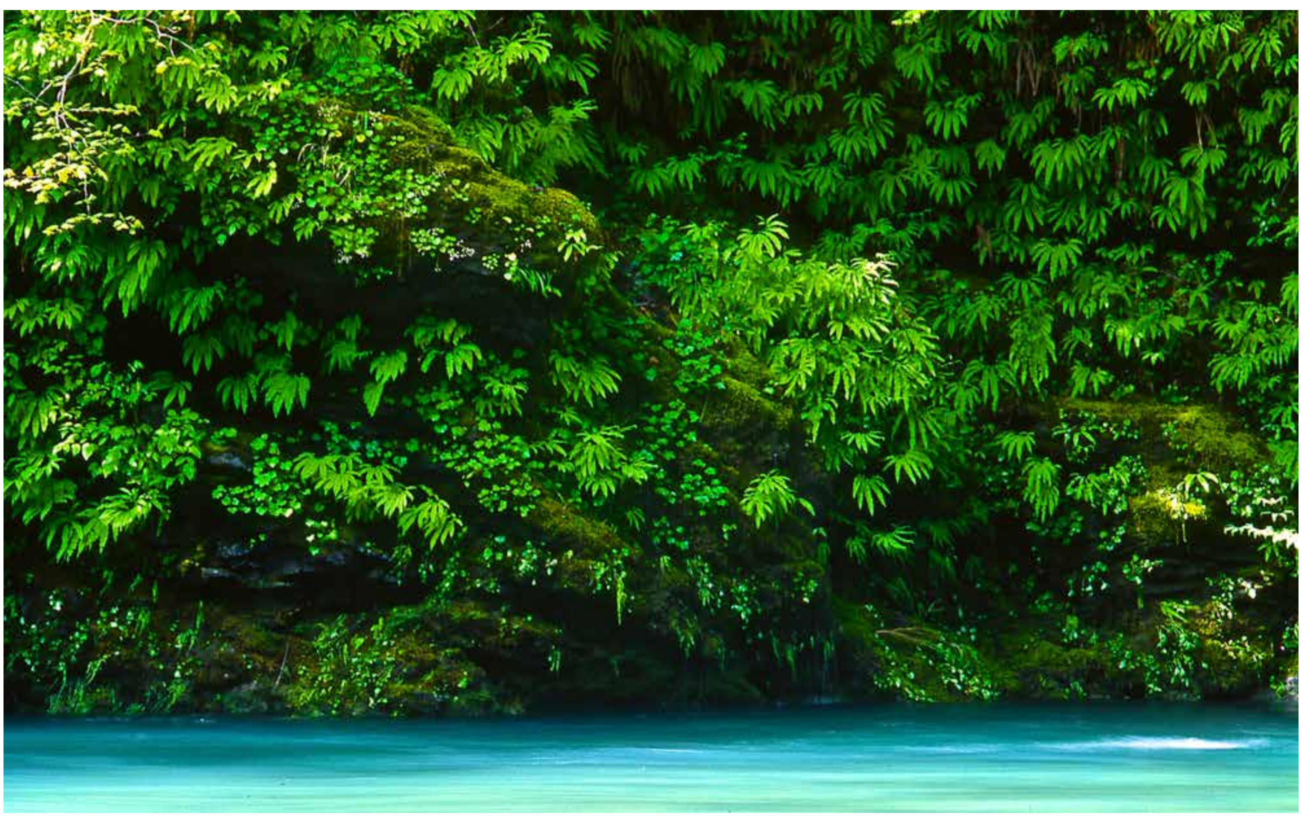


Table 8-1. Project Implementation Costs to Achieve Objectives 1.1 - 1.2.

Action	Lead	Project Description	Cost
Objective 1.1. Provide working lands easements or leases to agricultural and timber landowners.			
1.1-A	WRLT	Work with the Governor's Office and state legislators to establish a state fund to leverage federal and private investment in conservation easements.	$20,000
1.1-B	WRLT	Secure working lands (legacy) easements to complement SAP restoration projects for willing landowners.	N/A
Objective 1.2. Promote economic viability in the agricultural community through financial and technical support to implement BMPs and other stewardship measures.			
1.2-A	GAG	Work with willing agricultural landowners to convert 300 acres of gorse and other invasive plants to pasture and/or habitat.	$675,000
1.2-B	CWP	Develop a one-stop-shop (or a local ombudsman) through the SWCD, WC, or WRLT for landowners to support permitting, resource assessments, operational assessments, cultural resource surveys, funding for BMP implementation, and to serve as a conduit to the Oregon Agricultural Heritage Program (OAHP) (for succession and estate planning).	$40,000
1.2-C	CWP	Establish a landowner forum to facilitate tech transfer among agricultural landowners in the Elk and neighboring watersheds, and share information with and support for new producers (topics: economics of ranching; grazing management; a lease program to support the entry of young agricultural and timber producers into the industry; the restoration economy; ecosystem service values of riparian vegetation and wetlands; local successes/ demonstration projects; available grant programs; and guidance for permitting).	$15,000
1.2-D	WRLT	Partner with local Oregon Small Woodlands Chapter to investigate carbon offset incentives for forest conservation.	$15,000
1.2-E	CWP	Partner with ODA and NRCS to establish the Elk River as a Focus Area (SWCD-ODA) and a Conservation Implementation Strategy (CIS) target area to increase stewardship funds available to local agricultural landowners.	$15,000

Table 8-2. Project Implementation Costs to Achieve Objectives 2.1 - 2.3.

Action	Lead	Project Description	Cost
Objective 2.1 Stormproof / stabilize 45 miles of forest roads including full disconnection of the road system from the tributary network.			
2.1-A	KAS	Promote the Elk River watershed as the highest priority for USFS spending on road maintenance in SW region.	$15,000
2.1-B	USFS	Use the Netmap road maintenance optimization tool as needed to determine optimal maintenance designs on road segments identified in Figure 6-2.	$50,000
2.1-C	USFS	Stormproof the following roads (in order of priority): Panther Creek, Mainstem Butler to Red Cedar (5325), Bald Mountain Creek, Upper Blackberry Creek 295 (5544-110 and 5502-240, 295), North and South Forks (3353), Butler Creek, and Rock Creek (5105).	$4,750,000
Objective 2.2 Acquire or place easements or leases on high-risk landslide areas in need of larger buffers, and other high potential sediment source areas.			
2.2-A	WRLT	Secure acquisitions, easements, or leases on USFS inholdings, including parcels in: Rock Creek, Bear Creek, China Creek, the South Fork Bald Mountain Creek, Bald Mountain Creek, Purple Mountain Creek, West Fork Panther Creek, and Keystone Nature Preserve.	N/A
2.2-B	WRLT	Secure acquisitions, easements, or leases on upland parcels with the highest risk of headwall failure or other sediment delivery risk, including parcels in: Upper Bear Creek, Indian Creek, Camp Creek, Cedar Creek, Kermit Creek, and Dan Creek.	N/A
Objective 2.3 By 2021, evaluate actual and potential sources of sedimentation in the upper and lower HUCs.			
2.3-A	CWP	Conduct an assessment of potential headwall failure in: Swamp Creek, Indian Creek, Camp Creek, Cedar Creek, Knapp Creek, Kermit Creek, Bagley Creek, Bear Creek.	$30,000
2.3-B	USFS	Conduct a road system analysis on USFS land.	$200,000
2.3-C	CWP	Complete an inventory of privately owned roads in need of storm-proofing and other maintenance.	$28,000
2.3-D	CWP	Evaluate water impoundment areas in cooperation with willing landowners to assess potential for catastrophic failure.	$24,500

Table 8-3. Project Implementation Costs to Achieve Objectives 3.1 - 3.4.

Action	Lead	Project Description	Cost
Objective 3.1 By 2024, increase structural complexity in six miles of tributaries in the upper HUC by adding LWD to key overwintering areas			
3.1-A	USFS	Add LWD to the West Fork of Panther Creek and for 1/2 mile of mainstem Panther Creek.	$350,000
3.1-B	USFS	Add LWD to the East Fork of Butler Creek for willing landowners.	$300,000
3.1-C	USFS	Add LWD to Blackberry Creek (becomes highest priority if culvert removed).	$125,000
Objective 3.2 By 2022, increase instream complexity in 10.4 miles of the lower mainstem and tributaries.			
3.2-A	CWP	Re-meander Knapp Creek.	$92,000
3.2-B	CWP	Add LWD to Cedar Creek (includes floodplain/channel re-contouring, LWD, and riparian downstream of the lower reservoir; and LWD between reservoirs).	$35,000
3.2-C	CWP	Add LWD to Indian Creek.	$40,000
3.2-D	CWP/USFS	Add LWD to lower 3/4 mile of Bear Creek.	$106,000
3.2-E	CWP	Add LWD to mainstem (below Camp Creek and above two small tribs).	$120,000
3.2-F	CWP	Re-meander Bagley Creek and add LWD (pending acquisition).	$145,000
Objective 3.3 By 2024, reconnect 15% of historic floodplain along the lower mainstem, and restore 75 acres of historic Spruce bog and associated tidally influenced freshwater wetlands.			
3.3-A	CWP	Reconnect lower 1/4 mile of Indian Creek floodplain.	$46,000
3.3-B	CWP	Reconnect floodplains in lower Swamp Creek (includes LWD and riparian).	$242,000
3.3-C	CWP	Restore off-channel rearing habitat on the mainstem between Kermit and Camp Creeks.	$50,600
3.3-D	CWP	Create wetlands ("fish hotels") along Cedar Creek.	$81,000
3.3-E	CWP	Reconnect off-channel habitats on mainstem, just below Rock Creek.	$109,000
3.3-F	CWP	Reconnect off-channel habitats on mainstem, just below Rock Creek (includes LWD and riparian restoration on the large vegetated bar downstream of Rock Creek, and LWD in secondary channel features).	$80,000
3.3-G	CWP	Reconnect floodplains in lower mainstem tidal zones (LWD in the mainstem and slough channels entering estuary).	$200,000
Objective 3.4 Increase longitudinal connectivity in high-priority tributaries and restore fish passage to 2.6 miles of instream habitat.			
3.4-A	CWP	Replace culvert on Kermit Creek.	$50,000
3.4-B	CWP	Replace Blackberry Creek culvert.	$1,800,000
3.4-C	CWP	Install by-pass channel(s) on lower reservoir in Swamp Creek.	$184,000
3.4-D	CWP	Replace two culverts on Bagley Creek (pending acquisition) and construct a fish ladder/bypass channel into the fire pond.	$112,000
3.4-E	CWP	Enhance floodway capacity and replace culverts along ditched channel on Knapp Creek.	$69,000

Table 8-4. Project Implementation Costs to Achieve Objectives 4.1 - 4.2.

Action	Lead	Project Description	Cost
Objective 4.1 Restore 100 acres of vegetation in high-priority reaches along the upper mainstem and tributaries.			
4.1-A	WRLT	Interplant Port-Orford-cedar and other native species in upper mainstem (Blackberry to Butler).	$64,000
4.1-B	WRLT	Enhance riparian habitats on Bald Mountain Creek.	$15,000
Objective 4.2 By 2022, increase instream complexity in 10.4 miles of the lower mainstem and tributaries.			
4.2-A	CWP	Enhance riparian habitat on the mainstem between Kermit and Camp Creeks.	$64,000
4.2-B	CWP	Enhance riparian habitat on Camp Creek.	$10,000
4.2-C	CWP	Enhance riparian habitats on Kermit Creek.	$78,000
4.2-D	CWP	Enhance riparian habitats (including new fencing) on the mainstem between Anvil and Indian Creeks.	$1,420,000
4.2-E	CWP	Enhance riparian habitats along Ram Creek.	$10,000
4.2-F	CWP	Enhance riparian habitats on Cedar Creek.	$64,000
4.2-G	CWP	Enhance riparian habitats on Knapp Creek.	$135,000
4.2-H	CWP	Convert gorse to native vegetation on bars in the lower mainstem below Camp Creek.	$90,000

Table 8-5. SAP Implementation Cost Summary By Goal.

Total Costs by Project Types (from Project tables above) and Notes		
GOAL 1: Increase the technical assistance available to private landowners in the Elk River, promoting stewardship and the viability of working lands.		
Local technical assistance capacity	$105,000	Costs include a 1 fte position (with benefits) to undertake Actions 1.1 – A, and 1.2 – B thru E.
Gorse control on working lands	$675,000	This is the estimated cost of assisting landowners in controlling 300 acres of gorse. Project locations will include some of the actions in this SAP, as well as partnerships with other working land owners.
Working lands easements	N/A	Easements costs are not shown because of high variability by parcel and landowner privacy (Action 1.1 – B).
GOAL 2: Reduce habitat fragmentation and sediment delivery from upland sources.		
Inventory and assessments	$347,500	
Road maintenance	$4,750,000	
Land acquisitions	N/A	Acquisition costs are not shown to ensure landowner privacy (Actions 2-2 A&B).
GOAL 3. Increase the quality and extent of instream habitat in the mainstem and tributaries, while improving lateral connectivity with floodplain and off-channel habitats.		
Instream and floodplain habitat restoration projects	$2,467,000	
Blackberry culvert only	$1,800,000	This project is presented separately because of its high cost (Action 3.4 – B).
GOAL 4: Improve water quality (temperature, sediment, and nutrient loads) by improving riparian (streamside) function along mainstem, tributary, and off-channel habitats.		
Riparian & upland planting	$566,000	Costs associated with gorse eradication are shown in Goal 1 costs.
		Total SAP Implementation Costs: $10,711,000

Chapter 9

Implementation and Sustainability

Working in close partnership with ODFW and WRLT, member organizations of the CWP (Curry SWCD and SCWC) will serve as the oversight body for the implementation, monitoring, and adaptive management of this plan. Table 9-1 summarizes the roles of the core implementation partners, which will be responsible for putting the SAP into action.

9.1 Updating the SAP

The CWP is in regular contact with ODFW, WRLT, and other partners regarding the Elk River SAP, and implementation of the plan has been identified as a priority initiative in the CWP's delivery of its county-wide conservation programs. CWP member organizations will periodically give updates at their respective board meetings, which will provide the Elk River SAP's implementing partners and the public an ongoing opportunity to review and discuss SAP implementation. In addition, the CWP will facilitate an annual comprehensive review on the implementation of the Elk River SAP that summarizes the projects completed for the year; establishes the subsequent year's restoration, monitoring, research, and outreach priorities; and considers revisions to the priorities presented in the plan. This review will be attended by the core implementing partners and other interested stakeholders.

Ensuring adaptive management of the plan will be a critical function of the CWP. During the annual SAP review, implementing partners will present the data and findings generated from SAP monitoring projects and lessons learned from ongoing habitat restoration. As this SAP goes to print, funds are pending for the CWP and other implementing partners to conduct baseline monitoring

The lower Elk River estuary just before it meets the ocean. Photo: Tim Palmer.

Table 9-1. Core Implementation Partners

Core Implementation Partners		
Core Implementation Partner	*Experience*	*Anticipated Contributors*
Wild Rivers Land Trust (WRLT)	WRLT was founded in 2000 as the Elk River Land Trust and continues to prioritize the protection of vulnerable parcels in the Elk Watershed. Experienced ecoforestry staff brings watershed restoration expertise.	WRLT will continue to hold working lands easements, and to work toward protection of sensitive sites. WRLT will provide local expertise, cooperative restoration on LT holdings, and will continue to host/convene partnership meetings to sustain the vision of a recovered coho run on the Elk.
USFS	The Forest Service owns about 80% of the Elk River watershed, and is very familiar with conservation issues in the upper watershed.	USFS brings extensive local knowledge, technical forestry and habitat expertise, staff support, and some funding. Elk River is a priority watershed for the Rogue River-Siskiyou National Forest.
NMFS	NOAA Fisheries' SONCC recovery plan identifies Elk River as a core independent population. Local staff have extensive knowledge of coho and ecological processes specific to restoration strategies on the Elk River.	Local and species knowledge, staff support and technical review of proposed projects. Funding opportunities are available through programs including OWEB pass-through.
South Coast Watershed Council	SCWS has implemented more than 1,200 restoration projects in Curry County, many geared toward coho recovery, and maintains a strong relationship with private landowners on the Elk River and throughout the County.	SCWS will provide on-the-ground expertise in site-specific issues, outreach and landowner education. Will continue to work with private landowners to design, implement, and manage recovery projects coordinating with the Elk River Watershed Action Plan.
Curry SWCD	Curry SWCD has developed strong agricultural landowner relationships and local partnerships, bringing extensive experience to habitat and agricultural water quality projects for more than 64 years.	Curry SWCD acts as the sponsor for SCWC, providing project/program staffing, USDA program support and referrals, water quality project management and education.
ODFW	ODFW expertise includes regional fisheries, aquatic and terrestrial habitat issues, and state-wide partnerships.	ODFW staff will continue to provide local and agency expertise, as well as data and project development support.
DEQ	State-wide expertise in water quality limitations and best management practices on agricultural and residential land.	With the planned development of a TMDL for the Elk and Sixes watershed, DEQ staff will continue to be engaged in data-gathering prioritization
Wild Salmon Center	Since 1992, WSC has worked around the Pacific Rim to conserve wild salmon strongholds through support for locally-led partnerships, resulting in over 9 million acres and 8,000 miles of river protected or restored.	Through the Coast Coho Business Plan, WSC will work to coordinate and leverage funding to support local implementation of SAP projects and track resulting changes in habitat quality over the long term.
Wild Rivers Coast Alliance	A grant-making arm of Bandon Dunes Golf Resort committed to conservation, community, and economy. Priorities include supporting and promoting healthy fish and species habitats, working landscapes and seascapes, sustainable tourism and local entrepreneurs.	A valued partner in innovative conservation approaches on the South Coast, WRCA provides potential funding to continue strategic planning and recovery implementation in support of the Oregon Business Plan for Coho.
Natural Resources Conservation Service	For 80 years, NRCS and its predecessor agencies have worked in partnership with farmers and ranchers, local and state governments, and other federal agencies to maintain healthy and productive working landscapes.	NRCS will continue to provide private landowner financial and technical support to address natural resources concerns on private lands, including CREP technical support.

on current habitat conditions in the Elk River watershed and the population dynamics of its coho. Monitoring will include an assessment of water temperature in the mainstem and selected tributaries; AQI habitat surveys; and assessments of coho distribution and density. These and additional monitoring efforts planned in the years to come will provide critical baseline and effectiveness data against which the CWP, ODFW, WRLT, and others can evaluate progress towards the long term goals stated in the plan.

In addition to providing baseline data, the pending project will also help managers fill some of the data gaps described in chapter 7, including the locations of cold water refugia (monitoring will ground truth the locations modeled in Netmap); the timing of smolt outmigration; and the habitat types and reaches that provide the highest value spawning and rearing habitats. A small team of core partners including the CWP, WRLT, and ODFW will evaluate the results of these and other research and monitoring projects, and present the findings at the annual discussion of the Elk River SAP. The CWP will maintain all of the pertinent data generated, and prepare revisions to the plan as deemed necessary by the implementing partners.

9.2 Final Thoughts

The Elk River is a rugged Wild Rivers Coast gem from its summit to sea stacks, from its crystalline upper reaches to its sweeping coastal bluffs. The historic pace of development in this remote area has been relatively slow (though it's accelerating), preserving our community's deep connection to the wild and open spaces that support our quality of life and rural economy. The private landowner community is small, with several large ranches entering the 4th generation of stewardship.

Recovery of Elk River coho offers an exceptional opportunity to preserve a diverse range of habitats in this largely intact watershed, while tackling a restoration wish-list that is manageable and realistic. Decades of relationship building among knowledgeable landowners and dedicated conservation professionals provide opportunities for an exceptionally effective conservation investment. But timely action is required now to preserve blocks of intact habitat in the face of increasing economic uncertainty and growing development pressure.

Habitat protection and restoration can work hand in hand in the Elk River watershed to address human-caused legacy impacts, improve current land management practices, preserve intact habitat values, and ultimately recover the coho fishery that once sustained this unique south coast gem.

Chapter 10: References

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Appendices

The following appendices may be found at currywatersheds.org.

1. Elk River Framework
2. Literature Review
3. Annotated Bibliography
4. Project Prioritization Criteria
5. Project Prioritization Worksheet
6. Primary Threats Discussion, Conceptual Model, and Results Chains
7. Elk River Netmap Watershed Restoration Analysis

Opposite: Purple Mountain Falls, Ek River watershed. Photo: Steve Miller.