OCSRI Plan

Chapter 17F
Southwest Oregon Salmon Restoration Initiative

SOUTHWEST OREGON SALMON RESTORATION INITIATIVE

A Planning Effort in Support of the COASTAL SALMON RECOVERY INITIATIVE

Phase 1: A Plan to Stabilize the Native Coho Population From Further Decline

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Prepared for

Rogue Basin Steering Committee
South Coast Watershed Coordinating Council
Rogue Valley Council of Governments

Produced by:

Marc Prevost, Director RVCOG Water Resources Program
Robert Horton, Ph.D. Technical Writer/Analyst
Jerry MacLeod, Fishery Biologist
Rose Marie Davis, Ed.D. Public Involvement Coordinator

Rogue Valley Council of Governments
Box 3275
Central Point, OR 97502
(541) 664-6676

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"Seeking order, and simplification are the first steps toward aligning man with nature."

The Technical Team dedicates this document to Dr. David J. Duncan, Bureau of Reclamation, for recognizing the precarious position of our west coast salmonids and having the vision and dedication to provide the resources and support to develop this plan for the protection, maintenance and restoration of salmon in Southwest Oregon.

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EXECUTIVE SUMMARY

Currently there is a multi-state effort to address the decline of salmon on the West Coast. As part of this effort the National Marine Fisheries Service has divided the coast into a number of coho salmon population regions based on their genetic similarities. The coho regions are referred to as Evolutionarily Significant Units (ESUs). One of these coho ESUs bridges southern Oregon and northern California and is referred to as the Klamath Mountains Province (KMP).

Coordination between the State of Oregon (Coastal Salmon Recovery Initiative) and California on the shared KMP ESU has been limited. While the State of Oregon has been supportive and involved in the development of a recovery strategy for the Oregon side of the KMP, the State of California governor's office has not proceeded with the same level of effort. This has resulted in a split effort between Oregon and California in addressing native coho recovery within the KMP ESU.

The State of Oregon's Recovery Initiative in southern Oregon has been spearheaded primarily by a voluntary partnership of local watershed councils, stakeholders and government agencies from throughout the southwest region. This partnership was coordinated by the Rogue Valley Council of Governments and primarily funded by the Lower Columbia Area Office (Portland) of the Bureau of Reclamation. Additional funding, guidance and technical support was received from the State of Oregon, U.S. Fish and Wildlife Service, S.W. Oregon Resource Conservation and Development and For Sake of the Salmon (a multi-state non-profit group). The southern Oregon effort is referred to as the Southwest Oregon Salmon Restoration Initiative (Southwest Initiative).

Attached is the Phase 1 document of the Southwest Initiative. The Phase 1 document provides the basis for the coordinated and highly focused effort being undertaken to stabilize the native coho population in southwest Oregon from further decline. The Phase 1 document is an assessment and a call for action based upon methodology identified by the National Marine Fisheries Service (NMFS). The approach includes:

→ Identify the causes for the decline of coho salmon in southwest Oregon.
→ Identify which of the causes are of regional significance (i.e. - a priority).
→ Identify the current situation of the coho population and its habitat.
→ Identify targets to be used for coho habitat to indicate a stabilized condition.
→ Identify what actions will be taken to reach the targets.
→ Identify what assurances there are that the actions will be taken.
→ Identify how changes will be measured and evaluated.

A key reason for the high level of support for the Southwest Initiative is the pervasive and firm belief that we can do more to recover our native coho by

developing and implementing a plan quickly and effectively than we can by waiting until an Endangered Species Act listing occurs and then developing a plan. Through this initiative the partners have shown their willingness to undertake preemptive steps to definitively identify and implement actions which, based on the best information available, will improve salmon habitat and increase populations to a stable level; and in due course, restore the native populations to sustainable levels.

Primary to the development of the Initiative was the identification of current trends and an understanding of the causes unique to our region which are directing them. Federal, State and local agencies and 9 watershed councils contributed a wide range of information to the Rogue Valley Council of Government's technical team for collection and assembly. As part of assembling this information, the team reviewed technical literature, Federal and State databases, watershed council assessments, Forest Service and Bureau of Land Management assessments, oral histories and local information about the basin's fish populations and ecology. Federal, state, and local biologists familiar with the southern Oregon region participated in the development and critique of the document.

Another critical element of the document included the identification of the "best of the best" coho areas, referred to in this document as "core" areas. The Oregon State Governor's Salmon Recovery Initiative Science Team proposed 27 such areas for the southwest region. The purpose of these core areas was to identify focus areas for measuring current conditions and monitoring the success of ongoing restoration efforts. The core areas provided by the state were evaluated and modified locally based on current native coho population numbers, habitat qualities, and factors limiting survivability. Information on secondary "high value" coho habitat areas was also compiled in the final Phase 1 document. These analyses provided the basis for identifying measures needed to stabilize the native coho population.

Major factors limiting coho production in southwest Oregon were high water temperatures and low flows in rearing areas, along with poor riparian habitat, sedimentation, loss of instream structure and channelization. Some of these factors are naturally occurring and relate to climate, changing ocean conditions, and global ecological trends. Others are the result of past and current human activities relating to logging, agriculture, mining, urbanization, and commercial harvest.

A Draft of the Phase 1 document was circulated for public and agency review with comments solicited from September 1996 thru January 1997. Comments of critique are included in an Appendix and incorporated into the latest document revision.

A core tenant of the Southwest Initiative is that sub-basin watershed councils (with support of the Rogue Valley Council of Governments and the Governor's Watershed Enhancement Board) will assume the primary role for the more detailed, site specific

assessments and undertaking restorative actions within individual watersheds. These same watershed councils are currently updating their sub-basin Assessments and their Action Plans to include the regional concerns identified within the Phase 1 document. Local communities and government agencies will provide ongoing technical support to the watershed councils to increase the technical accuracy of their plans.

The Phase 1 Plan will be followed by a more comprehensive Phase 2 "Guidance Plan." The Guidance Plan will incorporate all the site specific information and proposed actions developed by the watershed councils. It will evaluate the significance of their plans to the coho population as a whole, measure the level of commitment, estimate the total benefits to the native coho population and be the basis of the Southwest Oregon Recovery Effort.

Watershed councils and local communities understand planning is not enough. They are already actively implementing on-the-ground projects to improve native coho habitat. The partners recognize that the native coho population must be stabilized from further decline before recovery can begin. The Phase 1 document identifies stabilization as being reached when the southwest Oregon population consistently remains above a minimum level of genetic survivability, which is 3,600 native coho. We calculate that this minimum can be maintained by keeping an ongoing average population of at least 8,000 natives. Recent returns on the Rogue River and the South Coast have demonstrated that we are within reach of this amount. During recent years we have seen a returning adult native population of up to 9,757 at Huntley Park on the lower Rogue River. [This estimate does not include the returning population of the south coast.] Based on these figures, it is certainly reasonable to believe that the average 8,000 number will be attained in the near future, considering no commercial harvest for coho is permitted.

Locally, we know that the process we have started is only the beginning of the road. It has taken about 100 years to put the populations of native coho salmon in the Rogue and South Coast Basins in their current stressed condition and it will take some time to achieve a satisfactory level of recovery. This Phase 1 document outlines the first steps the people of southwest Oregon are taking to bring the coho population back to being an integral part of their heritage.

Paula J. Grover FOR
Mary DeLaMare-Schaefer
Executive Director, RVCOG

Section A: Introduction to the Southwest Oregon Salmon Recovery Initiative

Abstract: **The Southwest Oregon Salmon Recovery Initiative proposes to stabilize declining coho populations in our region, and then, in due process, restore these populations to viable and sustainable levels.**

This section describes in general terms how the plan was initiated and the premises upon which it is built.

A.1 The Planning Mandate.

In 1990 participants in the widely acclaimed 'Salmon Summit' called by Senator Mark O. Hatfield, concluded that federal and state natural resource agencies lacked an effective, integrated plan to address salmon recovery in the Pacific Northwest states.[1] Subsequently, the National Research Council (NRC) was commissioned to conduct an independent audit of current agency policies and actions, and recommend options for recovery action. In 1992, the NRC recommended that the highest priority effort should be directed toward rehabilitation of critical salmonid habitat areas, *at the watershed level of effort*. The committee proposed that the relevant agencies in the Pacific Northwest, including the National Marine Fisheries Service (NMFS), agree on a process to formulate salmon recovery plans *in advance* of listings under the Endangered Species Act , and that the Pacific Northwest states, acting individually or through the Northwest Power Planning Council, provide technical and financial assistance to *watershed-level organizations* to prepare and implement recovery plans.[2]

In response, the NMFS called for regional watershed restoration efforts to meet Endangered Species Act mandates for declining salmon populations in Oregon.[3] NMFS is seeking cooperative efforts among diverse stakeholders to work together to identify restoration needs and recovery actions. They call for a naturalistic approach which takes account of a range of complex biological habitat systems and the life cycle characteristics of salmonid fisheries at the bioregional level. NMFS recommends using an approach of adaptive management of natural resource and habitat areas. In this fashion, they have called for *pre-emptive recovery plans* to be developed under the framework of the Endangered Species Act to foster cooperative, bioregional, adaptive agreements in watersheds.

Formulation and adoption of approved plans could forestall a listing under the Endangered Species Act to protect threatened salmon populations. The NMFS could decide to not act upon a filing action for two years after a state certifies that a recovery plan is being developed. This

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[1] Joseph Cone, 1995. A Common Fate: Endangered Salmon and the People of the Pacific Northwest. (New York: Henry Holt and Company), p-128-130.

[2] Upstream: Salmon and Society in the Pacific Northwest. National Research Council, (prepublication report) 1996, p-312-322.

[3] "Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale," National Marine Fisheries Service, Environmental And Technical Services Division, Habitat Conservation Branch, Federal Version, November 2, 1995.

would allow time for NMFS to adopt or reject the proposed plan. The specific objectives recommended by the National Research Council were to:

1. Identify all the causes of salmon mortality, the magnitudes, and the uncertainties of the estimates.
2. Recommend ways to reduce mortality, and assess probable effectiveness and drawbacks.
3. Identify probable costs of each method of reducing mortality (including market and non-market costs).

The State of Oregon has designated the Oregon Coastal Salmon Restoration Initiative as a process to evaluate the status of coho populations in Oregon. The CSRI Science Team has concluded that while some coho stocks may be depleted, the three groups of Oregon coho salmon do not meet the criteria for listing as threatened or endangered under the Oregon Endangered Species Act[4]. Oregon's Wild Fish Policy has adopted a minimum threshold of 300 breeding fish per stream per year, and currently Rogue and South Coast Basin coho populations exceed this minimum threshold.[5]

Private groups in Oregon however, have petitioned the NMFS to list selected coho stocks under the provisions of the Federal Endangered Species Act. As a result, the State of Oregon has prepared a salmon initiative, and is in the process of conducting status population assessments and developing pre-emptive recovery plans for potentially threatened stocks. The Initiative is intended to address the above recommendations of the NRC, to develop a pre-emptive approach to the listing of coho salmon.

A.2 Oregon Coastal Salmon Restoration Initiative.

The State of Oregon's approach to addressing coho salmon (*Oncorhynchus kisutch*) recovery is

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[4] "Risk-Trend Assessment Criteria," Appendix D, Coho Status, Part 1. Commission Decision Draft, 2/16/95. Attachment II. Science Team Information and Products. (Salem, Oregon: Oregon Coastal Salmon Restoration Initiative) 1996, p-59.

[5] Ibid. P-35.

through initiating the Coastal Salmon Restoration Initiative (CSRI).[6] Under this Initiative the Governor has directed state agencies to develop a Strategic Plan which, using existing laws, presents additional protective measures to be implemented by all levels of government and private resource managers. The Governor's strategy addresses harvesting, habitat, hatcheries, and hydropower (of limited concern in the South Coast area). The initiative includes a review of existing regulations, policies, programs, and voluntary efforts, as well as identifying new partnerships. Southwest Oregon watershed councils have chosen to collaborate with the state in this endeavor.

One purpose of the Initiative is to mobilize coastal communities, along with state and local governments, and watershed councils so they will take the actions necessary for maintaining, protecting, and restoring salmon populations to healthy levels coast wide. The Initiative is linked to a corresponding effort in California to encompass the entire Klamath Mountain Province fisheries. The CSRI Team submitted the first draft of the State's plan (including the Southwest Oregon Salmon Recovery Initiative) to NMFS on October 1, 1996. A revised final plan is being submitted in late February, 1997.

A.3. Southwest Oregon Salmon Restoration Initiative.

The Southwest Initiative is a regional strategy used to combine local and agency efforts to foster salmon recovery throughout the South Coast region. The Southwest Oregon Initiative is prepared in conjunction with the Oregon State Initiative, but it also attempts to move beyond the state plan in developing a salmon habitat restoration plan specifically for southwest Oregon. The Southwest Oregon Initiative will use a regional assessment approach to identify site specific actions to address the problems causing the decline of the coho population on the Oregon side of the Klamath Mountain Province Evolutionarily Significant Unit.

One feature of the Southwest Oregon Initiative approach is for local watershed councils to represent local stakeholders, and to serve as the lead planning bodies in identifying coho habitat restoration needs and actions within their watersheds. The site specific information they have accumulated on historic and current fishery conditions in their local areas, along with information from sub-basin watershed assessments and other sources, is aggregated and analyzed at the regional scale to define region-wide problems.

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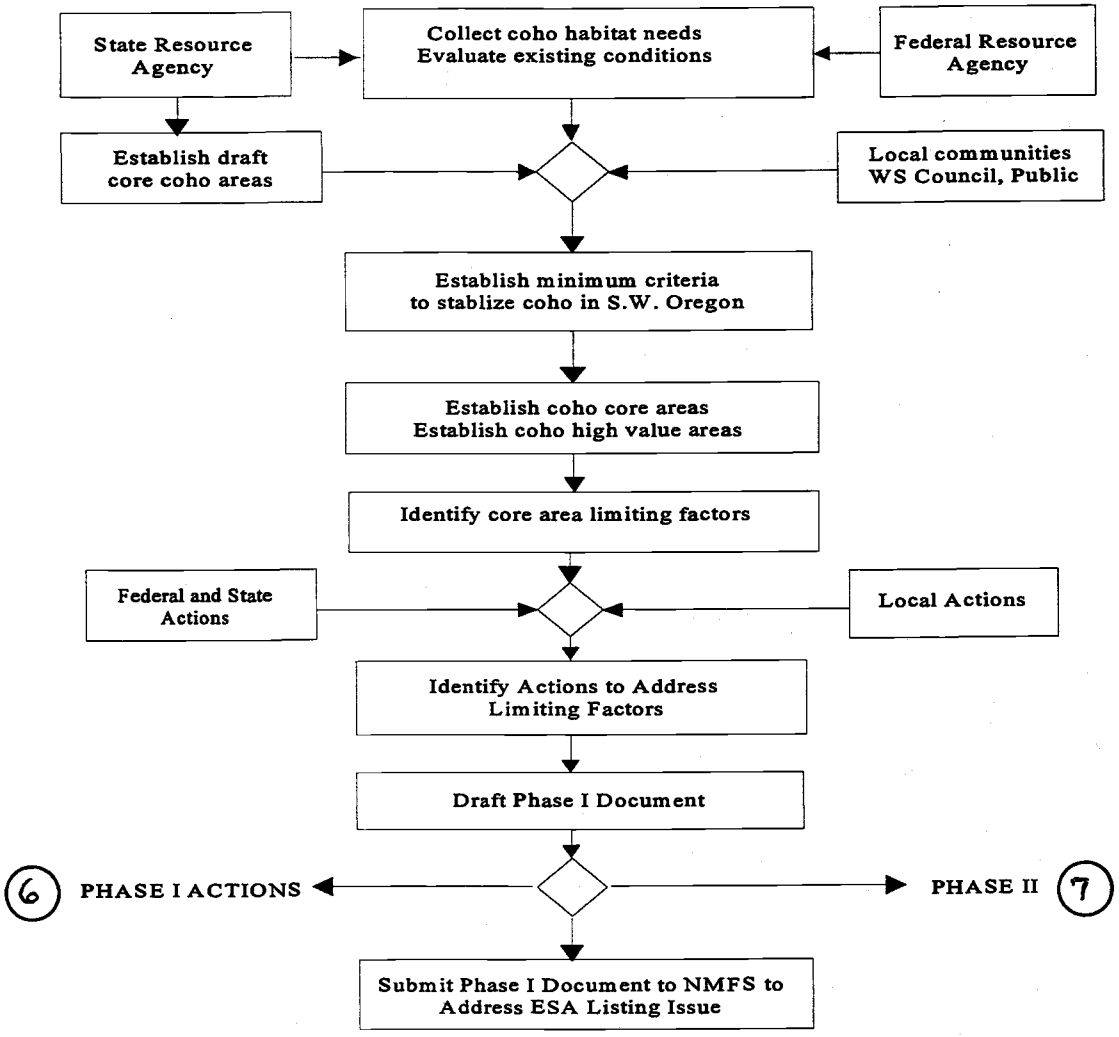
[6] Coastal Salmon Recovery Initiative Strategic Plan. Book 1, Management Measures. Oregon Coastal Salmon Restoration Initiative. Draft - August 26, 1996.

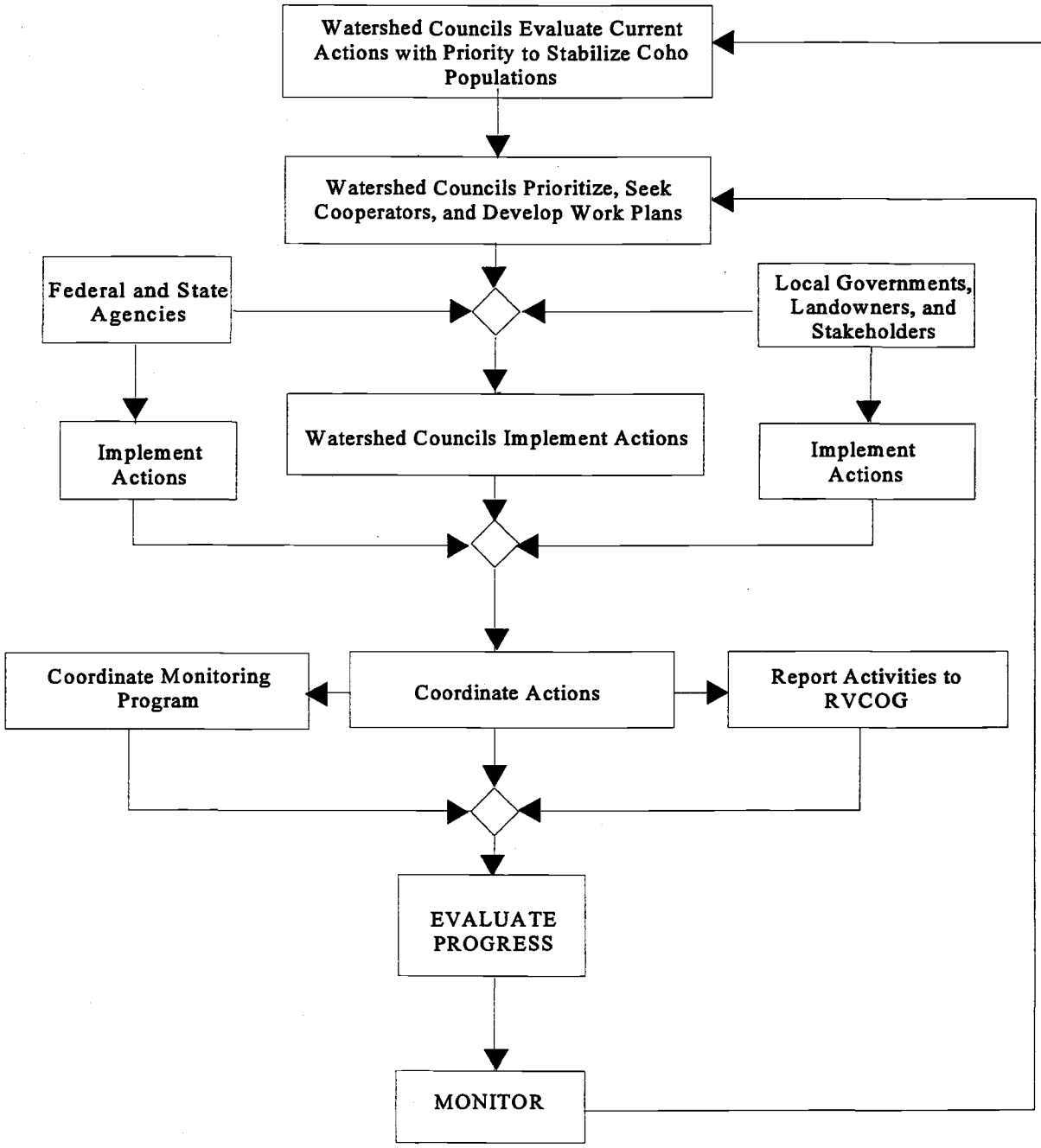
Figure 1: Flowchart of Phase I and Phase II Planning Activities.

This document focuses on Phase I of an overall larger program and how Phase I and the following Phase II segments of the program interrelate.

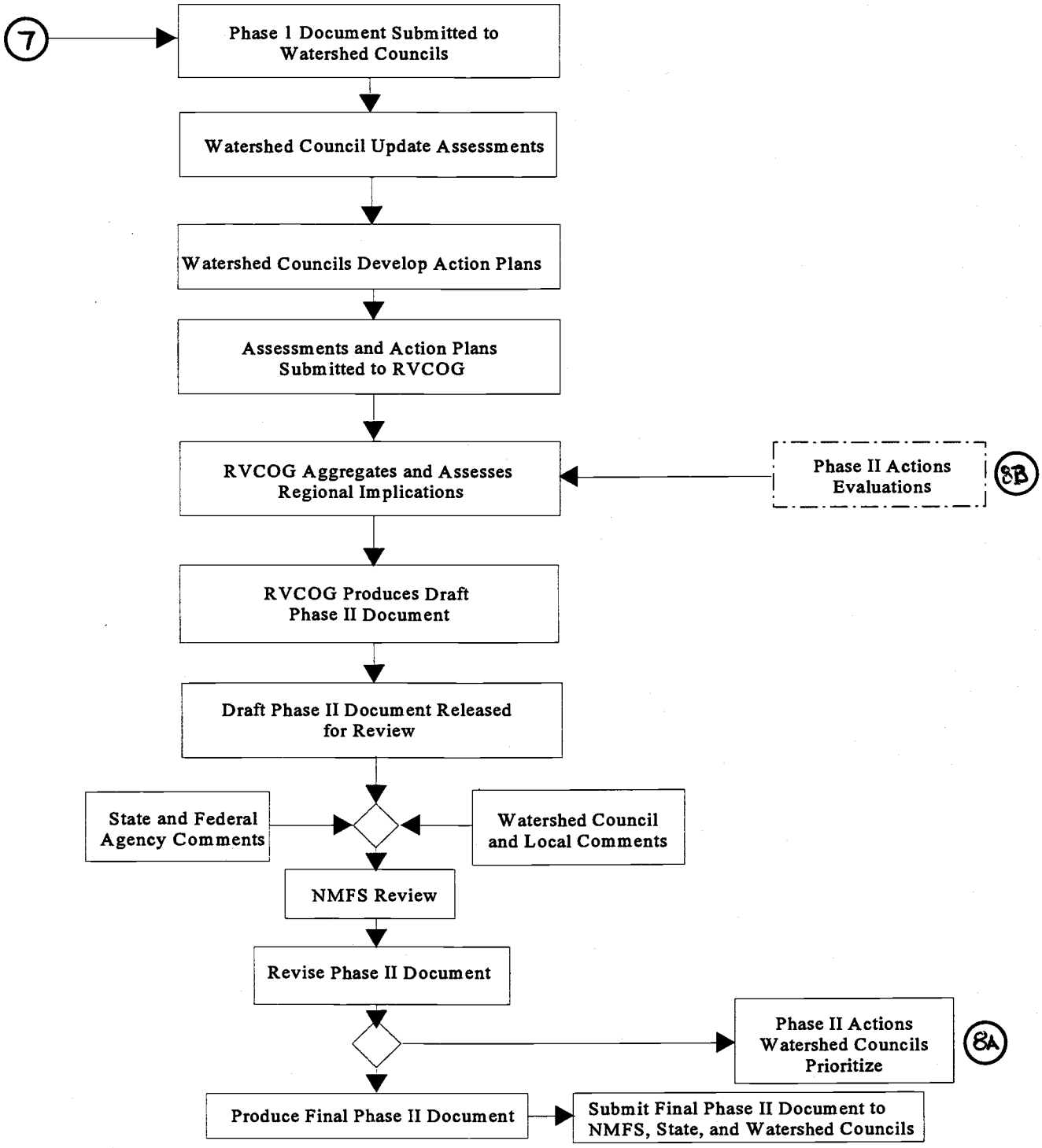
Phase I - Stablize coho populations - Immediate short term (0-10 yrs.) response.
Phase II - Recover coho populations - Long term (10-50 yrs.) responses



PHASE I ACTIONS



PHASE II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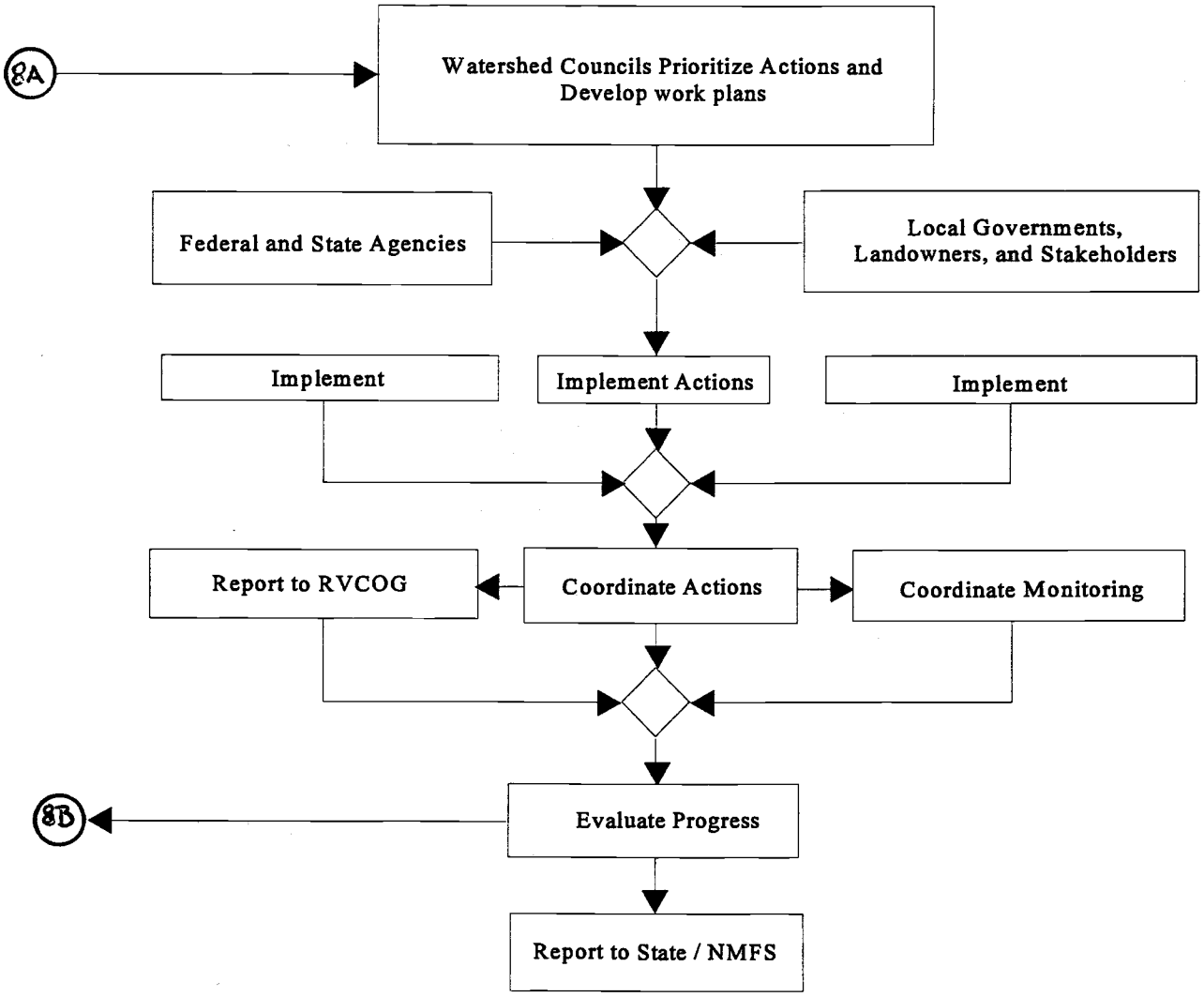
Phase 1 Document Submitted to Watershed Councils
Watershed Council Update Assessments
Watershed Councils Develop Action Plans
Assessments and Action Plans Submitted to RVCOG
RVCOG Aggregates and Assesses Regional Implications
Phase II Actions Evaluations
8B
RVCOG Produces Draft Phase II Document
Draft Phase II Document Released for Review
State and Federal Agency Comments
Watershed Council and Local Comments
NMFS Review
Revise Phase II Document
Phase II Actions Watershed Councils Prioritize
8A
Produce Final Phase II Document
Submit Final Phase II Document to NMFS, State, and Watershed Councils

PHASE II ACTIONS



Another feature of the Southwest Oregon Initiative strategy is to utilize a modified "patient-template" life-cycle model,[7] which focuses upon the specific habitat needs for each stage of the coho life cycle. In principle, a template of essential habitat needs (or current conditions) is developed for each life stage, then compared to a template developed for potential habitat conditions and coho production that could be accomplished if the habitat were restored to 'best achievable conditions'. The process enables the description of both *present* and *potential* habitat conditions, and links an 'Action Plan' to address the restoration needs identified in the evaluation process. The approach results in first, implementing actions which *stabilize* the present coho population in order to prevent further decline, and later in implementing actions which help *restore* the population to viable, sustainable levels.

A.4. The Southwest Oregon Initiative Approach - Phase 1.

A.4.a. Stabilizing the Coho Population.

Phase 1 of the Southwest Oregon Initiative is intended to stabilize the native coho population at a level higher than the minimum genetically viable population level. The major part of this document addresses Phase 1 objectives. Key elements of this stabilizing strategy are:

- Describe the Rogue and South Coast *current ecosystem conditions*, factors affecting current trends in coho habitat conditions, and their effects upon coho propagation for southwest Oregon (see Section B);
- Describe coho habitat needs throughout their *life cycle* (See Section C);
- Identify the historic variability of the coho population and *define a viable population range* which can be used to measure the success of recovery efforts (see Section D);
- Identify the historic and current *distribution of coho habitat* and develop policies and actions which maintain the range of the natural population (see Section E);

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[7] Lichatowich, J.A., L. Mobrand, L. Lestelle, and T. Vogel. 1995. "An Approach to the diagnosis and treatment of depleted Pacific salmon populations in freshwater ecosystems," Fisheries. (Bethesda, Maryland) 20(1): 10-18.

- *Designate critical coho habitat areas*, along with other biodiversity areas and refugia, where immediate protection and restoration actions should be potentially targeted (see Section F);

- *Identify the region-wide limiting factors* affecting coho production within critical habitat areas (see Section F);

- *Prioritize habitat restoration actions*, based upon the primary limiting factors (see Section G);

- *Inventory and evaluate existing actions being undertaken, and implement additional priority actions as warranted* (see Section H);

- *Specify the roles and responsibilities* of state, local governments, and other organizations, and foster cooperation among subbasin, basin and regional/state natural resource management entities (see Appendix 2);

- *Monitor plan and project results*, and modify actions in accordance with '*Adaptive Management*' principles, and measure changing trend conditions (plan to be developed for the Phase 2 - Guidance Plan).

A.4.b <u>Phase 1 Implementation.</u>

Watershed Councils, local, state and federal agencies, and area stakeholders were asked to submit a list of actions they were undertaking to protect coho habitat in Southwest Oregon as part of the data collection for the Oregon CSRI. Next, they were asked to assess state identified coho "core" areas to determine current habitat conditions and define limiting factors for habitat restoration. They were also asked to produce a workplan that identified new restoration actions to enhance the core areas. Their recommendations were integrated into this document, which is being prepared under the direction of the Rogue Basin Watershed Steering Committee and the South Coast Coordinating Watershed Council.

Specifically, watershed councils and local stakeholders were asked to:

(1) Examine the spatial distribution of coho habitat in their watershed and concur or recommend modification to include additional coho habitat areas (maps were provided for reference);

(2) Identify significant 'wellspring' areas within their watershed that should be evaluated as high value coho core areas,[8] alternate core areas, key watersheds, other officially recognized natural areas, etc.;

(3) Identify additional 'high value' [9] coho habitat areas within the watershed that might be addressed;

(4) Identify current conditions, problems, and limiting factors to coho survival in the core habitat areas;

(5) Develop protection/restoration measures for core habitat areas and prepare a workplan that has a high probability of leading to successful restoration action. All watershed plans specify near-term actions (1-10 years) and long-term needs and goals (10-50+ years) for the watershed;

(6) Identify project/funding needs, obstacles and assistance necessary to overcome barriers to project implementation. [This section is to be developed in the Phase 2 Guidance Plan, which will be prepared subsequently]

A.5. Watershed Councils, Agencies, Landowners, and the Southwest Oregon Initiative.

The Southwest Oregon Initiative's approach outlined in this document is a process - not a result. It is a voluntary planning tool, not a mandate. The Initiative provides a vehicle through which a region can set environmental priorities and measure collective results toward community-wide goals.

The Initiative's process does not supersede the management plans, implementation strategies or funding priorities of any watershed council or recognized jurisdiction. Nor does it supersede the legal authority of any agency or the rights of landowners. This document offers a tool to provide planning guidance and a yardstick to measure results at a regional level. What it offers is:

*...a way for our region to use our collective wisdom to document existing coho habitat conditions as a baseline inventory for the Oregon side of the Klamath Mountain Province

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[8] A 'core' area is a stream segment that contains significant coho spawning and rearing habitat so that coho can thrive from egg through smolt life stages.

[9] A 'high value' production area contains significant coho spawning or rearing habitat, but not necessarily both qualities.

(KMP) Evolutionarily Significant Unit,

*...a way to collectively agree on which current habitat conditions are of regional concern and regional priorities,

*...a way for individual agencies, watershed councils, and landowners to understand their role in the overall management, enhancement, and long-term recovery of the KMP coho population,

*...a way for the region to track its progress toward achieving regional habitat improvement goals by documenting site-specific actions. This also provides a way to identify which, if any, habitat concerns are not being adequately addressed,

*...an opportunity to integrate regional priorities into local, state, and federal management planning efforts.

It is important to re-emphasize that this Initiative is based primarily on voluntary measures. It establishes a broadly supported planning direction and identifies steps that need to be taken to achieve regional goals. The approach provides the basis for tracking and adjusting our individual actions to maintain consistency and continuity in coho management across the KMP.

It is also important to note that the Initiative does not dictate when, where, or how actions are to be taken or who is to take them. Project actions are to be determined on a site specific basis by the residents, land owners, and management agencies which have direct responsibility. For example, a watershed council has expressed concern over the core areas identified in this document, and how they could impact the council's flexibility to develop an integrated landscape management plan by precluding management options. This document does identify core areas for watersheds, and evaluates their habitat conditions. However, the purpose of evaluation is only to identify critical habitat restoration needs - not to establish mandatory management protection areas. The document evaluates these "best of the best" areas as a way to track current and ongoing habitat conditions and measure improvements in terms of coho life-cycle needs. Core areas are not to be used as "protective zones" or to limit management options.

Sections G, H, and Appendix 2 of this report describe proposed measures for watershed councils and state agencies to protect and stabilize core areas, as well as the distribution of habitat for the native coho population.

Watershed Councils in the Rogue and South Coast Basins.

Nine watershed council organizations have formed in the Rogue and South Coast basins, some being in existence for over 8 years. Council jurisdiction is based upon subbasins, and are administrated by Boards representing resident stakeholders, local governments, and natural resource management agencies. The councils support Technical Advisory Committees (TAC), which usually incorporate local/regional fishery biologists and ecologists, as well as other local experts. As such, the TACs provide an important source of knowledge, information, and expertise to the councils.

The councils serve as the primary locus for coordination, habitat assessment, project development, and implementation.

A.6 The Southwest Oregon Initiative Approach - Phase 2.

A.6.a. Restoring the Coho Population To Sustainable Levels.

Phase 1, discussed above, consists of assessing current conditions and identifying actions necessary for stabilizing a viable native coho population. Included in Phase 1 is the identification of strategies to be used in Phase 2. Phase 2 incorporates a more comprehensive examination of habitat throughout the entire native coho range in southwest Oregon. Phase 2, although identified herein, will be completed at a later date.

Key elements of the Phase 2 strategy, which are meant to be used to restore the coho and steelhead populations to healthy levels, are:

- Recognize the 'uniqueness' and special qualities of watersheds, and their contribution to the cultural, economic, and biologic functioning of the basin ecosystem;

- Complete a comprehensive regional assessment of coho and steelhead life history habitat needs within the Rogue and South Coast Basins;

- Develop estimates of current and potential native salmon production throughout the southwest Oregon region;

- Identify and prioritize habitat restoration needs both within and across land ownerships and jurisdictions for the entire Rogue and South Coast basins;

- Implement the restoration actions necessary to enhance watershed quality, at both the basin and site-specific levels;

- Monitor project outcomes and evaluate recovery success for sustaining the overall native salmon populations.

A.6.b. Implementation of Phase 2.

The watershed councils of both the South Coast CoordinatingWatershed Council and the Rogue Basin Watershed Steering Committee have agreed to produce a regional Southwest Oregon Salmon Recovery Guidance Plan. NMFS staff have been involved in developing the basis for this agreement since September, 1995. The Guidance Plan will reflect the cumulative watershed environmental assessments and action plans of each of the watershed councils, as well as present a basinwide habitat assessment and a plan for the recovery of South Coast salmonid populations to a level where they are no longer at risk.

The watershed scale environmental assessments will address coho and steelhead life-cycle habitat conditions and needs and environmental resource use objectives for the subbasins. Watershed councils are the vehicle for involving local interests in all phases of the assessment, planning, and implementation process. Councils build stakeholder acceptance and ownership of plan objectives and proposed actions within the watersheds. The watershed councils' technical advisory committees will review their plans for validity and adequacy and serve as resource persons in assisting the development of the Regional Guidance Plan.

The Rogue Valley Council of Governments (RVCOG) is functioning as a regional coordinating body for staffing the development of the Guidance Plan. RVCOG also acts as the coordinating body to involve federal, state, and local agencies. It is currently preparing a regional GIS database, in conjunction with EPA, and the U.S. Forest Service Province Team, which will be made available to watershed councils, and other local entities. In addition, the next phase of effort for the RVCOG Technical Assistance Team will be to produce the regionally based Salmon Recovery Guidance Plan.

As part of the Regional Guidance Plan, watershed councils have compiled a master list of watershed restoration activities conducted by state and federal agencies, basin and subbasin watershed councils and groups, local jurisdictions, and landowners, to portray the range and magnitude of restoration efforts that have been undertaken in southwest Oregon. This activity was completed in July, 1996 as part of the Oregon State CSRI, and the information has been provided to NMFS as evidence of local public and private commitment to salmonid restoration. Also, watershed councils are currently updating their watershed assessments and preparing action plans to specifically address coho and steelhead propagation needs within their subbasins as part of Phases 1 and 2 of the Southwest Oregon Initiative.

A.6.c. Guidance Document Method of Analysis.

The Southwest Oregon Regional Guidance Plan uses the seven key elements identified by the National Marine Fisheries Service to be included in a watershed restoration or conservation plan. These include:

1. Collate and synthesize baseline data and information;

2. Develop a method for analyzing habitat functions and identifying limiting factors (as portrayed in the NMFS Effects Matrix, for example);

3. Develop actions to address limiting factors, including priorities for implementing the actions formulated;

4. Formulate explicit watershed restoration objectives reflective of established priorities;

5. Develop methods for modeling or predicting the outcome of each proposed action;

6. Develop a time line and method for implementing proposed actions;

7. Develop a monitoring plan for measuring whether explicit objectives are being achieved, and for validating models and predictions (effects monitoring).

The Southwest Oregon Regional Guidance Plan addresses these seven points by:

1. Watershed subbasin plans are being combined to assemble baseline data and identify limiting factors. The data will be collated, synthesized, and analyzed at the regional scale (Rogue Basin and South Coast Basin) in order to identify and address cumulative effects.

2. Analysis of the collected information is accomplished through the use of a modified NMFS Effects Matrix. Limiting factors are identified through this analysis.

3. Actions to address limiting factors are formulated at both the watershed and regional scale, combining local, state, and federal resources. Priorities for implementing the actions are set by their impacts on regional scale core areas, sub-basin core areas, and secondary habitat use areas; in a higher to lower order of priority.

4. The restoration objectives and actions are prioritized, based on the life history needs of the fish, limiting habitat factors, and the outcome of priorities stated in number 3 above.

5. Federal and state agencies will have to be responsible for predicting outcomes because we do not have the capability to do this level of modeling locally without additional funding. However, RVCOG staff are working with state and federal agencies to model current conditions and track changes over time using GIS.

6. All actions that will be undertaken are categorized into short and long term priorities for implementation.

7. Each action proposed to be undertaken will contain a specific target, milestones to record progress, and a program which monitors project outcomes and success.

The Guidance Document anticipates that NMFS will use the combined Environmental and Habitat Assessments and Action Plans to determine the condition of 'jeopardy' (a formal designation by NMFS) of Rogue and Coastal basins' coho and steelhead, as a precursor of further listing procedures. The Guidance Plan addresses the risk condition, or level of jeopardy, for the coho and steelhead populations by including in the matrix the following environmental indicators:

Water Quality	Channel Condition and Dynamics
Habitat Access	Flow/Hydrology
Habitat Elements	Watershed Conditions

Indicators such as water temperature levels, quantity of sediments, channel substrate condition, flow rates, road density, canopy cover, etc., on streams within a watershed are compiled, and used to formulate baseline measurements of environmental conditions. If a stream's conditions are substandard, the fish resources can be judged to be at risk (in jeopardy), and in need of restoration.

To begin this assessment watershed councils (in coordination with their technical team, local, state, federal agencies, and major private landowners) have already gathered and analyzed habitat conditions on a "core" stream segment basis for salmonid use areas, utilizing a modification of the NMFS effects matrix indicators. This Phase 1 assessment of habitat conditions has been evaluated in Table 15 in this document as 'Properly functioning','At risk', or 'Priority for restoration'. The desired future condition for each habitat element is also defined, and enhancement actions identified. This Phase 1 concept will be carried forward into the Phase 2 development of the Guidance Plan for the entire Southwest Oregon region - for both coho and steelhead salmon. It is expected to be expanded over time to include all native fish, as well as other wildlife species.

Section B: SOUTHWEST OREGON ECOSYSTEM CONDITIONS AFFECTING COHO PRODUCTION

Step 1: Establish Current Environmental Conditions Existing in the Southwest Oregon Region.

Abstract: **The reasons for the decline in coho populations in the Rogue and South Coast basins have been a century in the making, and may well take a century more in their recovery. This section portrays the historic and current ecosystem conditions in the basins for the population as a whole, the forces and causes of change in those conditions, and the current trends, both within the basin ecosystems, and the native fisheries. Many of the conditions are amenable to change through a change in management. Other conditions need study and the careful collection of data to determine their potential effect.**

This section describes the basic environmental conditions of the Rogue and South Coast basins and their influence upon coho propagation.

B.1. Physical Environment. Although they are both within the Klamath Province in Southwestern Oregon, the Rogue and South Coast hydrologic basins are considered separate ecosystems, primarily due to the influence of coastal and inland climatic effects. The Rogue Basin is characterized by rugged, steeply dissected mountain ranges, a Mediterranean climate, and forest areas fragmented by soil types, rainfall, wildfire events, and alternative land uses. The majority of hillslopes have been disturbed by a century of human use (settlement patterns, forest harvest practices, road systems, mining, and agriculture). Tributary streams generally follow the northeast to southwest orientation of mountain valley drainages. Most drainages are highly erosive, producing inner gorges and alluvial plains. There are multiple 'key, and/or critical' watersheds within the basin for wildlife use.

The South Coast Basin has similar topography, created by similar natural geological forces, but differs by being vegetated by a temperate, moist coastal climate. Its valleys are less altered by human effects, with fewer private landownerships. The forests are characterized by a mosaic of mature, old-growth, and harvested stands, located within early and mid successional forests.

B.1.a. Climatic Factors. Climate is the single greatest factor directing the ecology of the Rogue and South Coast basins, and ultimately, fish production. The basin's location, just above 42° north latitude, is unique in the global energy balance, being where the intensity of global solar energy exposure shifts from deficit (north) to surplus (south).[10] Southwest Oregon is marked by the convergence of four distinct climatic zones: northern temperate, western coastal, eastern high desert, and southern Mediterranean; making the basins highly vulnerable to climatic shifts. Such shifts affect regional conditions including temperature and precipitation, vegetation composition, and migratory patterns of wildlife.

Several major climatic shifts have occurred within geologic history, which directly link to current ecological trends. The causes of global shifts in climate and geology are still unclear. There is evidence that the earth has tilted in its rotation (perhaps more than once during the five billion year geological epochs), exposing whole hemispheres to increased (or decreased) solar radiation. Some 780,000 years ago the earth's magnetic field flipped from south to north (which may have occurred more than once in geological history), producing unknown effects upon the world's environment.[11] These events reflect the longest term cycles impacting southwest Oregon.

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[10] Arthur N. Strahler and Alan H. Strahler, 1983, Modern Physical Geography, 2nd. ed., (Chicago: John Wiley and Sons), Chapter 27.

[11] Alan Busacca, Washington State University, "Digging reveals geologic history", quote in Associated Press, July 8, 1996.

Within the more recent Holocene era, there is evidence that solar eruption cycles of the sun, range an amazingly consistent 22 years in length, significantly alters solar radiation within shorter term cycles. Rainfall and temperature data for the Rogue Basin appear to reflect this cycle, but causality is not yet confirmed. Within the subcentury cycles are possible 7-10 year cycles, featured by sharp variation in local rainfall and temperature from year to year. The greater geologic climatic trend for southwest Oregon appears to be heading toward hotter and dryer conditions (interspersed with short run wet cycles). These patterns superceed any possible effects of commerce induced global warming influences. If these trends are valid, natural climatic conditions may become an overwhelming limiting factor affecting future salmonid propagation in southwest Oregon.

Although findings are still inconclusive, west coast dendrochronologists have identified a 22 year drought cycle in the growth rings of ancient cedars and Ponderosa pine trees[12]. This cycle corresponds with sun solar burst events, at least in data for this century. Some climatologists have predicted that solar radiation bursts may heat the Great Plains and southwestern desert states, prolonging the lifespan and intensity of continental high pressure zones, and also warming the South Pacific ocean to produce *el nino* events[13]. The combination and interaction of these two forces (as well as other earthly forces) increases the variability and extremes of weather events, resulting in short term temperature shifts and flood-drought cycles for local areas, and longer term shifts in regional continental climates (east coast snows, mid-west floods, Texas droughts, and Florida hurricanes). Through complex linkages, distant weather events eventually come to bear upon the ecology of the Rogue and South Coast Basins. In ways only vaguely understood, these climatic trends are linked to cycles and variability in ocean conditions, which significantly affect salmonid propagation in southwest Oregon.

Beyond the controlling global forces, there is wide variation in climate conditions within the Coastal and Rogue basins. The regional climatic conditions are largely influenced by the topography of the Coastal and inland Cascade mountain ranges and in their location relative to the ocean. Marine precipitation is highest along the coastal range and on windward slopes of the mountains, producing over 100 inches of rainfall in winter and almost none in summer. Rainfall is largely influenced by the predominant western continental airflow pattern, whereby the "jetstream" follows a middle air route into the Cordilleran mountains and Great Plains. Weather is driven by continent size low pressure systems which form in the Pacific Ocean, and intrude when intra-continental high pressure zones are diminished through winter cooling. Within the Cascade Mountains, condensation is accelerated by dynamic and/orographic cooling when the air

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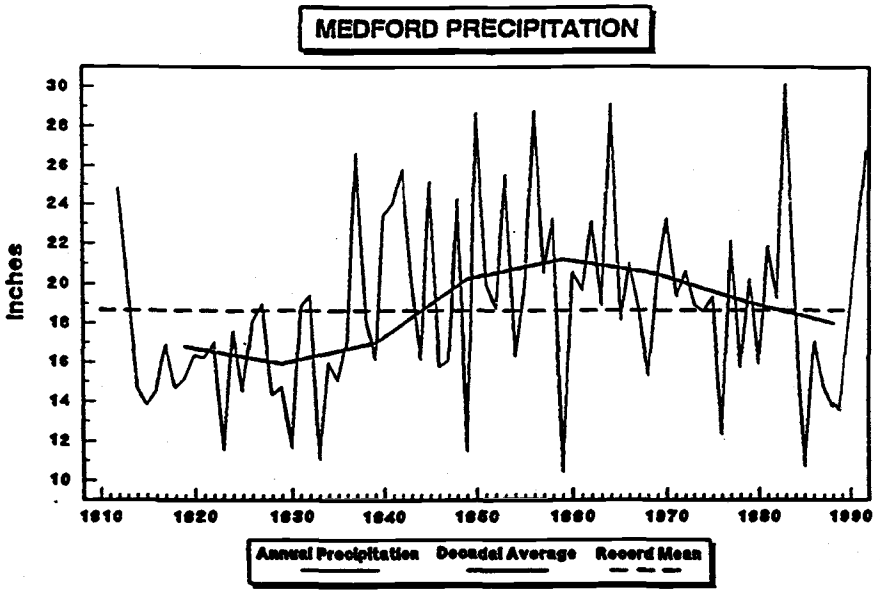
[12] Henry Lansford, "Tree Rings: Predictors of Drought," Weatherwise, 1979, p-194-199.

[13] Reid A. Bryson, "Ancient Climes on the Great Plains," Natural History, P-65-73.

rises to cross mountain ranges, and is diminished by warming through compression as it descends the leeward slopes. This pattern is most pronounced in winter, which produces the largest seasonal rainfall throughout the basins, causing heavy winter runoff and high streamflows, which can flush coho juveniles out of the systems.

In summer months, continental high pressure areas build from inland heating, which blocks the horizontal coastal flow and forces it northward into Canada.[14] Thus summer rainfall is sharply reduced for southwestern Oregon. Seasonal swings in inland and Great Plains warming patterns produce a whip-lash effect in weather patterns, creating sharp yearly fluctuations of temperature and rainfall within the Rogue Basin. Precipitation data from Medford, Oregon show a definable drought, wet, and new drought cycle for this area since 1910 (see Figure 2)[15].

Figure 2. Medford Precipitation Data.



[14] Lisa J. Graumlich, "Precipitation Variation in the Pacific Northwest (1675-1975) as Reconstructed from Tree Rings," Annals of the Association of American Geographers, 77:1 1987, pp 19--29.

[15]Don Todt, "Medford Precipitation Data - 1910-1990," Ashland, OR., 1996; National Oceanic and Atmospheric Administration, Medford, Oregon, February, 1997.

B.2 Impacts of Mining Upon Stream Structure and Habitat. The earliest and perhaps largest human caused environmental change within the Rogue basin occurred from early gold mining in southwest Oregon. Miners moved to the Rogue Basin following the California gold rush, and set up small-scale placer mines in the 1850s-60s. LaLande[16] reports that early miners in the Applegate drainage sometimes found more salmon in their sluice boxes than gold, often harvesting the fish for sale to finance continued mining. Even so, LaLande predicts that the placer mines probably had minimal impact upon stream water quality, because of their small size and limited operation.

Larger scale hydraulic mining developed during the 1870s, which dumped up to 1,500 cubic yards of tailings into the watercourse daily. In 1875, the Jacksonville newspaper reports that "streams ran red" from the mining sediment, which inevitably smothered salmon redds and rearing areas and degraded water quality. The 'house-sized' mining equipment and tailing piles no doubt moved and rerouted stream channels in unknown ways. Natural storm events accentuated the damage through transporting tailings miles downstream. The sediment loads were most severe during winter and spring months, which is the critical period for rearing juvenile chinook and coho. Sediment deposition and chemical contamination leached from mine tailings, also destroyed macroinvertebrate habitat and food sources, which exacerbated the survival of fry and juveniles.

In the 1930s the Oregon Department of Geology required miners to construct settling ponds, which greatly reduced downstream sedimentation. Mining decreased during the "Depression Period," and has continued at a much reduced level. Since then, salmonid production on these rivers stabilized at lower levels.[17]

B.3. Impacts of Forest Harvest and Management Practices Upon Watersheds. The forests of the Rogue Basin have been almost completely transformed within the past 100 years. Aside from the lowlands, which were cleared for agricultural and residential use in the first early settlements, the forests remained largely uncut until harvest surged during World Wars I and II. Fire suppression practices developed around the turn of the century, which resulted in an increase in tree and shrub density, fuels accumulation, and diminished open areas. Large scale clear-cut harvesting emerged around World War II, which resulted in increased erosion and sedimentation

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[16] Jeff LaLande, 1995, An Environmental History of the Little Applegate River Watershed. U.S.D.A. Forest Service, Rogue River National Forest, Medford, Oregon.

[17] Cole Rivers, 1963, "History and Development of the Rogue River Basin as Related to Its Fishery Prior to 1941." (typescript: Rogue River Fisheries, Vol.1) Salem: Oregon State Game Commission.

of tributaries, decreased watershed storage, and encouraged a species shift to more combustible, high density Douglas Fir forest stands. Approximately 50,000 miles of logging roads have been constructed over the years in forested areas (both public and private lands), which are now being closed at the rate of 2-5% per year to reduce erosion and sedimentation.

LaLande notes that overall, much more of the watershed is forested now than a century ago, with more dense conifer cover than previously [18] (presumably because of fire control practices). Accompanying this change, forest insect and disease infestations are probably far more prevalent as a result of this high-density undergrowth pattern. An exception are the riparian zones of lower and middle reaches of rivers, which have been reduced in size through development. Grassland, glade, and meadow areas within forests have shrunk to remnants of their former size, and encroached by brush species. Tree species have shifted from Ponderosa and sugar pine to Douglas Fir in the mid to upper elevations, with dense copses of 'scrub oak' on the hillsides and lower elevations. Competition for moisture accentuates tree stress and disease conditions in many areas throughout southwest Oregon.

Since 1910 fire suppression practices and timber harvest patterns have combined to produce a "younger" set of biotic communities across the landscape than earlier periods, composed of dense shrubbery and tree stands. Ecological succession is often interrupted by changes in the physical environment (fire, drought, temperature reversals), creating a mosaic of secondary and younger secession biota across the landscape. With the combination of topography, climate and soil, biotic zones range from the warm, wet Humid Transition and the semi-arid Upper Sonoran, to the Arctic-Alpine. Through time a multitude of phytosociological plant communities have evolved, presenting a series of overlapping ecological relationships.

As a result of land clearing through harvest and development, riparian areas in many river reaches have shrunk, and canopy cover decreased. Many stream channels have widened, become more shallow, and reduced in sinuosity and complexity. With time, baseline stream water temperatures have increased and spawning and summer/winter rearing habitat degraded. For the most part, beaver populations have been extirpated from many of the basins, which reduces their historic contribution to the preservation of riparian areas and enhancement of summertime flows[19].

Wood smoke pollution is probably diminished from historic times, as fire suppression has been more effective. Indians practiced controlled burning of the landscape on a mosaic pattern,

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[18] LaLande, 1995, op.cit., p-47.

[19] LaLande, 1995, p-34.

burning most of the forest area each 10-15 years, and early travelers along the Applegate Trail repeatedly report in their journals that the valley was filled with smoke. Indians used controlled burning to replenish meadows for wildlife and hunting, to clear trails and maintain open areas under the forest canopy, and fertilize new growth in plants and shrubs. Typically however, the fires were low intensity and rarely burned more than a few hundred acres (usually only a few acres). The fires cleared the combustible underbrush, reducing the overall fuels load of forests throughout the entire basin and probably did little to impact riparian tree cover.[20] In much of the lowlands in the Rogue Basin, residential expansion has followed forest harvest, permanently converting future land use.

Road density on public lands in the Rogue Basin is moderate, with some 14,000 miles of logging roads within the watershed still in use (approximately 3.5 miles road/per square mile). Most of the roads are unsurfaced, which significantly alter hydrological patterns and degrades water quality of upland areas (see Table 1).

Table 1. Road Development on Public Lands in Rogue and South Coast Basins.

National Forest or BLM District	Total Miles (All types)	Road Density (Mi/sq.mi.)
Rogue River NF	2,782 (4477 km)	3.92
Siskiyou NF	2,949 (4746 km)	3.28
Medford BLM	5,628 (9057 km)	3.92

Source: Table V-2. Summary of road development on public lands in the range of the northern spotted owl. Forest Ecosystem Management: An Ecological, Economic, and Social Assessment. Report of the Forest Ecosystem Management Assessment Team. U.S. Department of Agriculture, July, 1993.

[20] See LaLande 1995, 34-40; and also, James K. Agee, 1990, "The Historical Role of Fire in Pacific Northwest Forests," in: John D. Walstad, Steven R. Radosevich, and David Sandberg (eds). Natural and Prescribed Fire in Pacific Northwest Forests. Corvallis: Oregon State University Press; Thomas Atzet and David L. Wheeler, 1982, "Historical and Ecological Perspectives on Fire Activity in the Klamath Geological Province of the Rogue River and Siskiyou National Forests." (Publication R-6-Range-10). Portland: U.S.D.A. Forest Service, Pacific Northwest Region; and Robert T. Boyd, 1986, "Strategies of Indian Burning in the Willamette Valley." Canadian Journal of Anthropology, 5:1(Fall):65-86.

Over 2.8 million acres, or nearly 88% of the total Rogue Basin is forest land. Approximately 80% of both basins are public lands, leaving only 20% in private ownerships. However, the majority of critical (and core area) coho habitat areas are located on private lands, thus need special attention.

B.4. <u>Impacts of Agriculture Upon the Rogue Basin Watersheds.</u> Agricultural clearing in the Rogue Basin developed slowly until the turn of the century, expanded considerably during the two World War periods, then slowly began to evolve to the current mix of farming and residential "Hobby Farms" which exists today. The early impacts were to reduce forested lands, narrow riparian areas for livestock and developmental use, and divert stream flows for irrigation use[21]. Lowlands were drained, hummocky areas were leveled, and stream channels straightened to increase drainage.

The development of irrigation water sources began shortly after settlement in the Rogue Valley. By 1900, most tributary streams in the basin were 'over-allocated' for water rights, particularly for the summer and fall flows so important for rearing juvenile salmon. Multiple irrigation districts were formed in the Medford, Grants Pass, and Applegate valleys, even importing water from the Klamath Basin to water fruit orchards and pastures. Applegate Dam, Lost Creek, and Emigrant Reservoirs were constructed to control flood flows, and store irrigation water. The partially constructed Elk Creek Dam would have completed planned water management in the Rogue Basin, but has been halted because of alleged adverse effects upon water quality conditions (turbidity and temperature) and fish passage, especially coho. Irrigation diversions were rarely screened before the 1940s, which may have been a significant factor in fish declines[22].

Although the construction of Lost Creek and Applegate Dams has closed off some historic habitat range, they have also produced some beneficial effects for the fisheries. Reservoir releases increase river flows for salmonid survival during critical low flow periods, and both reservoirs are operated to reduce stream temperatures during the summer months. The impacts of Lost Creek Dam on both adult and juvenile coho were studied by ODFW and summarized in their 1991 Phase II completion report.

In the past 20 years, almost one-half of farmland in the lowlands of the Rogue Basin have been converted to 'residential farm units', most of which have preserved and continue to use their diversion water rights. Although residential water use is generally about one-third to one-half

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[21] LaLande, 1995, op.cit..., p-27-28.

[22] Cole M. Rivers, 1963, op.cit.

less than cropland use, the consumption of water on residential farmsteads is often transformed from cropland use to irrigating horse pastures and gardens. As a result, water diversion and consumption in the basin has not changed greatly from earlier levels.

B. 5. Urban Land Uses and Impacts. Changing patterns of land use within the Rogue and South Coast basins is constantly altering the landscape, and ultimately, coho habitat areas. The Rogue basin is experiencing rapid expansion of urban development among stream courses. The settlement pattern within the Rogue Valley is largely rural residential, and growing slowly, with scattered ranches, small farms, private forest lands, among sections of federal lands. In 1993, the Census population of Jackson County was 168,000; Josephine County, 62,649; and Curry County, 19,327. The urban areas of Medford-Ashland (population greater than 120,000), and Grants Pass (about 50,000) are growing steadily and the cities are becoming regional governmental centers.

Residential development is often detrimental to riparian habitat areas, limiting the space for natural vegetation and stream channel development. Urban and rural land use includes 20.2% of the coho stream miles in the Rogue basin, compared to 4-8% in other coastal regions.[23] Communities in the Rogue basin have been among the 'more active' of the state in reducing pollution from sewage effluent discharge, spending over $50 million in the last decade, with perhaps more than that amount to be spent in the next decade.[24] Bear Creek (Medford/Ashland area) is responding to TMDLs applied around 1990, and other streams in the region are being monitored by DEQ for thermal pollution. South Coast cities tend to be smaller than those in the Rogue Basin, with correspondingly fewer municipal sewage pollution problems. Urban land use affects only 4% of the 1,640 miles of coho streams in the region.[25]

Large units of the watersheds are protected from development and alteration by virtue of being in the domain of public lands. Land allocations and reserves in the watersheds are designated in the Northwest Forest Plan's Record Of Decision and the Medford District, Bureau of Land Management Resource Management Plan (RMP). These land allocations include Adaptive Management Areas, Late Successional Reserves, Big Game Management Areas, Research Natural Areas, Riparian Reserves, and 100 acre core areas for the northern spotted owl. The

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[23] Steven Cramer and Jon Pampush, Protection and Restoration Actions for Anadromous Salmonids by Cities and Counties in Oregon, A report prepared for Association of Oregon Counties and League of Oregon Cities, December 1996, p-1.

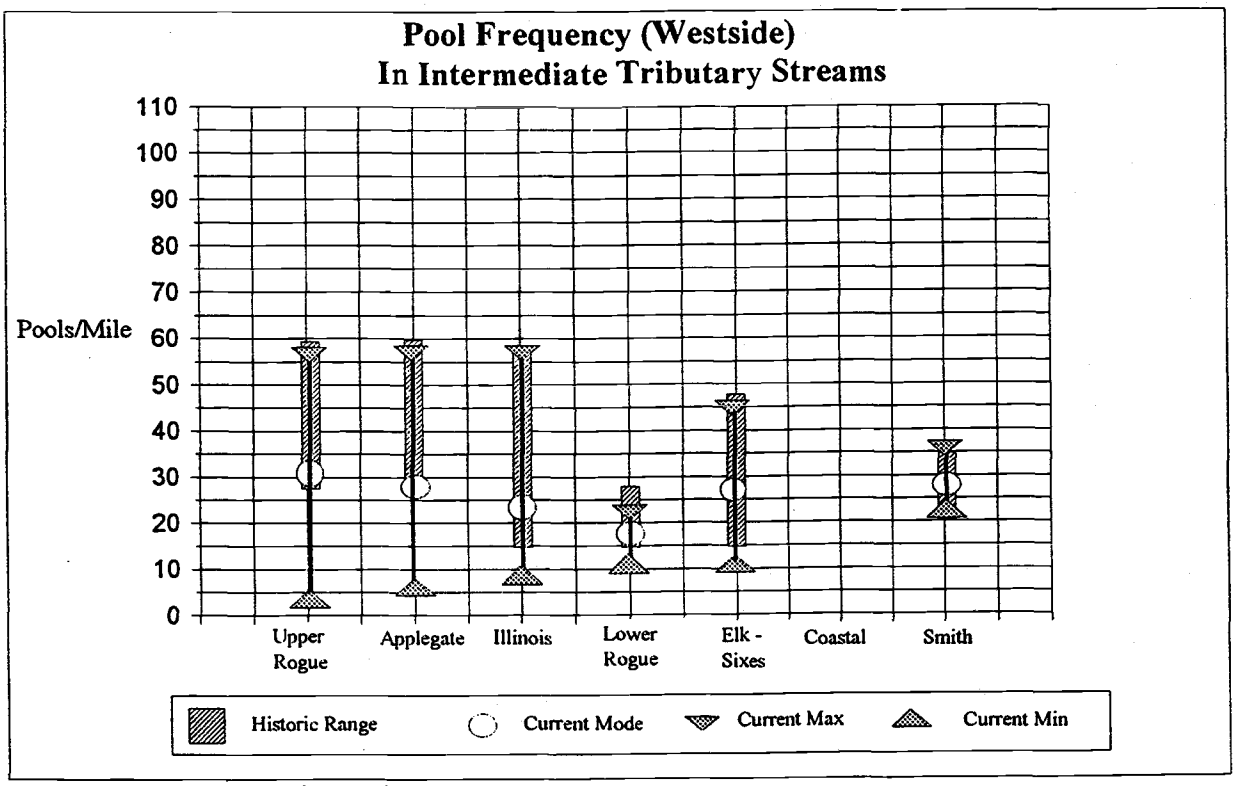
[24] Ibid. p-1.

[25] Ibid. p-36.

Medford District RMP has designated multiple RNA/ACEC areas (Area of Critical Environmental Concern). The RMP also designates elk management areas, and spotted owl habitat units.

B.6. Water Resources and Stream Environments. Hydrologic processes within the Rogue and South Coast basins have been altered from historic conditions[26]. Overall, river systems have simplified and changed by management and development, which has significantly reduced the quantity and quality of salmonid habitat available for use. Major sections of rivers have been confined by land development and roads. These alterations have resulted in a decrease in aquatic complexity and diversity. Pool frequency and quality throughout most of the basins has declined from historic conditions and has become a 'potentially limiting factor' for most streams throughout the region (see Figure 3. Historic Pool Frequency). Generally, salmonid rearing habitat areas have become more degraded than spawning habitat areas throughout the basin.

Figure 3. Historic Pool Frequency in the Rogue Basin.



[26] This trend is referenced in multiple sources, most specifically in Forest Ecosystem Management: An Ecological, Economic, and Social Assessment. Report of the Forest Ecosystem Management Assessment Team. (Washington, D.C.; U. S. Department of Agriculture, 1993), Pages V-12-25.

River flows in the Rogue Basin tend to peak earlier in spring and at higher levels, with lower corresponding summer base flows, creating a 'surging' pattern of water flows. Stream channels appear more prone to flood than in pre-settlement times, stream blow-outs tend to be bigger, and the absorptive capacity of the watershed is diminished. Yet, within the past decade, water quality parameters are slowly recovering from these conditions in some streams (such as Bear Creek, and mainstem Rogue River), as communities improve sewage treatment plants and reduce total maximum daily load (TMDL) problems and agricultural communities reduce/control chemical and fertilizer use.

The impact of water management practices upon fishery habitat quality continues to need improvement. The Center for the Study of the Environment conducted a regression analysis of determinants of salmonid production in the Rogue Basin and found that water quantity, or water flows constitute the overwhelming determinant of salmonid production, accounting for much more variance than hatchery production, troll catch, number of smolts released, etc.[27] The study is significant, but the analysis did not include measures of habitat quality and quantity, ocean habitat conditions, and the relationship/interaction with other species in production. Water quantity however, is a critical determinant of salmonid propagation in the Rogue Basin.

Relationships between salmonid production and life history, and freshwater physical factors, ocean physical factors, ocean harvest of salmon, freshwater harvest of salmonids, and the influence of hatchery fish have been examined in much greater detail for anadromous salmonids in the Rogue River Basin than most other Oregon coastal streams. These relationships are addressed in a number of ODFW research reports published between 1987 and 1994.

There were concerns that high streamflow events during winter months may have some impact upon coho fry and juvenile populations, in that untimely surges in river and tributary flows may move fish around through the system in disadvantaged ways.[28] Recent studies have shown that coho juveniles spend over a year in freshwater and may be vulnerable to flooding events, however, few juveniles rear in the mainstem of the Rogue River so dam releases have little or no effect on their survival. Also, the operation of Lost Creek Dam has minimal effect on the

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[27] M.L. Sobel and D.B. Bodkin, 1995. Status and Future of Salmon of Western Oregon and Northern California: Forecasting Spring Chinook Runs. (Santa Barbara: The Center for the Study of the Environment) p-53.

[28] Dennis M. Becklin, 1940-95 Rogue River Water Conditions and the Relationships of Water Conditions to the Five Anadromous Fish Species of the Rogue River in Southwest Oregon. (Grants Pass, Oregon, 1996).

migration timing of adult coho salmon.

In another location, the present timing of water storage accumulation in the Applegate River may reduce river flows in some locations during critical periods for coho rearing, while water releases may help steelhead and chinook during other time periods. Flows from Emigrant Reservoir on Bear Creek are often cut off in late summer months during critical coho rearing periods. The impacts from human directed events (such as diversions and recreational use) may significantly affect water flow during critical coho production periods. The operations policy for reservoirs within the Rogue Basin should be evaluated for its impacts upon and potential use for coho propagation, particularly to provide flows for late summer rearing habitat needs.

Push-up dams are scattered on stream systems throughout the basins (probably in excess of 80 dams in the Rogue Basin). These dams are created by landowners and water districts as the need arises, and while most are "permitted," there is little control over their construction or mitigation for their environmental effects. Multiple agencies and landowners are working with the Illinois Valley Watershed Council to limit push-up dam construction on the Illinois River system, through alternative structures, improved design, and reduced use. The Applegate and other watershed councils are addressing the problem as well.

Water quality parameters throughout the basin are significantly degraded from historic conditions (see Appendix 1, Watershed Core Area Summary below). Current stream temperature standards as defined by DEQ are 13°C (55°F) for spawning, egg incubation, and fry emergence, and 18°C (64°F) for rearing.[29] Peak water temperatures in salmonid habitat areas may be up to 10°F. warmer than historic presettlement years (see Figure 4 below), occasionally approaching lethal levels in some reaches. The increase is primarily attributed to change in stream structure to wider, more shallow channels, the loss of riparian habitat and shade, and the loss of watershed subsurface aquifer storage capacity fostered by forest harvest practices. These changes (warmer water conditions) have resulted in generally lower dissolved oxygen (DO) levels throughout the system. Dissolved oxygen levels are 'potentially limiting factors' in some locations throughout the basins, primarily in areas with low summer flow conditions. Sediment and turbidity problem areas are also scattered throughout the basins, but are generally not limiting factors (see Table 15 below). Primary source areas for sediment are from hydraulic mining (Applegate, Middle Rogue), geological deposits of granitic soils (Bear Creek, Evans Creek), and steep erosive coastal streams.

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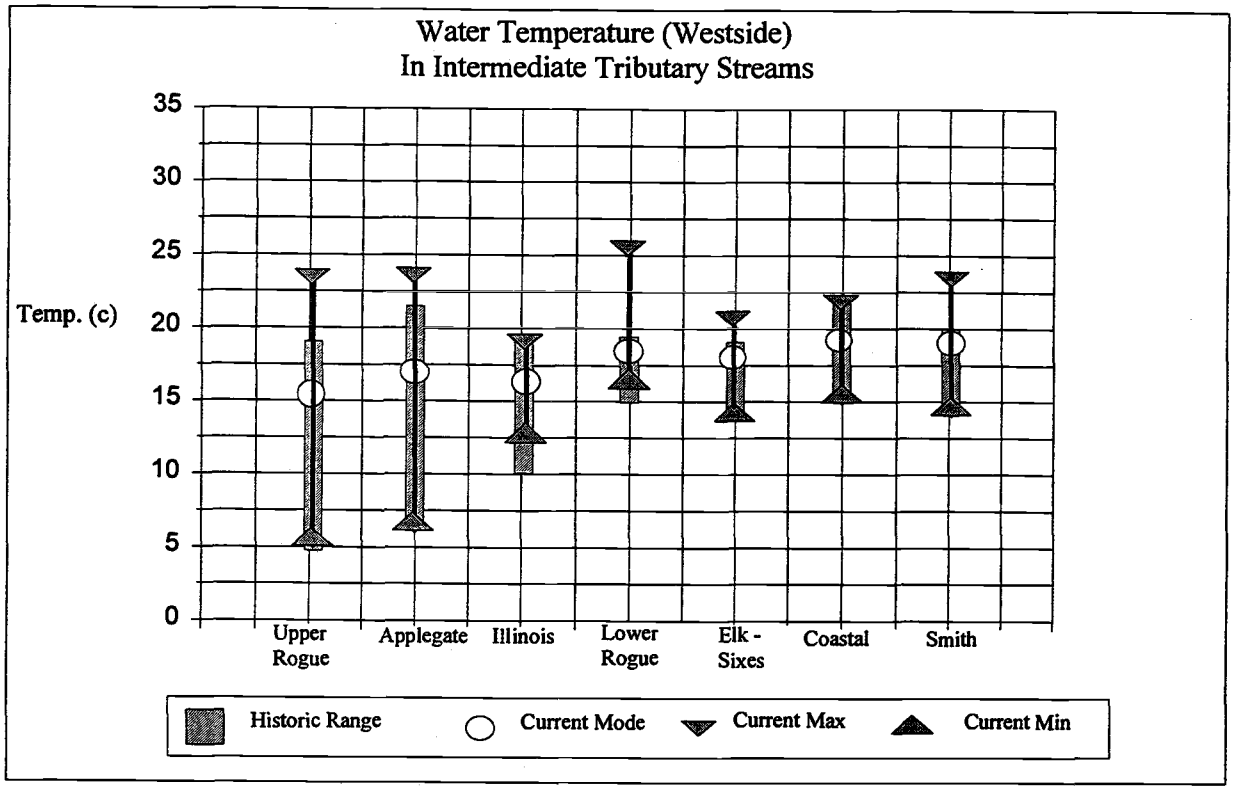
[29] Oregon Department of Environmental Quality, Oregon Listing Criteria for Section 303(d) List. December, 1995. Approved July 1, 1996.

Basin streams have also been impacted by thermal[30] and non-point source pollution from municipal and commercial development, and leaching of agricultural nitrates and pesticides. In 1987 the Bear Creek Subbasin was ruled in violation of Total Maximum Daily Load (TMDL) standards by DEQ, and is currently being remediated. Overall, water quality conditions are beginning to improve in the basins (such as Bear Creek and around Grants Pass), due to multiple landowner and municipal watershed restoration efforts.[31]

Figure 4. Historic and Current Peak Water Temperature Levels in Salmon Habitat Areas.



[30] U.S. Army Corps of Engineers, 1974, Rogue River Basin Water Temperature and Turbidity, Vol. 1. Main Report.

[31] This conclusion is formed from multiple examples of improving point source water quality conditions, including the TMDL studies of Bear Creek, the reduction of hydraulic mining operations in the Illinois, Applegate, and Lower Rogue subbasins, the construction of municipal sewage treatment systems, ODOT road drainage management, USFS and BLM water quality projects, reduction in agricultural tailwater drainage, etc. Systematic basin-wide water quality monitoring has not been conducted, and should be initiated.

B.6.a. Recreational Use of the Waterways. Studies of the potential impact of motorized boat traffic upon anadromous salmonids have come up with mixed results. There does not appear to be a significant impact on juvenile salmon or steelhead in the Hellgate Recreation Area from motorized boat use, or non-motorized use, for that matter (Satterthwaite, ODFW, 1994). However, based upon the conclusion of Sutherland and Ogle (1975), the ODFW believes that a significant percentage of the eggs and sac-fry of fall chinook salmon in the gravel are killed when exposed to motorboat traffic. Research conducted by the ODFW indicates that about 5% of the fall chinook spawn prior to October 1, and that the sac-fry remain in the gravel until late April (ODFW 1992). Consequently, ODFW has restricted jet motorboat traffic on the Rogue below Savage Rapids Dam from May 1 to Sept. 30. Since juvenile coho do not rear in the mainstem Rogue, there is no recommendation in regard to coho impacts.

B.7. Aquatic Wildlife Habitat Conditions. There are 21 key watersheds defined within the Rogue and South Coast basins (both the Forest Service "Key" watersheds and ODFW "Critical" watersheds are combined in this analysis). Other high quality 'biodiversity' areas also exist within the watersheds (such as spotted owl and elk habitat areas), but are not identified herein. The majority of core coho habitat areas are located within critical or key watersheds. High quality aquatic biodiversity areas are identified by watershed councils to receive particular attention for protection and restoration.

Historically, habitat biodiversity areas were created and maintained by fire disturbances. The present distribution of vegetation species throughout the watershed have been modified by fire control measures, creating alternative environments. There are 54 potential sensitive plant and animal species in the basins to be protected, along with habitat areas.

B.8. Impacts of the Ocean Environment. The ocean environment is by far the largest limiting factor for fish propagation, in that from 90 to 99% mortality occurs for anadromous fish that reach the ocean environment. Major sources of mortality are lack of food supply (from ocean upwelling), predation, and harvest.

The ocean food supply is probably the biggest determinant of coho health and propagation. Offshore ocean winds initiate upwelling from ocean depths to bring food nutrients, primarily chlorophyll, to the surface, which nourish ocean ichthyological fauna. Southwesterly winds (primarily from September through March) drive surface waters offshore, which are replaced by cold, nutrient rich subsurface water, with the reverse process occurring in the summer[32].

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[32] Neshyba, S. 1987, Oceanography. (New York: John Wiley) p-506.

The strength and consistency of these flows along the Oregon coast usually makes them particularly productive for maturing fish. These offshore flows can be altered however, and redirected by the *'el nino'* current, drastically reducing the upwelling pattern and corresponding food supply available to fish. In some recent years, returning salmon have been sharply smaller in size, perhaps due to these climatic changes.

The productivity of these off-coast flows may also account for the unique migration pattern of Rogue and South Coast basin salmonids, in that they typically migrate southward from Cape Blanco while salmonid stocks from Cape Blanco north tend to migrate north to Canada and Alaskan waters[33].

Environmental forces within the ocean have been linked to salmonid survival while in the marine habitat, and overall salmonid abundance[34]. Although there are data only for this century, (thus the longer ocean cycles cannot be validated), there does appear to be 40 - 60 year cycles of major productivity.[35] Lawson reports that a high productivity phase occurred during the 1960s, which shifted to low productivity off the Oregon Coast in 1976, reducing marine survival and escapement for salmonids. Currently, the northern Pacific Ocean is speculated to be near the bottom of an ocean productivity cycle[36] and perhaps recovering .

B.9. Impacts of Predation Upon Fish Production.

There is some loss of fish to predation through the life cycle of coho, but the loss is judged to be insignificant in determining production trends for coho production[37]. Major sources are from

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[33] Peggy J. Busby, Thomas C. Wainwright, and Robin Waples, 1994, Status Review for Klamath Mountains Province Steelhead. U.S. Dep. Commerce., NOAA Technical Memorandum NMFS-NWFSC-19, p-52.

[34] Peter W. Lawson, 1993, "Cycles in Ocean Productivity, Trends in Habitat Quality, and the Restoration of Salmon Runs in Oregon," Fisheries, 18:8, p-6-10.

[35] Ware, D.M., and R.E. Thomson, 1991, "Link between long-term variability in upwelling and fish production in the northeast Pacific Ocean," Canadian Journal of Fisheries and Aquatic Sciences, 48:2296-2306.

[36] Lawson, 1993, op.cit..

[37] "Rationale for Assessments of Risk-Trend Related to "Other Factors" For All Groups of Oregon Coho Salmon," Appendix C, Predation by Marine Mammals and birds, Coho Status,

pennipeds, birds, hake and other fish, which feed on coho juveniles as they enter the ocean, and some loss from birds and squawfish in freshwater. The extent of loss is largely unmeasured, but is currently under study. Predation is addressed by each core area analysis in Appendix 1.

B.10. Summary and Implications of Ecosystem Effects.

There appear to be several ecosystem influences upon the Rogue and South Coast fisheries that will affect stabilization and future propagation of the species. The long-term regional climatic trends toward warmer and possibly more droughty conditions will make protection of critical habitat more challenging, sensitive, and complicated. These trends accentuate the need for high quality riparian environments and enhanced cooler, more stable stream flows, particularly for summer rearing habitat areas.

Land use and development practices increasingly intrude upon salmonid habitat areas, thus additional protections and safeguards will be needed. Public education to landowners about salmonid habitat needs is an essential element of any recovery program.

The abnormal disturbance pattern created by control of fire and loss of historic patterns of burning has altered the vegetation of the landscape, causing current climatic disturbances to be accentuated in their destruction. Flood events on tributaries appear to becoming more catastrophic rather than less, in spite of more flood control structures within the river systems. Peak river flow regimes appear to be moving earlier in the seasons, which may be affecting the quality of coho migration and rearing areas. The management of reservoirs, and practices for release of supplemental flows may be used to improve summer habitat rearing conditions. The effects of these patterns need further study.

Riparian quality and water quality within the watersheds have degraded from historic conditions, but probably are in an upward trend of recovery. Considerable action has been undertaken toward improvement of riparian areas in the basins, but much more needs to be done. More protection for riparian buffer zones and improved management to foster environmental diversity and complexity in riparian zones are essential needs.

Historic coho habitat elements, such as stream sinuosity, side channels, alcoves, wetland connections, etc. have been measurably reduced or eliminated through programs promoting channelization, bank stabilization, and filling for development. Maintenance of these critical habitat features has been impacted by flood control measures, in a convoluted effort to remedy

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Part 2. (Salem, Oregon: Oregon Coastal Salmon Restoration Initiative). Draft 2/16/1995, p-52.

problems from disturbances. These measures have also precluded the creation of new habitat areas.

Most of the ideal coho habitat occurs in the low gradient valley areas, which were also the most popular areas for development. Because of extensive human development, these areas will be the most difficult to access and restore.

Push up dams, while generally not adversely affecting coho propagation, have disturbed stream structure, water quality, and occasional redds. They may affect juvenile migration, and the timing of smolt out-migration. Practices of water diversion and water use should be evaluated for their effects upon salmonid production and water conservation programs encouraged. Water pollution is declining within the subbasins, but considerably more needs to be done, particularly non-point surface water drainage and control.

These long-term trends direct the need for prioritizing restoration actions and for considering the time dimension of recovery. The most critical actions for the Rogue Basin revolve around buffering and protecting riparian areas to allow naturalistic regeneration, and protecting/increasing in-stream flows in habitat areas. Other problems tend to be site specific in need. The South Coast problems tend to revolve around the effects of high winter flows, which affect stream structure (large woody debris and boulders) and sediment density.

Section C: HISTORIC FACTORS AFFECTING COHO PRODUCTION, AND CURRENT LIFE-CYCLE NEEDS.

Step 2. Identify Historic Fish Management Practices, Environmental Conditions and Their Effect Upon Coho Production. Current Coho Life-Cycle Habitat Needs Within the Rogue and South Coast Basins.

Abstract: **The current coho population is a product of past environmental and hatchery management actions, and their history is pertinent to planning restoration actions. There are specific habitat needs at the respective coho life cycle stages which must be met to stabilize and enhance population growth.**

This section describes the historical fish management practice, and life cycle habitat needs in the Rogue and South Coast basins.

C.1. Historic Salmon Populations. Since the turn of the century, major environmental changes and habitat degradation have negatively impacted salmonid populations in the South Coast and Rogue basins. Run size estimates at Gold Ray Dam show significant declines in returns of coho salmon (ODFW, 1991a), winter steelhead (ODFW, 1990) summer steelhead (ODFW, 1994) and spring chinook salmon (ODFW unpublished data) from the time the counting station was first operated in 1942 through the late 1960s. Some believe we are now witnessing a death spiral of these salmon populations. Others believe this decline is just a phase of a rising and falling population cycle. Historic populations have not been known to decline to the recent low numbers observed in southwestern Oregon, however.

Historically, Indian Tribes harvested fish for consumptive use and developed annual rituals around their harvest, but had relatively little impact upon total fish production[38]. Estimates of Indian consumption of fish in the Rogue Basin range up to 0.9 million pounds/year (all species)[39]. Commercial fish harvest was conducted for over a century, harvesting some 1.4 million pounds/year (salmonid species).[40] Early settlers and miners harvested large quantities of fish and sold fish for alternative income, hauling wagon loads of fish to distant urban centers. Commercial canneries operated at the mouth of the Rogue and coastal rivers beginning in 1877, and continued for several decades until the canned fish market atrophied in the 1930s, and catch populations continued to decline to the 1960s. Salmonid populations have fluctuated widely since these first recorded times, with the Rogue cannery catch ranging from 28,000 fish in 1877 to 86,000 in 1891. The detrimental effects from mining, damming, logging, irrigation diversions, and forest harvest practices and early commercial river harvest combined, depressed the population, but did not bring them to threatened status until the emergence of increased commercial ocean harvest in the late 1960s. By the 1970s coho stocks were threatened, with escapement level counts to the Rogue Basin ranging below 500 fish.

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[38] Kathryn R. Winthrop, 1993, "Prehistoric Settlement Patterns in Southwest Oregon." (Unpublished Ph.D. dissertation.) (Eugene: University of Oregon).; see also LaLande, 1995, p-23.

[39] Jim Labbe, Conflict, Consensus, and Conservation: A History of the Rogue River Salmon Fishery. Thesis. Reed College, Portland, Oregon, 1994. This estimate is based upon extrapolation of Rogue Basin Indian population of 2,000-3,000 persons, consuming 300 lbs. of anadromous fish/year. See also, Gordon W. Hewes, "Indian Fisheries Productivity in Pre-Contact Times in the Pacific Salmon Area," Northwest Anthropological Research Notes, 7, No.2, Fall, 1973, p-133-155, for the methodology for estimating annual fish consumption of Rogue Indians in Pre-Contact times. In more recent literature, these estimates have been increased in size to provide for trading with inland tribes.

[40] Op.cit., see above note.

Sheppard estimates that North American salmonid abundance remained relatively constant from the 1890s through the 1960s[41] (early fishery biologists sometimes combined fish species in estimating abundance, instead of estimating single species).

Light, in 1987, attempted to estimate total steelhead runs for the Northwest coast for the 1980s, based upon sport harvest data, dam counts, and other river counts. He estimated wild Oregon coast runs approximating 108,000 fish in the mid-1980s (a figure that approximates Sheppard's estimate in the 1970s)[42]. Although these estimates tell us little about the southwest Oregon coho population, they do provide a vision of the likely metapopulation size.

C.2. Hatchery Influences. Fishery managers have altered the genetic composition and propagation of salmonids in the Rogue Basin since 1875. Anecdotal information and records collected by Cole Rivers indicate that cannery managers released up to 250,000 chinook in 1880, and moved the fry from stream to stream along the Coast to repopulate 'depleted' streams.[43] In 1904, over 8 million hatchery salmon were released in the Rogue River system and 18 million released in 1924,[44] with hatchery managers operating on the principle of 'The more fish, the better'. Salmonid eggs were transported (and no-doubt imported) to and from streams all over Oregon, Washington, and Northern California through several decades, until the practice was limited through state legislation in 1931 to protect native fish populations in streams.

Busby, 1994, in analyzing DNA from Western Oregon salmonids, notes that there is considerable consistency in southwestern Oregon DNA composition with fish populations in northern Oregon and Columbia basin stocks having much more similarity than would be expected. Perhaps this finding is reflecting the effects from the practices of fish managers a century ago in creating genetic homogenization within fish species from multiple river systems throughout the west coast[45].

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[41] Busby, 1994, p-56-57.

[42] J.T. Light, 1987, "Coastwide abundance of North American steelhead trout." (Document presented to the annual meeting of the International North Pacific Fish Commission, 1987.) Fisheries Research Institute Report FRI-UW-8913, University of Washington, Seattle.; also reported in Busby, 1994, op.cit.., p-56-57.

[43] Cole Rivers, 1963, op.cit..

[44] Data from U.S. Bureau of Fisheries and Oregon State Game Commission, 1963.

[45] Weitkamp, 1995, op.cit.. (NOAA Coho Status Report, p-80)

Nonresident fish species have been added to the river system several times throughout the past century by businessmen and U.S. Bureau of Fisheries, with most species not surviving. Hatchery managers reported in 1877 that several penned stocks were infected with slimy fungus (probably Saprolegnia sp.), thus disease and parasites were added to native stocks over a century ago.

Wild Stock Supplementation from Hatchery Production. For several years, concern has been expressed about dilution of the wild stock gene pool through interbreeding hatchery and wild stocks. An unknown portion of hatchery stock interbreed with wild fish, and spawn in the wild environment. There is some evidence that interbred hatchery stock have lower levels of survivability than full native stock (some estimates are as low as 10%[46]), but the extent of behavioral change and genetic migration is still unknown. Some local fishery biologists think that hatchery supplementation may have provided critical brood stock for seeding underutilized habitat areas in the Rogue Basin when the Cole Rivers Hatchery went into production in 1976, but the extent of this impact is not known.

The CSRI Technical Team has recommended a new hatchery operations policy for coho hatcheries, with production to be limited to supporting seeding of underutilized habitat areas[47]. This policy will be reviewed by the ODFW Commission, and state legislature. Any final policy will need to be consistent with the ODFW Wild Fish Management Policy, which stipulates that no more than 50% of the natural spawning population may be hatchery stock.

C. 3. Rogue Basin Coho Production.

The Rogue basin is on the southern end of the coho range in Oregon. Coho are the least abundant wild salmonid (with the exception of sea-run cutthroat) that use the Rogue system, but historically, the Rogue was a substantial producer of coho. Commercial harvests of coho began in 1861 and by 1888 the Rogue River fishery ranked third among the fisheries of the West Coast. In the early 1900s, egg-taking stations were operated by both public and private interests on a number of Rogue tributaries including the Applegate River, despite concerns as early as 1911 that salmon fish runs in the Rogue were declining [It should be noted that the cannery harvested

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[46] "Assessing the Potential Impact of Hatchery Program on Populations of Wild Coho," Appendix 4, Attachment II, Science Team Information and Products. (Salem, Oregon: Oregon Coastal Salmon Restoration Initiative). Draft, 1996.

[47] "Recommendations Relating to Population Status; Criteria for Hatchery-Wild Interactions," Attachment II, Science Team Information and Products. (Salem, Oregon: Oregon Coastal Salmon Restoration Initiative), Draft, 1996.

all salmonid species, and probably did not make any particular effort to distinguish among species, so harvest numbers may be distorted]. Between 1976 and 1989 the freshwater escapement of coho into the Rogue River basin was estimated at 7,000 hatchery and wild adults. The present estimate is approximately 3,600 hatchery and 3,200 wild age three adults .[48]

Adult coho enter the Rogue River system beginning in September. The upper river stocks reach Gold Ray Dam around mid-October, and hold in the main river until rains allow them to move into the secondary streams and tributaries to spawn in December and January (see Table 2 below). The lower river runs actually enter the river a little later but still spawn around the same time. During large run years, spawning may continue into March. Fry emerge during the month of April and rear in lower mainstems of streams for a year until they smolt. Smolts migrate to the lower mainstem Rogue River from mid-May through July. Young coho winter over in large pools and backwaters which provide cover during high water months. Most Rogue coho spend a year in freshwater and two years at sea before returning to their home stream to spawn. A small percentage of the population spend less than a year in the ocean before maturing as age 2 jacks.

Table 2. Coho Life-Cycle Model for the Rogue basin

Stage	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
Adult Migration		X	X	X								
Adult Spawning		X	X	X								
Eggs/Fry Emerge				X	X	X	X					
Fingerlings/Rearing	X	X	X	X	X	X	X	X	X	X	X	X
Juvenile migration						X	X	X	X	X		
Smolt out migration							X	X	X	X		

X - Indicates presence at the life-cycle month stage.

Besides coho, the Rogue Basin contains fall and spring chinook, winter and summer steelhead, and resident rainbow and cutthroat trout (including a small sea-run cutthroat trout population below the Illinois River). Brook and brown trout have also been introduced into the upper reaches of the basin. The Oregon Department of Fish and Wildlife manages the river system for multiple species. Data on coho smolt production of core areas and other coho habitat areas are

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[48] Rogue Basin Fish Management Plan . Oregon Department of Fish and Wildlife, Draft, October, 1994.

very limited and need to be expanded.

C.4. South Coast Coho Production.

The South Coast basin area includes five rivers, ten creeks, and smaller watersheds that empty directly into the Pacific Ocean along 100 miles of coastline. The watershed is located in the southwest corner of Oregon, in Curry and Coos Counties, within the Klamath Mountain physiographic region. The watershed is approximately 1,100 square miles, following the coastal crest, which extends inland up to 30 miles, and north from the California border to the Coquille River Basin. It does not include the Rogue or Coquille Rivers. Since this report deals exclusively with the Klamath Mountain Province, it essentially does not include any streams north of Cape Blanco.

Habitat is limited by the steep gradient of streams originating in the Siskiyou Mountains. In the upper, forested parts of the basin the steep gradient, high winter flows, and the transitory nature of large wood limit overwintering habitat. Lower in the system, sediment becomes a problem in some areas. Historically, the available overwintering habitat was probably concentrated in the mainstem and tributaries of the lower 3 to 5 miles of the watersheds where the open valleys and relatively unconfined channels provided side channels, backwaters, and ponds during high winter flows. That type of habitat is now very limited in most of the South Coast streams.

The South Coast Basin is on the southern end of the coho range in Oregon. Coho are the least abundant wild salmonid, with the exception of sea-run cutthroat trout, that use this area. The most significant population exists in the Floras Creek-New River system, which is just north of the Klamath Province. The Sixes, Elk, Winchuck and Chetco Rivers contain small populations of coho but in some of these streams there may be just remnant populations or strays attempting to colonize underutilized habitat.

Commercial fishing on the southern Oregon coast began in the early 1860s with the construction of canneries and hatcheries. By the mid-1900s a fleet of 60-70 fishing vessels operated out of Port Orford. Salmon harvest since the turn of the century has focused on offshore runs dominated by coho. According to commercial catch records during the 1927-28 season, for example, 13,336 pounds of coho were taken from the fishery on Elk River. That poundage would be equal to approximately 1,500 coho. As stocks throughout the basin have declined, the commercial fishery for coho has been closed.

Although coho numbers in the South Coast basin were never great, fish were distributed in almost every stream. The spatial distribution of coho is relatively unchanged from historic use areas, but current production has declined substantially from historic levels.

Adult coho enter South Coast basin streams beginning in September and hold in the estuary and lower river holes until rains allow them to move upstream to preferred spawning areas on the mainstem and in tributaries (see Table 3). Spawning occurs in December and January. Fry begin to emerge in March and April, and they rear in the backwaters and pools of the lower reaches for a year. Juveniles smolt in the spring and move into the ocean from May through July. Almost all coastal coho spend a year in freshwater and two years at sea before returning to their home stream to spawn.

Table 3. Coho Life-Cycle Model for the South Coast Basin .

Life-Cycle Stage	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
Adult Migration	X	X	X									X
Adult Spawning			X	X	X							
Eggs/Fry Emerge						X	X					
Fingerlings/Rearing	X	X	X	X	X	X	X	X	X	X	X	X
Juvenile migration						X	X	X	X	X		
Smolt out migration							X	X	X	X		

X - Indicates presence at the life-cycle month stage.

Besides coho, the South Coast Basin contains fall chinook, winter steelhead and sea-run and resident cutthroat trout. Data on coho smolt production of core areas and other coho habitat are very limited and need to be expanded.

C.5. Summary.

This analysis has examined basin-wide effects of environmental conditions upon coho habitat and propagation in the Rogue and South Coast Basins and identified life cycle habitat requirements and concerns to be addressed in preparing recovery actions. The life cycle model identifies habitat needs at specific time periods and limiting factors that must be addressed to stabilize coho production.

Section F of this document focuses upon specific core habitat areas and identifies limiting factors that need to be linked to life cycle habitat needs in restoration actions.

Section D: NATIVE COHO POPULATION VARIABILITY

Step 3: Establish A Minimum Viable Coho Population Size.

Abstract: **This section examines natural coho population variability for the Southwest Oregon region, and establishes a population range that is considered necessary to maintain minimum genetic integrity. This range is the basis for establishing the measures that the Southwest Oregon Initiative will use to stabilize the coho population in southwest Oregon from further decline.**

This section also estimates an average population size necessary to account for natural fluctuations that will ensure the native coho population will not drop below the minimum level necessary to maintain its genetic integrity.

D. 1. Coho Population Variability.

D.1.a. Concept of Population Variability.

It is axiomatic among ecologists that there is a natural range of variability in nature, and environmental conditions are better portrayed by the trend of change than by any singular data-point in time. Ecologists observed that the "Range of Natural Conditions" is reflected more by the *patterns* across environmental events, than by the data points or extremes themselves. Thus, the patterns represented within a data set are more revealing than any single indicated environmental condition. This concept of natural variability provides a means through which we estimate population numbers necessary to stabilize the coho population at minimum viable levels.

This concept of change was demonstrated for southwest Oregon in 1991, when federal ecologists for the Siskiyou, Rogue, and Umpqua National Forests sought to conduct an "ecosystem assessment" of environmental conditions in the Klamath Mountains Province.[49] They noted that an enduring problem is that environmental data often indicate a wide range of variability in conditions that individually may be presumed to be abnormal. It often is unclear whether a catastrophic event (such as a flood, drought, or large drop in population numbers) is a harbinger of change, or is simply an expected event within natural environmental cycles. Thus if a range of known indicators are *summed* to represent a trend, it is possible to develop summary indicators of ecosystem health. For example, if a majority of range points are evenly or randomly distributed within the natural range of environmental conditions, an ecosystem may be judged as representing natural variability, and no general state of "unhealthiness" may be indicated; if however, the majority of range points tend to reflect stressed or extreme conditions, an unhealthy condition may be indicated for a targeted species. Thus, *populations must be managed for variability within naturally occurring ranges, both within the genetic variation of a species, and in overall population size.* The difficulty lies in establishing the natural range of an environmental phenomena, and in assessing whether an extreme event is actually outside the normal range of variability, or within poorly defined margins of normality.[50]

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[49] "A First Approximation of Ecosystem Health," National Forest System Lands, Pacific Northwest Region, U.S. Department of Agriculture, June 1993.

[50] The concept of "variability," as used in this document, has two quite different dimensions; (1) maintaining *genetic* variability *within* the species, in protecting the different gene traits that exist within the coho population in the Southwest Oregon component of the Klamath Mountains ESU, and (2) managing for variability in *population size, species composition, etc.,* within a stream system or basin . The goal is to provide a coho population

D.1.b. Stabilizing the population.

The native coho population in southwest Oregon varies considerably in numbers from year to year, varying up to 400%. If the population is stabilized with a positive trend, we can be reasonably safe in maintaining a minimum genetically viable native coho population. Through identifying the natural range in population numbers and its historic lower limit, we can establish a minimum escapement level for the basin that should not be exceeded. That level could also serve as a baseline to monitor future progress toward a recovery in the population.

D.2. Coho Population Variability within the Southwest Oregon ESU.

This section applies a concept outlined in the NMFS Status Report to describe as precisely as possible the conditions affecting variability of the coho population within the Oregon side of the Klamath Mountains Province Evolutionarily Significant Unit (ESU); i.e. - our geographic production area.[51] The process compares the current population of coho with the range of natural variability (using best available data). If population numbers trend downward, and/or are consistently below the natural range of variability, then the population should be judged "in jeopardy." Ideally, this analysis would be conducted both *within* and *across* watersheds to identify problem areas, as well as judge the overall condition within the range of coho production in southwest Oregon.

There is no single preferred method in the literature for estimating or establishing the essential natural range of a coho population, therefore, a strategy of formulating successive approximations from three models was used. Since South Coast production follows similar cycles, and is linked to the Rogue Basin in being in the same ESU, the two basins are combined in this analysis. The Klamath Province South Coast coho production is estimated at generally less than 1% of Rogue Basin production, or about 200 adults/year.

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with adequate gene traits, that will maintain itself as a 'viable" population. Both concepts of variability must be maintained to "protect" a species.

[51] Status Review of Coho Salmon from Washington, Oregon, and California. NOAA Technical Memorandum NMFS-NWFSC-24, September, 1995.

D.2.a. Method 1: Historic Level of Survivability.

Estimates of historic runs for Oregon coastal salmon (south of the Columbia River, and north of California) range up to 1.6 million adults in the early 1900s, but in the last decade, the run may have declined to below 100,000 adults.[52] The Rogue and South Coast system may have represented between five and ten percent of west coast total salmon production.

Throughout the last half of this century, the Rogue Basin fishery has probably always functioned on the lower edge of the threshold of survivability. Actual levels of natural production in Southwest Oregon are difficult to estimate (see box below on problems of counting fish populations). In the 1890s the Rogue Basin supported an estimated 60,000 native coho, based upon estimates projected from cannery shipments. Between 1899 and 1936, Upper Rogue wild coho production was greatly overshadowed by privately operated hatcheries, which produced between 64,000 - 5,242,000 fingerlings/year. Thus, there is no reliable or accurate estimate of wild coho production for this period.

ESTIMATING COHO PRODUCTION

Determining the coho population in the Rogue and South Coast basins is a difficult process, subject to various inaccuracies. Counting fish is an expensive process, requiring considerable labor and time over an extended period. There are difficulties in determining the species, counting mixed-age groups, and working in turbid waters. Further, fish don't stay put, but migrate into and out of river systems, sometimes travel at night, or may be flushed somewhere by flood flows. For reasons unknown to fish biologists, they may avoid some streams and tributaries some years, then flock to them at other times. Counting actions may include all fish at one point or time, then only wild fish at another point. Different counting techniques can yield different results, depending upon the month, stream characteristics, persons doing the counting, time of day, and other unknown factors.

Fish populations are often estimated for a particular stream, based upon counts at some other location (such as Huntley Park, Gold Ray Dam, or Cole Rivers Hatchery). For example, if the number of hatchery stock returning to the hatchery are high, then estimates for other river systems are also projected at higher levels. It is impossible, under current practices, to know if the escapement population for a given stream is normal, high, or low, since there is little

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[52] "Aspects of Coastal Coho Recovery," Restoration, Oregon Sea Grant, Oregon State University, Summer, 1996. p-4.

baseline data to compare. ODFW conducts most counting operations, but funding is extremely limited for population monitoring, so the Department must resort to estimation procedures.

The ODFW operates fish counting stations on the Rogue River at Huntley Park and Gold Ray Dam. ODFW also monitors hatchery coho returns to the Cole Rivers Hatchery.

Huntley Park is located on the south bank of the Rogue River at River Mile 7. ODFW began this inventory program in 1976 to monitor the summer steelhead population. However, they also collect fall chinook and coho in adequate numbers to make a reasonable population estimate when conditions are suitable. The deep pool at Huntley Park is seined 15 times a day, 3-4 days each week from July through October when river conditions no longer make seining practical. Coho still enter the river after the seining effort has ceased but enough data is usually collected to statistically estimate the total run size with the Gold Ray Dam counts and Cole Rivers Hatchery returns factored in.

Gold Ray Dam is located just above the town of Gold Hill at River Mile 126. The counts began in 1942 by counting fish passing over a white board in the ladder channel. A few years later an underwater viewing window was installed. The counter tallied fish passing the window eight hours a day, three days a week and the total count was statistically estimated. In the late 1980s it was noted that coho returns to Cole Rivers hatchery were higher than the projected counts over Gold Ray Dam. It was suspected that some of the coho were passing Gold Ray at night. In 1991 a video camera was installed that records every fish passing the window 24 hours a day, seven days a week. Since 1992 all of the 200,000 coho released from Cole Rivers Hatchery have been physically marked. Consequently, all coho passing the dam are counted, with the numbers of hatchery and wild fish accurately recorded.

Most of the adult coho returning to the upper Rogue , enter the hatchery, located at River Mile 157, and are stripped of their eggs. About 98 percent of the coho are of hatchery origin. The few wild fish collected at Cole Rivers Hatchery are also spawned and used in improving the genetic composition of the hatchery stock. All returning coho are hand counted and examined for marks. The percentage of hatchery and wild fish is compared with the counts at Huntley Park and Gold Ray Dam. These data help develop a coho population estimate for the entire basin.

In other instances salmonid monitoring is conducted at specific locations by electroshocking pools and counting fish, seining to count fry, snorkeling, installing trap boxes, visual counting, and sportsman catch reports. Escapement rates for specific streams is often based upon redd counts or carcass counts after spawning. Many of the carcasses are consumed by animals, rot, or are not visible. Samples may be taken at different months at different locations, and virtually

no systematic on-going sampling is done other than at Huntley Park, Gold Ray Dam, and Cole Rivers Fish Hatchery.

Until very recently, hatchery fish were not marked, and all counts were combined total counts. In 1992, marking was commenced, and now all hatchery stock are marked before release. Thus, considerable error must be associated with early population estimates before 1994.

From 1936 to 1976 there also was transport of coho stocks both out of and into the Rogue Basin. Out-of-basin stocks were planted in the Rogue system in 1957 (50,210 - Coos stock fry) and again in 1966, 1968, 1969, and 1971 (950 Alsea stock fry).[53] Coho eggs were regularly transported in large quantity out of the region (tens of millions of eggs) during four to five decades (particularly before the 1940s).[54] The extent of removal was so great that the State legislature finally limited egg export to 40% of local escapement, and this law (developed because of excessive coho egg transport out of the Rogue Basin) still applies state-wide today.

The best data on historical native coho population in the Rogue Basin during this century is during the period between 1936 and 1976. Hatchery production during this period was sporadic and consisted primarily of fry releases into the mainstem by state hatcheries.[55] Subsequent studies have found that survival of unfed fry into the mainstem was minimal. Since the releases were well below Gold Ray Dam, there was virtually no impact on the fish counts at Gold Ray, which started in 1942. During this period, natural production ranged from a high of 10,000 natives to a low of 200 adults/year (see Figures 5 and 6 below). The production trend line for this period is clearly declining, reaching fewer than 500 adults/year between 1964 and 1978.

The sampling of Rogue River Basin fish populations between 1980 and the present primarily was undertaken in two locations: Huntley Park in the lower Rogue and Gold Ray Dam near the entry into the Upper Rogue drainage.

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[53] Status Review for Coho.....1995. Appendix E-1.

[54] Cole M. Rivers, 1963, op. cit.

[55] Biennial Reports of the Game Commission indicate that wild coho (as well as other species) were released in the Rogue as late as 1947, however, the effect of these releases is unknown. Biennial Report of the Game Commission of the State of Oregon. (Salem, Oregon: State Printing Department, 1947.

Figure 5 presents the calculated wild returns since sampling began at Huntley Park in 1979. Fish counts at Huntley Park since 1979 (through 1996) for native coho production in southwest Oregon ranged between a low of about 174 fish to a maximum of about 9,757. The average over the 18 years was about 3,630 wild coho.[56] [Note: The accuracy of these counts may underestimate total production in the Rogue System due to the sampling method used.]

Figure 6 displays the calculated wild fish returns for Gold Ray Dam. During the period of 1979 to 1995, counts of wild fish passing Gold Ray indicate a low of 195 fish to maximum of 3,681 fish. During this same period the return of hatchery fish over Gold Ray Dam showed much greater fluctuations in population. Counts of hatchery coho showed a range of about 485 hatchery coho to a maximum of 10,173 fish. Hatchery releases during this period were held essentially constant at about 200,000 coho smolts annually. Because of this year to year consistency in the numbers of coho smolts released, it can be conjectured that the variation in the return of these adult hatchery fish is primarily related to oceanic conditions.

If we consider that both the wild and the hatchery coho are being subjected to the same oceanic conditions then we would expect that both populations would tend to peak and bottom out in similar proportions to their relative smolt populations. This is not the case based on the above data and the information contained in Figures 5 and 6. What can be seen is that the wild fish are bottoming out in a similar fashion as the hatchry fish when oceanic conditions are poor but they are not peaking at the higher levels as we would expect when oceanic conditions have improved. Instead, for this time period, the wild coho never seem to exceed a total upper Rogue estimated population of 4,000. In fact the figures indicate the coho population "flatlines" within this range. The main explanation would seem to be that the wild fish are not leaving the freshwater areas in numbers sufficient to allow for a greater return. Hatchery fish, which are not subjected to the stresses of freshwater rearing are not limited by the carrying capacity of the freshwater habitat in the Rogue River while the wild coho are limited by the natural habitat conditions.

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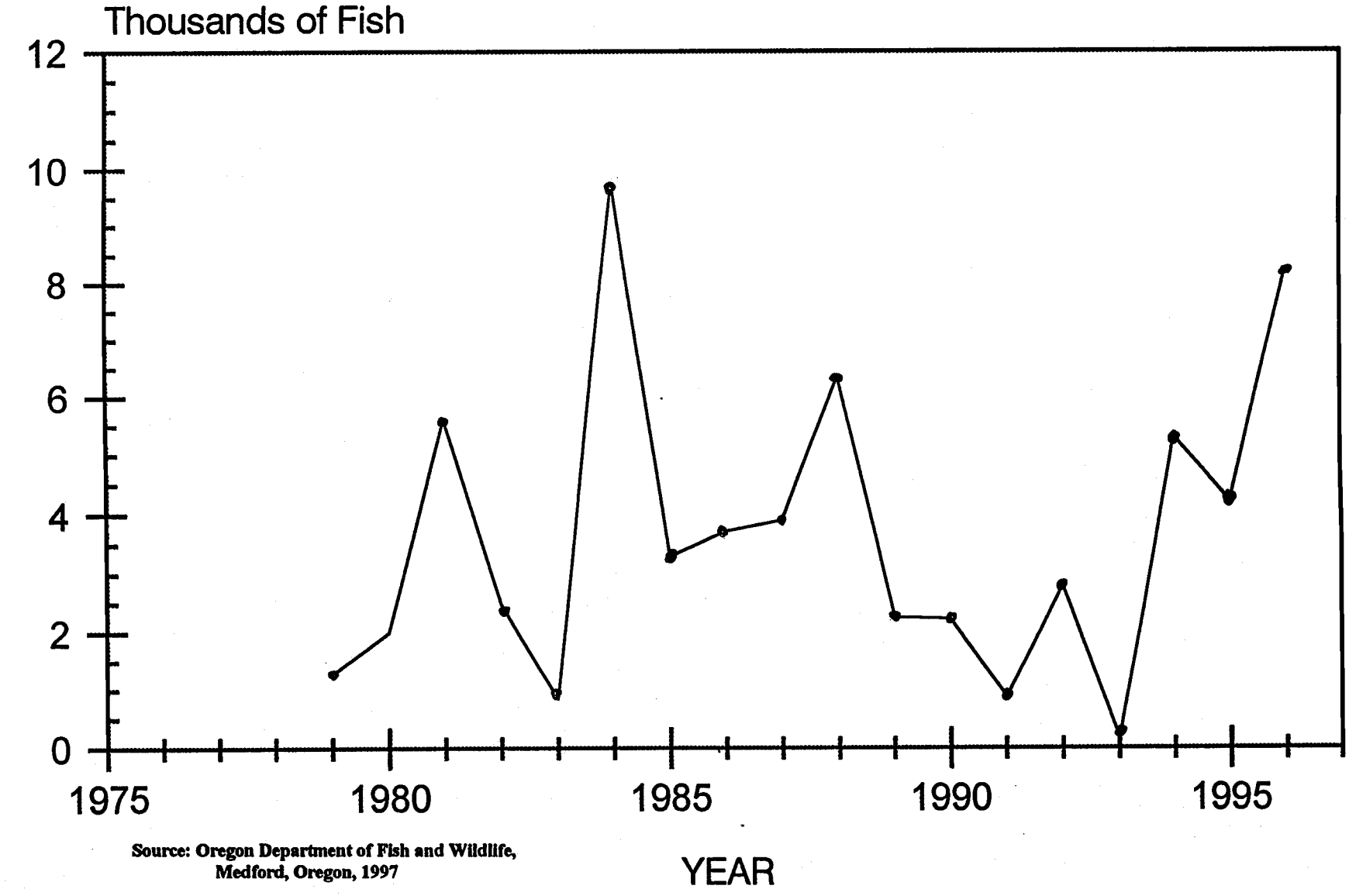
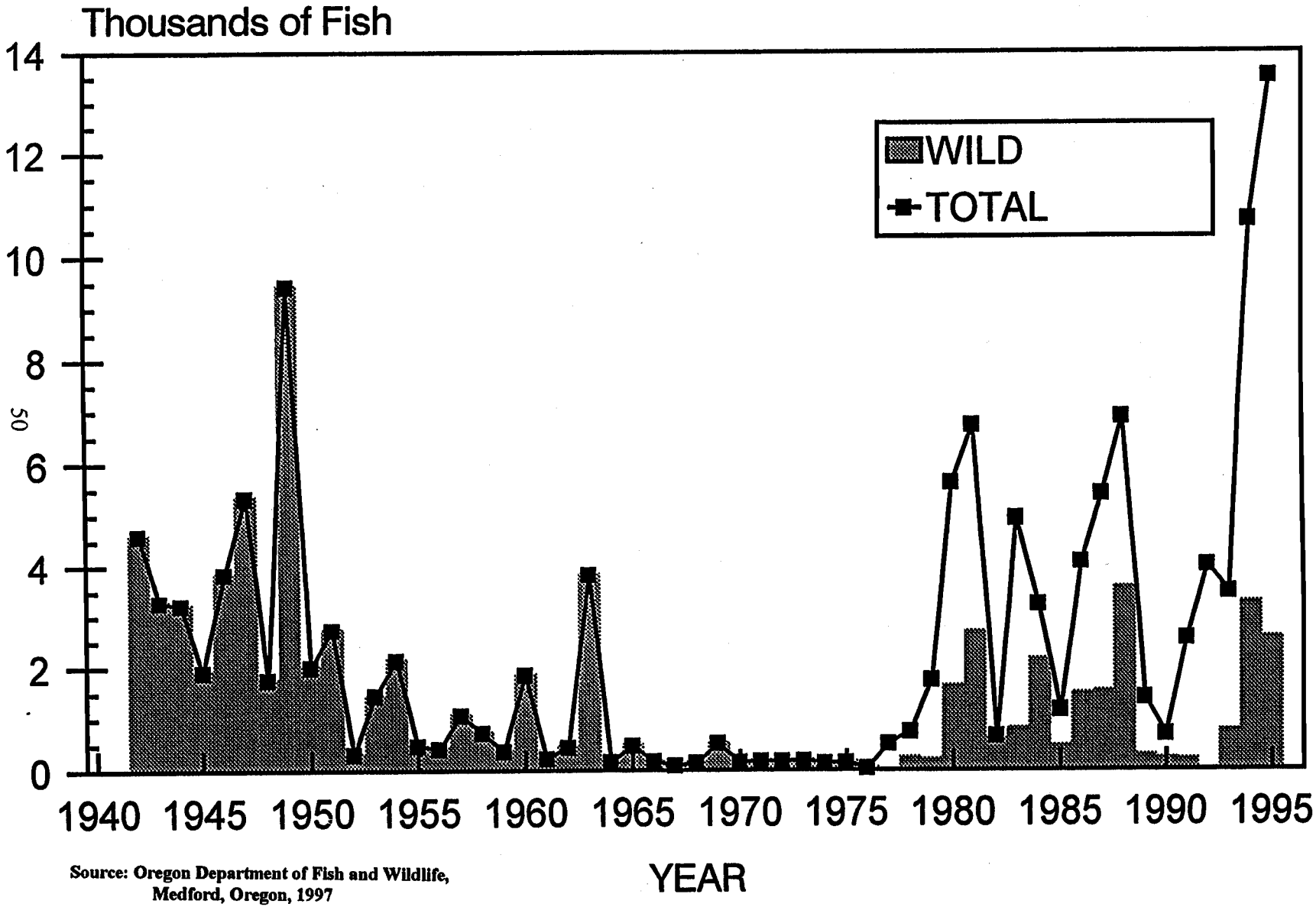
[56] Tom Nicholson, Oregon Department of Fish and Wildlife, Corvallis, Oregon. Personal communication, September 23, 1996.

Figure 5: Rogue Basin Wild Coho Salmon - Huntley Park.



Source: Oregon Department of Fish and Wildlife, Medford, Oregon, 1997

FIGURE 6: ROGUE BASIN COHO SALMON- GOLD RAY DAM



Source: Oregon Department of Fish and Wildlife, Medford, Oregon, 1997

Based on our assessment, focusing on improving freshwater habitat could potentially be the most productive and important fishery management steps that can be taken to improve wild fish production in the Rogue Basin. The good news is that the Rogue coho stocks appear to have a high degree of rebound capacity, in that production can and has rebounded from very low threshold populations within this century. Since 1978, the production pattern has been trending upward. The lower limit of 124 adult escapement is believed to be at a level which greatly threatened genetic survivability of the species[57]. Using the information collected on natural variability, we see that an average of 3,600 adults resulted in this lower limit occurring within the production cycle, which means that we should establish an average production target somewhat greater than the 3,600 level in order to ensure long-term survivability. As an example, a target range of three times this number, an average of 10,800 adults/year, would be expected to better protect the genetic viability of the population over time (which might produce a lower limit of approximately 1,000 adults/year in low production years).

D.2.b. Method 2: Ricker Stock-Recruitment Model.

The Ricker Stock-Recruitment model estimates the population necessary to achieve the "maximum" recruitment for the Rogue Basin. Under "good" conditions, about 3,000 native adults could potentially achieve "maximum" recruitment which would result in the production of about 8,000 aged-three adults for the next generation returning three years later[58] The 8,000 level of production, if maintained as an average returning adult population, could be expected to fluctuate to as low as 3,000 in "poor" years, which is considered to be at the lower edge of genetic survivability. Therefore, an 8,000 population of returning and successfully spawning adults could be used as a target for setting a minimum average population which under normal population fluctuation conditions would not fall below a 3,000 level of minimum genetic viability.

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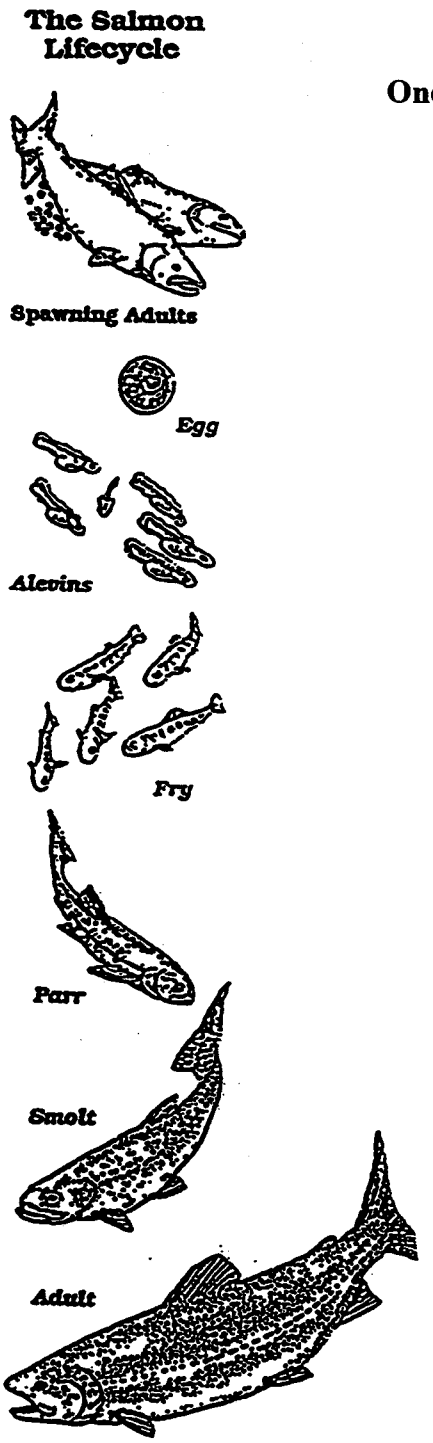
[57] Status Review of Coho.....1995. Op.cit. P-101.

[58] Tom Satterthwaite, Rogue River Studies. Oregon Department of Fish and Wildlife, Fish Research Project (unnumbered), Annual Progress Report, Portland, Oregon, 1992. P-13.

Figure 7: TYPICAL COHO SURVIVAL RATES



One pair of Coho Adults

Produces between 1,000-5,000 eggs (Average about 2,500 eggs)

Between 20 - 60 % of eggs hatch and survive to fry stage (Average about 30%)

About 80% of fry survive to smolt stage and migrate to the ocean

Between 1 - 10% of smolts will survive the ocean environment, and return to spawn (Average 2.5%).

Spawner recruitment rate for the Rogue Basin is about 6.6% (in good years),

Each generation of adult-pairs produce 0 .5 - 16 fish for the next generation.

D.2.c. Method 3: Habitat-Based Approach to Determining Escapement Goals.

Another approach for estimating the upper range of production can be developed from habitat-based escapement goals.[59] The Habitat Limiting Factors Model (HLFM)[60] is based upon the life-history of coho and the critical stages of habitat availability. It seeks to identify the productive capability of freshwater habitat that, when adjusted for ocean productivity conditions, assures 'full seeding" of freshwater habitat to produce maximum production. The goal is to identify the highest yield for a stock that would enable a harvestable surplus, at the smallest sustainable spawning escapement (a commercial harvest of 67% is often proposed as a minimal harvest level).

The HLFM is based upon an evaluation of optimum winter habitat, which is the major limiting factor in most coastal coho streams. Although winter habitat is degraded on the Rogue, high water temperatures and low flows during the summer months are probably more significant limiting factors in the Rogue Basin. Consequently, the numbers resulting from the model do not take this limiting factor into consideration.

HLFM regression equations for the Rogue Basin indicate that at least 41,000 spawning adults are needed for "maximum" smolt production. This level would permit significant harvest and presumes relatively good ocean productivity. This model and the projected conditions are judged by area biologists as being "optimistic," in that it is based upon ideal habitat and ocean conditions, and presumed good propagation. Actual production within the Rogue and South Coast Basins has been significantly below this goal (see Table 4 below).

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[59] "Alternative Approaches to Determining Spawning Escapement Goals for Oregon Coastal Natural Coho Salmon," Coho Salmon Plan, Oregon Department of Fish and Wildlife, 1982.

[60] Nicholson, T.E., M.F. Solazzi, S.L. Johnson, and J.D. Rodgers, "An Approach to Determining Stream Carrying Capacity and Limiting Habitat for Coho Salmon (Oncorhynchus kisutch)," p. 251-260. *In* L. Berg and P.W. Delaney, (eds.) Proceedings of the Coho Workshop, Nanaimo, B.C., May 26-28, 1992.

TABLE 4. MODEL COHO PRODUCTION RATES UNDER DIFFERENT OCEAN SURVIVAL RATES AND HABITAT QUALITY CONDITIONS.[61]

To Achieve 4,000 Adult Spawners

Habitat Condition	Min. % Marine Survival	Adult Escape Needed
Best	3%	4,983
Moderate	5%	8,305
Worst	10%	16,610

To Achieve 8,000 Adult Spawners

Habitat Condition	Min. % Marine Survival	Adult Escape Needed
Best	3%	Cannot be Achieved
Moderate	5%	9,195
Worst	10%	18,389

To Achieve 41,000 Adult Spawners

Habitat Condition	Min. % Marine Survival	Adult Escape Needed
Best	3%	Cannot be Achieved
Moderate	5%	Cannot be Achieved
Worst	10%	62,971

Table 4 demonstrates how the HLFM functions in relation to marine survival and habitat, and portrays the importance of good habitat conditions in both freshwater and ocean environments. For example, a combination of a relatively low marine survival rate of 3% and high quality habitat, would require 4,983 adults to produce 4,000 returning spawners. With the lowest quality habitat and a 10% (excellent) ocean survival, it would take 16,610 adults to produce the same number of spawners. Under poor freshwater habitat and 10% ocean survival, and to have some

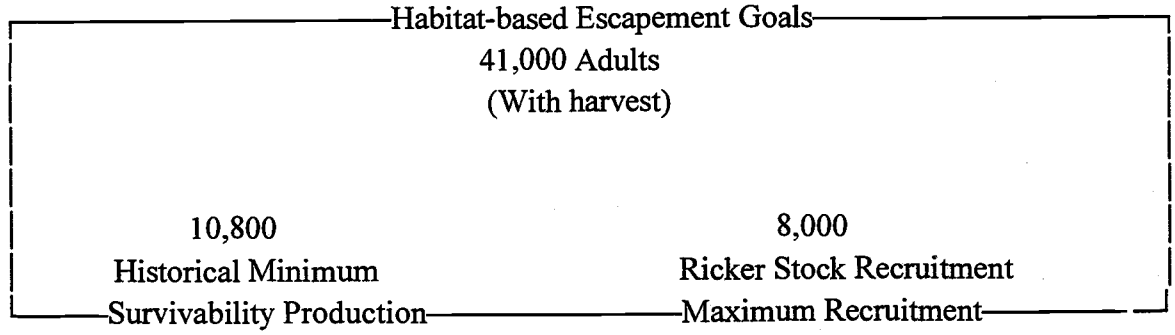
[61] Data provided by Tom Nicholson, Oregon Department of Fish And Wildlife, Corvallis, Oregon., September 23, 1996.

level of harvest, a production level greater than 63,000 fish would be needed. Since optimum conditions do not exist, this production level is not considered realistic at the present time.

D.2.d. Summary of Estimates.

The three methods of estimating population numbers can be viewed as constituting three points in triangulation, and the production target, or range of minimum production for coho would lie at y point within the data parameters.[62] The production goal should be to keep annual escapement "within the box" to maintain viable populations (see Figure 8 below).

Figure 8. Coho Production Models for the Rogue and South Coast Basins.



D.3. Conclusions.

From Method 1 above, based upon natural population counts, we see that given a natural population fluctuation between 200 and 8,000 fish, the average escapement of adults was about 3,600 in the Rogue and South Coast basins. Thus, an average production of 3,600 adults will not maintain the population safely above the level threatening genetic survivability of the species, i.e. above 3,000 adults.

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[62] It is risky to assume a literal interpretation of model estimates, as they are built upon *assumed* effects of *assumed* production, of *presumed* habitat conditions. They do provide a point of reference, however. The figures also *should not be construed to represent any legal mandate or enforceable target of production for the region,* as they are statistical models constructed to guide management decisions.

Method 2 above, indicates that when ocean survivability is taken into account (the ocean survival rate ranges between ≤ 1 to 10%), and, recognizing the resulting population fluctuations in freshwater escapement, maintaining an average returning population of 8,000 adults should ensure that the population will not be expected to fall below the 2,000 level during low production years.

[In a revised edition of the CSRI Strategic Plan, the NRC recommends that the maximum sustained yield model be replaced by the concept of "minimum sustainable escapement", which would produce more conservative estimates of production and a lower level of bycatch harvest from ocean fishing. No production estimates are available from the new model at this time, but the authors judge that model estimates would approximate the above figures].[63]

Method 3 above, demonstrates that if a commercial harvest level for coho (about 67% harvest) is added to a marine survival rate of about 10%, and habitat quality is limited, then a production level in excess of 40,000 adult freshwater escapement would be needed. The Rogue Basin production is nowhere near this level, but this level could probably be considered in the range of full recovery for the coho population.

We conclude: If the average population of native coho is maintained at or above 8,000 adults within the Rogue and South Coast basins, it is reasonable to expect that without commercial harvest, the population could be *stabilized* and further decline prevented. This level of successful adult spawners should prevent the loss of genetic viability in the population under existing normal population fluctuations experienced within the Rogue Basin / South Coast region within this century. This number is not presented to represent full recovery because it is <u>not</u> intended to account for any level of recreational or commercial harvest.

There is considerable reason to believe that this level of production is attainable and can be maintained in the Rogue and South Coast Basins, given that the current positive trend continues in the future. Although three or four years of data do not safely constitute a statistical trend, we might be considered to be ensconced on the bottom threshold of survivability for coho stocks in southwest Oregon. The CSRI Science Team reports that although Rogue populations are at some level of both short-term and long-term risk, they are at potentially survivable levels. In recent years, 1995 and 1996, production of wild stocks appear to have exceeded 8,000 fish, and there is reason to believe that this trend will continue as long as commercial harvest is restricted below

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[63] "Setting Harvest Levels," <u>Coastal Salmon Recovery Strategic Plan</u>. (Salem, Oregon: Oregon Coastal Salmon Restoration Initiative, Draft - August 16, 1996, p-3.

15% of outgoing smolt production, current habitat areas are maintained at 1/3 or above seeding rates, and ocean rearing conditions are favorable (greater than 3% survivability)[64]. Thus, protection and enhancement of inland habitat is critical to maintain this positive trend line of production over the longer term. [*Seeding rate* refers to the actual production of juvenile fish in a given habitat production area. This number is usually below the potential production for a habitat area, if habitat quality is improved].

The CSRI Science Team used a similar process as utilized by the Southwest Oregon Salmon Restoration Initiative team, (described above) using basically the same three independent modeling approaches, and proposed a Rogue Basin production level to maintain a healthy population for Southwest Oregon core areas in the future. This approach is based upon a modeling process projecting the "minimum sustainable escapement" for current habitat conditions, that presumes less than 15% harvest, and moderate marine survivability (3% or better). Using these parameters, they projected the potential production at full seeding for wild coastal coho in the Rogue and South Coast basins probably lies in the range of 5,000 to 20,000 fish.[65] The State considers that the coho production goal for Southwest Oregon is between 5,000 and 20,000 fish.

Definition of terms:

Endangered Species: A species is "endangered" if it is in danger of extinction throughout all or a significant part of its range. §1532(6).

Threatened Species: A species is "threatened" if it is likely to become an endangered species within the foreseeable future throughout all or a significant part of its range. §1532(20).

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[64] "A Population Viability Assessment of Coho Salmon in Oregon based upon Spawner-Recruit Data from 13 Populations," Appendix 2, Attachment II. Science Team Information and Products. (Salem, Oregon: Oregon Coastal Salmon Restoration Initiative), Draft, 1996, p-6-11.

[65] "Production Levels of Healthy Populations," Chapter V, Production Goals and Listing Criteria, Oregon Coastal Salmon Restoration Initiative, Oregon's Plan for Conservation and Restoration of Anadromous Salmonids in Coastal River Basins. (Salem, Oregon: Coastal Salmon Restoration Initiative, Draft, August, 1996), page V-2-4.

We recommend: The target for naturally reproducing adults in the Rogue and South Coast Basins would be an *average trend line population above 8,000 adults* to stabilize the population. Furthermore, that should the population dip near or below 2,000 adults for more than one year during normal population fluctuations, emergency action would likely be taken by NMFS, and state agencies.

D.4. Benchmarks for Coho Recovery in the Rogue and South Coast Basins.

As noted above, production of 8,000 returning adults does not represent recovery for the species, especially considering this does not make allowances for an ongoing program of harvest. There is no precise number of coho required to constitute recovery of the population, in that the definition of recovery is more a judgement of "relative health" of the species and the future trend in population numbers, rather than any absolute number. The NMFS suggests the use of the following criteria for delisting of a species:

> (1) The gene conservation group (GCG), in this case the basin runs of coho, maintains a status above the endangered level for nine consecutive years to be eligible for delisting, *or*
>
> (2) The GCG maintain a status that is three times the threatened level for six consecutive years, *and*
>
> (3) More than 50 % of the major basin ESUs be in compliance with the ODFW Wild Fish Policy for at least the most recent six consecutive years prior to approval of a status change, *and*
>
> (4) A monitoring program capable of assessing trends in habitat quality and coho population status at the GCG level be in place *with a proven commitment* for its continuation.[66]

[66] "Oregon's Plan for Conservation and Restoration of Anadromous Salmonids in Coastal River Basins," Oregon Coastal Salmon Restoration Initiative, Draft, August, 1996, p-V-10.

Section E: NATIVE COHO DISTRIBUTION IN SOUTHWEST OREGON.

Step 4: Establish the Coho Distribution in the Southwest Oregon Region.

Abstract: **This section examines historic and current distribution of the coho salmon population within the Southwest Oregon Region.**

It also describes the geographic distribution of habitat which should be maintained for native coho throughout the Southwest Oregon region.

E.1. Distribution and Production.

E.1.a. Importance and Method for Establishing Distribution.

Population distribution is an important concept, and maintaining distribution is essential to stabilizing the decline of the coho population. A population's distribution provides for biological and environmental protection from localized disturbances and destructive events (forest fires, floods, droughts, disease, competition, predation, etc.). The ODFW seeks to ensure that no particular gene conservation group (GCG) of coho becomes 'at risk' through requiring that 80% of basins within a GCG be populated under the requirements of the Wild Fish Policy (300 breeding fish/year).[67] Thus, protecting and maintaining the distribution of fish habitat areas within a region (or GCG range) is as important as maintaining minimum population size.

A broad geographic distribution of coho habitat areas within the Rogue and South Coast basins is beneficial, especially if the distribution is uninterrupted (i.e. continuous, or evenly dispersed), thereby permitting natural genetic exchanges within the population allowing for adaptation to naturally changing habitat conditions. The method used to establish native coho distribution for the Rogue Basin / South Coast areas was to examine agency records and accessing local knowledge contributed through watershed councils. Distribution studies were used to identify the presence of coho spawners and/or fry in streams, most of which were conducted during the past 5 years (see Map 1, Coho Distribution, below). [It should be noted that not all areas within the range of distribution shown on the map are suitable coho habitat. Coho spawning and rearing habitat exists potentially wherever there are suitable riparian and in-stream conditions and the stream gradient is 3% or less. Localized streamflow conditions may mean that potential habitat is not suitable for part or all of the year.]

E.1.b. Historical Versus Current Distribution.

The coho distribution map below shows the current distribution of native coho salmon in the southwest Oregon region. The RVCOG Technical Team sought to identify historical coho habitat through conferring with local fish biologists and area residents. Historic habitat areas no longer used were identified, and recorded in summary form, by watershed. Based on data in Table 5, we see that most of the historic coho production areas still exist and are still used to some extent by the fish. We estimate that approximately 90 % of presettlement habitat areas are still being used today, a loss of about 10% overall.

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[67] "Listing and Delisting Criteria Based on Graphical Analysis of Long Term Trends," Appendix 3, Attachment II. Science Team Information and Products. (Salem, Oregon: Oregon Coastal Salmon Restoration Initiative) 1996, p-1.

In Table 5, below, we can see how the various watersheds compare in terms of their historical and current distribution. Based on this analysis we estimate that the range of change is virtually nil in 5 subbasins, to a loss of 30% in the Little Butte Creek sub-basin. Other significant areas with habitat losses include Bear Creek (-27%) and the Upper Rogue sub-basin (-17%), and Applegate (-30%). These variations indicate that coho habitat loss has not been uniform in the Rogue Basin and South Coast region. Habitat losses are being addressed in individual watershed habitat assessments and action plans.

Map 1. Current Coho Distribution.

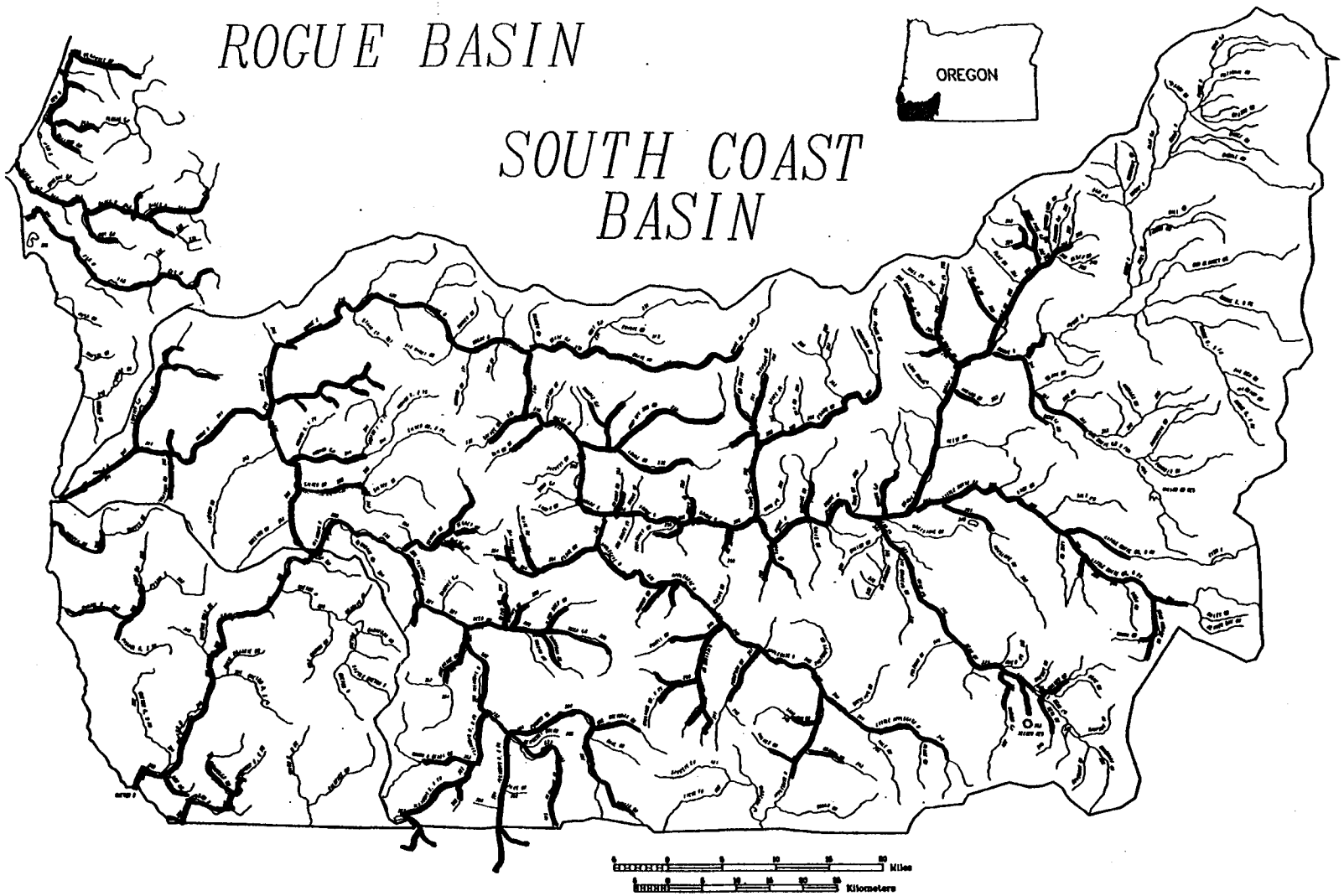

TABLE 5. HISTORICAL AND CURRENT DISTRIBUTION OF COHO HABITAT WITHIN THE ROGUE AND SOUTH COAST BASINS.*

WATERSHED	Historical Distribution Miles	Current Distribution Miles	% Change
Upper Rogue	159	137.2	-17%
Little Butte	102	71.3	-30%
Bear Creek	64	46.5	-27%
Applegate	223	155.9	-30%
Middle Rogue	136	136.2	0%
Illinois	260	254.0	-2%
Lower Rogue	107	107.4	0%
Evans Creek	91	91.3	0%
South Coast	288	287.7	0%
Total	1440 (2318 km)	1287.5 (2071 km)	-11%

* The historical mileage was calculated through using a cartographic scaler to measure stream miles from a 7.5 min USGS Quad map. The measurements are approximations, since historic fishery habitat use is relative and variable. See Appendix 3 for detailed data.

E.1.c. Analysis of Population Distribution, Overall Numbers and Habitat Condition.

It appears that what may be just as important as maintaining the current distribution of native coho, is the condition of the habitat within that geographic range. Since we have experienced dramatic declines in overall coho population numbers in the past with perhaps limited (-10% overall) loss of distribution of habitat, other factors are probably at work.

There is also some uncertainty whether there is a single gene conservation group within the Rogue Basin, or multiple genetic groups. The ODFW has identified 14 coho populations within the Rogue and South Coast study area, but it is unknown if these populations represent different

genetic groups.[68] Some regional biologists believe there may possibly be some differences among the coastal river populations, the Illinois River - Applegate runs, and the Upper Rogue runs, but DNA analyses are still inconclusive. The current CSRI and NMFS position on this question is to group all southwest Oregon populations into the Klamath Provence Evolutionary Significant Unit. If future analyses substantiate genetic differences among the populations, habitat use areas and production levels for each specific population would need to be protected, This would require a substantial reformulation of the content of this report.

In response to the query of whether the potential still exists for recovery of wild coho production to a viable sustainable population within the Rogue and South Coast Basins, the answer clearly is - Yes. Although it is dangerous and perhaps simplistic to use straight linear extrapolation of fish production for an habitat area to predict the future survivability of the species, such manipulations can be used to provide some degree of approximation and/or perspective. It is reasonable to expect that the Phase 1 actions of protecting the existing core areas and high value habitat will result in populations that are above the minimum viable level. Historic production of the 1440 miles of coho habitat in the Rogue and South Coast Basins resulted in about 41.7 fish/mile (estimated 1860s escapement = 60,000 fish/1440 miles of habitat = 41.7 fish). The current habitat of 1288 miles is producing only about 4.6 adult fish/mile (6,000 fish/1,288 miles of habitat = 4.6 adults/mile), which is about 10% of historic production. Logically, simply increasing coho production by 2 fish/mile of habitat over present production levels throughout the basins, would meet the minimum threshold for sustainability.

If existing coho habitat within the Rogue and South Coast basins is protected and allowed to function at current normal conditions, it can be expected to produce coho adults at a viable sustainable rate of reproduction, presuming there are favorable climatic conditions and no harvest (presumptions which are not always valid). To establish a recovery population of some 40,000 adults however, habitat enhancement, restoration and severe restriction of harvest will clearly be needed, to produce somewhere in the range of 31 fish/mile/ of current habitat. Recovery of the coho populations to long-term viable sustainable production levels within the Rogue and South Coast basins is realistically achievable with the remaining habitat available.

The current trend in population numbers in the Rogue Basin is beginning to turn in an upward direction. However, based on the last section, we see that current population numbers are only about 4,000 and we are projecting a need of a minimum average coho population of at least 8,000 to stabilize the population from further decline and assure its genetic integrity. Therefore,

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[68] Source: "Table 1. Grouping of 91 coho salmon populations among 4 Gene Conservation Groups," Section II, GCU Maps, Management Measures, Book 2, Oregon Coastal Salmon Restoration Initiative, Draft - August, 1996.

while focusing on maintaining our current population distribution, it is important to emphasize habitat quality and quantity as a significant issue.

Our conclusion is that maintaining native coho distribution at current levels is a high priority if we are to remain in keeping with the decision to stabilize the population so it declines no further. We recognize that the quality of aquatic habitat areas and riparian conditions vary widely from stream to stream, and some areas have habitat conditions which naturally limit native coho production. However, maintaining and enhancing existing habitat is essential to stabilizing the population. Most areas within the extent of distribution are probably still amenable to recovery activities. Also, another factor for consideration is fish passage, since both migratory and lateral seasonal movement is currently hindered.

The next sections address how the native coho overall population numbers, distribution pattern, quantity/quality of habitat and fish passage issues are being addressed.

Section F: HIGH VALUE NATIVE COHO HABITAT AREAS AND THEIR CONDITION.

Step 5: Determine Locations of Existing High Value Native Coho "Core" Habitat Areas, and Assess Their Conditions.

Abstract: **The Governor's Salmon Recovery Science Team designated twenty-seven "core" habitat areas in Southwest Oregon. These areas are the main habitat units being used to stabilize native coho populations in the Rogue and South Coast basins. In this section, the core areas were evaluated for factors limiting coho propagation and the habitat conditions that are in need of improvement. Information on secondary coho habitat use areas was also evaluated and is included in the watershed core area assessments.**

This section designates critical core areas which are to be protected, at least in the near term, to stabilize the coho population at a genetically viable level. The section also assesses and describes the core areas individually and collectively for their current habitat conditions, limiting factors and priority as a regional problem to be addressed.

F.1. Identification of Native Coho Core Areas.

F.1.a. Method of Core Area Identification.

The Governor's Salmon Recovery Science Team designated 27 "core " habitat areas in Southwest Oregon for protection and restoration. Core areas are defined as "reaches or watersheds that are judged to be of critical importance to the maintenance of salmon populations that inhabit those basins."[69] The selection of core areas was 'data driven' and based on data that identifies these areas as having above-average population densities or habitat quality"[70] throughout the coho life-cycle. The specification of core areas was based upon stream surveys conducted by federal and state agencies, as well as local knowledge from watershed councils and area residents. Maps portraying the designated core and secondary habitat use areas were provided to the Watershed Councils, local government, and resource management agencies for their evaluation of accuracy. Comments received led to the creation of modified maps portraying core areas (see Map 2) and high value production areas (see Map 3,4,5,6,7,8,9, on pages 85-91).

Core Areas are not to be considered as "natural preserves". The designation 'core area' does not encroach on, or supersede, any landowner rights, nor does it obligate the landowner to commit any funds or resources without his consent. Core streams presumably provide all of the habitat characteristics necessary to support coho in freshwater, including spawning and rearing habitat. They are identified so that they might be managed to best protect and enhance this critical habitat and recognize obligations under the Endangered Species act.

F.1.b. Methods Used to Evaluate Core Area Habitat Conditions.

Environmental conditions within core habitat areas were evaluated through organizing data into a modified NMFS Effects Matrix. The watershed councils helped provide information on 37 habitat conditions for each core area, which is collated and presented in Appendix 1.

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[69] Maps of Contemporary Core Areas of the Spawning and Rearing Distributions of Salmon and Steelhead in Oregon Coastal River Basins, (Salem, Oregon: Oregon Department of Fish and Wildlife, August, 1996), p-2.

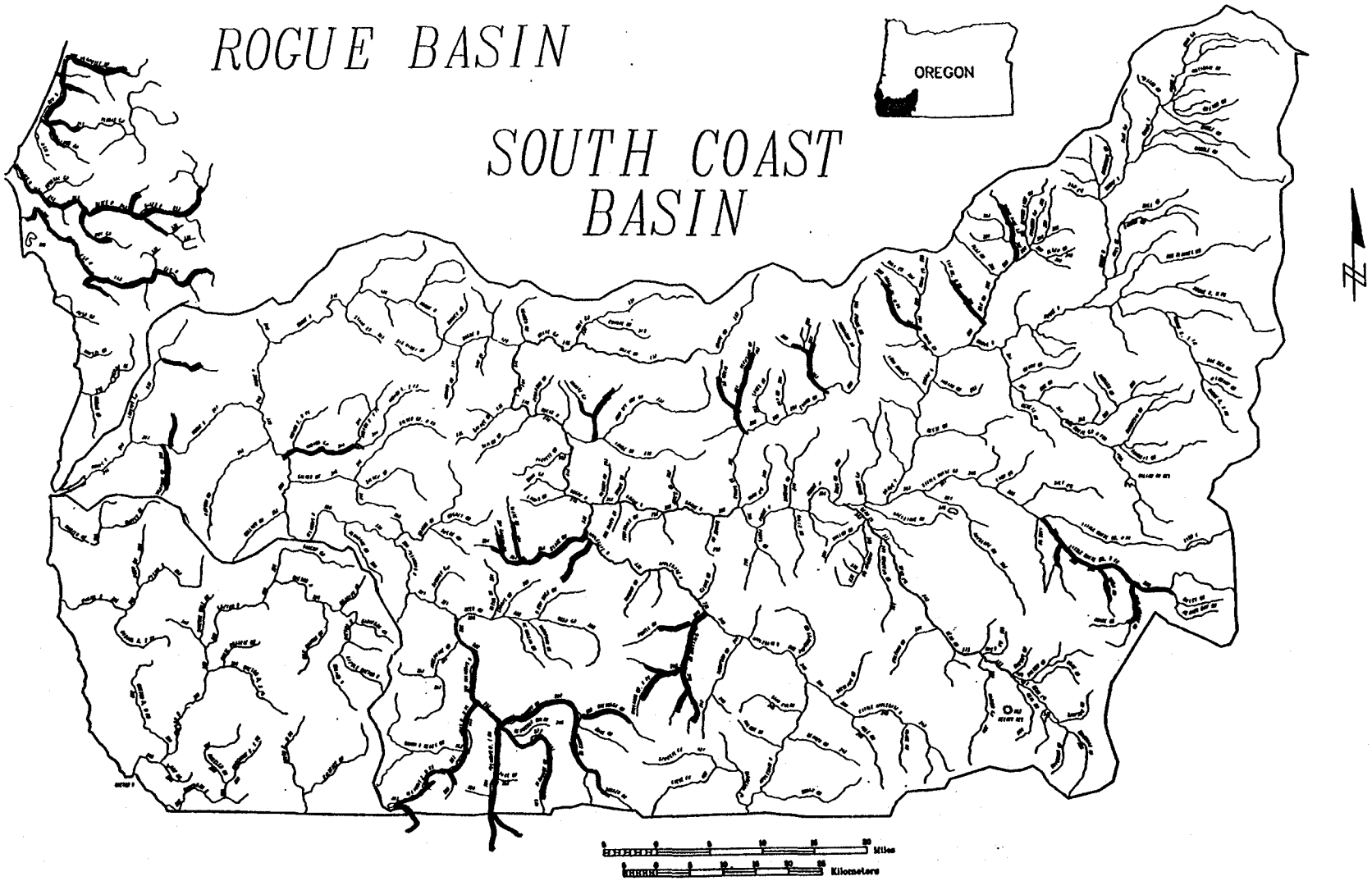
[70] Ibid. p-7.

The watershed habitat conditions were developed from stream surveys, watershed analyses, and anecdotal information provided by area stakeholders and residents. As such, they represent a summary consensus from best available sources of existing information. Judgements about current conditions were made after referencing 'ideal' standards, then adjusting them to fit local environmental conditions. These core area trends were summarized to create basin level data.

The detailed habitat assessments and proposed restoration actions are presented in Appendix 1. Trend lines on habitat parameters were collated across subbasins, then presented to represent basin parameters. A summary of key environmental parameters for the basins follows:[71]

[71]: Reference standards were obtained from literature listed in one or more of the following sources: (1) Rhodes, Jonathan J., Dale A. McCullough, and F. Al Espinosa, Jr., A Source Screening Process for Potential Application in ESA Consultations. Technical Report 94-4, National Marine Fisheries Service, December, 1994; (2) Quantitative Stream Habitat Surveys, 1991. Oregon Department of Fish and Wildlife, Aquatic Inventory Project, Physical Habitat Surveys, Fish Surveys, 1991; (3) Oregon Department of Fish and Wildlife, Aquatic Inventory Project, Habitat Benchmarks Draft, 12/1992

Map 2. Coho Core Areas



F.2. Core Area Characteristics.

F.2.a. Overview of Rogue Basin and South Coast Core Areas.

The 27 core areas within the Rogue and South Coast basins are spread across approximately 268 miles of streams (see list of core areas in Table 6 below, and maps in Appendix 1). Remaining coho use areas throughout the basins constitute secondary production habitat areas and are discussed later in this section.

Table 6. Coho Core Areas by Watershed.

UPPER ROGUE WATERSHED	Miles
West Fork Trail Creek	6.8
Sugar Pine Creek (Elk Creek)	3.9
West Branch Elk Creek	4.1
	14.8
LITTLE BUTTE WATERSHED	
South Fork Little Butte Creek	27.0
BEAR CREEK WATERSHED	0.0
EVANS CREEK WATERSHED	
West Fork Evans Creek	5.0
APPLEGATE WATERSHED	
Slate/Waters Creek	17.0
Cheney Creek	5.4
Williams Creek	15.0
	37.4
MIDDLE ROGUE WATERSHED	
Quartz Creek	5.7
ILLINOIS WATERSHED	
Sucker/Grayback Creek	16.3
East Fork Illinois	22.3
Althouse Creek	12.2
Elk Creek/Broken Kettle Creek	7.0
Dunn Creek	2.9
	60.7

LOWER ROGUE WATERSHED	Miles
Quosatana Creek	3.9
South Fork Lobster Creek	6.8
Silver Creek	4.1
Shasta Costa Creek	5.5
	20.3
SOUTH COAST WATERSHED	
Elk River	37.0
Sixes River System	
Crystal Creek (Sixes)	5.9
Edson Creek	2.7
Dry Creek (Sixes)	5.5
Murphy Canyon Creek (Sixes)	4.7
New River System	
Willow Creek (Floras)	4.0
Bethel Creek (New River)	5.9
Butte Creek (New River)	4.5
South Fork Fourmile Creek	6.5
	76.7
Grand Total	**267.6 miles**
	(430.7km)

F.2.b. Rogue Basin Core Area Characteristics

There are 110 streams within the Rogue Basin, with approximately 1000 miles designated as coho habitat use area. There are approximately 191 miles of coho habitat in the 18 core areas designated within the basin (71% of total southwest Oregon core area miles). Appendix 1 contains a list of 37 habitat conditions that were addressed for each identified core area in southwest Oregon. Of these 37 habitat conditions identified, 10 conditions were aggregated for regional significance, to utilize the NMFS effects matrix for the analysis. The following pages include tables on the Rogue Basin core areas, South Coast core areas, and an aggregated region-wide analysis . The Regional Assessment Table judges the habitat indicators "Acceptable (Properly Functioning); Potential Limiting Factor (At Risk); or Limiting Factor (Priority for Restoration)." Those conditions determined as known limiting factors are flagged for actions to be taken to correct the habitat problems and contribute to stabilizing the population.

Table 7. Rogue Basin Coho Core Area Habitat Conditions.

Habitat Indicator	**Upper Rogue Watershed**		
Current Environmental Baseline	**West Fork Trail Creek**	**West Branch Elk Creek**	**Sugar Pine Creek (Elk Creek)**
Water Quality **Temperature** ≤13/18°C (55/64°F)	Limiting factor for summer rearing	Limiting factor for summer rearing	Limiting factor for summer rearing
Sediment **≤5% fines**	Limiting Factor	Limiting Factor	Acceptable (marginally)
Chem. Contam.	Acceptable	Acceptable	Acceptable
Flow/Hydrology **Low Flow** ≥8 cfs	Limiting factor for summer rearing	Limiting factor for summer rearing	Limiting factor for summer rearing
Habitat Elements **Riparian Quality**	Limiting factor for summer rearing	Limiting factor for summer rearing	Limiting factor for summer rearing
Large Woody Debris **≥80 pieces/mile**	Limiting Factor 15-20 Pieces/mi	Limiting Factor 10-20 pieces/mi	At risk 35 pieces/mi
Spawning Gravel 1.3 3"dia.	Acceptable	Limiting Factor	Limiting Factor
Pool frequeney **≥50% riffle ratio**	Limiting Factor 20/80	Limiting Factor 20/80	Limiting Factor 20/80
Canopy cover **≥75% closure**	At risk 33%	At risk	At risk
Fish passage	Acceptable	Acceptable	Acceptable

The Upper Rogue watershed core areas have a high number of limiting factor conditions, particularly those that pertain to water temperature, summer flows, and riparian quality within the subbasin.

Table 7. Rogue Basin Coho Core Area Habitat Conditions (Cont')

Habitat Indicator	Little Butte Watershed	Middle Rogue Watershed	Evans Creek Watershed
Current Environmental Baseline	South Fork Little Butte Creek	Quartz Creek	West Fork Evans Creek
Water Quality **Temperature** ≤13/18°C (55/64°F)	Limiting factor for summer rearing	At risk	Limiting factor for summer rearing
Sediment **≤5% fines**	Acceptable	Acceptable (marginally)	Limiting Factor
Chem. Contam.	Acceptable	Acceptable	Acceptable
Flow/Hydrology **Low Flow** ≥8 cfs	Limiting factor for summer rearing	Acceptable (marginally)	Limiting factor for summer rearing
Habitat Elements **Riparian Quality**	Acceptable (marginally)	Acceptable (marginally	limiting factor for rearing
Large Woody Debris **≥80 pieces/mile**	Limiting Factor 10-20 pieces/mi	At risk 20/30 pieces/mi	At risk 28 pieces/mi
Spawning Gravel **1.3-3"dia.**	Acceptable	Good supply	Limiting Factor
Pool frequency **≥50% riffle ratio**	At risk 30/70	Good 50/50	At risk 35/65
Canopy cover **≥75% closure**	At risk	Acceptable (marginally)	At risk
Fish passage	Acceptable	Acceptable	Acceptable

Little Butte and Evans Creek watershed core areas have limiting factors in summer water flows, water temperature, and sediment levels. There is significant water diversion from the Little Butte system which exacerbates water quantity problems for that drainage.

Table 7. Rogue Basin Coho Core Area Habitat Conditions (Cont')

Habitat Indicator	Applegate Watershed		
Current Environmental Baseline	**Cheney Creek**	**Slate/Waters Creek**	**Williams Creek**
Water Quality **Temperature** ≤13/18°C (55/64°F)	Limiting factor for summer rearing	Limiting factor for summer rearing	Limiting factor for summer rearing
Sediment **≤5% fines**	Acceptable	At Risk	At Risk
Chem. Cont.	Acceptable	Acceptable	Acceptable
Flow/Hydrology **Low Flow** ≥8 cfs	Limiting factor for summer rearing	Limiting factor for summer rearing	Limiting factor for summer rearing
Habitat Elements **Riparian Quality**	Limiting factor for rearing	limiting factor for rearing	Limiting factor for spawning and rearing
Large Woody Debris **≥80 pieces/mile**	At risk	At risk	At risk
Spawning Gravel **1.3-3"dia.**	Excellent	Good in tributaries Low in mainstem	Good
Pool frequency **≥50% riffle ratio**	Good 40/60	Good 40/60	Good 50/50
Canopy cover **≥75% closure**	At risk	At risk	At risk
Fish Passage	Acceptable	Acceptable	Acceptable

The Applegate core areas are limited in water temperature, summer flows, and riparian quality.

Table 7. Rogue Basin Coho Core Area Habitat Conditions (Cont')

Habitat Indicator	Illinois Valley Watershed			
Current Environmental Baseline	Sucker/ Greyback Creek	East Fork and Dunn Creek	Althouse Creek	Elk/Broken Kettle Creek
Water Quality **Temperature** ≤13/18°C (55/64°F)	Greyback - Good Sucker - Limiting	At risk	Limiting factor for summer rearing	Acceptable
Sediment **≤5% fines**	Greyback - Good Sucker - At risk	Acceptable (marginally)	Acceptable (marginally)	Acceptable
Chem. Contam.	Acceptable	Acceptable	Acceptable	Acceptable
Flow/Hydrology **Low Flow** ≥8 cfs	Greyback - Good Sucker - Limiting	Limiting factor for summer rearing	Limiting factor for summer rearing	Acceptable
Habitat Elements **Riparian Quality**	Greyback - Good Sucker - At risk	limiting factor for rearing	Limiting factor for rearing	Acceptable (marginally)
Large Woody Debris **≥80 pieces/mile**	Limiting Factor 2-4 pieces/mi	At risk 10-15 pieces/mi	Acceptable 50-90 pieces/mi	At risk 20 pieces/mi
Spawning Gravel **1.3-3"dia.**	Good supply	Acceptable	Good supply	Good supply
Pool frequency **≥50% riffle ratio**	Limiting Factor 20/80	Good 50/50	Good 50/50	Acceptable 40/60
Canopy cover **≥75% closure**	Greyback - Good Sucker - At risk	At risk	At risk	Acceptable
Fish passage	Acceptable	Acceptable	Acceptable	Acceptable

Althouse Creek is limited in summer water flows and water temperature for rearing areas. Sucker/Greyback creeks have limited in-stream structure conditions. East Fork and Dunn creeks are limited in summer stream flows and riparian quality. Push-up dams may impede out-migration of juveniles.

Table 7. Rogue Basin Coho Core Area Habitat Conditions (Cont')

Habitat Indicator	Lower Rogue Watershed			
Current Environmental Baseline	Quosatana Creek	South Fork LobsterCreek	Silver Creek	Shasta Costa Creek
Water Quality **Temperature** ≤13/18°C (55/64°F)	Acceptable	Acceptable	Acceptable	Acceptable (marginally)
Sediment **≤5% fines**	Acceptable	At risk	Acceptable	Acceptable
Chem. Contam.	Acceptable	Acceptable	Acceptable	Acceptable
Flow/Hydrology **Low Flow ≥8 cfs**	Acceptable	Limiting factor for rearing	At risk	At risk
Habitat Elements **Riparian Quality**	Acceptable	limiting factor for rearing	Acceptable	Acceptable
Large Woody Debris **≥ 80 pieces/mile**	Good supply	At risk 23 pieces/mi	Good supply 60-80 pieces/mi	Good Supply Logs added to system
Spawning Gravel **1.3-3"dia.**	Good supply	Good supply	Good supply	Good supply
Pool frequency **≥50% riffle ratio**	Good	Good 45/55	Good 50/50	Good 50/50
Canopy cover **≥75% closure**	Good	At risk	Good	Excellent
Fish passage	Acceptable	Acceptable	Acceptable	Acceptable

South Fork Lobster Creek is limited in summer flows and riparian quality conditions.

Discussion: The human activities, particularly residential development, logging, agriculture and mining are major forces in creating coho habitat problems in the Rogue basin. Channelization, stream diversions and removal of riparian zones are frequent consequences of these land uses. Frequent fires of natural and human origins on the West Fork of Evans Creek have caused damage to a greater degree than on any other watersheds in the Rogue-South Coast basins.

Excellent coho habitat is available in Grayback, Elk and Broken Kettle creeks in the Illinois Watershed, Quartz Creek in the Middle Rogue Watershed, and Quosatana, Silver and Shasta Costa Creeks in the Lower Rogue Watershed.

F.2.c. The South Coast Basin Core Area Characteristics.

The South Coast Watershed area includes five rivers, ten creeks, and smaller watersheds that empty directly into the Pacific Ocean along 100 miles of coastline. The watershed is located in the southwest corner of Oregon, in Curry and Coos Counties, within the Klamath Mountain physiographic region. The watershed is approximately 1,100 square miles, following the coastal crest, which extends inland up to 30 miles, and north from the California border to the Coquille River Basin. It does not include the Rogue or Coquille Rivers. Since this report deals exclusively with the Klamath Mountain Province, it does not include any streams north of Cape Blanco (except for Sixes River, Floras Creek, and New River, which are just above Cape Blanco).

Coho habitat is limited by the steep gradient of streams originating in the Siskiyou Mountains. In the upper, forested parts of the basins the steep gradient, high winter flows, and the transitory nature of large wood supply limits overwintering habitat for coho juveniles. Historically, the available overwintering coho habitat was probably concentrated in the mainstem and tributaries of the lower 3 to 5 miles of the basins where the open valley and relatively unconfined channels provided side channels, backwaters, and ponds during high winter flows. That type of habitat is very limited in most of the South Coast streams.

There are approximately 77 miles of core habitat in the 3 core areas (9 streams) designated within the South Coast Basin. The environmental qualities for these areas is described in Table 8 below.

Table 8. South Coast Basin Coho Core Area Habitat Conditions.

Habitat Indicator	South Coast Watershed				
Current Environmental Baseline	Elk River	Crystal Creek (Sixes River)	Edson Creek (Sixes River)	Dry Creek (Sixes River)	Murphy Canyon (Sixes River)
Water Quality Temperature ≤13/18°C(55/64°F)	At risk	At risk	At risk	At risk	At risk
Sediment ≤5% fines	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
Chem. Contam.	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
Flow/Hydrology Low Flow ≥8 cfs	At risk	At risk	At risk	At risk	At risk
Habitat Elements Riparian Quality	At risk	At risk	At risk	Acceptable	At risk
Large Woody Debris ≥80 pieces/mile	At risk	At risk	At risk	At risk	At risk
Spawning Gravel 1.3-3"dia.	Good supply	Acceptable	Acceptable	Good Supply	Acceptable
Pool frequency ≥50% riffle ratio	Good 45/55	At risk 30/70	At risk 35/65	At risk 35/65	At risk 30/70
Canopy cover ≥75% closure	At risk	At risk	At risk	Acceptable	At risk
Fish passage	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable

Table 8. South Coast Basins Coho Core Area Habitat Conditions. (Cont')

Habitat Indicator	South Coast Watershed (Cont')			
Current Environmental Baseline	**Willow Creek (Floras Creek)**	**BethelCreek (New River)**	**Butte Creek (New River)**	**South Fork Fourmile Creek**
Water Quality **Temperature** ≤13/18°C (55/64°F)	At risk	At risk	At risk	At risk
Sediment **≤5% fines**	Acceptable	Acceptable	Acceptable	Acceptable
Chem. Contam.	Acceptable	Acceptable	Acceptable	Acceptable
Flow/Hydrology **Low Flow ≥8 cfs**	At risk	At risk	At risk	At risk
Habitat Elements **Riparian Quality**	Limiting factor for summer rearing	Limiting factor for summer rearing	Limiting factor for summer rearing	Limiting factor for summer rearing
Large Woody Debris ≥80 pieces/mile	Good supply	At risk	At risk	At risk
Spawning Gravel 1.3-3"dia.	Good supply	Acceptable	Acceptable	Acceptable
Pool frequency ≥50% riffle ratio	Good	Good	Good	Good
Canopy cover ≥75% closure	At risk	At risk	At risk	At risk
Fish passage	Acceptable	Acceptable	Acceptable	Acceptable

Discussion: Coastal streams suffer from a problem unique to the coast, the lack of winter habitat. Heavy stream flows in the winter months due to frequent, heavy rains, especially when coupled with channelization, wash gravel, boulders and woody debris downstream. Coho redds and young coho are frequently destroyed in the process. Studies have been done addressing the significance of large woody debris, beaver dams, and side channels and alcoves in coastal streams and their contribution to salmonid production.

F.3. Habitat Conditions Aggregated for the Rogue and South Coast Region.

An analysis of "Coho Core Area Habitat Conditions" as presented in Table 9 indicates there are problems common throughout the Rogue-South Coast basins. Habitat conditions *within* coho core areas can be summed *across* the basins' streams to provide an indication of the relative health or condition of the basin high value habitat areas. The core areas with limiting factors are presented below.

TABLE 9. Summary of Environmental Conditions of Rogue and South Coast Basins.

Habitat Indicator	Number of Watershed Core Areas (N=27)		
Current Environmental Baseline	Condition Acceptable *(Properly Functioning)*	Potential Limiting Factor *(At Risk)*	Limiting Factor *(Priority for Restoration)*
Water Quality Temperature ≤13/18°C (55/64°F)	6	11	11
Sediment ≤5% fines	20	4	3
Chem. Contam.	27	0	0
Flow/Hydrology Low Flow ≥8 cfs	4	11	12
Habitat Elements Riparian Quality	8	7	12
Large Woody Debris ≥80 pieces/mile	5	17	5
Spawning Gravel 1.3-3"dia.	23	3	1
Pool frequency ≥50% riffle ratio	14	6	7
Canopy cover ≥75% closure	7	20	0
Fish passage	27	0	0

The priority limiting factors identified in Table 9 above of regional concern are:

- Low stream flows during summer months are found in 23 of the 27 core areas. Low flows limit summer rearing habitat, increase water temperatures and increase competition and the risk of predation.

- The lack of large woody debris is a problem on 22 of the 27 streams. Large woody debris provides shelter for coho, creates pools, collects spawning gravel, helps reduce water velocity, and provides hiding habitat..

- High water temperatures are found in 20 of the 27 core area streams, half of which also lack canopy cover. The fisheries literature indicate that temperatures below 14 degrees (58 F.) are most conducive to coho health. Temperatures ranging from 21 -27 C. (70 to 80 F.) foster diseases and diminish the food supply. Water temperatures over 27 C (80 F.) are lethal to coho.

- Riparian quality is of concern on 18 of the 27 streams. Adequate riparian habitat provides shade, streambank stabilization, a source of food for aquatic life, and increased holding areas.

- About 50 per cent of the streams lack the frequency of pools needed to support an abundant coho population. Coho prefer deep pools, side channels, alcoves, etc. for rearing.

- Lack of adequate canopy is found in 20 of the 27 core area streams. Canopy cover is a critical element in maintaining suitable water temperatures and also providing sources of food to the stream.

- There are relatively few problems from the supply of spawning gravels, or passage problems for coho within the core areas. Push-up dams, however, may affect coho smolts by blocking their downstream migration.

Based upon the previous NMFS Effects Matrix Table above, our analysis indicates that 6 habitat conditions warrant consideration as regional priorities. These conditions, plus our goals for their corrective measures are given in Table 16.

Table 10. Priority Core Areas Limiting Factors for the Rogue and South Coast Region.

Priority Limiting Factors*	Number of Core Streams Limited	Goals
High Streamwater Temperatures	20	• Maintain or reduce water temperature to 30 C. degrees or lower for spawning, egg propagation, and fry emergence; 18 C. maximum for rearing, or as appropriate for natural conditions. • Maximize stream shading • Reduce temperatures of irrigation return flows • Increase base flows where limited
Low Stream Flows	23	• Maintain adequate stream flows to support spawning and and rearing of salmonids • Manage water withdrawals for maximum efficiency for all uses
Riparian Quality	19	• Maintain or reestablish riparian buffers as appropriate • Improve riparian vegetation diversity • Stabilize stream banks as appropriate
Lack of In-stream Structures (incl. Large woody debris)	22	• Place logs and boulders in streams where needed (short term) • Plant conifers in riparian areas (long term) • Protect existing riparian areas • Establish a minimum of 80 pieces of large wood per mile, or as appropriate • Provide off channel refuges (i.e. side channels, alcoves, etc.)
Pool Frequency and condition	13	• Modify pool/riffle ratio to approximately 50:50 • Protect pools from sedimentation • Create new pools with placement of instream structures
Canopy Cover	20	• Increase canopy to 75% cover • Improve native species diversity

* These limiting factors were selected from the analysis of the modified NMFS Effects Matrix, performed in the previous section.

Additionally, we have found that within the core areas identified,

1. Chemical contamination is *not* a significant problem that needs to be addressed in the basins;

2. Fish passage is *not* identified as an issue in core areas (we recommend that a culvert inventory be conducted and sites evaluated); Passage problems do exist within river mainstems (Elk Creek Dam, and Illinois River push up dams);

3. Lack of spawning gravels is an issue in only four core areas and is not a regional issue.

   Spawning gravel supply should be addressed at the watershed level.

Attention to addressing limiting factors in core areas could produce significant results. Coho production within the Rogue and South Coast basins is not linear in fish/mile of habitat, but tends to be concentrated into select segments and streams. Conceptually, as little as 4% of the highest quality Rogue Basin habitat areas is estimated to produce an escapement of 6,040 adults at 3% marine survival rates. (2% survival = 4,026 adults; 5%=10,066 adults).[72]

Smolt production within these high value habitat areas varies considerably from stream to stream and year to year. For reasons unknown to biologists, a stream may produce high densities of fry one year, then almost none another year, even with similar environmental conditions. Stream spawning surveys and snorkel surveys conducted in 1994-1995 have indicated that high density production streams in the Upper and Middle Rogue Basin report in the range of 25-30 spawners per mile of habitat and summer densities of 0.2-0.3 juveniles/m2 of pool area. The total production of coho salmon fry can be as high as 19,000 fry/km2[73] Redd numbers can range from 0-50/mile, with considerable variation in year to year numbers. High density streams might be expected to average 25 redds/mile over a five year period. This pattern multiplies throughout the system and, when yearly system climatic variation is added, produces system wide variation in recruitment rates from 0.15 per spawner to 10.2 recruits per spawner.[74] Statistically, production of seven adults/mile of habitat throughout the basins could meet the minimum production targets to stabilize the population within the basins. Caution should be used in projecting these figures, however, as they represent "spot" samples, and not average or representative conditions throughout the system on an annual basis.

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[72] Data developed from HLFM estimates, Table 4, op.cit.

[73] Satterthwaite, et al. 1996

[74] Satterthwaite, Annual Progress Report, Rogue River Studies, 1992, op.cit., p-12.

F.4. Other "High Value" Coho Production Areas.

Aside from the core areas, there are approximately 1,011 miles of additional coho habitat in 132 streams in the Rogue and South Coast basins that are used for spawning or rearing. In addition, approximately 209 miles in 15 streams in the Rogue and South Coast basins are identified as *high density production areas*, but not designated as "core areas."[75] In this document, they are sometimes referred to as secondary coho production areas or high value areas. These 'high value" areas constitute almost 20% of the total coho habitat use areas within the basins.

These "high value" or secondary areas are often as productive or even more productive than some of the streams designated as core areas. Since it was cumbersome to individually discuss every coho producing stream in both basins, a few of the best streams were selected as core areas. The best of the rest are noted in this section as "high value" or "secondary" areas. They should receive the same attention and protection as areas designated as core areas.

A list of "high value" areas in each watershed is presented in Table 11.

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[75] Different agencies use several definitions to describe quality coho habitat areas. The definitions overlap at times, often applying to the same areas. Key terms are:

Core Areas: High quality habitat that is capable of sustaining coho spawning and rearing year round. The designation of "core areas" was developed by the CSRI Science Team to select certain habitat areas for protection within a watershed.

High Density Habitat Area: A section of stream that was surveyed and found to have an abundance of coho (usually fry).

High Value Habitat Areas: A section of stream that appears suitable for coho spawning and rearing, whether or not fish are present.

Table 11. High Value Coho Habitat Areas, by Watershed.*

*Note: The 'High Value Areas' are designated separate from the 'Core Areas', and are part of the remaining total coho habitat area available for use within the basins.

UPPER ROGUE WATERSHED	Miles
Elk Creek	16.9
Canyon Creek	1.3
Big Butte Creek	16.9
	35.1

LOWER ROGUE WATERSHED	Miles
Lobster Creek	14.3
Foster Creek	1.3
Billings Creek	1.3
	16.9

BEAR CREEK WATERSHED	Miles
Bear Creek	27.7
Ashland Creek	3.0
	30.7

EVANS CREEK WATERSHED	Miles
Pleasant Creek	7.8
Queens Branch Creek	1.3
	9.1

APPLEGATE WATERSHED	Miles
Little Applegate River	10.4
Thompson Creek	5.2
	15.7

ILLINOIS WATERSHED	Miles
North Fork Deer Creek	3.9
Crooks Creek	6.5
Wood Creek	1.1
	11.5

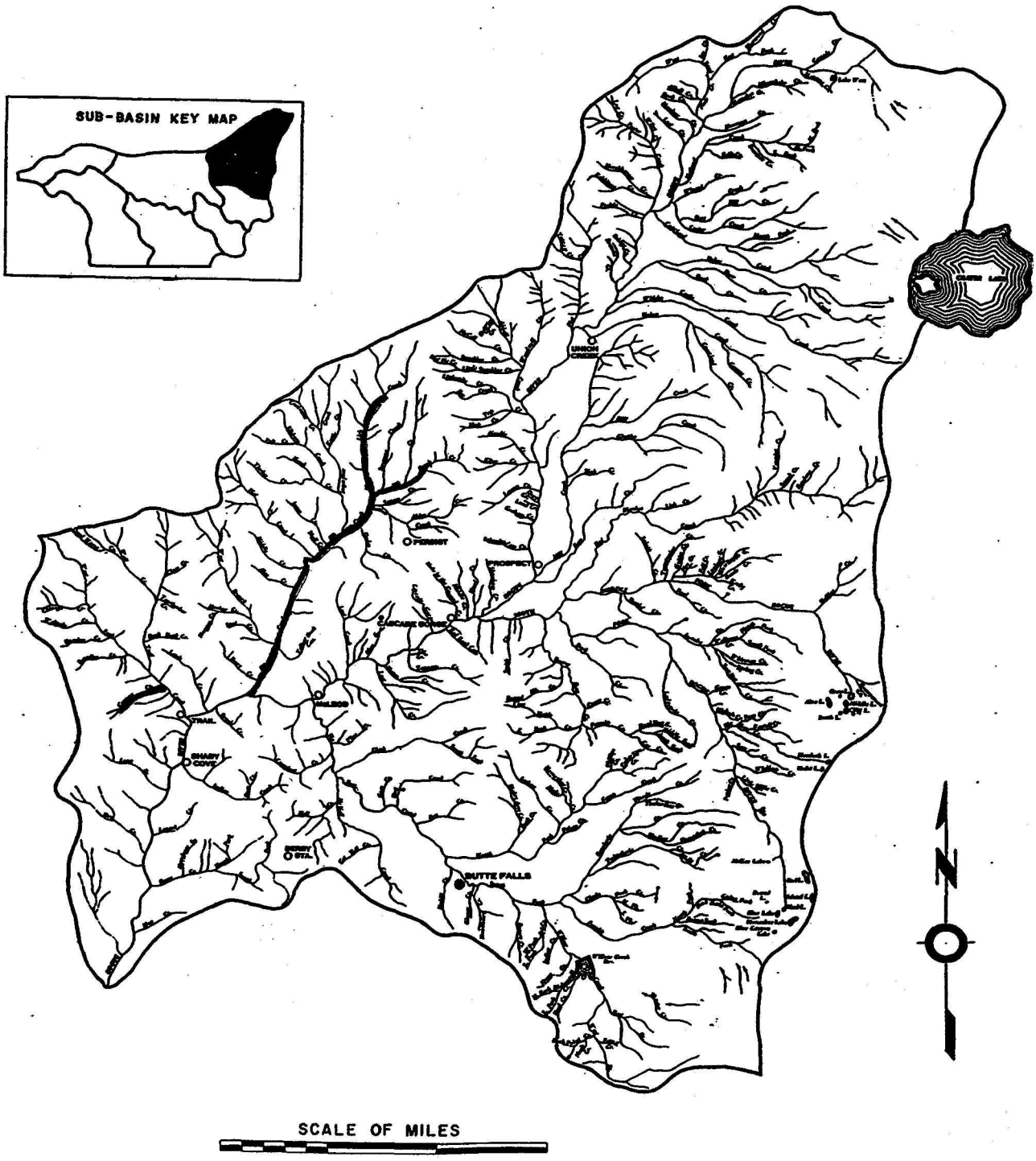
SOUTH COAST WATERSHED	Miles
Chetco River	72.8
Winchuck River	16.9
	89.7

Grand Total	**208.7 (335.9 km)**

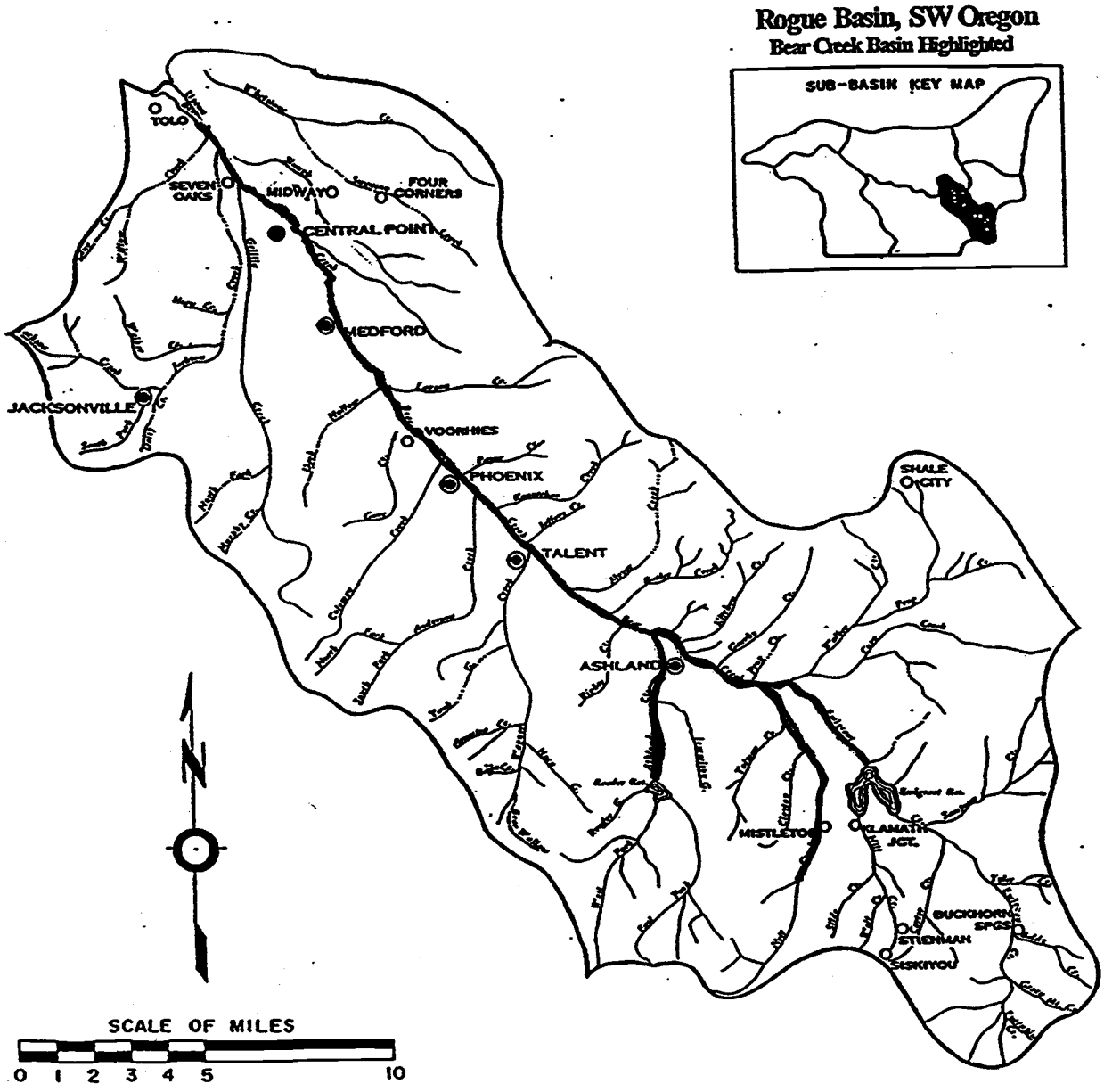
The strategy for coho inhabited areas is to (1) stabilize and protect existing habitat use and production, then (2) identify limiting factors and formulate priority actions that will supplement the productivity of the high value habitat areas.

Based upon our objective to stabilize the coho population and our detailed watershed habitat assessments in Appendix 1, we have identified some additional concerns beyond those resulting from the NMFS effects matrix that need to be addressed within the Rogue and South Coast region to stabilize the coho population (see Table 12. below).
map3

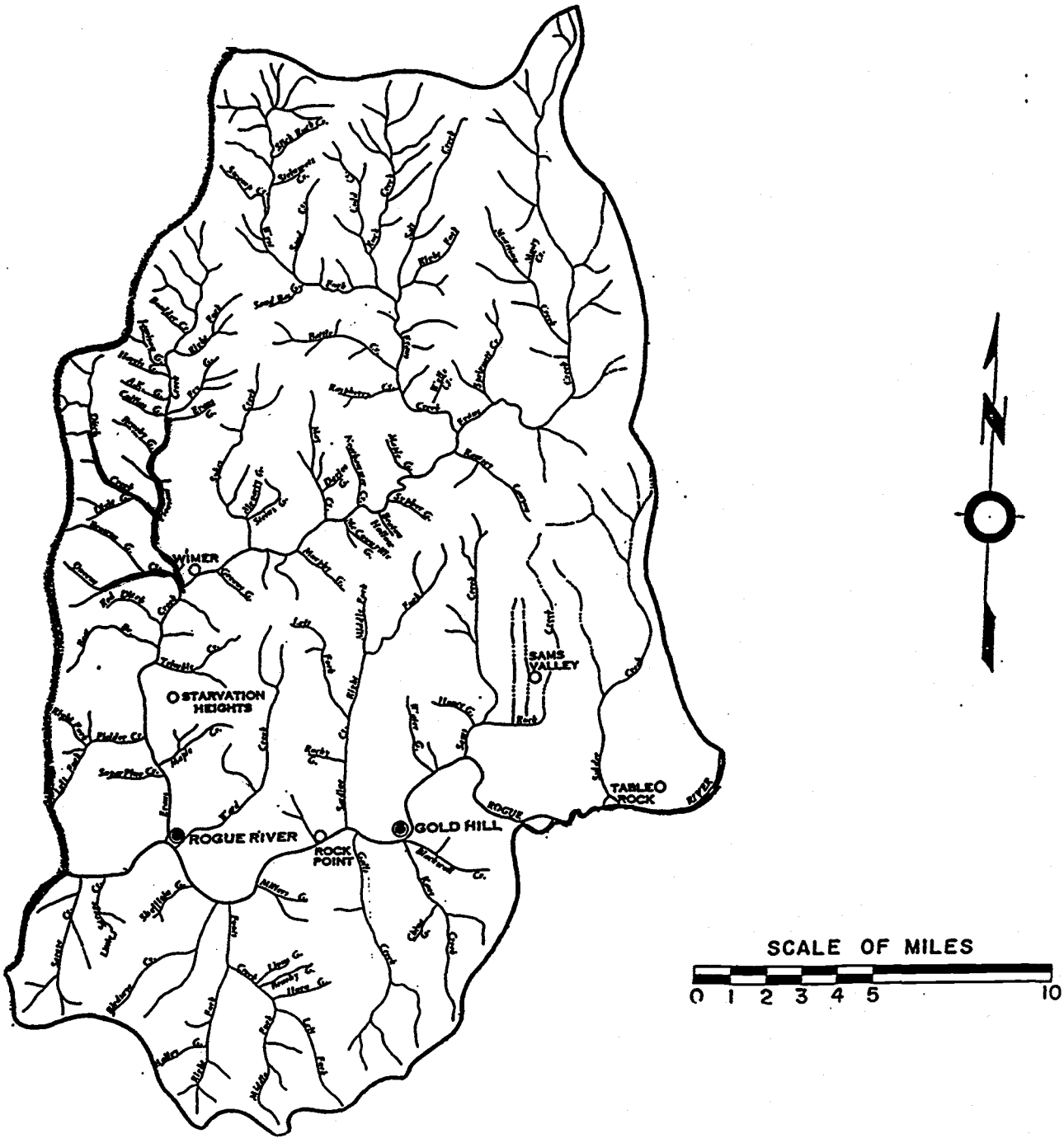
Map 3: Upper Rogue Watershed High Value Areas



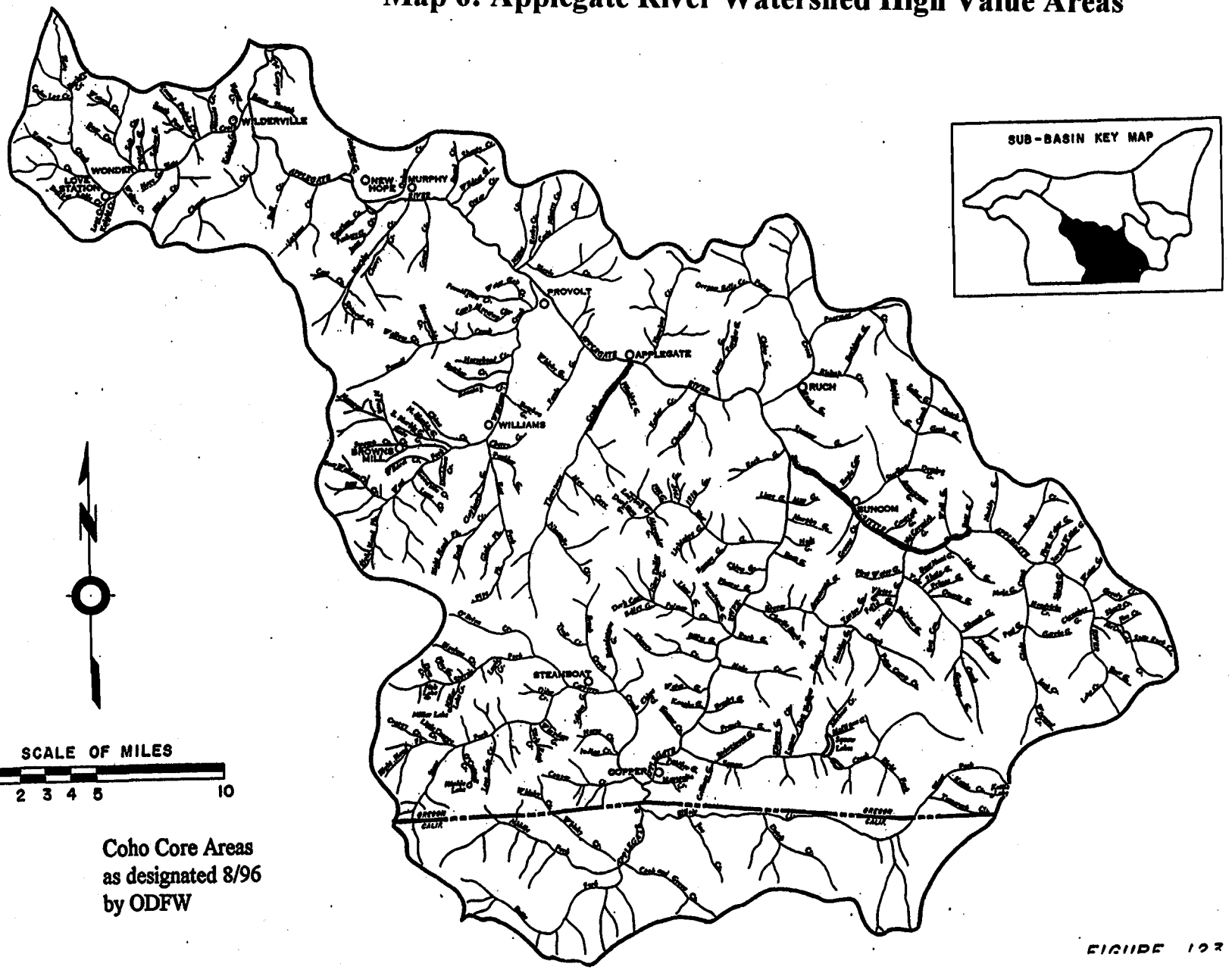
Map 4: Bear Creek Watershed High Value Areas



Map 5: Evans Creek Watershed High Value Areas



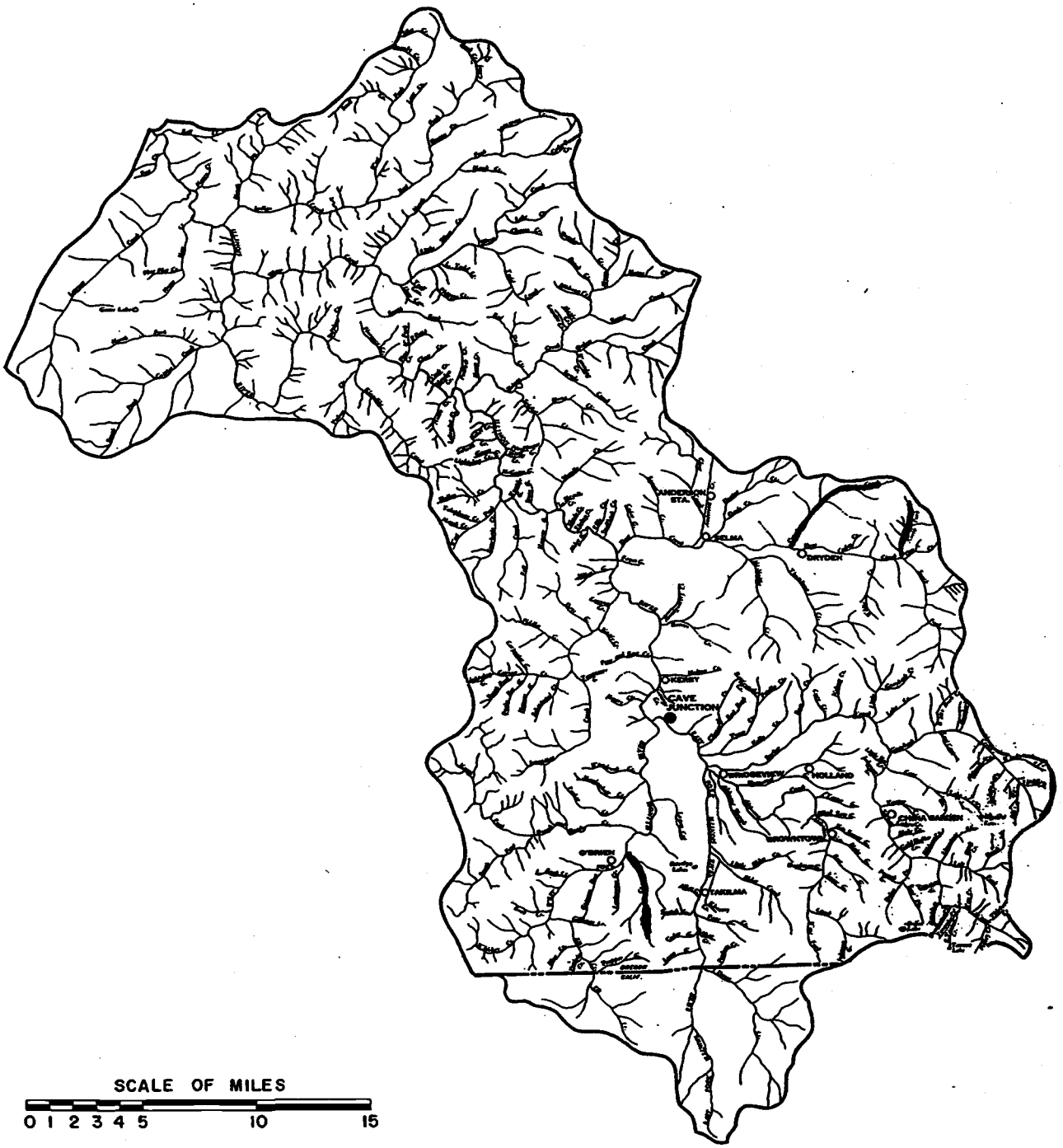
Map 6: Applegate River Watershed High Value Areas



Coho Core Areas
as designated 8/96
by ODFW

FIGURE 123

Map 7: Illinois Valley Watershed High Value Areas



Map 8: Lower Rogue Watershed High Value Areas

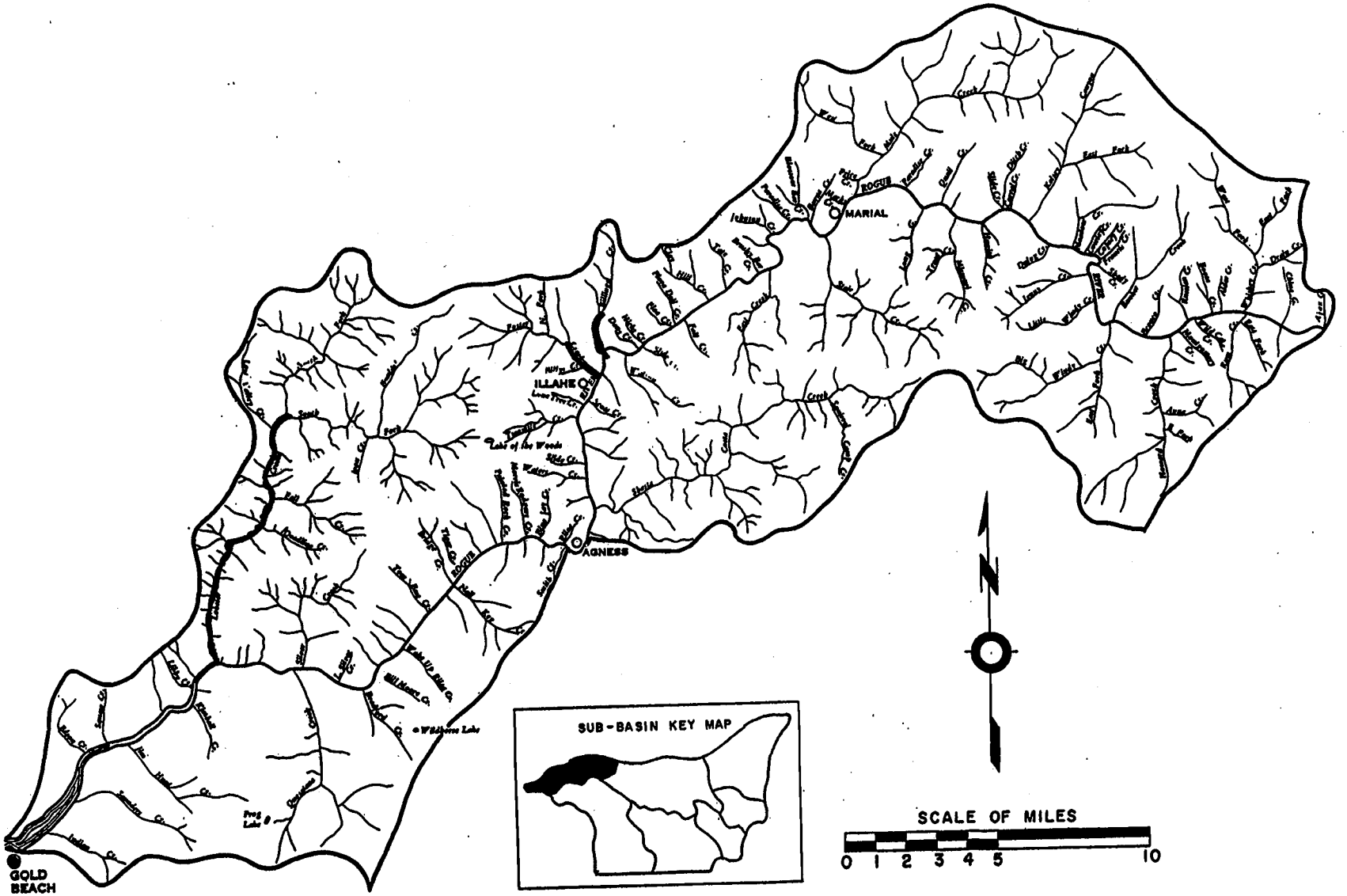


FIGURE 22A

Map 9: South Coast Watershed High Value Areas

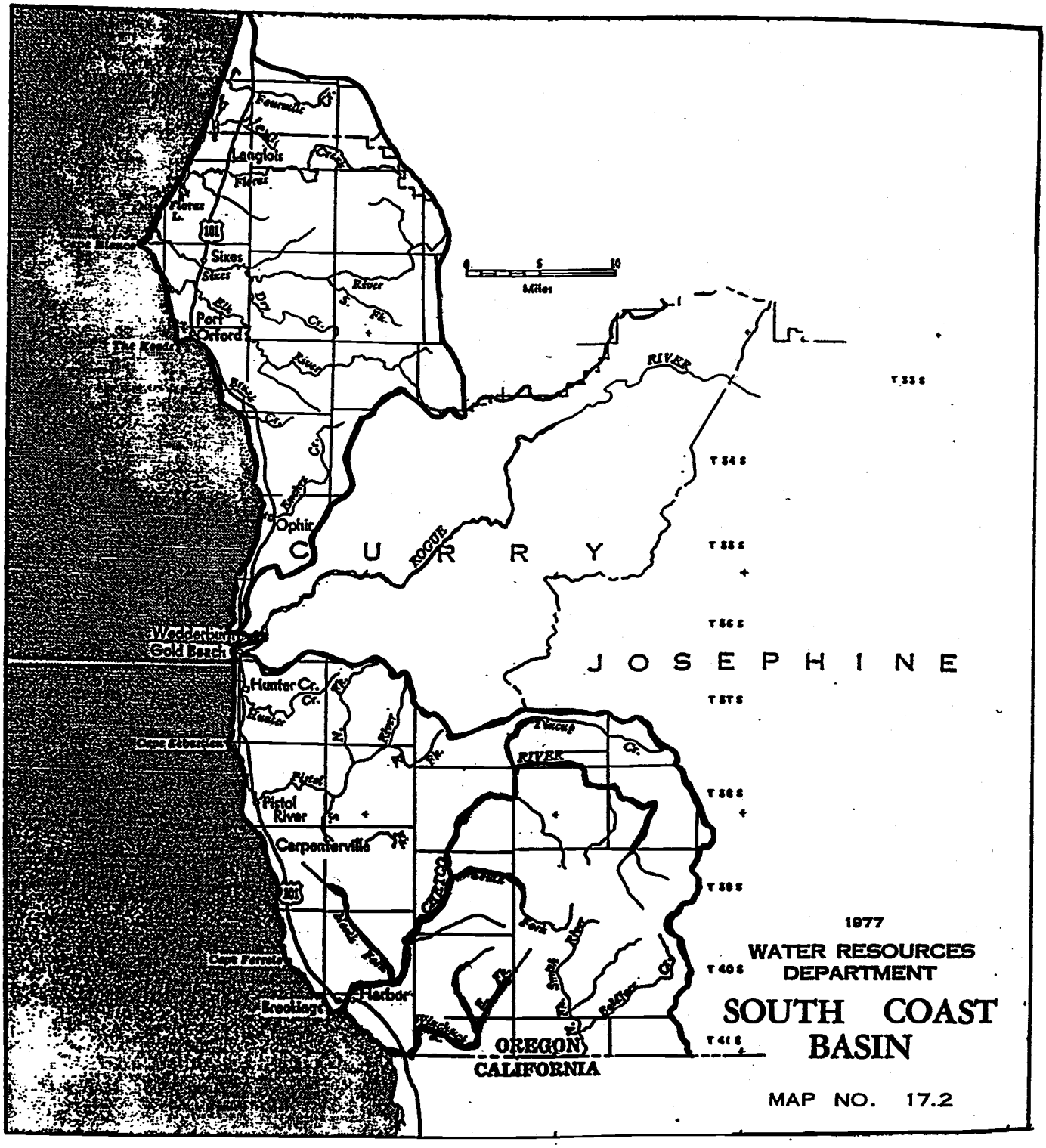


Table 12. Other Concerns of Regional Priority in Southwest Oregon.

Regional Priority Concerns*	Goals
Coho Population Size	Monitor population size to determine when coho population level reaches and maintains an average of at least 8,000 successful adult spawners, or that it does not drop below 2,000 fish .
Harvest levels	Limit harvest levels and incidental take while average coho population is ≤ 8,000. Institute more stringent restrictions if the population drops near or below 2,000.
Watershed Productivity Levels	Determine the proportion of the overall coho population that utilizes each watershed and use that as a baseline to monitor changes.
Hatchery Practices	Limit, and eventually, operate hatchery production of coho within the Rogue and South Coast basins, as consistent with the ODFW Wild Fish Management Policy.
Fish Passage	Improve coho fish passage where appropriate.
Habitat Loss	Discourage the removal of coho habitat, especially where it would lessen overall population distribution. Encourage, as appropriate, re-opening access or creating habitat for coho within their historical range.
Wintering Habitat	Create and maintain appropriate in-channel structure and side-channel habitat to provide refuge for rearing coho during high winter flows.
Water Quality	Monitor water quality parameters and promote actions that will provide optimum opportunities for coho production and survival.
Stream Complexity	Increase stream complexity where appropriate for coho spawning and rearing.
Erosion/Sediment, and Turbidity.	Develop a region-wide program that will outline and implement techniques to reduce watershed erosion.
Water Management (Water Quantity)	Operate and/or create storage facilities to favor coho survivability, and maximize efficiency of water use. Provide adequate flows for summer rearing.
Interagency Cooperation	Promote information sharing , networking, and cooperative projects that will benefit anadromous salmonids.
Public Education	Develop and implement a region-wide public education program for students and adults to explain the life histories, habitat needs, impacts and programs that can be utilized to benefit salmonids.
Assessment, Monitoring, and Research	Develop and implement comprehensive inventory programs to determine and monitor the status of the coho populations and their habitat. Encourage and support research that will expand knowledge about the coho life-cycle, their habitat, and propagation needs.

*These concerns were selected by using local knowledge, issues, and current information addressing region-wide coho management. These factors are aimed beyond just coho core areas and represent significant concerns needing to be addressed to stabilize the region-wide population from further decline.

Section G. PLANNING GOALS AND PRIORITY ACTIONS FOR STABILIZING THE ROGUE AND SOUTH COAST NATIVE COHO POPULATION.

Step 6: Establish Planning Goals and Priority Actions As A Basis For Implementation.

Abstract: **This section sets the stage for linking specific on-the-ground actions to specific goals. By linking actions to goals we can determine how successful we are being in responding to specific priority problems, i.e. limiting factors and region-wide special concerns.**

The goals identified in this section and their associated actions, were selected because they specifically address the priority limiting factors and additional concerns identified in the previous sections.

G.1. Analysis Process.

In the previous section the NMFS Effects Matrix identified priority "limiting factors" which were determined to be of regional concern to a majority of the core areas. Also identified were "special concerns" that, using local knowledge, agency research, and community input are considered important factors requiring region-wide action.

The following tables list the six identified limiting factors identified in the previous chapter, plus the 14 additional special concerns. The tables also list the goals we have identified for each limiting factor and special concern. In turn, each goal has at least one planning action that is suggested as the highest priority. The codes associated with the planning actions are used to inventory and analyze whether on-the-ground actions are being implemented for each planning action identified. This provides a way to track and measure the composite actions of all participants (agencies, watershed councils, communities, landowners) toward achieving specific goals.

Table 13. Core Level Goals and Actions to Address Regional Limiting Factors.

Limiting Factors	Goals	Planning Action
1. Water temperature **Vision: DEQ standards for stream water temperature is ≤13°C (55° F.) For spawning, egg incubation, and fry habitat; ≤18°C. (64° F.) (7 day moving average) for rearing habitat.** [76]	A. Maximize stream shading.	1.A.1. Increase canopy cover. 1.A.2. Increase riparian zone size and density. 1.A.3. Manage riparian zone for multi-layered canopy.
	B. Maximize stream complexity.	1.B.1 Increase pool depth and quantity. 1.B.2. Increase quantity of off-channel areas. 1.B.3. Increase hiding cover.
	C. Maintain instream flows at levels which support coho spawning and rearing.	1.C.1. Increase instream base flows during dry season. 1.C.2. Increase dry season ground water levels.
	D. Decrease higher temperature irrigation return flows.	1.D.1. Decrease irrigation return flows. 1.D.2. Monitor return flows and determine problem areas.
	E. Address water temperature as a regional issue.	1.E.1. Monitor and address water temperatures through inter-agency and community-wide cooperation.

[76] Oregon Department of Environmental Quality, Oregon Listing Criteria for Section 303(d) List. December, 1995. Approved July 1, 1996.

Limiting Factors	Goals	Planning Action
2. Low Stream Flow **Vision: Stream flow will be maintained at adequate levels to support coho spawning and rearing**	A.. Maintain instream flows necessary for coho spawning and rearing.	2.A.1. Increase instream base flows during dry season. 2.A.2. Increase dry season groundwater levels. 2.A.3. Manage water withdrawals for maximum efficiency and conservation. 2.A.4. Encourage water rights transfers/leases for instream use. 2.A.5. Establish instream water rights.

Limiting Factors	Goals	Planning Action
3. Riparian Quality **Vision: Riparian zones will be maintained at a size and density to adequately protect and enhance instream conditions.**[77]	A.. Maximize riparian size and density.	3.A.1. Increase riparian zone size as appropriate. 3.A.2. Increase the vegetation density and diversity of plant species. 3.A.3 Manage riparian vegetation for a multi-layered canopy. 3.A.4. Increase multi-channel stream courses. 3.A.5. Limit development intrusions within riparian zone. 3.A.6. Increase side-channel alcoves and refuges for coho spawning/rearing.

[77] The required buffer widths for riparian zones vary according to land ownership. Buffer widths for riparian reserves on federal lands are required to be 300 feet for fish bearing streams, 150 feet for permanent-flowing nonfish-bearing streams, and 100 feet for intermittent streams (FEMAT, Riparian Reserves, Option 9, III-22); Oregon Forestry Practices Act rules for state and private lands require a 100 feet buffer for large (10 cfs or higher) fishbearing streams, and 70 feet for large, non-fishbearing streams. Medium (over 2 cfs, but less than 10) fishbearing streams require a 70 foot buffer, with 50 feet needed on medium non-fishbearing streams. Small (less than 2 cfs) fishbearing and non-fishbearing streams must have buffers of 50 and 20 feet respectively. (Oregon Department of Forestry Water Protection Rules, Division 635 Rules, p-1-11, 12/11/96); Municipalities may establish urban buffer widths by local zoning (often 20-50 feet).

Limiting Factors	Goals	Planning Action
4. Lack of In-stream structure.	A. Maximize logs and boulders in the streams, where appropriate. Attach a minimum of 80 pieces of larger wood per mile.	4.A.1. Increase large woody debris and boulders in streams.
Vision: Instream structure will be sufficient to provide high quality coho summer and winter spawning and rearing habitat	B. Provide for long-term recruitment of large woody debris.	4.B.1. Plant conifers in riparian zone. 4.B.2. Protect existing large wood sources in riparian areas.

Limiting Factors	Goals	Planning Action
5. Pool Frequency	A. Protect pools from sedimentation.	5.A.1. Maintain appropriate riparian buffer zone. 5.A.2. Revegetate stream banks, riparian areas, and upland exposed areas. 5.A. 3. Revegetate unused roads. 5.A.4. Limit access of livestock from riparian zone.
Vision: Pool frequency will be maintained at or near a pool/riffle area ratio of 50:50.	B. Create new pools with placement of in-stream structures.	5.B.1* Specifically place logs and boulders to create pools. 5.B.2. * Add large woody debris to create scouring, damming, and plunge pools. 5.B.3. * Open or create side channels and/or alcoves to increase pool area. * Indicates found in a limiting factor action plan.

Limiting Factors	Goals	Planning Action
6. Canopy Cover. **Vision: Canopy cover will be maintained at 75% throughout the region or as appropriate for environmental conditions.**	A. Improve native plant species and diversity	6.A.1. Plant sufficient conifers to provide a 50% mixture of conifers and deciduous trees, where growing conditions permit. 6.A.2.* Limit forest harvest in and near riparian areas. 6.A.3.* Plant trees and forbs along the stream to increase canopy cover. 6.A.4.* Foster riparian growth and development through exclusions to protect critical vegetation. * Indicates found in a limiting factor action plan.

Special Concerns	Goals	Planning Action
7. Coho Population Size **Vision: Southwest Oregon wild coho population will be maintained at a minimum average level of successful adult spawners, so that the normal variation never drops below genetic viability levels in a given year and to stabilize the population from further decline.**	A. Establish an average number of yearly successful adult spawners as a minimum target level that will prevent further population decline B. Establish a lower population limit to genetic viability which the yearly successful adult spawners should never drop below.	7.A.1. Use 8,000 successful adult coho spawners as the presumed minimum average yearly population. 7.B.1. Use 2,000 successful adult coho spawners as the presumed lower limit to maintaining genetic viability.

Special Concerns	Goals	Planning Action
8. Coho Harvest Levels. **Vision: Harvest levels and incidental take will be limited as appropriate to ensure a minimum average wild coho population size of 8,000 escapement in the Rogue and South Coast Basins.**	A. Limit harvest levels and incidental take to maintain or exceed the minimum average wild coho population size.	8.A.1. Provide input to appropriate agencies who negotiate to set ocean harvest rates for coho. 8.A.2 . Provide input to ODFW who sets freshwater coho harvest regulations. 8.A.3. OSP will enforce regulations and assist in educational outreach projects to inform communities in fish identification and issues surrounding taking and possession of listed fish stocks of concern..
	B. Monitor population size to determine appropriate harvest rate.	8.B.1. Coordinate coho salmon surveys throughout the region to assist in designing a long term sampling program. 8.B.2. Develop sampling program to consistently monitor population size and trends. 8.B.3. Develop sampling and models program to determine both ocean and freshwater harvest rates and percentage of harvest of Rogue and South Coast stock. 8.B.4. Maintain Huntley Park seining and Gold Ray Dam fish counting programs to estimate adult coho escapement into the Rogue River.

Special Concerns	Goals	Planning Action
9. Watershed Productivity Levels. **Vision: A minimum suggested productivity allotment of the total wild coho population will be established for each watershed. Watersheds will be able to maintain the suggested productivity allotment.**	A. Establish for each watershed a minimum number of successful adult spawners as its proportion of coho population that utilizes the watershed.	9.A.1. Evaluate productivity and habitat availability of each watershed and compare it to other watersheds in the basin. 9.A.2. Each watershed is assigned a target population that serves as a baseline to monitor change.

Special Concerns	Goals	Planning Action
10. Hatchery Practices. **Vision: Limit, and eventually eliminate, hatchery production of coho within the region as consistent with ODFW Wild Fish Management Policy.**	A. Monitor hatchery practices and results in relation to restoration of wild coho population.	10.A.1.* Review and revise objectives and genetic guidelines for the Rogue coho program at Cole Rivers Hatchery. 10.A.2.* Conduct sampling, expansion and mathematical modeling for abundance, trends, and status of coho. 10.A.3.* Develop harvest opportunities on Rogue hatchery produced coho while minimizing impact on wild coho stock. 10.A.4.* Externally mark all hatchery coho released into the Rogue River for easy identification to promote effective broodstock management. 10.A.5. Evaluate value of hatchery coho broodstock as a source to assist in restoring coho stocks consistently below the minimum viable populations. * Indicates found in a limiting factor action plan.

Special Concerns	Goals	Planning Action
11. Fish Passage. **Vision: Coho will have access to historical spawning and rearing streams throughout the region, as appropriate.**	A. Improve coho fish passage where appropriate.	11.A.1.* BOR continues to implement its Fish Facilities Improvement Program for design and construction of fish passage structures at Reclamation-owned facilities. Extend to non-Reclamation owned facilities on federal and private lands. 11.A.2.* Provide technical assistance and funds for removal of push-up dams and design alternatives. 11.A.3.* Provide technical assistance to Savage Rapids Dam Task Force for evaluating alternatives for fish passage. 11.A. 4.* Modify culverts restricting fish passage. 11.A.5. * Remove dam on East Fork Evans Creek. 11.A.6.* Remove artificial fish barriers or minimize their impact on fish passage at Elk Creek, Savage Rapids Dam, Antelope Creek, Bear Creek, on Little Butte, and the North and South Forks of Little Butte * Indicates found in a limiting factor action plan.

Special Concerns	Goals	Planning Action
12. Habitat Loss. **Vision: Maintain coho habitat to sustain or increase present coho distribution and population throughout the region.**	A. Maintain or increase present coho habitat.	12..A.1.* Monitor riparian management areas under Forest Practices Act. 12.A.2.* Develop and test approaches to timber practices which restore and maintain the quality of riparian habitat. 12.A.3.* Monitor trees along fish bearing steams (Type F streams) for 25% canopy cover requirement, as per the Forest Practices Act. 12.A.4.* Remove push-up dams. 12.A.5.* Remove artificial fish barriers or minimize their impact on fish passage at Elk Creek Dam, Savage Rapids Dam, Antelope Creek, North Fork Little Butte ,South Fork Little Butte Creek, and Bear Creek. 12.A.6.* Provide wetland enhancement areas. 12.A.7.* Use Hire the Fishers and Jobs in the Woods Programs to protect and enhance coho habitat. 12.A.8* Restore areas heavily impacted by mining. * Indicates found in a limiting factor action plan.

Special Concerns	Goals	Planning Action
13. Wintering Habitat.	A. Provide in-channel structures to protect rearing fish from flushing winter flows.	13.A.1.* Large wood and boulder structures will be placed or secured in streams to provide shelter.
Vision: In-channel structure and side-channel habitat will be maintained in the amount needed to protect rearing coho from high winter flows.	B. Maintain or create side-channel habitat to shelter coho during high winter flows.	13.B.1.* Open existing back-water channels that have been filled with sediment. 13.B.2. Create side channels with equipment such as backhoes. * Indicates found in a limiting factor action plan.

Special Concerns	Goals	Planning Action
14. Water Quantity Management. **Vision: Instream water quantity management be encouraged to favor native wild coho survivability.**	A. Maintain stream flows of sufficient quantity throughout the year to provide optimum spawning and rearing conditions for coho.	14.A.1.* Install measuring devices to accurately assess instream flows. 14.A.2.* Install head gates with measuring devices to regulate irrigation withdrawals. 14.A.3. Review and revise water management practices to maximize stream flows. 14.A.4.* Create incentives to obtain instream water rights to increase and/or maintain optimum stream flows.. 14.A.5* Negotiate purchase or lease of existing water rights through Oregon Water Trust. 14.A.6. Reduce or eliminate cities' and irrigation districts' withdrawal of water from streams with low flows. 14.A.7.* Assist irrigation districts in planning and implementing monitoring programs. 14.A.8.* Develop a hydrologic model for water management. 14.A.9.* Assess water management practices and evaluate conservation potential. 14.A.10.* Digitize water maps for all coastal basins to aid in regulation and water use monitoring. * Indicates found in a limiting factor action plan.

Special Concerns	Goals	Planning Action
15. Water Quality. **Vision: Water quality will be maintained at levels which provide best achievable conditions for coho production and survival.**	A. Monitor water quality parameters for compliance with DEQ standards.	15.A.1.* Sample stream water on a regular schedule to determine compliance for TMDL requirements. 15..A.2.* Coordinate assessment of waterways for pollution, hazardous materials, industrial wastes, pesticides, point and non-point source pollution.
	B. Promote actions which will provide optimum production and survival conditions for coho.	15.B.1.* Cities will reduce debris going into storm drains by using street sweepers and marking those drains leading directly to the stream. 15.B.2.* Non-renewal of aggregate site permits located in or along streams. 15.B.3.* Reduce herbicide use on road shoulders, Use registered herbicides near waterways. 15.B.4.* Revise mine reclamation plans to include fish friendly methods. 15.B.5. Close waters to removal-fill actions. * Indicates found in a limiting factor action plan.

Special Concerns	Goals	Planning Action
16. Stream Complexity. **Vision: Increase stream complexity where needed to provide for the spawning and rearing needs of coho throughout the region.**	A. Increase side channels, alcoves, sinuosity, beaver dams, and braided streams to provide more habitat and shelter for coho.	16.A.1.* Work with landowners to locate sites for construction of side channels and alcoves. 16.A.2.* Cooperate with landowners, watershed councils, and state and federal agencies to fund and construct side channels and alcoves. 16.A.3.* Initiate an educational program to promote protection of beavers and to deal with results of beaver dams. 16.A.4.* Install large woody debris in the waterway to maintain and enhance pool structure. 16.A.5.* Educate landowners on the benefits in returning streams to their natural state by allowing natural meandering and riparian development. * Indicates found in a limiting factor action plan.

Special Concerns	Goals	Planning Action
17. Erosion, Sediment, and Turbidity. **Vision: Limit and control erosion which generates sediment and turbidity in streams.**	A. Best Management Practices will be used to reduce and curtail causes of erosion, which lead to sediment and turbidity in streams.	17.A.1.* Fence streams and use alternative methods for providing water to livestock away from streams. 17.A.2.* Enforce timber harvest practices that protect watershed from erosion, use selective harvesting, helicopter logging, buffer zones, and develop logging road specifications. 17.A.3.* Close and revegetate unused roads. 17.A.4.* Enforce mining regulations. 17.A.5.* Build silt fences, sediment barriers, check dams. 17.A.6.* Promote planting of riparian areas. 17.A.7. Revegetate exposed upland areas. 17.A.8. Establish and enforce standards to control erosion from commercial and residential development.
	B. Develop a region-wide program to reduce and eliminate causes of watershed erosion.	17.B.1.* Distribute to all pertinent agencies the Integrated Vegetation Management Plan for roads, rights-of-way, being produced by Jackson County, ODOT, and Federal Highway Administration. 17.B.2. Pertinent agencies will follow Standards and Criteria for Stream Road Crossings by ODFW. 17.B.3.* Pertinent agencies will work with ODOT in producing an erosion control handbook and in implementing the handbook. * Indicates found in a limiting factor action plan.

Special Concerns	Goals	Planning Action
18. Interagency Cooperation. **Vision: Create a formal interagency effort to share information and cooperate on projects that benefit anadromous fish.**	A. Create a formal coordinating body for agencies to share information. B. Develop a means whereby agencies can cooperate/coordinate their efforts on projects benefiting coho.	18.A.1.* Expand model and role of Regional Ecosystem Office in developing a data base, in conjunction with FS, BLM, and FWS, to facilitate sharing of fishery information. 18.B.1.* Use models of cooperation for removal of fish passage barriers: Example: OSP in removing push-up dams in cooperation with DSL, ODFW, OWRD, DEQ, ODA, SWCD, RVCOG, BOR, NRCS, Illinois Valley Watershed Council; ODFW in removing or renovating Elk Creek Dam, Savage Rapids Dam, barriers on Antelope, North and South forks of Little Butte, and Bear Creeks, in conjunction with OWRD, DSL, OSP, ODOT, BLM, USACE, NRCS, Watershed Councils, irrigation districts, and landowners. * Indicates found in a limiting factor action plan.

Special Concerns	Goals	Planning Action
19. Public Education. **Vision: Create a formal public education program to expand the knowledge and involvement of the communities in addressing habitat needs and survival of coho in Southwest Oregon.**	A. Develop and implement a region-wide program to explain the life histories and habitat needs of coho .	19.A.1.* Continue the annual Water Festival and *Spirit of the Rogue* cultural center on the Upper Rogue to inform area residents about the life cycle of salmonids, and habitat needs. 19.A.2.* Continue and expand to other councils the activities of the Bear Creek Watershed Education Partners. 19.A.3.* Expand the STEP Program, Macroinvertebrate study, River Keepers Program, and Adopt-A-Stream Program.
	B. Develop and implement an educational program to inform workers, students, and citizens of the impacts affecting coho and actions that can be used to maintain and restore the coho populations.	19.B.1.* Government resource agencies and watershed councils work cooperatively to teach rules, regulations, and alternative methods of resource utilization. 19.B.2.* Train pertinent agency workers in fish passage requirements in road construction and maintenance. 19.B.3.* Produce a video to increase agency workers and the public's awareness of salmon issues. 19.B.4.* Promote use of existing curriculum and conduct school and public education on riparian rehabilitation. 19.B.5. * Educate bridge maintenance crews on ways to minimize impacts upon fish. 19. B.6.* Promote workshops for road crews on fish friendly culverts. 19.B.7.* Develop a restoration guide based on research and monitoring. 19.B.8.* Provide technical assistance for watershed councils on dimensions of Coastal Salmon Restoration Initiative.

Special Concerns	Goals	Planning Action
20. Assessment, Monitoring, and Research. **Vision: Develop and implement comprehensive programs to understand coho and their habitat. Monitor, and adjust our management treatments**	A. Develop and implement inventory programs to assess and monitor coho populations and their habitat.	20.A.1.* Promote research in developing sampling programs that will effectively evaluate coho populations and harvest rates. 20.A.2.* Develop database to facilitate sharing of species information among watershed councils and agencies.
	B. Encourage and support research to expand knowledge about coho life cycle needs, habitat, and propagation.	20.B.1. Conduct smolt monitoring in all core areas. Develop basin production models. 20.B.2.* Develop approaches to timber management practices which restore and maintain quality riparian habitat. 20.B.3.* Monitor marine survival of Rogue River coho. 20.B.4.* Fund studies and projects proposed by watershed councils. * Indicates found in a limiting factor action plan.

Concluding Remarks:

This section identified, categorized, and provided a method to inventory actions which address priority regional problems. The tables included above are the basis for converting our current "random acts of kindness" to prioritized actions. All actions can be reviewed to determine if they accomplish specific goals that address specific region-wide limiting factors and special concerns. Based on our analysis included in this document, this action oriented guide should lead to accomplishing our overall intention of stabilizing the coho population at a non-declining level. Our level of success will depend upon the amount and type of actions implemented.

Section H. WATERSHED COUNCILS AND THEIR ROLE IN IMPLEMENTING ACTIONS.

Step 7: Specify Habitat Restoration Actions Needed Within Watershed Core Areas and Evaluate What Watershed Councils Are Doing To Address Them.

Abstract: **This section identifies the current and planned near-future actions to be undertaken by watershed councils in the Rogue and South Coast basins to address the specific habitat needs for each core area within their watersheds for recovery of the native coho populations. Watershed councils will develop restoration plans for the limiting factors affecting coho propagation, prepare funding proposals, and oversee restoration actions.**

In Sections G and Appendix 1 information from watershed assessments and stream surveys was evaluated to identify basin level limiting factors affecting coho propagation in the Rogue and South Coast basins. This section serves to link the limiting factors to the individual core areas at the watershed scale and specify the restoration actions needed for each watershed. In this fashion, watershed councils are made accountable for the actions necessary to enhance and restore habitat in each watershed and thereby protect coho populations.

It should be recognized that the actions are specified on a core area basis and not a landowner basis. Landowner participation is voluntary and coordinated by the watershed council. Past experience in the Illinois, Applegate, Little Butte, and Upper Rogue subbasins indicates that initially, about half of the landowners within a watershed project area are generally amenable to participating in a council proposed action. Additional landowners often come to join as the project progresses.

H.1. Watershed Councils and the SOSRI.

Local watershed councils are the cornerstone of the SOSRI plan, as they will become the locus for decision making and local involvement in habitat protection and restoration within their watersheds. A watershed council is a locally organized, voluntary, non-regulatory group established to administrate environmental protection and restoration activities on behalf of local landowners and stakeholders within a watershed. The councils consist of cooperative partnerships among local stakeholders to seek common solutions which protect and restore the environmental health of watersheds and support sustainable resource use and wildlife populations. Watershed councils offer local residents the opportunity to participate in decisions which affect their environment and watershed at the local level.

The Rogue and South Coast watershed councils were authorized under House Bill 2215 in 1993, when they were sanctioned by the Governor's Strategic Watershed Management Group. Some $3.2 million was allocated to councils in Southwest Oregon. They were funded to conduct watershed assessments and prepare action plans. The councils became an official entity when they were recognized by local government (the County Board of Commissioners) and the Governors Watershed Enhancement Board (under HB 3441).[78] Nine watershed councils have been recognized in the Rogue and South Coast basins.

[78] See Section VI-C Watershed Council Process and Governor's Watershed Enhancement Board, Coastal Salmon Recovery Plan. (Salem, Oregon) Draft, 1996.

H.2. Roles and Responsibilities of Local Watershed Councils.

Watershed councils are autonomous in establishing their own administrative processes, which may serve to:

- Foster communication and cooperation among all interests within a watershed. Councils should seek balance among interested and affected stakeholders.
- Provide a forum for conflict resolution and decision making in order to resolve critical resource and management issues and shape the watershed's future. Provide information and conduct all meetings as open public meetings.
- Document limiting factors to aquatic resources identified by the resource agencies in watershed habitat assessments.
- Prepare and implement a watershed action plan which identifies issues, sets goals, and priorities for actions to protect and enhance the watershed and wildlife species.
- Seek financial commitments from government, private, and local community sources.
- Coordinate and monitor on-the-ground habitat enhancement projects.
- Promote watershed education within the community.
- Foster political understanding, support, and involvement among multiple stakeholders within the watershed.
- Promote sub-basin-wide monitoring of watershed conditions.

One of the most important functions of watershed councils is to establish cooperative agreements for watershed restoration and habitat protection between landowners and state and federal natural resource management agencies, which include the U.S. Forest Service, Bureau of Land Management, Bureau of Reclamation, Soil and Water Conservation Districts, and other state natural resource departments. In the near future we expect watershed councils will come to be seen as advisory committees to local planning bodies within the cities and the counties.

H.3. Integration of Watershed Councils into the SOSRI.

Watershed councils are the source for implementing the habitat restoration actions identified within the SOSRI, in integrating the watershed habitat assessments and recovery efforts throughout landownerships in the watershed. They will also serve as the primary mechanism for funding projects and ongoing assessment and monitoring of watershed environmental conditions. The action plans are intended to serve as the strategic blueprint for watershed restoration, identify information gaps, recommend strategies for addressing watershed needs, establish priorities, and solicit participation of multiple stakeholders and interest groups. The watershed councils are advised by Technical Advisory Committees (TAC), which provide scientific advice and coordination with resource agency technical specialists and programs.

The following pages describe (1) the formation of the watershed councils in both the Rogue and South Coast basins, (2) a map of the watershed indicating the core habitat areas, (3) a list of restoration actions indicated by the limiting factors derived from the watershed habitat assessments, and (4) the current and recent habitat restoration actions undertaken within the watersheds that support the SOSRI. An example of the use of the limiting factors and restoration actions in assessing work done on watershed and work needing to be accomplished to protect, maintain, and restore coho habitat and populations is provided at the end of this section.

H.3.a. Watershed Councils in the Rogue and South Coast Basins.

ROGUE BASIN STEERING COMMITTEE

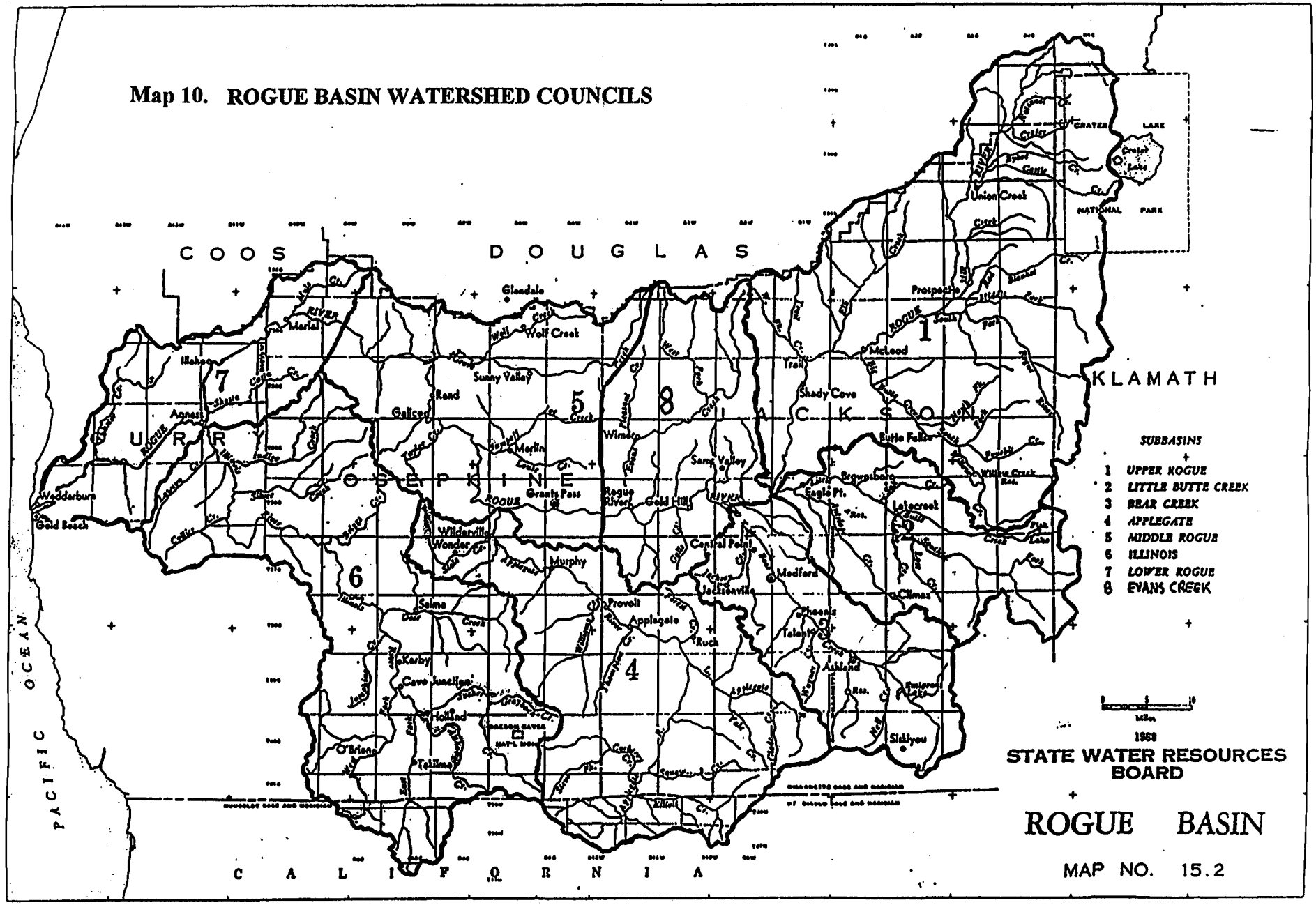
The idea for a Rogue Basin Steering Committee was discussed at the November 9, 1993 Water Resources Steering Committee meeting when members decided three councils would be formed: a Rogue Basin Council, a Coos Council and a Curry Coastal Council, with Curry County having representation on the Rogue Basin Council. At the January 1994 meeting of the Boards of Commissioners of Jackson, Josephine and Curry counties, the focus was on the development of a Rogue Basin Watershed Council, its formation, objectives, composition and responsibility. By April 25, 1994 the Rogue Basin Steering Committee was in operation, serving to coordinate a basin-wide approach of the eight watershed councils to resource planning and management to protect, enhance and restore the natural resources of the basin. The Steering Committee acts as a conduit for information, provides a regional voice on watershed and basin issues.

Twenty official members comprise the Rogue Basin Steering Committee. The membership includes two county commissioners each from Curry, Josephine and Jackson counties, six city representatives and one representative from each of the eight Rogue Basin watershed councils.

A recent survey of Committee members indicated the meetings serve their stated purpose. For a number of months, an insufficient number of members have attended meetings to form a quorum. The Committee is in the process of resolving this obstacle to conducting official business.

Lu Anthony is chair of the Rogue Basin Steering Committee. Phone: (541)826-2908 Address: 104 Stevens Road Eagle Point, OR 97524

Map 10. ROGUE BASIN WATERSHED COUNCILS



UPPER ROGUE WATERSHED COUNCIL

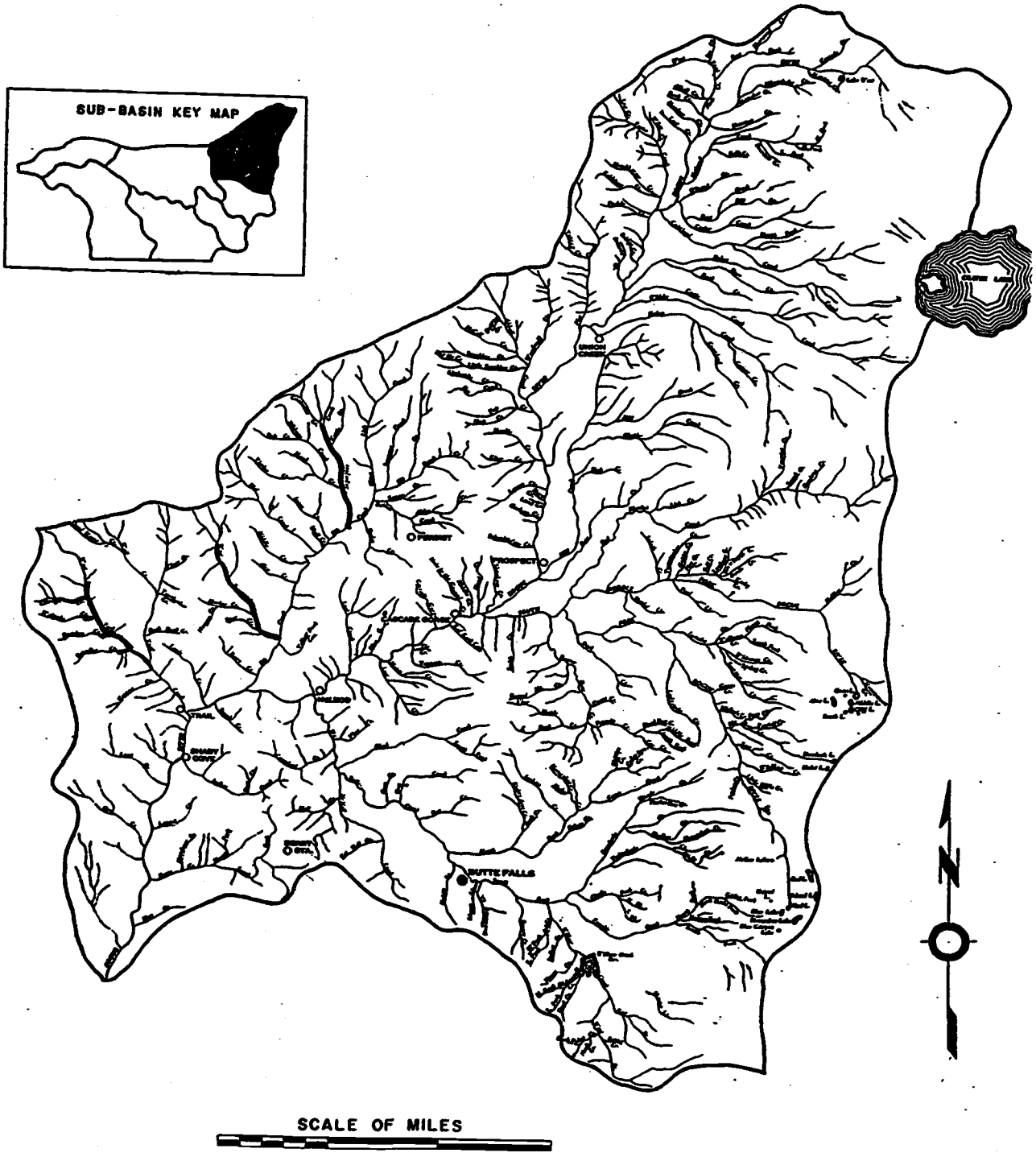
The Upper Rogue Watershed Council is a public advisory group designated by the Jackson County Board of Commissioners in June of 1994 to assume a key role in the establishment of guidelines and practices for the protection of the Upper Rogue watershed. Because the Upper Rogue watershed encompasses a large geographic area, the Council has delineated four separate areas as planning units. These areas are (1) the drainage above Lost Creek Lake, (2) Big Butte Creek drainage, (3) Rivermile 133 to Lost Creek Lake and (4) the Trail and Elk Creek Drainage.

Education has been a central focus of the Upper Rogue Watershed Council. The Council works with the schools in the watershed, helping with curriculum and hands-on projects. An annual Water Festival is held at McGregor Park, a Corps of Engineers facility at the Lost Creek Dam complex. Natural resource agencies and organizations set up displays, provide tours and demonstrations to inform participants of the life history and habitat needs of salmonids. The display center at McGregor Park is used throughout the year for eductional displays. In collaboration with the Riverkeepers, the Council sponsors a riparian restoration workshop. The Council is working with The Spirit of the Rogue committee to establish a permanent educational center at McGregor Park that will include among its attractions an in-stream viewing window.

The Upper Rogue Watershed has worked closely with the Corps of Engineers, the Forest Service, the Oregon Department of Fish and Wildlife, Boise Cascade and environmental groups in planning and implementing projects. The fervor of some Council members and Upper Rogue residents insures that there will be no lack of projects for the Council. A concommitant factor is the willingness of members and residents to do research, make contacts and engage in the labor needed for projects.

Carol Fishman is coordinator for the Upper Rogue Watershed Council. Phone: (541)878-3800
Address: P.O. Box 1128 Shady Cove, OR 97539

Map 11. Upper Rogue River Coho Core Areas



UPPER ROGUE WATERSHED
Watershed Habitat Limiting Factors and Restoration Actions

LIMITING FACTOR	STREAM	CODE	ACTIONS NEEDED	PAGE APDX 2
Water temperature	Sugarpine West Branch Elk	1.A.1 1.A.3	Increase canopy cover. Manage riparian zone for multilayered canopy.	A-2-3
Low stream flow	Sugar Pine West Branch Elk	2.A.3	Manage water withdrawals for maximum efficiency and conservation.	A-2-4
Riparian quality	Sugar Pine West Fork Trail	3.A.3	Manage riparian vegetation for a multilayered canopy.	A-2-5
Lack of instream structures	Sugar Pine West Branch Elk West Fork Trail	4.A.1 4.B.1	Increase large woody debris and boulders in streams. Plant conifers in riparian zone.	A-2-6
Pool frequency	Sugar Pine West Branch Elk West Fork Trail	5.B.1 5.B.3	Specifically place logs and boulders to create pools. Open or create side channels and/or alcoves to increase pool area.	A-2-7
Canopy cover	Sugar Pine West Fork Trail	6.A.3 6.A.4	Plant trees along the stream to increase canopy cover. Foster riparian growth and development through exclusions to protect critical vegetation.	A-2-8
Winter habitat	Sugar Pine West Fork Trail	13.A.1	Large wood and boulder structures will be placed or secured in streams to provide shelter.	A-2-14
Erosion, sedimentation	West Branch Elk	17.A.1 17.A.2	Fence streams and use alternative methods for providing water to livestock away from streams. Enforce timber harvest practices that protect watershed from erosion. Use selective harvesting, helicopter logging, buffer zones and develop logging road specifications.	A-2-18
Spawning gravel	Sugar Pine West Branch Elk	Not listed	Install instream log and boulder structures designed to gather gravel.	

Action Code	Watershed	Lead Management Agency/Organization	Name of Stream	Name of Project	Watershed Actions Undertaken to Address Salmonid Habitat Conditions
1.D.2	Rogue Upper	Upper Rogue Watershed Council	West Fork Trail Creek		Place an electronic thermograph in the lower reach
3.A.2	Rogue Upper	Upper Rogue Watershed Council	Rogue River/Holy Waters	Tree caging	To cage the trees in order to keep them safe from the beavers
3.A.2	Rogue Upper	Upper Rogue Watershed Council	Big Butte/Fourbit/Willow CR	Planting and seeding	Enhance current riparian
4.B.1	Rogue Upper	Upper Rogue Watershed Council	West Fork Trail Creek		Plant native mixed conifers and hardwoods in riparian zone where appropriate.
4.B.2	Rogue Upper	Upper Rogue Watershed Council	West Fork Trail Creek		Thin around conifers where beneficial to increase the growth rate of the conifers for shade and future large woody debris
5.A.3	Rogue Upper	Upper Rogue Watershed Council	West Branch Elk Creek		Studies are underway to evaluate cattle use adjacent to streams and develop fencing programs and alternative methods for providing water to livestock away from the stream
5.B.1	Rogue Upper	Upper Rogue Watershed Council	Skeeter Creek	Skeeter Swamp Detention Ponds	construct 2 detention ponds as a preventative measure to catch spills
5.B.2	Rogue Upper	Bureau of Land Management	Butte Falls area: Elk Creek		Add wood to streams to enhance fish habitat
10.A.1	Rogue Upper	Oregon Department of Fish and Wildlife	Cole Rivers Hatchery on Rogue River		Review and revise objectives and genetic guidelines for the Rogue coho program at Cole Rivers Hatchery
10.A.4	Rogue Upper	Oregon Department of Fish and Wildlife	Cole River Fish Hatchery on Rogue River		Externally mark all hatchery coho released into the Rogue River for easy identification to promote effective broodstock management
11.A.6	Rogue Upper	Oregon Department of Fish and Wildlife	Elk Creek Dam -Rogue River Basin		Remove artificial fish barriers or minimize their impact on fish passage
11.A.6	Rogue Upper	Oregon Department of Fish and Wildlife	Antelope Creek-Rogue River Basin		Remove artificial fish barriers or minimize their impact on fish passage
11.A.6	Rogue Upper	Upper Rogue Watershed Council	Big Butte Creek	Lower Big Butte Cr. Falls fish passage enhancement	Jump pools blasted from falls and constructed w/ concrete to assist passage
11.A.6	Rogue Upper	Upper Rogue Watershed Council	Big Butte Creek	Lower Big Butte Falls Fish Passage	Spring Chinook spawning Access to additional 8.5 miles of stream.Jump pools

Action Code	Watershed	Lead Management Agency/Organization	Name of Stream	Name of Project	Watershed Actions Undertaken to Address Salmonid Habitat Conditions
12.A.5	Rogue Upper	Oregon Department of Fish and Wildlife	Elk Creek Dam-Rogue River Basin		Remove artificial fish barriers or minimize their impact on fish passage
13.B.1	Rogue Upper	Upper Rogue Watershed Council	West Fork Trail Creek		Open existing backwater channels that have been filled with sediment to provide preferred coho
13.B.2	Rogue Upper	Boise Cascade	West Branch Elk Creek		A cooperative instream enhancement project has been developed between ODFW, BLM, USFS and Boise Cascade Corporation. The project will include installing large wood structures and boulders and creating side channels with equipment as needed
15.A.	Rogue Upper	Upper Rogue Watershed Council	Skeeter Creek/Swamp	Skeeter Cr/Swamp road Imp. Project	construct guard rails to minimize the risk of a spill into the waterway
17.A.1	Rogue Upper	Upper Rogue Watershed Council	West Branch Elk Creek		Studies are underway to evaluate cattle use adjacent to streams and develop fencing programs and alternative methods for providing water to livestock away from the stream
17.A.3	Rogue Upper	Upper Rogue Watershed Council	Tribs	Road Improvement	Improve roads to reduce sediments in the water
17.A.5	Rogue Upper	Oregon Department of Transportation	Dutton Road to Linn Road on Crater Lake Highway		Erosion control through use of silt fences, sediment barriers, check dams, spill prevention, revegetation of riparian areas
17.A.5	Rogue Upper	Upper Rogue Watershed Council	Willow Creek	Willow Creek fencing project	Fence sensitive riparian areas
17.A.5	Rogue Upper	Upper Rogue Watershed Council	Rogue River (Holy Water)	Holy Water Fencing	Fence riparian area adjacent to Holy water area below dam to eliminate cattle
17.A.5	Rogue Upper	Upper Rogue Watershed Council	Skeeter Creek	Skeeter Creek fencing project	fence sensitive riparian
17.A.5	Rogue Upper	Upper Rogue Watershed Council	Fourbit Creek	Four Bit Creek Fencing project	fence sensitive riparian
17.A.5	Rogue Upper	Upper Rogue Watershed Council	Rogue River	Sediment Reduction	Install a catch basin filter for sediment retention
17.A.5	Rogue Upper	Upper Rogue Watershed Council	Rancheria Creek	Rancheria Creek fencing project	fence the sensitive areas and provide water for them
17.A.5	Rogue Upper	Upper Rogue Watershed Council	Lost Creek Lake	Lost Creek Lake Riparian Fencing	Fence riparian area adjacent to Lost Creek to eliminate cattle access
17.A.5	Rogue Upper	Upper Rogue Watershed Council	Rogue River	ODOT Erosion Control	to restore the habitat and reduce sediment in the water

Action Code	Watershed	Lead Management Agency/Organization	Name of Stream	Name of Project	Watershed Actions Undertaken to Address Salmonid Habitat Conditions
17.A.6	Rogue Upper	Upper Rogue Watershed Council	So.Fork Big Butte Creek	Planting	Enhance current Riparian,provide educational opportunity
17.A.6	Rogue Upper	Upper Rogue Watershed Council	Willow Creek	Willow Creek Tree Planting Project	Tree & vegetation planting will stabilize soil & minimize sedimentation
17.A.6	Rogue Upper	Upper Rogue Watershed Council	Four Bit Creek	Four Bit Creek Tree Planting Project	Tree & vegetation planting will stabilize soil & minimize sedimentation
17.A.6	Rogue Upper	Upper Rogue Watershed Council	Big Butte Creek Springs	Big Butte Spring Tree Planting Project	replant areas that have been harvested and burned but did not regenerate
17.B.1	Rogue Upper	Upper Rogue Watershed Council	Skeeter CR/Swamp	Road Improvements	Install a guardrail to reduce the sediment flow
18.B.1	Rogue Upper	Oregon Department of Fish and Wildlife	Antelope Creek-Rogue River Basin		Remove artificial barriers or minimize their impact on fish passage
18.B.1	Rogue Upper	Oregon Department of Fish and Wildlife	Elk Creek Dam-Rogue River Basin		Remove artificial fish barriers or minimize their impact on fish passage
19.A.1	Rogue Upper	Upper Rogue Watershed Council	McGregor Park at Jess (Lost Creek) Dam		Water Festival
19.B.1	Rogue Upper	Oregon State Police	Upper Rogue HUC: Trail/Canyon, Elk, Sugar Pine, Little Butte, Soda, Lake creeks		Work cooperatively with government resource agencies and watershed councils to teach rules, regulations and alternative methods of resource utilization

LITTLE BUTTE CREEK WATERSHED COUNCIL

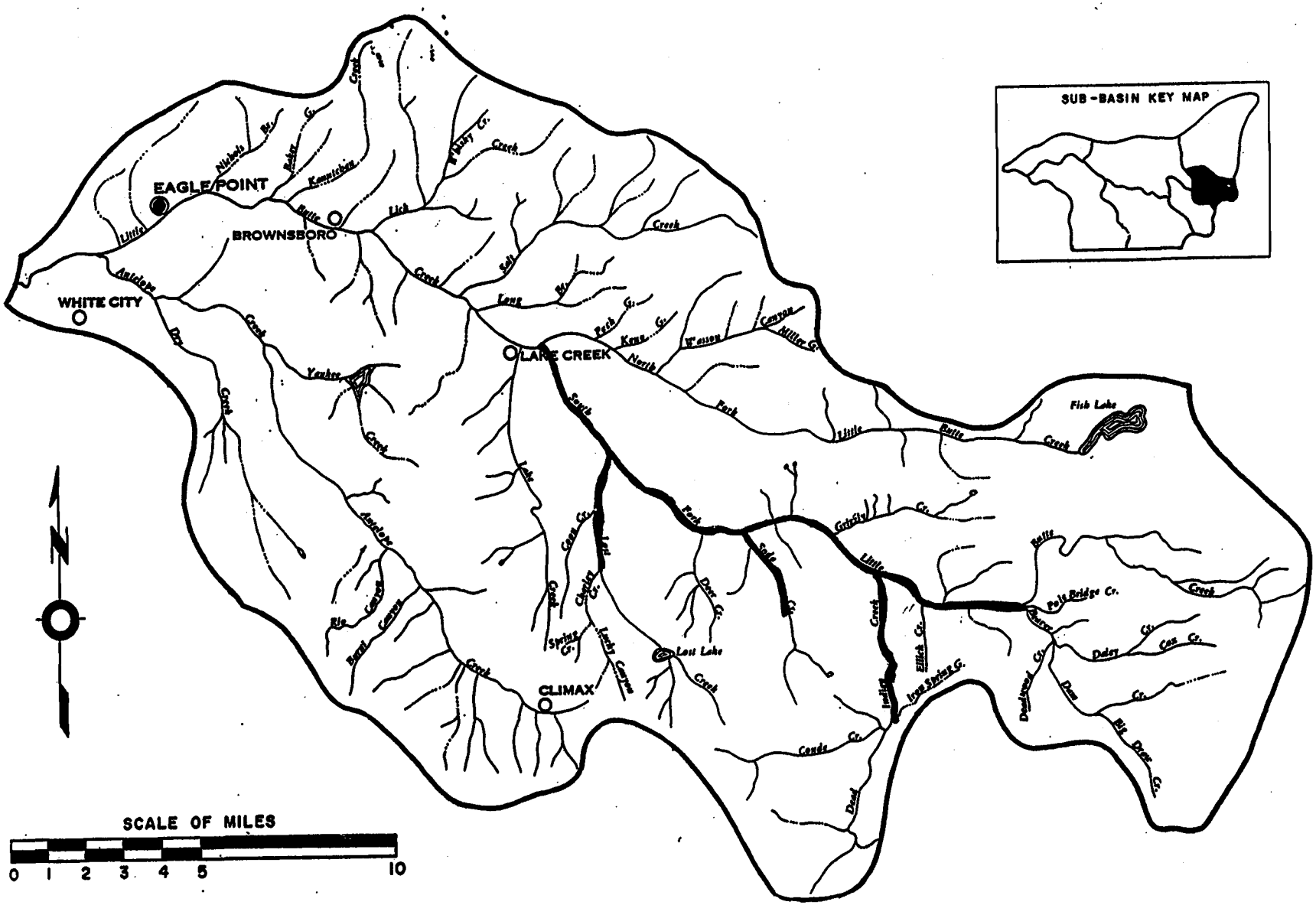
Formed under HB 2215 as one of the eight watershed councils of the Rogue River Basin, Little Butte Creek Watershed Council's area is located in the upper Rogue area. Over half of the Little Butte Creek watershed is federally owned, with the federal lands generally located in the higher elevations of the system. Logging and agriculture have been the major economic factors in the watershed and have given direction to the activities of the council. The Little Butte Creek Watershed Council was formed from an existing local committee that had been focused on fish habitat issues for about two years.

With a number of large ranches on the watershed, extensive fencing has been done to keep cattle from the stream and riparian area. To restore the riparian corridor many tree planting projects have been completed and more are planned.

Little Butte Creek Watershed Council involves many people through its mailings and solicitation of persons with technical expertise to help in planning and executing projects. Using a landscape based approach, Little Butte Creek Watershed Council has divided the watershed into three zones. For each of the zones an assessment has been done. From the assessments goals have been established and criteria developed to guide actions to be undertaken. This procedure has provided the basis for long term planning and, undoubtedly, has been a factor in the Council's success in securing project funding.

Lu Anthony is coordinator of the Little Butte Creek Watershed Council. Phone: (541)826-2908 Address: 104 Stevens Road Eagle Point, OR 97524.

Map 12. Little Butte Coho Core Areas



Coho core areas

LITTLE BUTTE CREEK WATERSHED
Watershed Habitat Limiting Factors and Restoration Actions

LIMITING FACTOR	STREAM	CODE	ACTIONS NEEDED	PAGE APDX 2
Water temperature	South Fork Little Butte	1.A.1 1.A.2 1.B.1 1.C.2 1.D.1	Increase canopy cover. Increase riparian zone size and density. Increase pool depth and quantity. Increase dry season ground water levels. Decrease irrigation return flows.	A-2-3
Low stream flow	South Fork Little Butte	2.A.3	Manage water withdrawals for maximum efficiency and conservation.	A-2-4
Riparian quality	South Fork Little Butte	3.A.1 3.A.2	Increase riparian zone as appropriate. Increase the vegetation density and diversity of plant species.	A-2-5

Action Code	Watershed	Lead Management Agency/Organization	Name of Stream	Name of Project	Watershed Actions Undertaken to Address Salmonid Habitat Conditions
1.B.1	Little Butte	Little Butte Watershed Council	Little Butte Creek		Encourage greater pool formation and depth through placement of LWD
1.B.3	Little Butte	Oregon Department of Fish and Wildlife	Little Butte Watershed		Placement of small dead conifers in and along streams
1.D.1	Little Butte	Little Butte Watershed Council	Little Butte Creek		Limit irrigation return flows
1.F.1	Little Butte	Little Butte Watershed Council	Little Butte Creek		Infrared flyover of Little Butte Creek
2.A.2	Little Butte	Little Butte Watershed Council	Little Butte Creek		Increase subsurface water storage upslope to increase natural inflow during the summer months
2.A.4	Little Butte	Little Butte Watershed Council	Little Butte Creek	Water Rights Lease	Negotiate agreement for instream rights for 30 acre feet of water
2.A.4	Little Butte	Little Butte Watershed Council	S.Fr. Little Butte	Irrigation Improvements/Water Rights Lease	Acquire a water right on the S.Fr Little Butte Cr. For 1995 & renew for 1996
2.A.4	Little Butte	Little Butte Watershed Council	South Fork Little Butte Creek	Water Rights Lease	Finalize Water right lease for 10 years.
2.A.4	Little Butte	Oregon Water Resources Department	Little Butte Creek		Obtain instream water rights/leases
2 .B.4	Little Butte	Bureau of Reclamation	Bureau of Reclamation areas		Fund studies and technical assistance
3.A.1	Little Butte	Little Butte Watershed Council	Little Butte Creek		Provide buffer zone of 150-300 feet for protection of riparian area
3.A.3	Little Butte	Little Butte Watershed Council	Little Butte Creek	Dutton Road - Linn Road Highway improvement	replace Crater Lake Hwy bridge over Little Butte & other Hwy improvements
3.A.6	Little Butte	Little Butte Watershed Council	So.Fork-Little Butte Creek	South Fork Little Butte off channel rearing Hab.	Develop off channel rearing area for the Coho.
4.A.1	Little Butte	Little Butte Watershed Council	Little Butte Creek		Placement of large woody debris and boulders in stream
5.B.3	Little Butte	Bureau of Land Management	South Fork Little Butte Creek		Add wood instream, repair log and rock weirs, restore channel and do riparian plantings
6.A.3	Little Butte	Little Butte Watershed Council	Little Butte Creek		Plant trees and forbs along the waterway to increase canopy cover
11.A.1	Little Butte	Little Butte Watershed Council	Little Butte Creek	Instream Enhancement	Fish Passages
11.A.1	Little Butte	Little Butte Watershed Council	South Fork Little Butte Creek	S. Fr. Little Butte Irrigation Diversion Improve.	Improve fish passage at the MID irrigation diversion on the S.Fr.Little Butte Cr.

Action Code	Watershed	Lead Management Agency/Organization	Name of Stream	Name of Project	Watershed Actions Undertaken to Address Salmonid Habitat Conditions
11.A.1	Little Butte	Little Butte Watershed Council	Antelope Creek	Antelope Creek Diversion	Project proposes to open up 17 miles of spawning and rearing habitat.
11.A.4	Little Butte	Little Butte Watershed Council	Antelope Creek	Antelope Creek Push up Dam Replacement	Develop a solution to an erosion problem on the Jackson County Bridge
11.A.6	Little Butte	Little Butte Watershed Council	Little Butte Cr.	Fish Passage Enhancement	Improve fish passage at 2 sites that will allow fish access to additional Hab.
11.A.6	Little Butte	Oregon Department of Fish and Wildlife	Little Butte Creek, North and South Forks-Rogue River Basins		Remove artificial fish barriers or minimize their impact on fish passage
12.A.5	Little Butte	Oregon Department of Fish and Wildlife	Little Butte Creek-North and South Forks		Remove artificial fish barriers or minimize their impact on fish passage
13.A.1	Little Butte	Little Butte Watershed Council	So. Fork Little Butte Creek	So.Fork Little Butte Creek Instream Recovery Pro	address limiting summer and winter instream habitat condition
13.A.1	Little Butte	Little Butte Watershed Council	South Fork Little Butte Creek	S. Fork Little Butte Habitat Project	Large woody debris,Rootwads & Boulders were added to the stream to enhance salmonid habitat
13.A.1	Little Butte	Little Butte Watershed Council	Little Butte Creek	South Fork Little Butte Habitat Improvements	create salmonid Habitat in a 5 mile segment of the S.Fk. Little Butte Creek
14.A.2	Little Butte	Oregon Water Resources Department	Little Butte Creek		Installation of headgates, measuring devices
14.A.5	Little Butte	Oregon Water Resources Department	Little Butte Creek, Evans Creek, Applegate River, Illinois River		Obtain instream water rights/leases
14.A.9	Little Butte	Bureau of Reclamation	Irrigated areas		Assess water management practices and evaluate conservation potential
17.A.1	Little Butte	Little Butte Watershed Council	Little Butte Creek	Little Butte Riparian Rehabilitative Project	planting trees in the riparian area and fencing the area from livestock use
17.A.3	Little Butte	Little Butte Watershed Council	Big Butte Creek	Big Butte Road Improvement	Reduce erosion and sedimentation
17.A.5	Little Butte	Little Butte Watershed Council	Lake Creek	Cascade Ranch Fencing	Fence 2.5 miles of Lake Creek to Exclude livestock from the stream area
17.A.6	Little Butte	Little Butte Watershed Council	Little Butte Creek	Little Butte Tree Planting	Plant conifers on a private ranch to improve riparian habitat
17.A.6	Little Butte	Little Butte Watershed Council	Antelope Creek	Antelope Creek Tree Planting	Planting Conifers along Antelope Creek to improve Riparian Habitat.
17.A.6	Little Butte	Little Butte Watershed Council	South Fork Little Butte Creek	S.Fr.Little Butte Tree Planting	Plant conifers on several private farms along the S.Fr.Little Butte CR.
17.A.6	Little Butte	Little Butte Watershed Council	South Fork Little Butte Creek	S. Fr. Little Butte Tree Planting	Planting 150 conifers on the private landowners property to enhance riparian are

Action Code	Watershed	Lead Management Agency/Organization	Name of Stream	Name of Project	Watershed Actions Undertaken to Address Salmonid Habitat Conditions
17.A.6	Little Butte	Little Butte Watershed Council	South Fork Little Creek	Little Butte Tree Planting	involves planting 100 conifers on steep slopes to reduce erosion
17.A.6	Little Butte	Little Butte Watershed Council	Little Butte Creek	Denman Tree Planting	Plant conifers on the Denman wildlife management area along the lower Creek
17.A.6	Little Butte	Little Butte Watershed Council	Lake Creek	Cascade Ranch Tree Planting	Plant Trees along Lake Creek to establish a riparian area & protect from cattle.
17.A.6	Little Butte	Little Butte Watershed Council	Little Butte Creek	Planting	Planting trees in order to restore the habitat
17.B.1	Little Butte	Little Butte Watershed Council	Antelope Creek	Antelope Creek Hwy. Improvement	Hwy. Improvement w/a Partial goal to reduce erosion.
17.B.2	Little Butte	Little Butte Watershed Council	North Fork Little Butte Creek	N.Fr.Little Butte Irrigation diversion improvement	Improve fish passage at the MID irrigation diversion on the north Fr.Little Butt
18.B.1	Little Butte	Oregon Department of Fish and Wildlife	North and South Forks of Little Butte Creek-Rogue River Basin		Remove artificial barriers or minimize their impact on fish passage

BEAR CREEK WATERSHED COUNCIL

The Bear Creek Watershed Council's roots go back to 1983 when the Jackson County Water Quality Advisory Committee was formed under the aegis of the Rogue Valley Council of Governments. The Bear Creek Valley 2050 committee was one of five subcommittees established. The mission of the 2050 group was to study and project water resources and needs for the next fifty years. In April 1994 the Jackson County Water Quality Advisory Committee was designated as the Bear Creek Watershed Council and chartered in accordance with HB 2215.

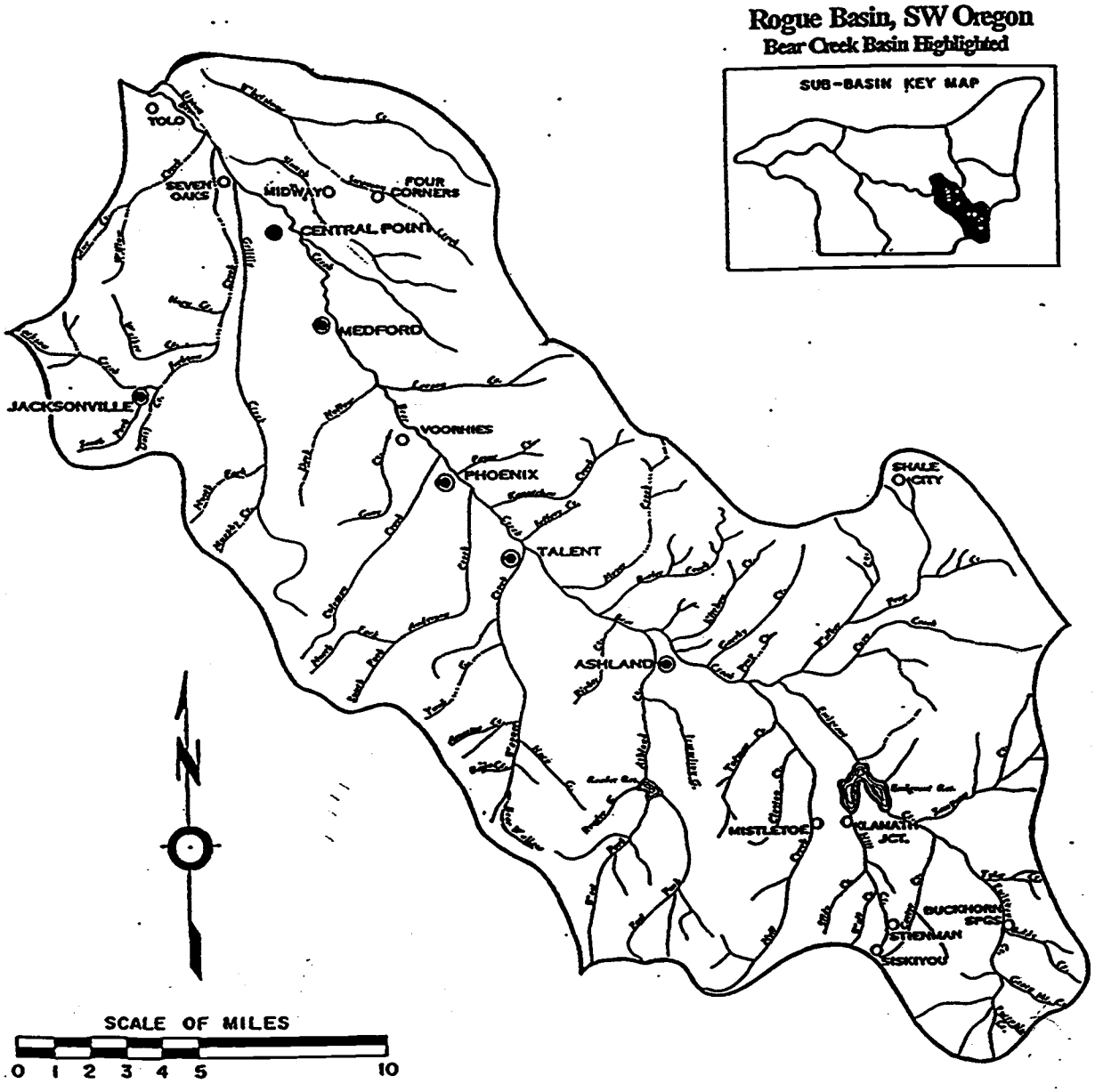
Bear Creek Watershed Council was formed to help address watershed management issues and to provide a framework for coordination and cooperation among those individuals, groups and agencies having key interests in the development and implementation of a watershed action program.

The Bear Creek watershed has no designated coho core streams, however, its tributaries provide spawning and rearing habitat for coho, chinook and steelhead. Bear Creek Watershed Council's concerns center around water quantity, quality and habitat. Because Bear Creek flows through the urban areas of Medford, Ashland, Phoenix, Talent and Central Point, the Bear Creek Watershed Council's issues are more urban centered than those of other Rogue/South Coast councils.

Bear Creek Watershed Council has five subcommittees to administrate its activities: Executive, Agriculture, Public Information and Education, Municipal and Instream and Water Sources. The Bear Creek Watershed Education Partners has memorandums of understanding with the school districts along Bear Creek: Central Point (SD 6), Medford (SD 549C), St. Mary's, Phoenix-Talent (SD4) and Ashland (SD 5). Students are involved in STEP, semiannual clean-ups of Bear Creek, macroinvertebrate surveys and water quality studies.

Bear Creek Watershed Council coordinator is William Meyer. Phone: (541)664-6674 ext. 219
Address: P.O. Box 3275 Central Point, OR 97502

Map 13. Bear Creek Coho Core Areas (none identified)



Action Code	Watershed	Lead Management Agency/Organization	Name of Stream	Name of Project	Watershed Actions Undertaken to Address Salmonid Habitat Conditions
1.A.1	Bear Creek	Jackson County Roads and Park Department	Jackson County		Vegetation around bridges will be managed so as not to reduce shading of streams
1.D.1	Bear Creek	Bear Creek Watershed Council	Bear Creek	Griffin Creek Irrigation Improvements	Improve the irrigation Districts water transportation system
2.A.3	Bear Creek	City of Phoenix, Oregon	Bear Creek		Feasibility study for Phoenix, Talent, Ashland Intertie project to eliminate Talent's withdrawal of water from Bear Creek by connecting to Medford water system
2.A.6	Bear Creek	Rogue Valley Council of Governments	Bear Creek Basin		Study Bear Creek flow condition with the purpose of developing a minimum flow for instream purposes
3.A.2	Bear Creek	Jackson County Roads and Park Department	Jackson County		No vegetation will be removed from road rights-of-way within 50 feet of streams unless hazardous to motorists. Vegetation around bridges will be managed so as not to reduce shading of streams
3.A.3	Bear Creek	Bear Creek Watershed Council	Bear Creek	North Medford Interchanging	Stabilize the Riparian area and reduce pollution by planting vegetation
3.A.3	Bear Creek	Siskiyou National Forest	Siskiyou National Forest		Riparian planting, road decommissioning, culvert replacement and decommissioning
3.A.5	Bear Creek	Bear Creek Watershed Council	Hamilton	Upslope enhancement	to clear brush land to keep fire to minimum and erosion out of the water
3.A.5	Bear Creek	City of Phoenix, Oregon	Phoenix		Riparian Set-Back Ordinance #751; enforced by City of Phoenix Planning Department
4.A.1	Bear Creek	Bear Creek Watershed Council	Bear Creek	off channel development	To keep riparian healthy and make fish passages and safer drainage areas
4.A.1	Bear Creek	Oregon Department of Transportation	Jackson County		Storage and disposal of woody debris for use in stream enhancement
4.A.1	Bear Creek	Oregon Department of Transportation	Jackson County		Storage and disposal of woody debris for use in stream enhancement
11.A.1	Bear Creek	Bureau of Reclamation	Bureau of Reclamation facilities		Design and construct fish passage facilities
11.A.6	Bear Creek	Bear Creek Watershed Council	Bear Creek	Fish passage	to allow the fish to travel through safely
11.A.6	Bear Creek	Oregon Department of Fish and Wildlife	Bear Creek-Rogue River Basin		Remove artificial fish barriers or minimize their impact on fish passage
12.A.4	Bear Creek	Bear Creek Watershed Council	Bear Creek	Talent Push-Up Dam Removal	Removal of 2 push up dams in Bear Creek near Talent to facilitate fish Passage

Action Code	Watershed	Lead Management Agency/Organization	Name of Stream	Name of Project	Watershed Actions Undertaken to Address Salmonid Habitat Conditions
12.A.5	Bear Creek	Oregon Department of Fish and Wildlife	Bear Creek-Rogue River Basin		Remove artificial fish barriers or minimize their impact on fish passage
12.A.6	Bear Creek	Bear Creek Watershed Council	Jackson Creek	Wetland Creation	shade for the fish and a place to hide
12.A.6	Bear Creek	Bear Creek Watershed Council	Bear Creek	off channel development/wetland creation	fish passages and more fish and riparian
12.A.6	Bear Creek	City of Phoenix, Oregon	City park adjacent to Bear Creek		Development of a wetland enhancement area
13.A.1	Bear Creek	Bear Creek Watershed Council	Wagner Creek	Instream enhancement	easier traveling for fish, places to hide and have shade
14.A.3	Bear Creek	Bear Creek Watershed Council	Bear Creek	Jackson St.Dam Modifications	Improve irrigation transportation system as part of the Jackson St. Dam
14.A.6	Bear Creek	City of Phoenix, Oregon	Bear Creek		Feasibility study for Phoenix, Talent, Ashland Intertie project to eliminate Talent's withdrawal of water from Bear Creek by connecting to Medford water system
14.A.8	Bear Creek	Bureau of Reclamation	Bear Creek drainage; Illinois River watershed		Hydrologic model for water management
14.A.9	Bear Creek	Bureau of Reclamation	Irrigated areas		Assess water management practices and evaluate conservation potential
15.A.1	Bear Creek	City of Phoenix, Oregon	DMAs bordering Bear Creek within Phoenix boundary		Sampling to meet TMDL requirements
15.B.1	Bear Creek	City of Phoenix, Oregon	Phoenix, Oregon		Storm Master Drain Plan
15.B.1	Bear Creek	City of Phoenix, Oregon	Phoenix, Oregon		Purchase street sweeper to reduce debris going into storm drains
15.B.3	Bear Creek	Jackson County Roads and Park Department	Jackson County		Reduction of herbicide use on road shoulders in core coho areas. Herbicide use will be limited to those registered for use in water
15.B.4	Bear Creek	Jackson County Roads and Park Department	Jackson County		Herbicide use will be limited to those registered for use in water
17.A.6	Bear Creek	Bear Creek Watershed Council	Wagner Creek	Planting	plant more trees
17.A.6	Bear Creek	Bear Creek Watershed Council	Bear Creek	Planting	to plant more trees
17.A.6	Bear Creek	Bureau of Land Management	Forest Creek in Ashland area		Riparian plantings

Action Code	Watershed	Lead Management Agency/Organization	Name of Stream	Name of Project	Watershed Actions Undertaken to Address Salmonid Habitat Conditions
17.B.1	Bear Creek	Jackson County	Jackson County		Integrated Vegetation Management Plan for road rights-of-way
17.B.2	Bear Creek	Bear Creek Watershed Council	Antelope Creek	Dutton Road - Linn Ross Highway Improvements	Replace Crater Lake Hwy bridge over Antelope Creek & other Hwy improvements
17.B.2	Bear Creek	Jackson County Roads and Park Department	Core salmonid areas in Jackson County		Replacement, renovation of culverts, bridges in core salmonid areas as needed as shown by results of inventory with ODFW Standards and Criteria for Stream Road Crossings
18.B.1	Bear Creek	Oregon Department of Fish and Wildlife	Bear Creek-Rogue River Basin		Remove artificial barriers or minimize their impact on fish passage
19.A.2	Bear Creek	Bear Creek Watershed Education Partners	Bear Creek watershed		Training of teachers and students in water quality monitoring, habitat restoration
19.A.3	Bear Creek	Bear Creek Watershed Education Partners	Bear Creek watershed		Involve more schools and classrooms in STEP, Adopt-a-Stream, stream clean-up and macroinvertebrate study programs
19.B.4	Bear Creek	Jackson County roads and Parks	Jackson County: Shady Cove and Bear Creek Greenway sites		Public education on riparian rehabilitation with schools being involved
19.B.6	Bear Creek	Jackson County Roads and Park Department	Jackson County		Workshop on fish friendly culverts for Roads and Park staff
20.B.4	Bear Creek	Bureau of Reclamation	Bureau of Reclamation areas		Fund studies and technical assistance

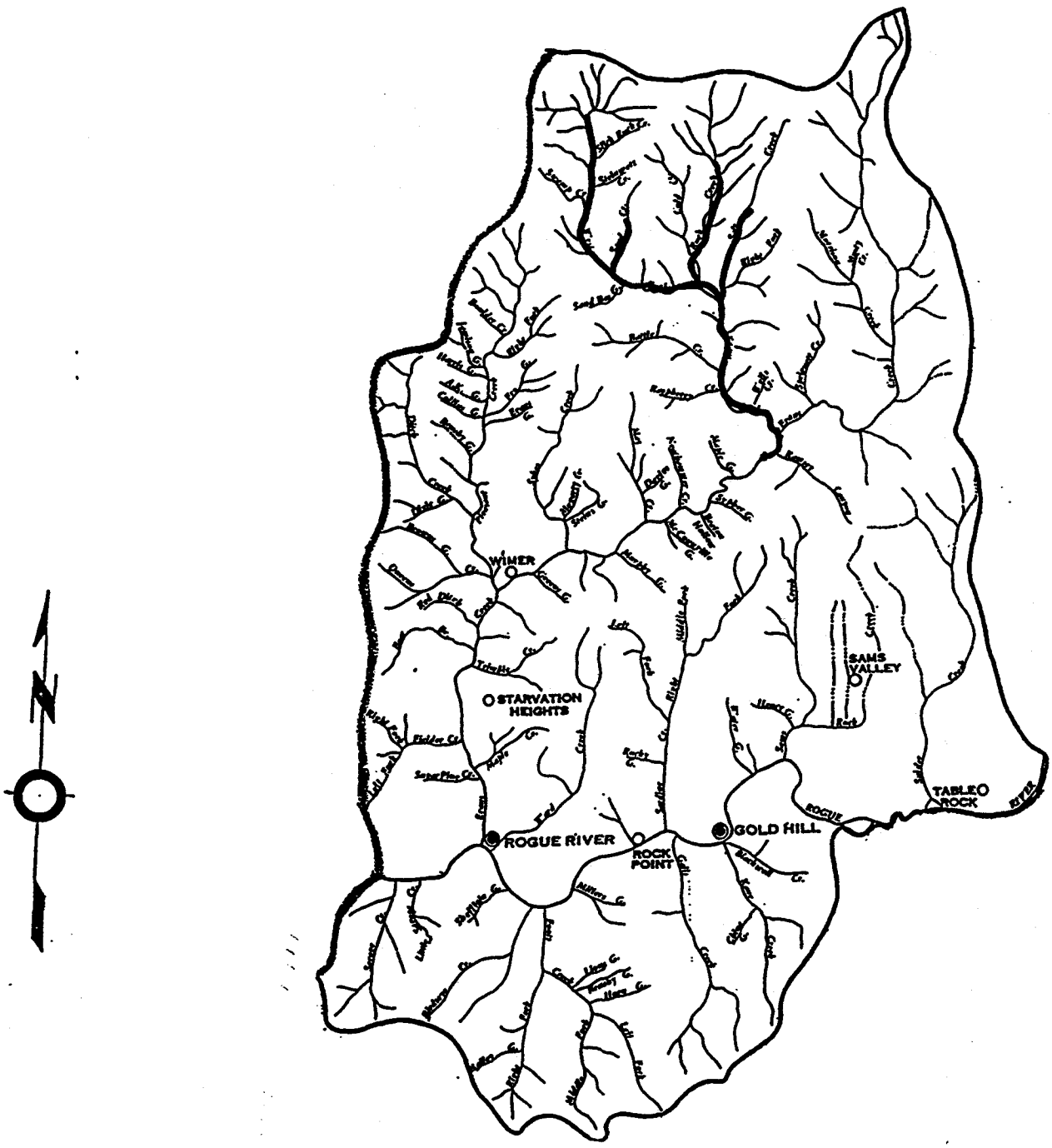
EVANS CREEK WATERSHED COUNCIL

The Evans Creek Watershed Council was formed as a non-profit 501(c)(3) organization in response to HB 2215. The Council consists of local community members concerned with watershed health issues. The council is dedicated to establishing a landscape-level, ecosystem-based management plan. Forest Ecosystem Management: An Ecological, Economic and Social Assessment is the guiding document for the Council's management plan. A goal of the plan is to design the future landscape in such a manner as to protect biodiversity.

The Evans Creek watershed has experienced catastrophic fires. Within the past 15 years, over fifty percent of the planning area has burned with some lands burning two or three times. Extensive reforestation projects have been completed. An issue of the Council is fuel management to reduce losses and protect resources.

Phil Gremaud is the coordinator of the Evans Creek Watershed Council. Phone: (541)855-5463
Address: P.O. Box 12 Gold Hill, OR 97525

Map 14. Evans Creek Coho Core Areas



Coho core areas

EVANS CREEK WATERSHED
Watershed Habitat Limiting Factors and Restoration Actions

LIMITING FACTOR	STREAM	CODE	ACTIONS NEEDED	PAGE APDX 2
Water temperature	West Fork Evans	1.A.1 1.A.3	Increase canopy cover. Manage riparian zone size and density.	A-2-3
Riparian quality	West Fork Evans	3.A.2	Increase the vegetation density and diversity of plant species.	A-2-5
Pool frequency	West Fork Evans	5.B.1	Specifically place logs and boulders to create pools.	A-2-7
Fish passage	West Fork Evans	11.A.4	Modify culverts restricting fish passage.	A-2-11
Wintering habitat	West Fork Evans	13.A.1	Large wood and boulder structures will be placed or secured in streams to provide shelter.	A-2-14
Erosion, sediment and turbidity	West Fork Evans	17.A.2 17.A.3	Enforce timber harvest practices that protect watershed from erosion. Use selective harvesting, helicopter logging, buffer zones and develop logging road specifications. Close and revegetate unused roads.	A-2-18
Lack of spawning gravel	West Fork Evans	Not listed	Install instream log and boulder structures designed to gather gravel.	

Action Code	Watershed	Lead Management Agency/Organization	Name of Stream	Name of Project	Watershed Actions Undertaken to Address Salmonid Habitat Conditions
2.A.4	Evans	Oregon Water Resources Department	Evans Creek		Obtain instream water rights/leases
4.A.1	Evans	Evans Creek Watershed Council	West Fork Evans Creek	W. Fork Evans Habitat Improvement Project	constructed rearing habitat on 2 miles of stream
11.A.4	Evans	Evans Creek Watershed Council	Evans Creek	Structures	Reconstruct diversions and Dams
11.A.5	Evans	Bureau of Land Management	East Fork Evans Creek, West Fork Evans Creek in Butte Falls area		Remove instream dam; construct instream culvert for fish passage
11.A.6	Evans	Evans Creek Watershed Council	Evans Creek	Williams/Waylon Ditch Repair	Replaces the fish screen on the ditch and modifies irrigation diversion
14.A.3	Evans	Evans Creek Watershed Council	Evans Creek	Irrigation Diversion Improvements	water right diversion transfer,mod. of a diversion dam, repair fish screen
17.A.6	Evans	Evans Creek Watershed Council	Evans Creek	Hull Mt. Fire Rehab Project	Restore and rehabilitate habitat impacted by the 10,000 acres Hull Mt. Fire
17.A.6	Evans	Evans Creek Watershed Council	Evans Creek	Planting	reforestation
19.B.1	Evans	Evans Creek Watershed Council	Evans Creek	Hull Mt. Fire Restoration Project	development of an Evans Creek Watershed, Outreach program to assist landowners

APPLEGATE RIVER WATERSHED COUNCIL

The Applegate River Watershed Council had its genesis in 1992 as the Applegate Partnership. The Applegate Partnership's primary focus was forest health issues. Their cooperative, interagency approach received national recognition and was cited by the Clinton administration as a model to be emulated by other watershed councils. Under the Watershed Health Program created in 1993, the board members of the Partnership in conjunction with interested community members formed the Applegate River Watershed Council.

As a watershed council, the focus expanded to embrace the entire aquatic ecosystem: streams and the plants and animals the streams support. Since a large portion of the Applegate watershed is managed by federal agencies, predominately the Bureau of Land Management and the U.S. Forest Service, a spirit of cooperation exists between private landowners, residents and the agencies.

With its relatively long, active history, the Applegate Watershed Council is a stable, energetic group designing and implementing many projects with wide community involvement.

The Applegate is one of three watershed councils in Oregon selected as pilot watershed councils for the Coastal Salmon Restoration Initiative. The Applegate Council will now work to develop an assessment to be used as a template for other councils on the Coast.

Coordinator and contact for the Applegate Watershed Council is Jan Perttu. Phone: (541)899-8036 Address: 2816 Upper Applegate Rd., Jacksonville, OR 97530

Map 15. Applegate Coho Core Areas

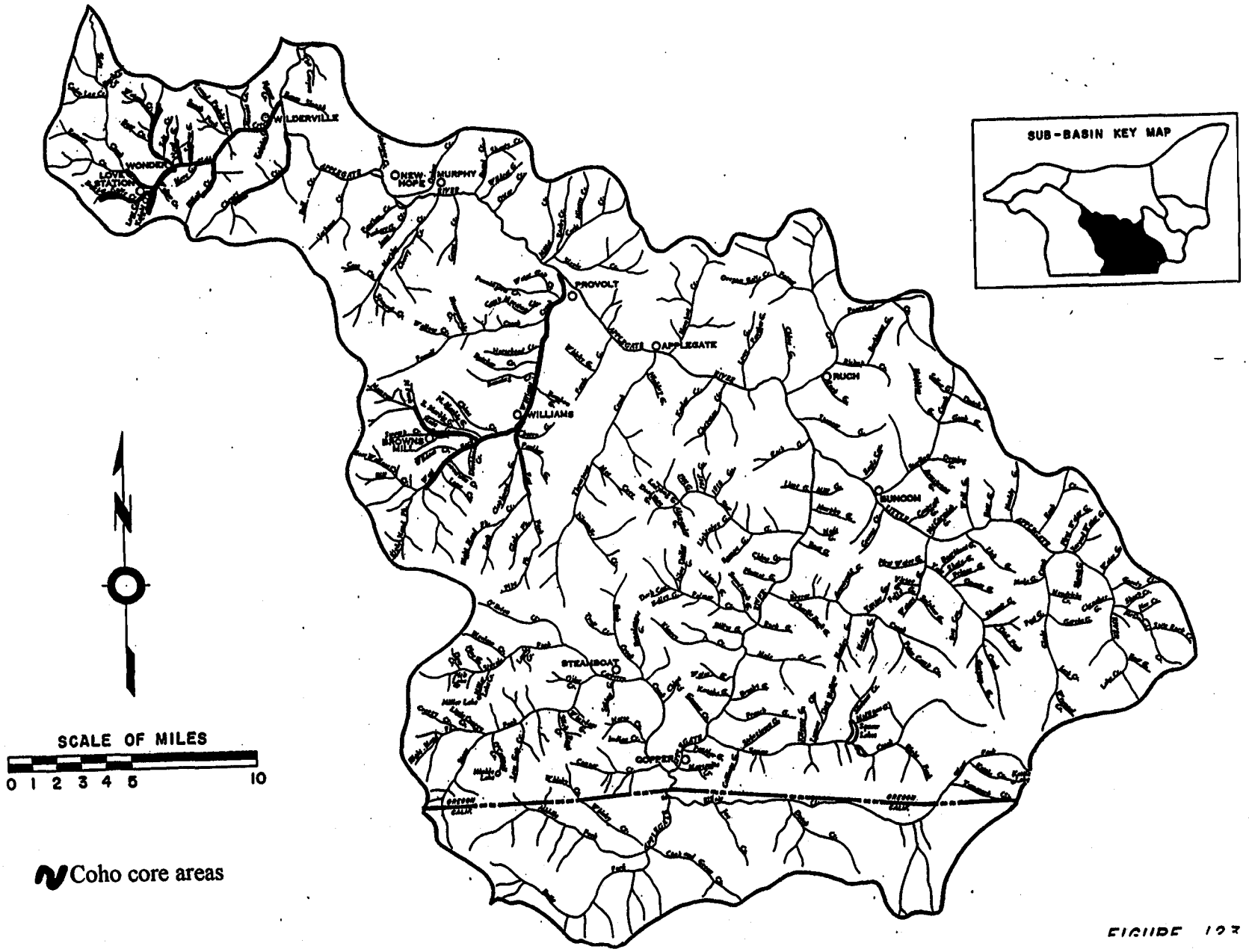


FIGURE 123

APPLEGATE WATERSHED
Watershed Habitat Limiting Factors and Restoration Actions

LIMITING FACTOR	STREAM	CODE	ACTIONS NEEDED	PAGE APDX 2
Water temperature	Slate-Cheney Williams	1.A.1 1.A.2 1.C.1 1.C.2	Increase canopy cover. Increase riparian zone size and density. Increase dry season ground water levels. Decrease irrigation return flows.	A-2-3
Low stream flow	Slate-Cheney Williams	2.A.2 2.A.3	Increase dry season ground water levels. Manage water withdrawals for maximum efficiency and conservation.	A-2-4
Riparian quality	Slate-Cheney Williams	3.A.1 3.A.2 3.A.3	Increase riparian zone as appropriate. Increase the vegetation density and diversity of plant species. Manage riparian vegetation for a multi-layered canopy.	A-2-5
Stream complexity	Slate-Cheney Williams	16.A.2 16.A.4	Cooperate with landowners, watershed councils, state and federal agencies to fund and construct side channels and alcoves. Install large woody debris in the waterway to maintain and enhance pool structure.	A-2-17

Action Code	Watershed	Lead Management Agency/Organization	Name of Stream	Name of Project	Watershed Actions Undertaken to Address Salmonid Habitat Conditions
1.A.2	Applegate	Applegate Watershed Council	Williams Creek		Foster riparian growth and development through the use of management practices which protect critical vegetation. Limit forest harvest to create riparian buffer zones of adequate size.
1.B.2	Applegate	Applegate Watershed Council	Slate/Cheney creeks		Promote the development of off channel alcoves and pools
1.C.1	Applegate	Applegate Watershed Council	Williams Creek		Increase instream flows through reduced diversion
1.C.2	Applegate	Applegate Watershed Council	Williams Creek		Increase subsurface water storage upslope to increase natural inflow in summer months
2.A.4	Applegate	Oregon Water Resources Department	Applegate River		Obtain instream water rights/leases
5,B.3	Applegate	Bureau of Land Management	Star Gulch Creek		Add wood instream, repair log and rock weirs, restore channel and do riparian plantings
5.B.3	Applegate	Bureau of Land Management	Forest Creek		Add wood instream, repair log and rock weirs, restore channel and do riparian plantings
11.A.1	Applegate	Applegate Watershed Council	Applegate	Irrigation Improvements including Thompson Creek	Improve fish passage to improve fish migration and decrease direct fish mortality
11.A.1	Applegate	Applegate Watershed Council	Applegate	Kubli Ditch Headgate and Fishscreen	Reduce salmonid fry mortality by moving fish screen to the point of diversion
12.A.7	Applegate	Applegate Watershed Council	Applegate	Laurel Hill Headgate Stabilization	Decrease fish mortality by controlling flows and enhance instream water quantity and quality
16.A.4	Applegate	Applegate Watershed Council	Slate/Chaney creeks		Install large woody debris in the waterway to maintain and enhance pool structure
17.A.5	Applegate	Applegate Watershed Council	Applegate	Rush Creek Road Restoration	Water quality and fish habitat for anadromous fish by reducing sediment run-off
17.A.5	Applegate	Applegate Watershed Council	Applegate	Applegate Watershed Fencing	Reduce livestock access to stream banks and channels
17.A.5	Applegate	Applegate Watershed Council	Applegate	Hunter Feedlot Quality Protection	Improve riparian vegetation along 2,000 ft. to filter water and lower stream temp.
17.A.6	Applegate	Applegate Watershed Council	Applegate	Applegate Watershed Tree Planting	35,000 trees will be planted in riparian and upland areas on private property
17.A.8	Applegate	Applegate Watershed Council	Applegate	Residential Road Sediment Reduction	Improve drainage conditions permanently
17.B.2	Applegate	Applegate Watershed Council	Williams Creek	Williams Creek Bridge replacement	Replace Applegate road bridge across Williams Creek

Action Code	Watershed	Lead Management Agency/Organization	Name of Stream	Name of Project	Watershed Actions Undertaken to Address Salmonid Habitat Conditions
19.B.1	Applegate	Oregon State Police	Applegate HUC: Slate, Waters, Chaney, Williams creeks		Work cooperatively with government resource agencies and watershed councils to teach rules, regulations and alternative methods of resource utilization

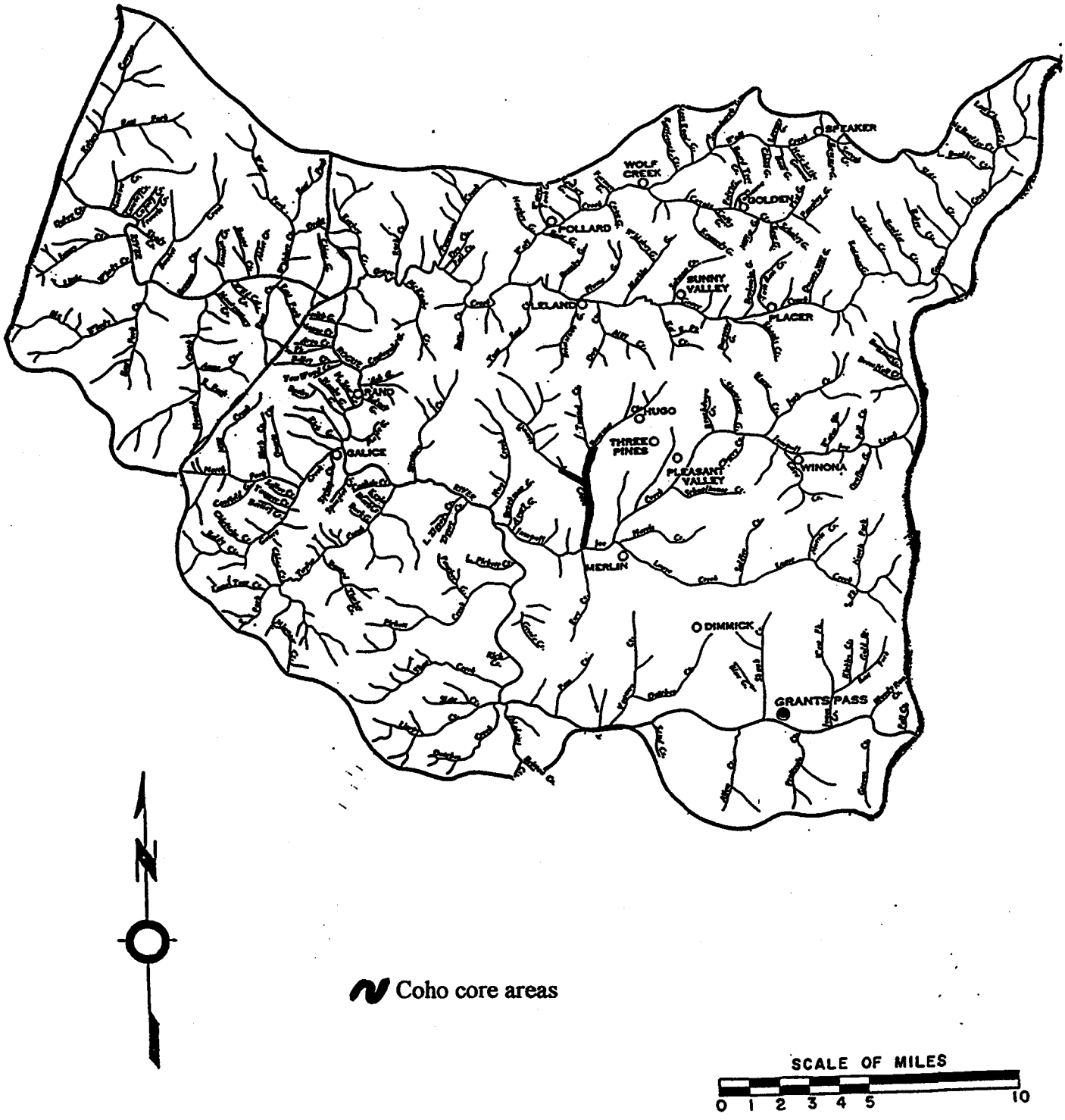
MIDDLE ROGUE WATERSHED COUNCIL

The forerunner of the Middle Rogue Watershed Council was the Water Resource Advisory Committee which was appointed as the Council by the Josephine County Commissioners under the provisions of HB 2215. The Water Resources Advisory Committee had for twenty years advised throughout Josephine County on such issues as groundwater, surface water and irrigation. When designated as a watershed council, the group assumed the added responsibility of improving the conditions of the Middle Rogue watershed.

The Middle Rogue Watershed Council has conducted projects in bank/slope stabilization, sediment reduction, upslope enhancement, tree planting, fencing, fish passage, road decommissioning and instream structures.

For most of the past year the Middle Rogue Watershed Council has been without a coordinator, due to lack of funding. Several people in the area are attempting to revitalize the council. For the present Amy Wilson, RC&D coordinator is serving as contact person. Amy may be reached at (541)476-5906 or at 576 NE "E" Street Grants Pass, OR 97526.

Map 16. Middle Rogue River Coho Core Areas



MIDDLE ROGUE WATERSHED
Watershed Habitat Limiting Factors and Restoration Actions

LIMITING FACTOR	STREAM	CODE	ACTIONS NEEDED	PAGE APDX 2
Water temperature	Quartz	1.A.1	Increase canopy cover.	A-2-3
Low stream flow	Quartz	2.A.3	Manage water withdrawals for maximum efficiency and conservation.	A-2-4
Riparian quality	Quartz	3.A.2	Increase the vegetation density and diversity of plant species.	A-2-5
Lack of instream structures	Quartz	4.A.1 4.B.1	Increase large woody debris and boulders in stream. Plant conifers in riparian zone.	A-2-6
Wintering habitat	Quartz	13.A.1	Large wood and boulder structures will be placed or secured in streams to provide shelter.	A-2-14

Action Code	Watershed	Lead Management Agency/Organization	Name of Stream	Name of Project	Watershed Actions Undertaken to Address Salmonid Habitat Conditions
1.A.1	Rogue Middle	Oregon Department of Transportation	Allen Creek		Revegetate along Allen Creek
2.A.4	Rogue Middle	Middle Rogue Watershed Council	Bear Creek	Irrigation Improvements/water rights	safe traveling for the fish
3.A.3	Rogue Middle	Middle Rogue Watershed Council	Rogue River	Road Decommissioning	Decommission 29 miles of forest roads and replace 1 culvert in the lower Rogue
3.A.3	Rogue Middle	Middle Rogue Watershed Council	Rogue River	Road Remedial Sediment Reduction	Upgrade roads to reduce sediment inputs into waterways
4.A.1	Rogue Middle	Middle Rogue Watershed Council	Galice Area	Structures	Instream wood placement and reduction of erosion
4.A.1	Rogue Middle	Middle Rogue Watershed Council	Bear Creek	Structures	Fish passages
4.B.1	Rogue Middle	Middle Rogue Watershed Council	Tribs (Taylor Creek)	Fish Passage	Put Channels into the stream
5.B.2	Rogue Middle	Bureau of Land Management	Grants Pass area: Deer and Elliot creeks		Add wood to streams to enhance fish habitat
8.B.4	Rogue Middle	Oregon Department of Fish and Wildlife	Gold Ray Dam		Monitor marine survival of wild coho produced in Rogue River Basin
11.A.1	Rogue Middle	Middle Rogue Watershed Council	Neil Creek	fish passage	construct more fish ladders to and to design change
11.A.6	Rogue Middle	Oregon Department of Fish and Wildlife	Savage Rapids Dam Rogue River Basin		Remove artificial fish barriers or minimize their impact on fish passage
12.A.6	Rogue Middle	Middle Rogue Watershed Council	Bear Creek	off channel development/wetland creation	restore land and water for fish to live
12.A.7	Rogue Middle	Middle Rogue Watershed Council	Rogue River	Bank Stabilization	Install riprap and Gabions to stabilize banks
12.A.7	Rogue Middle	Middle Rogue Watershed Council	Tyler/Bear Creek	Tyler Creek Bank Stabilization	Keep sediment out of the stream
13.A.1	Rogue Middle	Middle Rogue Watershed Council	Quartz Creek		Large wood and boulder structures will be placed into the stream to provide spawning gravel, pools and also provide shelter for fish during high flow periods
15.A.2	Rogue Middle	Middle Rogue Watershed Council	Bear Creek	Irrigation Improvements	Minimizing water temperature and reducing sediment and nutrient inputs into waterway
17.A.2	Rogue Middle	Middle Rogue Watershed Council	Bear Creek	Sediment Reduction	Keeping sediment out of the water

Action Code	Watershed	Lead Management Agency/Organization	Name of Stream	Name of Project	Watershed Actions Undertaken to Address Salmonid Habitat Conditions
17.A.2	Rogue Middle	Middle Rogue Watershed Council	Tribs	Sediment reduction	reduce the sediment
17.A.5	Rogue Middle	Middle Rogue Watershed Council	Tribs (Taylor Creek)	planting and fencing	to plant more trees
17.A.5	Rogue Middle	Middle Rogue Watershed Council	Rogue River	Sediment Reduction	Construct a flume to control erosion
17.A.6	Rogue Middle	Middle Rogue Watershed Council	Bear Creek	Planting	Give shade to the fish
17.A.6	Rogue Middle	Middle Rogue Watershed Council	Tribs	Planting	Watershed rehabilitation
17.B.1	Rogue Middle	Middle Rogue Watershed Council	Rogue River	Road Maintenance	Maintain 23 miles of forest roads to minimize sedimentation
17.B.1	Rogue Middle	Middle Rogue Watershed Council	Upper Rogue River Area	Sediment Reduction	Reduce sediment and drainage vegetation
17.B.2	Rogue Middle	Middle Rogue Watershed Council	Limpy Creek	Limpy Creek Bridge Replacement	replace the Limpy Creek Bridge
18.B.1	Rogue Middle	Oregon Department of Fish and Wildlife	Savage Rapids Dam-Rogue River		Remove artificial fish barriers or minimize their impact on fish passage
19.B.1	Rogue Middle	Oregon State Police	Middle Rogue HUC: Evans, Salt, Battle, Rock, Coal creeks		Work cooperatively with government resource agencies and watershed councils to teach rules, regulations and alternative methods of resource utilization
19.B.5	Rogue Middle	Oregon Department of Transportation	Grants Pass		Educate bridge maintenance crews on ways to minimize impacts upon fish
20.B.3	Rogue Middle	Oregon Department of Fish and Wildlife	Huntley Park, Gold Ray Dam; Rogue River and tributaries		Monitor marine survival of wild coho produced in Rogue River Basin

ILLINOIS RIVER WATERSHED COUNCIL

The Illinois River Watershed Council was recognized by the Oregon Strategic Water Management Group on December 13, 1994. The objective of the council is to promote the recovery of anadromous fish stocks in the Rogue Basin by improving habitat and natural resource conditions in the Illinois Valley through the encouragement of water conservation and development, the reduction of soil erosion, the improvement of water quality and the enhancement of woodland resources.

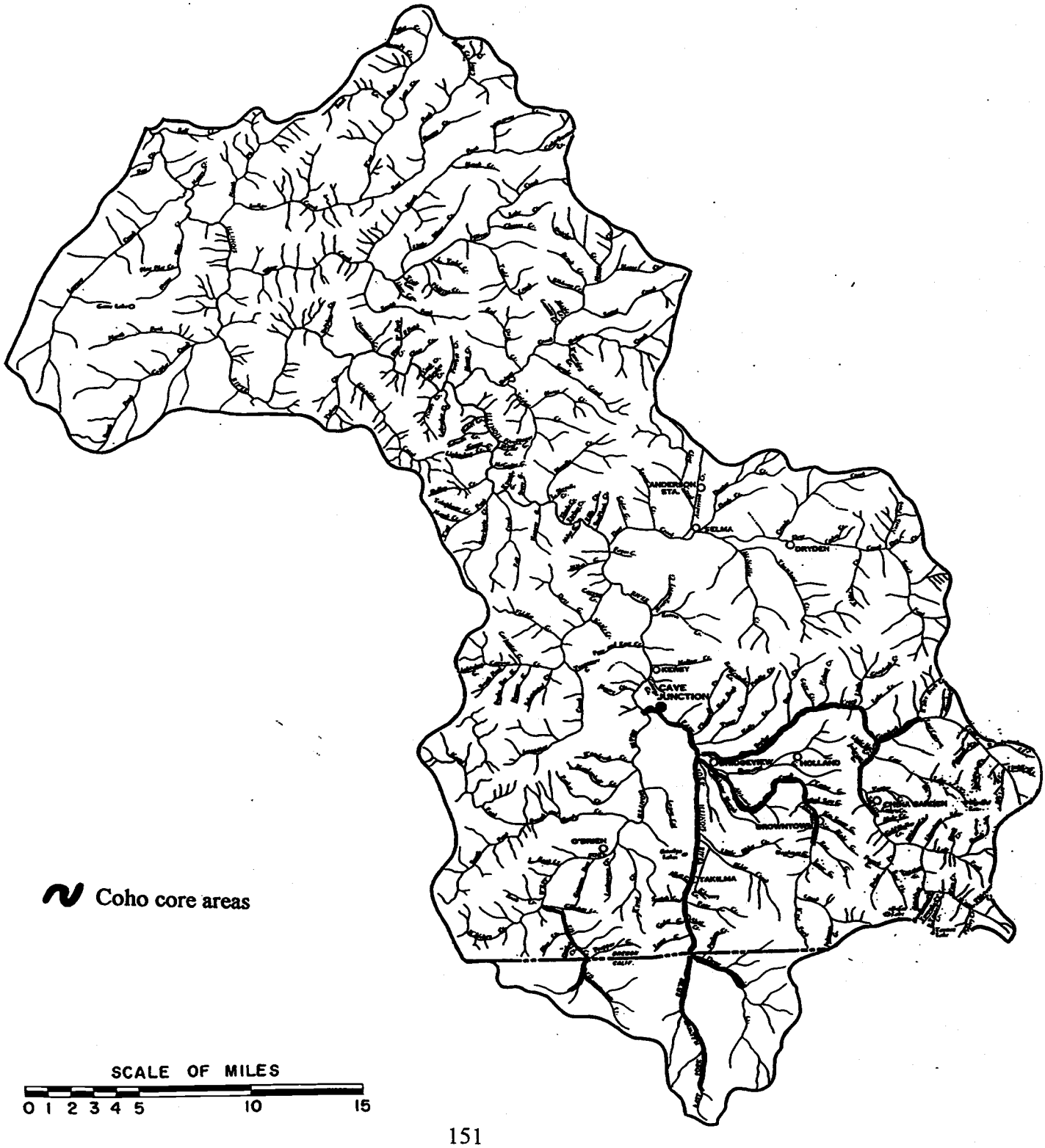
The Illinois River Watershed Council has been closely aligned with the local Soil and Water Conservation district and the Rogue Valley Council of Governments since its inception. The Soil and Water Conservation District was recommended by the Josephine County Commissioners to serve as the official watershed council in response to HB 2215. Other community members were added to the SWCD board to provide greater diversity of membership. The council coordinator is an employee of the Rogue Valley Council of Governments with office space, materials and equipment provided by the Josephine SWCD.

Gravel push-up dams are numerous throughout the Illinois River Watershed. The dams adversely affect water temperature, fish passage and habitat. In a concerted, cooperative effort to mitigate the effects of the push-up dams, the watershed council, the Oregon State Police, Oregon Department of Fish and Wildlife, Oregon Water Resources Department, Department of Forestry, Bureau of Land Management, Division of State Lands, Corps of Engineers, Natural Resource Conservation Service and landowners are replacing the dams with alternatives. The results of the project have been so successful other watershed councils are replicating the process. The push-up dams Task Force has completed one year of activity on implementing its Action Plan, and will be continuing into 1977.

The stable funding of Illinois Valley Watershed Council and its collaboration with other agencies has resulted in the continuity of personnel and many other successful projects, such as extensive tree planting, in addition to the elimination of push-up dams. The success of the projects fosters motivation, enthusiasm and dedication among Illinois Valley residents.

Corky Lockard is coordinator of the Illinois River Watershed Council. Phone: (541)592-3731 Address: P.O. Box 352 Cave Junction, OR 97512.

Map 17. Illinois River Coho Core Areas



Coho core areas

ILLINOIS RIVER WATERSHED
Watershed Habitat Limiting Factors and Restoration Actions

LIMITING FACTOR	STREAM	CODE	ACTIONS NEEDED	PAGE APDX 2
Water temperature	Althouse East Fork Illinois Grayback/Sucker	1.A.1	Increase canopy cover.	A-2-3
Low stream flow	Althouse East Fork Illinois Grayback/Sucker	2.A.3	Manage water withdrawals for maximum efficiency and conservation. See Riparian Quality actions.	A-2-4
Riparian quality	Althouse East Fork Illinois	3.A.2	Increase the vegetation density and diversity of plant species.	A-2-5
Lack of instream structures	Althouse East Fork Illinois Elk Grayback/Sucker	4.A.1 4.B.1	Increase large woody debris and boulders in streams. Plant conifers in riparian zone.	A-2-6
Pool frequency	Althouse Grayback/Sucker	5.B.1	Specifically place logs and boulders to create pools.	A-2-7
Fish passage	Althouse East Fork Illinois Grayback/Sucker	11.A.4	Modify culverts restricting fish passage.	A-2-11
Habitat loss	Althouse East Fork Illinois Elk Grayback/Sucker	12.A.7 12.A.8	Use Hire the Fisherman and Jobs in the Woods programs to protect and enhance coho habitat. Restore areas heavily impacted by mining.	A-2-13
Wintering habitat	Althouse Grayback/Sucker	13.A.1	Large wood and boulder structures will be placed or secured in streams to provide shelter.	A-2-14
Erosion, sediment and turbidity	Althouse East Fork Illinois Grayback/Sucker	17.A.1 17.A.2 17.A.3 17.A.4	Fence streams and use alternative methods for providing water to livestock away from streams. Enforce timber harvest practices that protect watershed from erosion. Use selective harvesting, helicopter logging, buffer zones and develop logging road specifications. Close and revegetate unused roads. Enforce mining regulations.	A-2-18

Action Code	Watershed	Lead Management Agency/Organization	Name of Stream	Name of Project	Watershed Actions Undertaken to Address Salmonid Habitat Conditions
1.A.4	Illinois	Illinois Basin Interest Group	Illinois Basin		Encourage private landowners to plant tree in riparian areas to increase canopy cover
1.F.1	Illinois	Illinois Watershed Council	Illinois Basin		Infrared flyover of Illinois River Basin
2.A.4	Illinois	Oregon Water Resources Department	Illinois River		Obtain instream water rights/leases
3.A.3	Illinois	Illinois River Watershed Council	Deer Creek	Illinois Road Decommission	Decommission 15 miles of Roads in the Deer Creek Drainage
3.A.3	Illinois	Illinois River Watershed Council		Road Improvement/Sediment Reduction	Dunn Cr.9 1/2m E. Fr.Illinois 3m Jerry Cr. 5m upper E.Fr. Illinois 14m
3.A.6	Illinois	Oregon Department of Agriculture	Illinois HUC		Instream structure work, riparian fencing, plantings through Habitat Restoration Jobs program and Landowner Incentives and Demonstration program
5.B.1	Illinois	Illinois River Watershed Council	West Fork Illinois River	Elting Salmonid off-channel Rearing	Rearing Ponds
5.B.1	Illinois	Oregon Department of Agriculture	Illinois HuC		Instream structure work, riparian fencing, plantings through Habitat Restoration Jobs program and Landowner Incentives and Demonstration program
5.B.3	Illinois	Bureau of Land Management	Ninemile Creek		Add wood instream, repair log and rock weirs, restore channel and do riparian plantings
12.A.4	Illinois	Illinois River Watershed Council	East Fork Illinois River	Illinois Valley Push Up Dam Removal	Remove push up dams and replace with an appropriate alternative
12.A.4	Illinois	Illinois River Watershed Council	Althouse Creek	Illinois Valley Push Up Dam Removal	Remove push up dams and replace with an appropriate alternative
12.A.4	Illinois	Illinois River Watershed Council	Anderson Creek	Illinois Valley push up dam removal	remove push up dams and replace with an appropriate alternative
12.A.4	Illinois	Illinois River Watershed Council	Lewisingen Creek	Illinois Valley Push Up Dam Removal	Remove push up dams and replace with an appropriate alternative
12.A.4	Illinois	Illinois River Watershed Council	West Fork Illinois River	Illinois Valley Push Up Dam Removal	Remove push up dams and replace with an appropriate alternative
12.A.4	Illinois	Illinois River Watershed Council	Sucker Creek	Illinois Valley Push Up Dam Removal	Remove push up dams and replace with an appropriate alternative
12.A.4	Illinois	Illinois River Watershed Council	Deer Creek	Illinois Valley Push Up Dam Removal	Remove push up dams and replace with an appropriate alternative
12.A.4	Illinois	Illinois River Watershed Council	East Fork Illinois	Illinois Valley Push Up Dam Removal	Remove push up dams and replace with an appropriate alternative
12.A.4	Illinois	Oregon State Police	Illinois River HUC		Elimination of push-up dams

Action Code	Watershed	Lead Management Agency/Organization	Name of Stream	Name of Project	Watershed Actions Undertaken to Address Salmonid Habitat Conditions
12.A.6	Illinois	Illinois River Watershed Council	Illinois River	Conservation Easement	Apply for and acquire a conservation easement to protect water flows
12.A.6	Illinois	Illinois River Watershed Council	Sucker Creek	Stehelin Wetland and Fish Habitat Enhancement	Development of a wetland enhancement area
12.A.7	Illinois	Illinois River Watershed Council	Crooks Creek	Illinois Bank Stabilization	Bank Stabilization
12.A.7	Illinois	Illinois River Watershed Council	Draper Creek	Illinois Bank Stabilization	Bank Stabilization
12.A.7	Illinois	Illinois River Watershed Council	Althouse Creek	Illinois Bank Stabilization	Bank Stabilization
12.A.7	Illinois	Illinois River Watershed Council	Deer Creek	Illinois Bank Stabilization	Bank Stabilization
12.A.8	Illinois	Illinois Watershed Council	Illinois River watershed		Plans are underway to restore many of the most heavily impacted mining areas. Most of this activity will be on USFS land, but the Watershed Council is negotiating with several private landowners to initiate habitat improvement projects
13.A.1	Illinois	Illinois River Watershed Council	E. Fork Illinois River	Fish Habitat Bundles	thinning material & construct brush bundles that will be placed in stream
14.A.2	Illinois	Illinois Watershed Council	East Fork Illinois River		Work on getting locking headgates on irrigation ditches to control flow and provide incentives for increased efficiency
14.A.3	Illinois	Illinois River Watershed Council	Rough & Ready Creek	Wing/Ferrin Ditch Rehabilitation	Put pipe in to creek to Eliminate leakage
16.A.5	Illinois	Illinois Watershed Council	Elk Creek		Educate landowners on the benefits to their operations in returning streams to their natural state by allowing the streams to resume their historic meandering
17.A.1	Illinois	Illinois River Watershed Council	Illinois River	Bill Phohl lands: Tree planting & Fencing	trees were planted & fencing was to protect the river from livestock
17.A.3	Illinois	Illinois River Watershed Council	East Fork Illinois River	E. Fork Illinois Sediment Control	Roads & adjacent slopes were stabilized & seeded to reduce sedimentation
17.A.3	Illinois	US Forest Service	Grayback/Sucker Creeks		New road building is being kept to a minimum and unused roads stabilized and closed
17.A.4	Illinois	US Forest Service	Althouse Creek		Old mining ditch walls that traverse across stream channels will be broken open to prevent water diversions to new locations on hillslopes

Action Code	Watershed	Lead Management Agency/Organization	Name of Stream	Name of Project	Watershed Actions Undertaken to Address Salmonid Habitat Conditions
17.A.6	Illinois	Illinois River Watershed Council	Illinois River System	Forest Management	Thinning, stocking level control, hardwood seeding, conifer planting
17.A.6	Illinois	Illinois River Watershed Council	Illinois River Basin	Illinois Valley Tree Planting	Trees are planted by 150-250 volunteers usually on private land
18.B.1	Illinois	Oregon State Police	Illinois River HUC		Elimination of push-up dams
19.A.3	Illinois	Illinois River Watershed Council	West Fork-Evans Creek	W. Fork Evans Stream Surveys	Volunteers surveyed 25 miles of the Stream and provided info. to ODFW
19.B.1	Illinois	Oregon State Police	Illinois HUC: Sucker, Grayback, Elk, Althouse, Broken Kettle creeks, Illinois River		Work cooperatively with government resource agencies and watershed councils to teach rules, regulations and alternative methods of resource utilization

LOWER ROGUE RIVER WATERSHED COUNCIL

The Lower Rogue River Watershed Council represents the communities at the southernmost reaches of the Rogue river. Unlike many of the councils, the Lower Rogue Council had no predecessor group. An ad was placed in the paper advising interested persons of the formation of a watershed council in accordance with HB 2215. A sufficient number of people responded to form a council.

Many of the conditions on the lower Rogue watershed are vastly different from those of the other seven watershed council areas. The differences range from climate to topography, from economy to vegetation. The common denominator for all the watershed councils, however, is the condition of the salmon and their habitat. As with all watersheds, the effects of human activity are evidenced by the health of the environment and its native inhabitants.

Because of the Lower Rogue's proximity to the South Coast watershed councils, it works closely with those councils, yet maintains contact with the Rogue Basin Steering Committee, its members and activities.

Federal ownership of land is prevalent throughout the Rogue Basin. In the Lower Rogue 80% of the land is under federal jurisdiction. Private holdings, including those of the Hancock Insurance Company, tend to be managed for timber production. Projects of the Lower Rogue River Watershed council have encompassed fish passage, habitat improvement and education.

Mark Weinhold and Margaret Forbes serve as coordinators of the Lower Rogue River Watershed Council. Mark- Phone: (541)247-2871 Address: 97063 Bluebird Lane Gold Beach, OR 97444 Margaret-Address: P.O. Box 1315 Brookings, OR 97415.

Map 18. Lower Rogue River Coho Core Areas

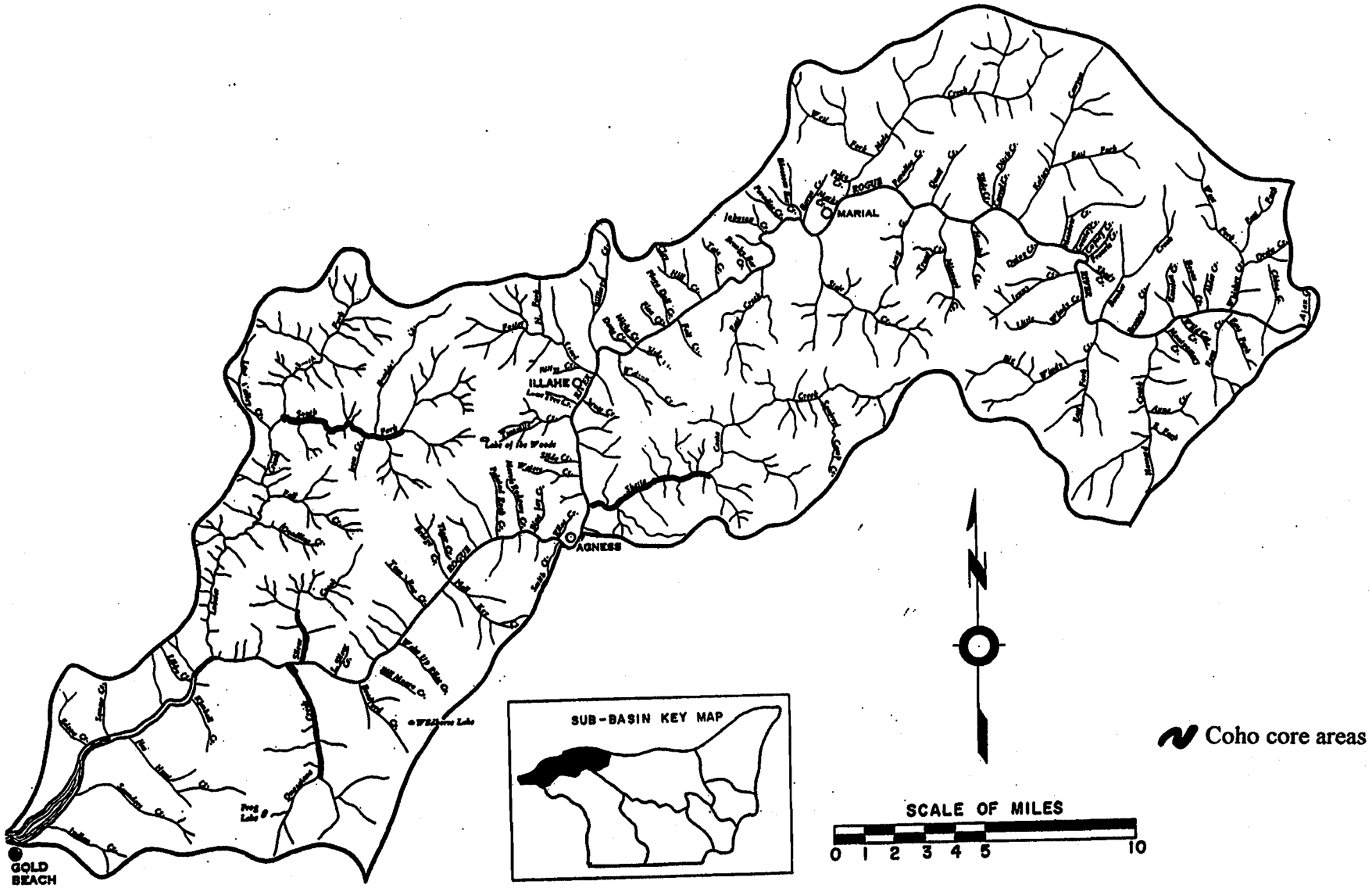


FIGURE 22A

LOWER ROGUE WATERSHED
Watershed Habitat Limiting Factors and Restoration Actions

LIMITING FACTOR	STREAM	CODE	ACTIONS NEEDED	PAGE APDX 2
Water temperature	Shasta Costa Silver South Fork Lobster Quosatana	1.A.1 1.A.3 1.D.2 1.E.1	Increase canopy cover. Manage riparian zone for multilayered canopy. Monitor return flows and determine problem area. Monitor and address water temperatures through interagency and community-wide cooperation.	A-2-3
Low stream flow	Lobster		See Riparian Quality and Canopy Cover actions.	
Riparian quality	Lobster	3.A.1 3.A.2 3.A.3	Increase riparian zone as appropriate. Increase the vegetation density and diversity of plant species. Manage riparian vegetation for a multi-layered canopy.	A-2-5
Canopy cover	Lobster	6.A.1 6.A.3	Plant sufficient conifers to provide a 50% mixture of conifers and deciduous trees, where growing conditions permit. (For Lobster Creek, an 85-15 % conifer-deciduous mix is recommended.) Plant trees along the stream to increase canopy cover.	A-2-8
Fish passage	Silver South Fork Lobster Quosatana	11.A.4	Modify culverts restricting fish passage.	
Habitat loss	Shasta Costa Silver South Forest Lobster	12.A.1 12.A.2	Monitor riparian management areas under Forest Practices Act. Develop and test approaches to timber practices which restore and maintain the quality of riparian habitat.	
Wintering habitat	Shasta Costa Silver South Fork Lobster Quosatana	13.A.1 13.B.1 13.B.2	Large wood and boulder structures will be placed or secured in streams to provide shelter. Open existing backwater channels that have filled with sediment. Create side channels with equipment such as backhoes.	A-2-14

Erosion, sediment and turbidity	Shasta Costa Silver South Fork Lobster Quosatana	17.A.2 17.A.3 17.A.7. 17.A.8 17.B.1 17.B.2 17.B.3	Enforce timber harvest practices that protect watershed from erosion. Use selective harvesting, helicopter logging, buffer zones and develop logging road specifications. Close and revegetate unused roads. Revegetate exposed upland areas. Establish and enforce standards to control erosion from commercial and residential development. Distribute to all pertinent agencies the Integrated Vegetation Management Plan for roads, rights-of-way. Pertinent agencies will follow Standards and Criteria for Stream Road Crossings. Pertinent agencies will work with ODOT in producing an erosion control handbook and in implementing the handbook practices.	A-2-18

Action Code	Watershed	Lead Management Agency/Organization	Name of Stream	Name of Project	Watershed Actions Undertaken to Address Salmonid Habitat Conditions
1.A.3	Rogue Lower	Lower Rogue Watershed Council	Rogue River	Lower Rogue Educational Restoration	monitoring of riparian planting & instream structures,implement fish watch pro.
3.A.3	Rogue Lower	Lower Rogue Watershed Council	Lobster Creek/Big Draw Road	Road Improvements	Road storm proofing replacing undersized culverts
3.A.3	Rogue Lower	Lower Rogue Watershed Council	Silver Creek	Silver Creek Riparian Conversion	Riparian conservation blocks on Industrial Timberland
3.A.3	Rogue Lower	Lower Rogue Watershed Council	Lawson Creek	Road Improvements	Improve roads to reduce sediments
4.A.1	Rogue Lower	Lower Rogue Watershed Council	Lobster Creek	Structures	put wood debris into water for fish to have a place to hide
4.B.1	Rogue Lower	Lower Rogue Watershed Council	N/A	Planting Native grasses for restoration	Grow grass to provide seed source for future restoration
5.B.1	Rogue Lower	Lower Rogue Watershed Council	Indian Creek	Indian Creek Fish Passage	Provide jump pools to provide passage over the dam
5.B.3	Rogue Lower	Lower Rogue Watershed Council	Indian creek	Indian Creek Fish Habitat Improvement	Installed 5 Rock Weirs to stabilize and create gravel spawning areas
5.B.3	Rogue Lower	Lower Rogue Watershed Council	Jim Hunt Creek	Instream Enhancement	Enhance stream habitat by placing 34 structures, including logs etc.
8.B.3	Rogue Lower	Oregon Department of Fish and Wildlife	Huntley Park		Monitor marine survival of wild coho produced in Rogue River Basin
10.A	Rogue Lower	Lower Rogue Watershed Council	Indian Creek	Indian Creek Hatchery Water Supply	develop water storage as back up supply for Indian Creek hatchery
10.A.3	Rogue Lower	Pacific Marine Fisheries Council	Rogue River estuary and in-river		Develop harvest opportunities on Rogue hatchery produced coho while minimizing impact on wild coho stock
11.A.4	Rogue Lower	Lower Rogue Watershed Council	Fall and Deadline Creeks	Lobster Creek Road Storm Proofing	Road Storm proofing-unplug culverts
11.A.5	Rogue Lower	Lower Rogue Watershed Council	Saunders Creek	Fish Passage	Removal of culverts to replace with bridge
11.A.6	Rogue Lower	Lower Rogue Watershed Council	Indian Creek	Indian Creek Watershed Enhancement	stabilize uplands enhance riparian and stream habitat provide fish passage
11.A.6	Rogue Lower	Lower Rogue Watershed Council	Dead Line Creek	Deadline Creek Fish Passage	Step stools to decrease drop to 8" Reestablish Fish Passage
12.A.7	Rogue Lower	Lower Rogue Watershed Council		Indian Creek Bank Stabilization	Seeding and mocking to restore bank cover

Action Code	Watershed	Lead Management Agency/Organization	Name of Stream	Name of Project	Watershed Actions Undertaken to Address Salmonid Habitat Conditions
12.A.7	Rogue Lower	Lower Rogue Watershed Council	Rogue River	Lower Rogue Bank Stabilization	Planting riparian along Rogue River to prevent erosion
17.A.5	Rogue Lower	Lower Rogue Watershed Council	Edson Creek	Riparian Enhancement	Fence 0.3 mi.riparian area along the creek and plant 0.3 mi of Riparian Habitat
17.A.6	Rogue Lower	Lower Rogue Watershed Council	Mule Creek	Mule Creek Tree Planting	Plant trees in the Mule Creek drainage for slope stabilization
19.B.1	Rogue Lower	Oregon State Police	Lower Rogue HUC: Lobster, Quosatana, Limpy, Quartz, Silver creeks		Work cooperatively with government resource agencies and watershed councils to teach rules, regulations and alternative methods of resource utilization

Action Code	Watershed	Lead Management Agency/Organization	Name of Stream	Name of Project	Watershed Actions Undertaken to Address Salmonid Habitat Conditions
1.E.1	Rogue	Rogue River National Forest	Rogue Basin		Place electronic thermograph in creeks throughout the Rogue Basin
2.A.1	Rogue	Oregon Water Resources Department	Southwest Oregon streams		Propose issuance of pending instream water rights to increase flows
2.A.5	Rogue	Oregon Department of Fish and Wildlife	Rogue Basin streams		Protect instream flows by acquiring instream water rights
6.A.4	Rogue	Oregon Department of Fish and Wildlife	Rogue River Basin		Promote habitat protection
8.B.1	Rogue	Oregon Department of Fish and Wildlife	Rogue River Basin		Solicit volunteers through sportsman's clubs, watershed councils, school groups, STEP and other sources to assist with habitat surveys, culvert surveys and spawning surveys
8.B.4	Rogue	Oregon Department of Fish and Wildlife	Rogue River and tributaries		Monitor marine survival of wild coho produced in Rogue River Basin
10.A.2	Rogue	Oregon Department of Fish and Wildlife	Rogue River Basin		Sampling, expansion and mathematical modeling for abundance, trends and status of coho
11.A.1	Rogue	Bureau of Reclamation	Non-Reclamation facilities located on federal lands and on non-federal diversions on private land		Design and construct fish passage facilities
11.A.2	Rogue	Bureau of Reclamation	Southern Oregon		Technical assistance for removal of push-up dams and design of alternatives
11.A.3	Rogue	Bureau of Reclamation	Savage Rapids Dam		Technical assistance to Savage Rapids Dam Task Force to evaluate alternatives for improving fish passage
11.A.4	Rogue	Oregon Department of Transportation	Jackson, Josephine, Curry, Coos counties		Replacement and modification of culverts hindering fish passage
12.A.2	Rogue	Oregon Department of Environmental Quality	Rogue Basin		Development and testing of approaches to timber practices which restore and maintain quality of riparian habitat
12.A.5	Rogue	ODFW, ORWD, DOF, ODOT, BLM, USACE, NRCS, watershed councils, irrigation districts, landowners	Antelope Creek-Rogue River Basin		Remove artificial fish barriers or minimize their impact on fish passage
12.A.7	Rogue	National Marine Fisheries Service	Pacific Northwest		Hire the Fishermen projects such as fencing streams, stabilizing stream banks

Action Code	Watershed	Lead Management Agency/Organization	Name of Stream	Name of Project	Watershed Actions Undertaken to Address Salmonid Habitat Conditions
14.A.3	Rogue	Bureau of Reclamation	Rogue River Basin		Work with water users to implement irrigation block water management and cooperate in a general water conservation evaluation of the Bear Creek drainage. Continue assistance for irrigation districts in developing and implementing water conservation plans through the Field Services Program.
14.A.3	Rogue	Bureau of Reclamation	Rogue River Basin		Continue to provide assistance for irrigation districts in developing and implementing water conservation plans through the Field Services Program
14.A.4	Rogue	Oregon Department of Fish and Wildlife	Rogue Basin streams		Protect instream flows by acquiring instream water rights
14.A.7	Rogue	Bureau of Reclamation	Irrigation districts		Assist irrigation districts in planning and implementing monitoring programs
15.A.2	Rogue	Oregon State Police	Rogue Basin		Assessment of waterway pollution, hazardous materials violations, industrial waste violations, pesticide use violations, point and non-point source pollution
15.B.2	Rogue	Oregon Department of Transportation	Josephine, Jackson, Curry, Coos counties		Nonrenewal of aggregate site permits located in or along streams
15.B.6	Rogue	Division of State Lands	Specified waters		Inform ODFW, DOGAMI, ODF, DEQ, ODA, OPRD, OSMB, ODOT, EDD, local governments that they may request OWRD to close specified waters to removal-fill
19.B.7	Rogue	Oregon Department of Fish and Wildlife	Rogue River Basin		Development of a restoration guide based on prior research and monitoring
20.A.1	Rogue	Oregon Department of Fish and Wildlife	Rogue River Basin		Conduct spawning surveys to establish standard survey areas for stratified random survey methodology on coho producing streams throughout the Rogue Basin to design a long term sampling plan
20.B.2	Rogue	Oregon Department of Environmental Quality	Rogue River Basin		Development and testing of approaches to timber practices which restore and maintain quality of riparian habitat

SOUTH COAST COORDINATING WATERSHED COUNCIL

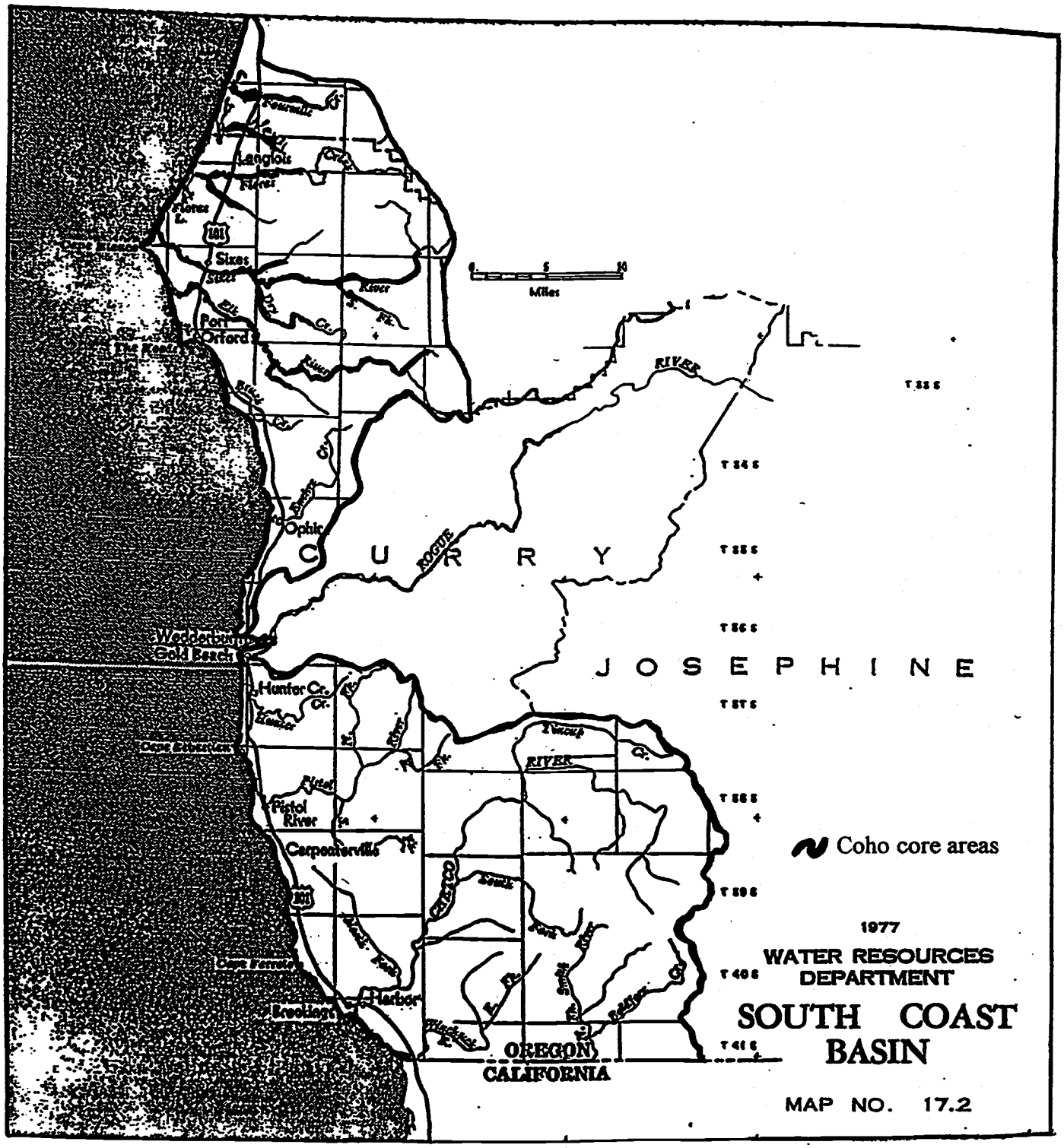
The South Coast Coordinating Watershed Council is an umbrella organization encompassing all watershed councils south of the Coquille River to the Oregon-California border, excluding the Rogue River drainage. The South Coast Coordinating Watershed Council was officially recognized by the Strategic Water Management Group in August of 1994. The Coordinating Council worked with people in each of the 16 watersheds to form councils. Once the councils were developed, they were then recognized and became part of the Coordinating Council.

The sixteen watersheds contain over 100 miles of coastline. Five rivers, ten creeks and some smaller watersheds empty directly into the Pacific Ocean. Extending inland up to 30 miles, the South Coast Watershed is influenced hydrologically, geologically, climatically and topographically by its proximity to the Pacific, creating a region different in many respects from most of the Rogue Basin.

The South Coast Coordinating Watershed council has been a smoothly functioning group which has planned and accomplished many projects. They have made excellent progress in developing sources of funding which will help to ensure the continuation of the organization and its efficacy in salmon restoration.

Luci LaBonte is coordinator for the South Coast Coordinating Watershed Council. Phone: (541)469-0935 Address: P.O. Box 7996 Brookings, OR 97415

Map 19. South Coast Coho Core Areas



SOUTH COAST BASIN - ELK/SIXES /FLORAS/NEW RIVER/FOURMILE
Watershed Habitat Limiting Factors and Restoration Actions.

LIMITING FACTOR	STREAM	CODE	ACTIONS NEEDED	PAGE APDX 2
Water temperature	Elk/Sixes/Floras/ New River/ Fourmile	1.A.1 1.A.3	Increase canopy cover. Manage riparian zone for multilayered canopy.	A-2-3
Low stream flow	Elk/Sixes/Floras/ New River/ Fourmile	 2.A.3	See Riparian Quality Manage water withdrawals for maximum efficiency and conservation.	A-2-4
Riparian quality	Elk/Sixes/Floras/ New River/ Fourmile	3.A.2 3.A.3	Increase the vegetation density and diversity of plant species. Manage riparian vegetation for a multi-layered canopy. See Lack of Instream Structures.	A-2-5
Lack of instream structures	Elk/Sixes/Floras/ New River/ Fourmile	4.A.1 4.B.1	Increase large woody debris and boulders in streams. Plant conifers in riparian zone.	A-2-6
Wintering habitat	Elk/Sixes/Floras/ New River/ Fourmile	13.A.1 13.B.1	Large wood and boulder structures will be placed or secured in streams to provide shelter. Open existing backwater channels that have filled with sediment.	A-2-14
Stream complexity	Elk/Sixes/Floras/ New River/ Fourmile	16.A.1 16.A.2 16.A.3	Work with landowners to locate sites for construction of side channels and alcoves. Cooperate with landowners, watershed councils, state and federal agencies to fund and construct side channels and alcoves. Initiate an educational program to promote protection of beavers and to deal with the results of beaver dams.	A-2-17

Erosion, sediment and turbidity	Elk/Sixes/Floras/ New River/ Fourmile	17.A.1 17.A.2 17.A.8	Fence streams and use alternative methods for providing water to livestock away from streams. Enforce timber harvest practices that protect watershed from erosion. Use selective harvesting, helicopter logging, buffer zones and develop logging road specifications. Establish and enforce standards to control erosion from commercial and residential development.	A-2-18

Action Code	Watershed	Lead Management Agency/Organization	Name of Stream	Name of Project	Watershed Actions Undertaken to Address Salmonid Habitat Conditions
1.A.1	South Coast	South Coast Watershed Council	Cedar Creek	Cedar Creek Fish Habitat	Install Large Wood Structures into creek for fish habitat
1.A.1	South Coast	South Coast Watershed Council	Cedar Creek	Cedar Creek Fish Habitat	Place rock barbs in creek for fish habitat and flow deflectors
1.A.1	South Coast	South Coast Watershed Council	Cedar Creek	Cedar creek Fish Habitat	Install rock barbs for fish habitat and slow deflectors in Cedar Creek
1.A.1	South Coast	South Coast Watershed Council	Wheeler Creek	Wheeler Creek Fish Habitat Improvement	maintenance of existing structures
1.A.1	South Coast	South Coast Watershed Council	Willow Creek	Wheeler Creek Fish Habitat Improvement	replace culverts for easier fish passages
1.A.1	South Coast	South Coast Watershed Council	Cedar Creek	Cedar Creek Fish Habitat	Place boulders and rock deflectors in creek for fish habitat and flow deflectors
1.A.1	South Coast	South Coast Watershed Council	Euchre Creek	Euchre Creek Fish Habitat	Put Trees into creek to create Habitat
1.A.3	South Coast	Oregon Department of Forestry	South Coast		Monitor riparian management areas under Forest Practices Act
3.A.3	South Coast	South Coast Watershed Council	Winchuck River	Road Improvement/Sediment Reduction	Storm proofed and decommissioned roads
3.A.3	South Coast	South Coast Watershed Council	Cedar Swamp	Cedar Swamp Road Stabilization	Stabilize road
3.A.3	South Coast	South Coast Watershed Council	Chetco River	Road Improvement/Sediment Reduction	road maintenance to keep the sediment level down to a min.
3.A.6	South Coast	Oregon Department of Agriculture	Sixes River HUC		Instream structure work, riparian fencing, plantings through Habitat Restoration Jobs program and
4.A.1	South Coast	South Coast Watershed Council	Middle Fork Sixes	Structures	Log placements
4.A.1	South Coast	South Coast Watershed Council	Cedar Creek	Structures	wood, boulders, barbs, fish rock, deflectors, weirs
4.A.1	South Coast	South Coast Watershed Council	Edson Creek	Structures	Log Deflectors, rootwads and boulders
5.B.1	South Coast	Oregon Department of Agriculture	Sixes River HUC		Instream structure work, riparian fencing, plantings through Habitat Restoration Jobs program and
5.B.1	South Coast	South Coast Watershed Council	Langlois Creek	Knapp Pond Construction	construct 10 acre pond for a weir source
5.B.3	South Coast	South Coast Watershed Council	Pea Creek	Euchre Creek Stream Habitat Improvement	Place boulders and log weirs for bank protection and fish habitat

Action Code	Watershed	Lead Management Agency/Organization	Name of Stream	Name of Project	Watershed Actions Undertaken to Address Salmonid Habitat Conditions
5.B.3	South Coast	South Coast Watershed Council	2nd Creek	Chetco Stream habitat improvement	repair existing weirs
5.B.3	South Coast	South Coast Watershed Council	Deep Creek	Pistol River Stream Habitat Improvement	Place 5 Structures in Deep Creek to improve fish habitat over a 2m stream segment
5.B.3	South Coast	South Coast Watershed Council	Hunter Creek	Hunter Creek Stream Enhancement	Install deflector logs, rootwads and boulders structures for fish habitat
6.A.2	South Coast	Oregon Department of Forestry	South Coast		Monitoring of riparian management areas under Forest Practices Act
6.A.3	South Coast	South Coast Watershed Council	Euchre Creek	Structures	Put trees into creek to add shade for the fish
6.A.4	South Coast	South Coast Watershed Council	Jack Creek	Structures	cover for the fish
8.A.3	South Coast	Oregon State Police	Rogue and South Coast basins		Provide an effective enforcement program in situations where cooperative efforts are unsuccessful
11.A.1	South Coast	South Coast Watershed Council	Bear Creek/Little Butte	Structures	fish passages
11.A.1	South Coast	South Coast Watershed Council	Pea Creek	Fish Passage	put culverts in for the fish
11.A.4	South Coast	South Coast Watershed Council	Deep Creek	Pistol Stream habitat improvement	Install baffles in a culvert on Deep Creek to improve fish passage
11.A.4	South Coast	South Coast Watershed Council	North & South Forks	Fish Passage	Fish ladders and replace culverts with a bridge
11.A.4	South Coast	South Coast Watershed Council	Langlois Creek	Langlois Creek Culvert Installation	Install Culvert into Langlois Creek to improve fish passage
11.A.4	South Coast	South Coast Watershed Council	Chetco	Prot Improvement	replaces culvert in the Chetco sport boat basin to improve quality
12.A.1	South Coast	Oregon Department of Forestry	South Coast		Monitor riparian management areas under Forest Practices Act
12.A.3	South Coast	Oregon Department of Forestry	South Coast		Monitoring of trees along Type N streams for 25 per cent requirement
12.A.4	South Coast	South Coast Watershed Council	Jacks Creek	off channel development	pull culvert to increase alcove size and provide habitat complexity
12.A.6	South Coast	South Coast Watershed Council	Middle Fork Sixes	off channel development/wetland creation	side channel developments

Action Code	Watershed	Lead Management Agency/Organization	Name of Stream	Name of Project	Watershed Actions Undertaken to Address Salmonid Habitat Conditions
12.A.7	South Coast	South Coast Watershed Council	Willow Creek	South Coast Bank Stabilization	Bank Stabilization
12.A.7	South Coast	South Coast Watershed Council	Pistol River	Lower Pistol Streambank stabilization	stabilize streambank by placing 20 wood structures to prevent erosion
12.A.7	South Coast	South Coast Watershed Council	Winchuck River	Winchuck estuary habitat improvement	Improve estuary habitat with large wood cover structures
12.A.7	South Coast	South Coast Watershed Council	Pea Creek	Euchre Creek Culvert Replacement	Replace 2 Culverts on Creek to improve fish passage
12.A.7	South Coast	South Coast Watershed Council	Floras Creek	South Coast Bank Stabilization	Bank Stabilization
12.A.7	South Coast	South Coast Watershed Council	Chetco River	Lower Chetco Stabilization	stabilize about 11.4 miles of stream bank along the lower to eliminate erosion
12.A.7	South Coast	South Coast Watershed Council	Floras Creek	South Coast Bank Stabilization	Bank stabilization
12.A.7	South Coast	South Coast Watershed Council	Jack Creek	Structures	Stabilizing bank streams
12.A.7	South Coast	South Coast Watershed Council	Floras Creek	Floras Creek Riparian Habitat Improvement	plant trees and fence the riparian area along streams
13.A.1	South Coast	South Coast Watershed Council	Winchuck River	Winchuck Stream Habitat Improvement	Place boulders and rootwad structures in the River for fish habitat
13.A.1	South Coast	South Coast Watershed Council	South Fork/Winchuck River	S.Fr. Winchuck Stream Habitat Improvement	Provide cover with both boulders and wood for about 3 miles of stream
13.A.1	South Coast	South Coast Watershed Council	Pistol River	Lower Pistol River Stream Enhancement	Place rootwads and boulders in the stream to enhance fish habitat
13.A.1	South Coast	South Coast Watershed Council	Pea Creek	Euchre Creek Stream Habitat Improvement	Place barbs,points and fish rocks in the stream for fish habitat
13.A.1	South Coast	South Coast Watershed Council	Euchre Creek	Euchre Creek Stream Habitat Improvement	Place barbs, fish rocks in the stream to improve fish habitat and reduce
13.A.1	South Coast	South Coast Watershed Council	Emily Creek	Emily Creek Stream Rehabilitation	woody material added to creek to improve salmonid Habitat
13.A.1	South Coast	South Coast Watershed Council	Elk River	Elk River Stream Habitat Enhancement	Place large woody debris structures in River to provide additional fish habitat.
13.A.1	South Coast	South Coast Watershed Council	Schoolhouse Creek	Schoolhouse Creek habitat improvement	place boulders and rootwad structures in the River for fish habitat

Action Code	Watershed	Lead Management Agency/Organization	Name of Stream	Name of Project	Watershed Actions Undertaken to Address Salmonid Habitat Conditions
14.A.1	South Coast	Oregon Water Resources Department	Coastal basins		Install 20 staff gages on priority streams and near critical habitat areas identified in MOU. Add telemetry to gaging stations to enhance Department capability to monitor instream flows on coastal streams. Develop a mechanism to distribute flow information to other agencies.
14.A.10	South Coast	Oregon Water Resources Department	All coastal basins		Digitize water maps for all coastal basins to aid in regulation and water use monitoring
15.B.5	South Coast	Department of Geology and Mineral Industries	Most coastal watersheds		Revise mine reclamation plans to include fish friendly methods
16.A.1	South Coast	South Coast Watershed Council	Elk and Sixes rivers		Resource agencies and the local watershed councils are working with landowners in locating sites for construction of side channels and reestablishing wetlands. Several projects have already been completed with several more planned.
16.A.3	South Coast	South Coast Watershed Council	Elk and Sixes rivers		An educational program has been initiated to promote protection of beavers and assist landowners in dealing with some of the conflicts with the construction of beaver dams.
17.A.1	South Coast	South Coast Watershed Council	Winchuck River	Winchuck off site watering facility	off site watering trough inside fences
17.A.1	South Coast	South Coast Watershed Council	Chetco River	Livestock watering	develop off site watering troughs inside fenced enclosure
17.A.1	South Coast	South Coast Watershed Council	Euchre Creek	Stock Watering	construct 11 stock watering troughs for three landowners on Euchre Creek
17.A.1	South Coast	South Coast Watershed Council	Euchre Creek	Livestock watering	water troughs off stream system
17.A.2	South Coast	Oregon Department of Forestry	Sixes River watershed		Watershed monitoring
17.A.3	South Coast	South Coast Watershed Council	S. Fork Elk/Butler	Road Obliteration	Road Obliteration
17.A.3	South Coast	South Coast Watershed Council	Bald Mtn. Creek	Bald MT. Road Obliteration	Obliterate and decommission 1.65 miles of road in the Bald Mt. Creek Watershed
17.A.3	South Coast	South Coast Watershed Council	Barklow Mt. Area	Barklow Mt. Trail Maintenance	Maintenance five miles of Barklow Mt. Trail
17.A.4	South Coast	Department of Geology and Mineral Industries	South Coast ESU		Monitor mine reclamation plans for fish friendly methods with inspections

Action Code	Watershed	Lead Management Agency/Organization	Name of Stream	Name of Project	Watershed Actions Undertaken to Address Salmonid Habitat Conditions
17.A.5	South Coast	South Coast Watershed Council	Euchre Creek	Riparian Restoration Demonstration	Planting and Fencing to improve fish and riparian habitat
17.A.5	South Coast	South Coast Watershed Council	Jack Creek	Jack Creek Habitat improvement	Planting and fencing 1.3 miles of riparian habitat along Jack Creek
17.A.5	South Coast	South Coast Watershed Council	Euchre Creek	Planting and fencing	Planting more trees and fencing
17.A.5	South Coast	South Coast Watershed Council	South Fork Winchuck River	S.Fr. Winchuck Riparian Habitat Improvement	plant and Fence about 2.5m of riparian habitat.
17.A.5	South Coast	South Coast Watershed Council	Winchuck River	Winchuck Riparian Habitat Improvement	Plant and fence 1.04 miles of riparian habitat along river
17.A.5	South Coast	South Coast Watershed Council	Cedar Creek	Cedar Creek Riparian	Plant and Fence 6,000 feet of riparian along Habitat Cedar Creek
17.A.5	South Coast	South Coast Watershed Council	Cedar Creek	Cedar Creek Restoration	Plant and Fence about 2,540 ft of riparian habitat along Cedar Creek
17.A.5	South Coast	South Coast Watershed Council	Pistol River	Pistol River Riparian Habitat Enhancement	Plant and Fence Riparian Habitat along Pistol River
17.A.5	South Coast	South Coast Watershed Council	Chetco River	Chetco Riparian Enhancement	Plant trees and fence .34 miles of riparian habitat along river
17.A.5	South Coast	South Coast Watershed Council	Winchuck River	Winchuck Riparian Habitat Improvement	Plant and fence 5 acres to enhance riparian habitat.
17.A.6	South Coast	South Coast Watershed Council	Elk River	Elk River Tree Planting	Plant trees on 6 miles of riparian habitat along Elk River
17.A.6	South Coast	South Coast Watershed Council	Hunter Creek	Hunter Creek Tree Planting	Plant trees in the lower Hunter creek Area
17.A.6	South Coast	South Coast Watershed Council	Pistol River	Pistol River Riparian Habitat Enhancement	Fence about 1/2 mile of Riparian habitat on Cedar Creek
17.A.6	South Coast	South Coast Watershed Council	Middle Fork Sixes	Planting	Plant more trees
17.A.6	South Coast	South Coast Watershed Council	Hubbard Creek	Planting	Planting more trees
17.A.6	South Coast	South Coast Watershed Council	Euchre Creek	Euchre Tree Planting	Riparian planting
17.A.6	South Coast	South Coast Watershed Council	Sixes River	Sixes tree planting	plant trees to improve riparian & upslope habitat for stabilization & Erosion
17.A.6	South Coast	South Coast Watershed Council	Hunter Creek	Hunter Creek Tree Planting	Plant more trees

Action Code	Watershed	Lead Management Agency/Organization	Name of Stream	Name of Project	Watershed Actions Undertaken to Address Salmonid Habitat Conditions
17.A.6	South Coast	South Coast Watershed Council	Middle Fork Sixes River	Sixes Tree Planting	Plant trees for slope stabilization and riparian habitat enhancement
17.A.6	South Coast	South Coast Watershed Council	Middle Fork	Planting	plant more trees
17.A.6	South Coast	South Coast Watershed Council	Cedar Creek	Cedar Creek Restoration	Plant about 8,000 feet of riparian habitat along Cedar Creek
17.A.6	South Coast	South Coast Watershed Council	Cedar Creek	Cedar Restoration	Plant 400 trees of riparian habitat along Cedar Creek
17.A.6	South Coast	South Coast Watershed Council	Willow Creek	Willow Creek Planting	Plant and fence 18 acres along Creek with 1800 trees
17.A.6	South Coast	South Coast Watershed Council	Sixes River	Planting	tree planting
17.A.6	South Coast	South Coast Watershed Council	Cedar Creek	Cedar Creek Restoration	Plant about 1,000 ft of riparian habitat along Cedar Creek
17.A.6	South Coast	South Coast Watershed Council	Elk River	Elk River Trees Planting	Plant trees on 240 acres in the Elk River Watershed for bank slope stabilization
17.B.2	South Coast	South Coast Watershed Council	Hamilton Creek	Jack Creek stream habitat improvement	add log weirs to Hamilton Creek to provide spawning & rearing habitat for the salmonids
17.B.2	South Coast	South Coast Watershed Council	Foggy Creek	Foggy Creek Bridge Replacement	Replace bridges and foggy Creek
18.A.1	South Coast	Regional Ecosystem Office	South Coast ESU		Develop database to facilitate sharing of species information among agencies
19.B.1	South Coast	Oregon State Police	Sixes HUC: Crystal, Edson, Dry, Murphy Canyon creeks		Work cooperatively with government resource agencies and watershed councils to teach rules, regulations and alternative methods of resource utilization
19.B.2	South Coast	Oregon Department of Transportation	Coos, Curry, Jackson and Josephine counties		Training in fish passage requirements in road construction and maintenance
20.A.2	South Coast	Regional Ecosystem Office	South Coast ESU		Develop database to facilitate sharing of species information among agencies

Relating Watershed Actions to Past Restoration Activities. A watershed actions assessment represents the next step in the analysis of actions undertaken within a hypothetical watershed. This level of analysis will be performed on all watersheds within the Rogue Basin-South Coast. The goal of this analysis is to establish where work has been done in identified core areas and to determine how to best focus actions to address unmet issues. This table is not intended to be an appraisal of the success of individual watersheds in implementing actions. At the time when the listed actions were planned and undertaken in individual watersheds, core areas and their priority actions had not yet been identified. Rather this analysis is an inventory of what actions have been taken in the past in order to allow watershed partners to focus their efforts on identified core area projects needed in the future.
Shown in the table below is the watershed assessment for a hypothetical watershed. In the table, *Limiting Factor* refers to those factors that have been identified as of regional concern for salmonids. *Code* refers to goals and specific actions identified to overcome the limiting factors (Codes are defined in Appendix 2). A short description of each action is given in the table. It should be noted that actions that address several goals are listed under more than one *Code* and *Limiting Factor*. *Number of Core Areas Needing Specific Actions* refers to the number of actions identified to address specific limiting factors in a core area. A zero in this column indicates that the specific action was not identified as a core area issue of regional concern. The numbers listed under *Number of Actions being Undertaken in Watershed* represent those actions reported as having been undertaken within a given watershed. These actions have been undertaken within a watershed by Watershed Councils and other private and public agencies and are not specific to core areas. These numbers represent a combination of those actions undertaken in core areas (those of regional concern), as well as those identified as priority watershed issues (local watershed concern).

An analysis will be performed on each individual watershed. For the example watershed in the table, 25 core area actions were identified. The watershed partners have undertaken 36 projects, 3 of which include core area actions of regional concern. From this analysis it is clear that watershed has been very active in projects of local watershed concern especially in the area of erosion control/sedimentation and fish passage. The assessment indicates that future efforts should focus actions on the identified core areas.

The watershed actions assessment will act as a tool for the watershed partners to determine a direction for future projects. It will allow for a base-line determination of where specific watersheds are in addressing core area concerns and allow the watersheds to focus future efforts to meet core area goals. The combination of individual watershed assessments is also intended to provide the information necessary to take a basin-wide approach to regionally significant projects.

Watershed Actions Assessment for a Hypothetical Watershed

Limiting Factor	Code	Description of Action	Number of Core Areas Needing Specific Actions	Number of Actions being Undertaken in Watershed
1. Water Temperature	1.A.1	Increase Canopy Cover	1	0
	1.A.3	Multilayered Canopy in Riparian	1	0
	1.D.2	Thermograph	0	1
2. Low Stream Flow	2.A.3	Manage Water Withdrawals	1	0
3. Riparian Quality	3.A.3	Multilayered Canopy in Riparian	1	0
	3.A.2	Cage trees to Prevent damage	0	2
4. Lack of Instream	4.A.1	Increase instream structures	3	0
	4.B.1	Plant Conifers	3	1
	4.B.2	Thin Conifers	0	1
5. Pool Frequency	5.B.1	Detention Ponds	3	1
	5.B.2	Add Woody debris	0	1
	5.B.3	Offstream alcoves added	3	0
6. Canopy Cover	6.A.3	Plant Trees	2	0
	6.A.4	Exclusions to protect vegetation	3	0
10. Hatchery Practices	10.A.1	Review Coho hatchery program	0	1
	10.A.4	Mark all hatchery fish	0	1
11. Fish Passage	11.A.6	Remove fish barriers	0	4
12. Habitat Loss	12.A.5	Remove fish barriers	0	1
13. Wintering Habitat	13.A.1	Increase instream structures	2	0
	13.B.1	Open offchannel alcoves	0	1
	13.B.2	Instream enhancement	0	1
14. Water Quality	15.A	Road improvements	0	1
15 Erosion/Sedimentation	17.A.1	Watering alternatives for livestock	1	1
	17.A.2	Selective harvesting	1	0
	17.A.3	Road improvement	0	1
	17.A.5	Fence sensitive areas	0	9

	17.A.6	Planting Projects	0	4
	17.B.1	Road improvements	0	1
18. Interagency Cooperation	18.B.1	Remove barriers to fish passage	0	2
19. Public Education	19.B.1	Collaborate to educate public	0	1

Section I. ADVANTAGES AND LIMITATIONS OF THE SOUTHWEST OREGON SALMON RESTORATION INITIATIVE

Step 8: Identify Assurances and Hindrances to Implementing Actions.

Abstract: **This section identifies the collective current and planned near-future actions which are being undertaken in the Southwest Oregon region to address the recovery of the native coho populations. The section also categorizes the actions based on which goals, limiting factors, and special concerns they address.**

In the future, we will offer a judgement on how successful these actions will be in meeting and accomplishing each goal, assurances that the actions will be conducted as needed, and the hindrances to progress that need to be overcome.

I.1. Implementation Plan.

There is great difficulty in trying to analyze the success of a multitude of actions by numerous agencies, organizations and individuals to accomplish any specific goal. Even under the best of conditions, actions across ownerships are only peripherally coordinated. Each entity has its own priority, restrictions, and time frames. So the question facing us was how to inventory the actions and analyze them as meeting specific coho needs (i.e. limiting factors and special concerns). We developed an implementation plan to accomplish this task.

I.1.a. Aggregation of Actions.

In the previous section an inventory system was established to aggregate miscellaneous unconnected actions by using a categorical system that would allow coding any action to a specific goal (or goals). The code is the key to joining all actions together which address a single goal, thereby allowing us to analyze whether the actions are being taken related to the goal.

I.1.b. Identification of Actions.

Appendix 2 contains a list of the actions identified by state and federal agencies and watershed councils to be taken in behalf of this effort. The list will be expanded as the analysis is completed.

I.1.c. Coding of Actions.

The proposed actions in the previous tables are being entered into a computer database and sorted by the goal they address, limiting factor represented, the responsible party, the core area addressed, etc. Further, the database will be updated as new data are available. Qualitative analysis can be performed at any of these levels. In the near future, the database of actions will be analyzed for how well the actions meet and accomplish each goal.

I.1.d. Assurances of Implementation.

The assurance of future action can be found in part, in the past patterns of demonstrated performance in watershed restoration actions. The watershed councils of the Rogue and South Coast basins have almost a decade of history of commitment and action, and most of the problems and pitfalls of organizing councils are already resolved. Council boards of directors are appointed and functioning. Coordinators are in place and have been operating with a track record of performance. Liaisons with local governments and resource agencies are established

and have been working. Technical committees have been appointed and have completed one round of action plans. Watershed stakeholders are acquainted with the role and mission of the watershed councils. The capacity for watershed councils to act in the future is demonstrated by:

1. Watershed councils have demonstrated their capacity to administer watershed planning, management, and coordinated action through several years of existence. They have formed functioning boards of directors, technical advisory committees, and appointed coordinators. They have conducted watershed assessments and action plans, and prepared funding proposals for projects within their watersheds.

2. Watershed councils have participated in the Watershed Health Program, and funded some $3.2 million in fish habitat and water quality restoration actions. Most councils in the Rogue and South Coast basins have submitted administrative funding requests to the Save Our Salmon program, GWEB, USBR, and COE. and other funding sources (see list of projects in Section H).

3. Watershed councils have established a working relationship with landowners in their watersheds through participating in past project actions on private lands (tree planting, fencing projects, bank stabilization, and irrigation diversions. Almost all projects were located in riparian areas, thus the watershed councils have access to aquatic areas.

4. The watershed councils are coordinating actions across the basin through the Regional Council Steering committees. The coordination process also supports basin level monitoring and ecological assessments.

5. Federal and state resource agencies are committed with staff and funding to undertake protection and restoration actions on public lands (which is 60% of area lands). Thus, a major portion of public lands are already assured of protection.

6. The Governor, through the CSRI has proclaimed the states commitment to salmonid habitat restoration through watershed council action. Funding is not yet available to support council projects.

7. The state natural resource agencies (ODFW, DOF, DOT, DOA, DSL, DWR) and OSP have officially proclaimed their commitment to support salmonid habitat protection measures within watersheds in Southwest Oregon, and the respective agencies are coordinating with watershed councils in the respective subbasins.

I.1.e. Hindrances and Barriers.

There are no superordinate regulatory or administrative barriers to watershed councils proceeding with formulating and implementing watershed restoration actions. Coordinating entities are in place both within watersheds and across subbasins. The administrative and technical capacity is in place to proceed with funding proposals, and Jackson, Josephine, and Curry County Commissioners have endorsed council actions.

By far the most prominent limitation is the availability of funding for council administration and restoration actions. The councils can arrange "in-kind" support for funding actions, but not baseline funding. Funding for habitat restoration is essential for this effort to continue.

I.1.f. Factors Currently Limiting Watershed Council Process.

The strength of watershed councils is in their leadership and ability to galvanize local support for watershed protection and restoration. As such, a local infrastructure and administrative staff needs to be created and maintained. Even under minimal program effort, more than 1 FTE of a coordinators time will be consumed in administration, planning, coordination, and preparing funding requests. While volunteer coordinators can be effective to a degree, they cannot sustain a viable, long-term program on a volunteer basis. The Watershed Health Program has demonstrated the need and productivity of paid, professional coordinators.

The support for southwest Oregon council coordinators has mainly been from state sources, and continues on an indeterminant basis. For the most part, with the loss of O&C funding, local government has proven unable to assume council operations costs and cannot be expected to provide a sustainable funding base. Most established councils have proven very proficient in raising money for watershed projects on a one-shot basis, but watershed restoration must be conducted on a long-term coordinated basis. Stability of funding for coordinator administration is as important as project funding for watershed restoration actions, particularly for recovery of habitat for a specific species.

Some federal resource agencies are recognizing the need to fund watershed council infrastructure, and are budgeting for future support. However, no specific commitments are being discussed at the present time.

I.2. Monitoring Strategy.

Monitoring within the Southwest Oregon Salmon Recovery Initiative area should be conducted at multiple levels (region, basin, subbasin watershed, core area, and site), and conducted in accordance with the CSRI "Comprehensive Monitoring Program" [79]. Monitoring should include stream channel and habitat assessments, stream biotic conditions, water quality, summer juvenile abundance, spawner abundance, genetic and life history monitoring of fish propagation, harvest and index area monitoring (gene conservation group), among other indices. Oregon state natural resource agencies will conduct regional and a portion of the basin GCG and environmental monitoring. Federal natural resource agencies, watershed councils, and regional governmental entities (RVCOG and county governments) will also participate in appropriate efforts. They are expected to coordinate voluntary participation of watershed councils in watershed and core area monitoring. One example of an integrated cooperative effort is the Rogue River Basin Cooperative Stream Temperature Monitoring Program [80] which provides baseline data for longitudinal comparison and establishing stream water temperature trends in the Rogue Basin. The Environmental Protection Agency, and the Oregon Department of Environmental Quality are also developing a streamwater temperature monitoring strategy for core areas within the subbasins.

Monitoring must be systematic in time and location, and long term in approach. Commitment (especially for staff and funding), cooperation and coordination among state, federal, and local entities is essential for the completion of monitoring objectives. A detailed monitoring program will be developed for the Phase 2 Recovery Plan.

I.3. Adaptive Management in Habitat Restoration.

The CSRI strategy recommends the use of the adaptive management approach to planning and implementing habitat restoration actions, which consists of identifying a science-based course of action, then monitoring and evaluating the outcomes of restoration, then re-adapting the strategy

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[79] "Proposal for a Comprehensive Monitoring Program to Support Oregon's Coastal Salmon Restoration Initiative," Attachment II, Science Team Information and Products. (Salem, Oregon: Coastal Salmon Recovery Initiative, Fall, 1996).

[80] See Rogue River Basin Cooperative Stream Temperature Monitoring Program. (Medford, Oregon: Rogue River National Forest, November, 1996). The program coordinates information from the Oregon Department of Fish and Wildlife, Medford Water Commission, U.S. Geological Survey, Bureau of Land Management, Siskiyou National Forest, and Rogue River National Forest.

to incorporate new, more effective actions indicated by the evaluation effort. As such, we learn from the past and present experience to be more effective in the future.

The CSRI adaptive management philosophy is supported by the Southwest Oregon Salmon Restoration Initiative for both basin and subbasin restoration actions.

I.4. Disaggregation of the Rogue and South Coast Basins From the Klamath ESU.

Although the Rogue and South Coast basins are grouped within the Klamath Basin ESU, some biologists have questioned if the Southwest Oregon basins might be disaggregated from the northern California ESU and exempted from listing with unique provisions. The basic premise for the ESU classification is to identify and protect a Gene Conservation Group from extinction under Endangered Species Act provisions, and the CSRI Science Team has defined the coastal area south of Elk River to Winchuck River as possibly constituting a separate genetic population grouping.[81]

Reasons for consideration of disaggregation are: (1) Rogue Basin production of coho is at significantly higher levels than some other stocks within the Klamath ESU, and northern California; (2) the Rogue Basin is distinct from either northern Oregon or northern California, in climate, ecology, genetic composition, and extent of protection of habitat areas; (3) the decision in linking the Rogue stocks with the Klamath ESU is in part a product of the conventional practice of linking the pattern of southern migration and rearing of coho south of Cape Blanco (which separate the Rogue stocks from the Umpqua and northern Oregon stocks), rather than upon gene conservation groups; and (4) the response of southwest Oregon communities to proposed listing actions through forming subbasin watershed councils, conducting subbasin and basin level habitat assessments and planning actions, and incorporating local governments and stakeholders in recovery actions. Rogue and South Coast coho stocks possess genetic similarities to both the Trinity River stock of California, and the Umpqua River stock (as well as some Columbia River stocks probably introduced through transplantation). On the other hand, some geneticists note that because of the multiple qualities, the Rogue River stocks might be considered unique, filling a transitional nitch that is qualitatively different than the Umpqua or Trinity stocks.[82] Thus, there is biological basis (as well as ecological, organizational,

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[81] "Management of Oregon Coastal Natural Fisheries", Attachment II. Science Team Information and Products. (Salem, Oregon: Oregon Coastal Salmon Restoration Initiative) Draft, 1996, p-5.

[82] "Identification of Distinct Population Segments of Coho Salmon Under the Oregon Endangered Species Act," Commission Decision Draft 2/16/95, Oregon Coho Salmon Biological Status Assessment and Staff Conclusion For listing Under the Oregon Endangered Species Act.

jurisdictional, and administrative rationale) for disaggregating the Rogue/South Coast stocks from the West Coast ESUs.

Some local governmental officials are concerned that potential interjurisdictional problems will occur in coordinating Rogue and South Coast basin activities as they seek to comply with a listing action directed by the California division of the NMFS.

Decisions pertaining to disaggregation of the ESU would by made by the National Marine Fisheries Service [in consultation/coordination/approval with the Federal Ninth District Court].

February, 1995, in Attachment II, Science Team Information and Products, (Salem, Oregon: Oregon Coastal Salmon Restoration Initiative) 1996, p-10.

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GLOSSARY

AGENCY ABBREVIATIONS

BLM: Bureau of Land Management
BOR: Bureau of Reclamation
COPE: Coastal Oregon Productivity Enhancement Program
DEQ: Department of Environmental Quality
DOGMI: Department of Geology and Mineral Industries
GWEB: Governor's Watershed Enhancement Board
LCDC: Land Conservation and Development Commission
NMFS: National Marine Fisheries Service
NPPC: Northwest Power Planning Council
NRC: National Research Council
NRCS: Natural Resources Conservation Service
ODA: Oregon Department of Agriculture
ODFW: Oregon Department of Fish and Wildlife
ODOT: Oregon Department of Transportation
RVCOG: Rogue Valley Council of Governments
USACE: U. S. Army Corps of Engineers
USFS: U. S. Forest Service
USBR: Bureau of Reclamation
WSC: Watershed Council

OTHER ABBREVIATIONS

ACEC: Area of Critical Environmental Concern
AMA: Adaptive Management Area
AUM: Animal Unit Month
BMP: Best Management Practices
CFS: Cubic Feet Per Second
CSRI: Coastal Salmon Restoration Initiative
DNA: Deoxyribonucleic acid
ESA: Endangered Species Act
ESU: Evolutionary Significant Unit
FEMAT: Forest Ecosystem Management Assessment Team
GCG: Gene Conservation Group
GIS: Geographic Information System
HLFM: Habitat Limiting Factors Model

KMP: Klamath Mountain Province
LSR: Late Successional Reserve
LWD: Large Woody Debris
RBSC: Rogue Basin Steering Committee
RMA: Resource Management Area
RMP: Resource Management Plan
SRST: Salmon Recovery Science Team
SOSRI: Southwestern Oregon Salmon Restoration Initiative
TMDL: Total Maximum Daily Load

RESOURCE DEFINITIONS

ARCTIC-ALPINE ZONE: A climatic induced vegetation zone usually located above 8,000 feet in elevation.

ADAPTIVE MANAGEMENT: The process of implementing policy decisions as scientifically driven management experiments that test predictions and assumptions in management plans, and using the resulting information to revise and improve the plans.

ADAPTIVE MANAGEMENT AREAS: Landscape units designated for development and testing of technical and social approaches to achieving desired ecological, economic, and other social objectives.

ADULT: A salmon or trout that has reached maturity and will or has already spawned.

ANADROMOUS: Fish that are born and rear in freshwater, move to the ocean to grow and mature, and return to freshwater to reproduce. Salmon, steelhead, and shad are examples.

ANALYSIS OF THE MANAGEMENT SITUATION (AMS): A document that summarizes important information about existing resource conditions, uses, and demands as well as existing management activities. It provides the baseline for subsequent stems in the planning process, such as the design of alternatives and affected environment.

ANIMAL UNIT MONTH (AUM): The amount of forage necessary for the sustenance of one cow or its equivalent for one month.

AQUATIC ECOSYSTEM: Any body of water, such as a stream, lake or estuary, and all organisms and nonliving components within it, functioning as a natural system.

AQUATIC HABITAT: Waters which support fish or other organisms which live in water and which includes the adjacent land area and vegetation (riparian habitat) that provides shade, food and/or protection for those organisms.

AREA: A stream, a lake, a group of streams or lakes, or a portion of the ocean managed for or with a common stock of fish, or for protection of a stock or stocks of fish.

AREA OF CRITICAL ENVIRONMENTAL CONCERN (ACEC): Bureau of Land Management lands where special management attention is needed to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish, and wildlife resources or other natural systems or processes or to protect life and provide safety from natural hazards.

ARMORING: (a) The formation of an erosion-resistant layer of relatively large particles on the surface of the stream bed which resists degradation by water currents, resulting from removal of finer particles by erosion. (B) The application of various materials to protect stream banks from erosion.

AT-RISK FISH STOCKS: Stocks of anadromous salmon and trout that have been identified by professional societies, fish management agencies, and in the scientific literature as being in need of special management consideration because of low or declining populations.

BASELINE: The starting point for analysis of environmental consequences. This may be the conditions at a point in time (e.g., when inventory data are collected) or may be the average of a set of data collected over a specified period of years.

BASIN: An area that encompasses all the watersheds within a river basin, from ridge top to ridge top and all the associated waterways. An example the Rogue River Basin.

BENEFICIAL USE: In water use law, reasonable use of water for a purpose consistent with the laws and best interest of the people of the state. Such uses include, but are not limited to, the following: instream, out of stream, and ground water uses, domestic, municipal, industrial water supply, mining, irrigation, livestock watering, fish and aquatic life, wildlife, fishing, water contact recreation, aesthetics and scenic attraction, hydropower, and commercial navigation.

BENTHIC: Living on or within the bottom sediments in water bodies.

BEST MANAGEMENT PRACTICES (BMP): Methods, measures, or practices designed to prevent or reduce water pollution. Not limited to structural and nonstructural controls, and procedures for operations and maintenance. Usually, BMPs are applied as a system of practices rather than a single practice.

BIOLOGICAL DIVERSITY: The variety of life forms and processes, including a complexity of species, communities, gene pools, and ecological functions.

BIOLOGICAL REQUIREMENTS: Those environmental conditions such as water quality, water quantity, and available food that are necessary for fish to grow and/or reproduce.

BOULDER: Stream substrate particle larger than 256 mm in diameter.

BRAIDED: A stream that divides into an interlacing or tangled network of several branching and reuniting channels separated from each other by branch islands or channel bars.

BROOD STOCK: A group of fish, generally from the same population, that are held and eventually artificially spawned to provide a source of fertilized eggs for hatchery programs.

BUFFER STRIP: Vegetation strip left intact along a stream or lake after logging.

CANOPY: The overhead branches and leaves of streamside vegetation.

CANOPY COVER: The vegetation that projects over the stream. Can arbitrarily be divided into two levels: Crown cover is more than 1 m above the water surface. Overhang cover is less than 1 m above the water surface.

CANOPY DENSITY: The percentage of the stream covered by the canopy of plants, sometime expressed by species.

CAPE BLANCO: A geographic feature on the Oregon coast at 43°50' N. This is the dividing line between the northern and middle coho ESU.

CAPE MENDOCINO: A geographic feature on the California coast at 40°25' N. This is the dividing line between the middle and southern coho ESU.

CARRYING CAPACITY: Level of use which can be accommodated and continued without irreversible impairment of natural resources productivity, the ecosystem and the quality of air, land, and water resources.

COASTAL OREGON PRODUCTIVITY ENHANCEMENT PROGRAM (COPE): A cooperative research and education program to identify and evaluate existing and new opportunities to enhance long-term productivity and economic/social benefits derived from the forest resources of coastal Oregon.

COASTAL STREAM: Any stream within the coastal zone.

COASTAL ZONE: The area lying between the Washington border on the north to the California border on the south, bounded on the west by the extent of the state's jurisdiction, and on the east by the crest of the coastal mountain range, with the exception of the (a) Umpqua River basin, where the coastal zone shall extend to Scottsburg, (b) the Rogue River basin where the coastal zone shall extend to Agness.

COBBLE: Stream substrate particles between 64 and 256 mm in diameter. Also called rubble.

COHORT: Individuals all resulting from the same birth-pulse, and thus all of the same age.

CONSERVE: To manage in a manner which avoids wasteful or destructive uses and provides for future availability.

CONSERVATION: The act of conserving the environment.

CONSULTATION: A formal interaction between the National Marine Fisheries Service or the U.S. Fish and Wildlife Service and another agency when it is determined that the agency's action may affect a species that has been listed as threatened or endangered or its critical habitat.

CORDILLERAN RANGE: The collection of parallel mountain ranges in the western states, such as the Rocky Mountains and western coastal ranges.

CORE AREA: This is a stream area designated by the state that is of critical importance to the sustenance of salmonid populations that inhabit the Rogue and South Coast basins. These areas contain the resources and habitats necessary for the persistence of each population. They are a major source for seeding new habitats as restoration programs are implemented.

CORRIDOR: A defined tract of land, usually linear, through which species must travel to reach habitat suitable for reproduction and other life-sustaining needs.

COVER: Anything that provides protection from predators or ameliorates adverse conditions of streamflow and/or seasonal changes. May be instream cover, turbulence, and/or overhead cover, and may be for the purposes of escape, feeding, hiding, or resting.

CRITICAL HABITAT: Under the Endangered Species Act, critical habitat is defined as (1) the specific areas within the geographic area occupied by a federally listed species on which are found physical and biological features essential to the conservation of the species, and that may require special management considerations or protection; and (2) specific areas outside the geographic area occupied by a listed species, when it is determined that such areas are essential for the conservation of the species.

CRUCIAL HABITAT: Habitat that is basic to maintaining viable populations of fish or wildlife during certain seasons of the year or specific reproduction periods.

CRUCIAL WATERSHEDS: These watersheds, due to geology, hydrologic conditions, position in the basin and other environmental factors; have unique productivity and support a diversity of flora and fauna, including substantial anadromous and resident salmonid fish populations.

CUMULATIVE EFFECTS: The effects on the environment that result from past, present and foreseeable future actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

DEBRIS TORRENT: Rapid movement of a large quantity of materials (wood and sediment) down a stream channel during storms or floods. This generally occurs in smaller streams and results in scouring the streambed.

DECOMMISSION: To remove those elements of a road that reroutes drainage and present slope stability hazards. Another term for this is "hydrologic obliteration."

DENDROCHRONOLOGY: The study of tree ring growth patterns as indicators of earlier climatic patterns within a region (within the past 1,000 years).

DENSITY, BIOLOGICAL POPULATION: The number or size of a population in relation to some unit of space. It is usually expressed as the number of individuals or the population biomass per unit area or volume.

DENSITY-DEPENDENT: A process, such as fecundity, whose value depends on the number of animals in the population per unit area.

DISTURBANCE: A force that causes significant change in structure and/or composition through natural events such as fire, flood, wind, or earthquake. Also, mortality caused by insect or disease out breaks, or by human-caused events, e.g., the harvest of fish.

DIVERSITY: The variety of natural, environmental, economic, and social resources, values, benefits, and activities.

DNA (deoxyribonucleic acid): DNA is a complex molecule that carries an organism's heritable information. The two types of DNA commonly used to examine genetic variation are mitochondrial DNA, a circular molecule that is maternally inherited, and nuclear DNA, which is organized into a set of chromosomes.

EARLY SERAL STAGE FORESTS: Stage in forest development that includes seeding, sapling, and pole-sized trees.

ECOLOGICAL HEALTH: The state of an ecosystem in which processes and functions are adequate to maintain diversity of biotic communities commensurate with those initially found there.

ECOLOGICALLY SIGNIFICANT: Species, stands, and forests considered important to maintaining the structure, function, and processes of particular ecosystems.

ECONOMICALLY FEASIBLE: Having costs and revenues with a present net value greater than zero.

ECOSYSTEM: The living and non-living components of the environment which interact or function together, including plant and animal organisms, the physical environment, and the energy systems where they exist. All the components of an ecosystem are inter-related.

ECOSYSTEM DIVERSITY: The variety of species and ecological processes that occur in different physical settings.

ECOSYSTEM MANAGEMENT: A strategy or plan to manage ecosystems to provide for all associated organisms, as opposed to a strategy or plan for managing individual species.

EDDY: A circular current of water, sometimes quite strong, diverging from and initially flowing contrary to the main current. It is usually formed at a point at which the flow passes some obstruction or on the inside of river bends. Often forms backwater pools or pocket riffles.

ELIGIBLE RIVER: A river or river segment found, through interdisciplinary team and, in some cases, interagency review, to meet Wild and Scenic River Act criteria of being free-flowing and possessing one or more outstanding values.

ELECTROPHORESIS: This refers to the movement of charged particles in an electric field. It has proven to be a very useful analytical tool for biochemical characters because molecules can be separated on the basis of differences in size or net charge. Protein electrophoresis, which measures differences in the amino acid composition of proteins from different individuals, has been used for over two decades to study natural populations, including all species of anadromous Pacific salmonids. Because the amino acid sequence of proteins is coded for by DNA, data provided by protein electrophoresis provide insight into levels of genic variability within populations and the extent of genetic differentiation between them. Genetic techniques that focus directly on variation in DNA also routinely use electrophoresis to separate fragments formed by cutting DNA with special enzymes.

EL NIÑO: An environmental condition often cited as a cause for the decline of west coast salmonids. El Niño is a warming of the Pacific Ocean off South America and is caused by atmospheric changes in the tropical Pacific Ocean. During an El Niño event, a plume of warm sea water flows from west to east toward South America, eventually reaching the coast where it is reflected south and north along the continents. El Niño ocean conditions are characterized by anomalously warm sea surface temperatures and changes in thermal structure, coastal currents, and upwelling. Principal ecosystem alterations include decreases in primary and secondary productivity and changes to prey and predator species distributions.

EMBEDDEDNESS: The degree that larger particles (boulders, rubble, or gravel) are surrounded or covered by fine sediment. Usually measured in classes according to percentage of coverage of larger particles by fine sediments.

EMIGRATION: Permanent movement of individuals of a species from its established population.

ENDANGERED SPECIES: Any species which is in danger of extinction throughout all or a significant portion of its range.

ENDANGERED SPECIES ACT: A federal law passed in 1973 for the purpose of providing a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved.

ENDEMIC: A species that is unique to a specific locality.

ENHANCEMENT: Management activities, including rehabilitation and supplementation that increase fish production beyond the existing levels.

ENVIRONMENTAL ANALYSIS: An analysis of alternative actions and their predictable short-term and long-term environmental effects, incorporating physical, biological, economical, and social considerations.

ENVIRONMENTAL ASSESSMENT: A systematic analysis of site-specific activities used to determine whether such activities have a significant effect on the quality of the human environment and whether a formal environmental impact statement is required; and to aid an agency's compliance with the National Environmental Policy Act when no environmental impact statement is necessary.

ENVIRONMENTAL IMPACT: The positive or negative effect of any action upon a given area or resource.

ENVIRONMENTAL IMPACT STATEMENT: A formal document to be filed with the Environmental Protection Agency that considers significant environmental impacts expected from implementation of a major federal action.

ENVIRONMENTAL PROTECTION AGENCY: An independent agency of the U.S. government.

EPHEMERAL STREAMS: Streams that contain running water only sporadically, such as during and following storm events.

ESCAPEMENT: The number of fish that survive to reach the spawning grounds or hatcheries. The escapement plus the number of fish removed by the harvest form the total run size.

ESTUARY: A body of water semi-enclosed by land, connected with the open ocean, and within which salt water is usually diluted by freshwater derived from the land. The estuary includes (a) estuarine water, (b) tidelands; (c) tidal marshes, and (d) submerged lands. Estuaries extend upstream to the head of tidewater.

ESTUARINE ENHANCEMENT: An action which results in a long-term improvement of existing estuarine functional characteristics and processes that is not the result of a creation or restoration action.

EVOLUTIONARY SIGNIFICANT UNIT (ESU): A designation by the National Marine Fisheries Service of a distinct species population. The NMFS uses this term instead of Stock or Population. The population must satisfy two criteria to be considered an ESU:

1. It must be reproductively isolated from other specific population units.

2. It must represent an important component in the evolutionary legacy of the biological species. (Example - Klamath Mountain Province steelhead ESU).

The first criterion, reproductive isolation, need not be absolute, but must be strong enough to permit evolutionarily important differences to accrue in different population units. The second criterion would be met if the population contributed substantially to the ecological/genetic diversity of the species as a whole.

The NMFS has identified two coho ESUs in Oregon:

- The Northern Oregon coast, south to Cape Blanco.

- Cape Blanco, south and including Northern California.

EXTINCT SPECIES: A species that no longer exists.

EXTIRPATION: The elimination of a species from a particular area.

EXTIRPATION RISK SPECIES: Those species that were generally ranked as having a medium-low or low viability over a 50 year period.

FECUNDITY: The potential number of young an adult female fish is capable of producing.

FILL: (a) The localized deposition of material eroded and transported from other areas, resulting in a change in bed elevation. This is the opposite of scour. (b) The deliberate placement of (generally) inorganic materials in a stream, usually along the bank.

FINAL ENVIRONMENTAL IMPACT STATEMENT: The final report of environmental effects of proposed action on an area of land. This is required for major federal actions under section 102 of the National Environmental Policy Act. It is a revision of the draft environmental impact statement to include public and agency responses to the draft.

FINE SEDIMENT: The fine grained particles in stream banks and substrate. These have been defined by diameter varying downward from 6 mm.

FINGERLING: Fish that have recently emerged as fry and have begun feeding.

FISH AND WILDLIFE SERVICE: A division within the U.S. Department of the Interior.

FISH HABITAT: The aquatic environment and the immediately surrounding terrestrial environment that, combined, afford the necessary biological and physical support systems required by fish species during various life history stages..

FLOW:

mean flow: The average discharge at a given stream location, usually expressed in m3/sec, computed for the period of record by dividing the total volume of flow by the number of days, months, or years in the specified period.

minimum flow: The lowest discharge recorded over a specified period of time (preferred definition).

modified flow: The discharge at a given point in a stream resulting from the combined effects of all upstream and at-site operation, diversions, return flows, and consumptive uses.

natural flow: The flow as it occurs under natural unregulated conditions at a given stream location.

peak flow: The highest discharge recorded over a specified period of time. Often thought of in terms of spring snowmelt, summer, fall or winter rainy season flow. Also called maximum flow.

regulated flow: The flow in a stream that has been subjected to regulation by reservoirs, diversions, or other works of man.

return flow: That portion of the water previously diverted from a stream, and subsequently returned to that stream, or to another body of ground or surface water.

seven day/Q 10 (7 day/Q 10): That low flow which has occurred for seven consecutive days within a ten day period. A specific low flow.

subsurface flow: That portion (part or all) of the water that infiltrates the stream bed and moves horizontally through and below it. It may or may not return to the stream channel at some point downstream.

survival flow: That instantaneous discharge required to prevent death of aquatic organisms in a stream during specified short periods of time (e.g. 7 days) of extremely low flow.

turbulent flow: That type of flow in which any particle of water may move in any direction with respect to any other particle.

uniform flow: A flow in which the velocities are the same in both magnitude and direction from point to point. Uniform flow is possible only in a channel of constant cross section and gradient.

FLOODPLAIN: Level lowland bordering a stream or river onto which the flow spreads at flood stage.

FLUVIAL: Pertaining to streams or produced by stream action.

FOOD CHAIN: Organisms that are interrelated in their feeding habits, each feeding upon organisms that are lower in the chain and in turn being fed on by organisms higher in the chain.

FOREST CANOPY: The cover of branches and foliage formed collectively by the crowns of adjacent trees and other woody growth.

FOREST LAND: Land that is now, or is capable of becoming, at least 10 percent stocked with forest trees and that has not been developed for non-timber use.

FOREST PLAN: A land management plan designed and adopted to guide forest management activities on a National Forest or Bureau of Land Management District.

FOREST SUCCESSION: The orderly process of change in a forest as one plant community or stand condition is replaced by another, evolving toward the climax type of vegetation.

FOREST SERVICE: A division within the U.S. Department of Agriculture.

FOREST ECOSYSTEM MANAGEMENT ASSESSMENT TEAM (FEMAT): As assigned by President Clinton, the team of scientists, researchers, and technicians from seven federal agencies who created the President's Forest Management report..

FOREST WATERSHED: The forested drainage area contributing water, organic matter, dissolved nutrients, and sediments to a lake or stream.

FRY: Fish which have recently hatched and have not started feeding.

GENE CONSERVATION GROUP (GCG): This is the Oregon Department of Fish and Wildlife's designation of distinct populations. A GCG is a genetically distinct cluster of one or more populations within a taxonomic species that resulted because gene flow between the cluster and other populations of the same species has been zero or very low over sufficient time.

The ODFW has identified four GCGs in Oregon:

- North and Mid-coast, including the Necanicum, south to the Siuslaw River. (55 Populations)
- Mid to south coast, from Siltcoos south to and including the Sixes River. (21 Populations)
- The Umpqua system. (4 Populations)
- The South coast, south of the Sixes River south to the California border. (11 Populations)

The 11 populations in the South Coast GCG are:

- Hubbard Creek
- Brush Creek
- Mussel Creek
- Rogue River, up to and including the Illinois River
- Rogue River above the Illinois River to Gold Ray Dam
- Applegate River
- Rogue River above Gold Ray Dam
- Hunter Creek
- Pistol River
- Chetco River
- Winchuck River

GENETIC DIVERSITY: The variety within populations of a species.

GEOMORPHIC: Pertaining to the form or shape of those processes that affect the surface of the earth.

GEOGRAPHIC INFORMATION SYSTEM: A computer system capable of storing and manipulating spatial (i.e., mapped) data.

GRANITIC: Any light-colored, coarse-grained rock formed at considerable depth by crystallization of molten rock.

GUIDANCE DOCUMENT: The watershed councils in the southwest Oregon part of the Klamath Province Evolutionary Significant Unit will update their assessment and action plans to establish historical, current and future desired coho and steelhead habitat conditions and to include their proposed improvement projects. A Rogue Valley Council of Governments managed technical team will assemble this information in the SW Oregon habitat restoration guidance document(s) in partnership with ODFW for distribution.

GUIDELINE: A policy statement that is not a mandatory requirement (as opposed to a standard, which is mandatory).

HABITAT: The place where a plant or animal naturally or normally lives and grows.

HABITAT CONSERVATION AREA: This is a contiguous block of habitat, as proposed by the Interagency Scientific Committee, to be managed and conserved for a species of concern. The application may vary throughout its range according to local conditions.

HABITAT CONSERVATION PLAN: A written contract between private landowners and the NMFS (and/or the USFWS). These contracts permit landowners to establish a level of "take" and provide landowners protection from third party lawsuits.

HABITAT DIVERSITY: The number of different types of habitat within a given area.

HABITAT FRAGMENTATION: The breaking up of habitat into discrete sections of land through modification or conversion of habitat by management activities.

HALF-POUNDER: A life history trait of steelhead exhibited in the Rogue, Klamath, Mad, and Eel Rivers of southern Oregon and northern California. Following smoltification, half-pounders spend only 2-4 months in the ocean, then return to fresh water. They overwinter in fresh water and emigrate to salt water again the following spring. This is often termed a false spawning migration, as few half-pounders are sexually mature.

HATCHERY: Salmon hatcheries use artificial procedures to spawn adults and raise the resulting progeny in fresh water for release into the natural environment either directly from the hatchery or by transfer into another area. In some cases, fertilized eggs are out planted (usually in "hatch-boxes"), but it is more common to release fry (young juveniles) or smolts (juveniles that are physiologically prepared to undergo the migration into salt water). The broodstock of some hatcheries is based on the adults that return to the hatchery each year; others rely on fish or eggs from other hatcheries, or captured adults in the wild each year.

HAZARDOUS MATERIALS: Anything that poses a substantive present or potential threat to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

HIDING COVER: Generally, any vegetation used by wildlife for security or to escape from danger. More specifically, any vegetation capable of providing concealment (e.g., hiding 90 percent of an animal) from human view at a distance of 200 feet or less.

HOLOCENE PERIOD: The most recent major geologic period of 8,000 - 10,000 years, since the last ice age in the Pacific northwest. Earliest human settlement of this area occurred during this period.

HUMID TRANSITION ZONE: The coastal vegetation zone, composed of dense plant communities, diverse in species, in a humid climate.

HYDRAULIC: Related to the movement or pressure of water. Hydraulic hazards are those associated with erosion or sedimentation caused by the action of water flowing in a river or streambed, or oceanic currents and waves.

HYDRAULIC MINING: Excavating large areas near a stream with water jets under great pressure. The liquefied material was funneled through a sluce box and the gold extracted. The water hoses were called "giants". This activity resulted in extensive turbidity in the stream and is no longer permitted.

HYDRAULIC PROCESSES: Actions resulting from the effect of moving water or water pressure on the bed, banks, and shorelands of water bodies (oceans, estuaries, streams, lakes, and rivers).

HYDROLOGIC: Relating to the occurrence and properties of water. Hydrologic hazards include flooding (the rise of water) as well as hydraulic hazards associated with movement of water.

IMPACT: The consequences of a course of action; effect of a goal, guideline, plan or decision.

INCIDENTAL TAKE: The harvest or destruction of individuals from a listed species, or the modification of habitat that results in the loss of these individuals, that results from, but is not the purpose of, an otherwise lawful activity (Example - incidental take of a listed species is illegal unless authorized by the NMFS or the USFWS.)

INDIGENOUS: Fish or animal descended from a population that is believed to have been present in the same geographical area prior to the year 1800 or that resulted from a natural colonization from another indigenous population.

INSTREAM COVER: Areas of shelter in a stream channel that provide aquatic organisms protection from predators or competitors and/or a place in which to rest and conserve energy due to a reduction in the force of the current.

INSTREAM WATER RIGHT: A water right held in trust by the Water Resources Department for the benefit of the people of the State of Oregon to maintain water instream for aquatic and public use. An instream water right does not require a diversion or any other means of physical control over the water.

INTEGRITY: The quality or state of being complete and functionally unimpaired; the wholeness or entirety of a body or system, including its parts, materials, and processes. The integrity of an ecosystem emphasizes the interrelatedness of all parts and the unity of its whole.

INVENTORY: A process of counting fish, wildlife, trees, ect., or monitoring habitat conditions, such as by physical stream surveys.

JACK: A male salmon that returns from the ocean to spawn one or more years before full-sized adults return. For coho salmon in California, Oregon, Washington, and southern British Columbia, jacks are 2 years old, having spent only 6 month in the ocean, in contrast to adults, which are 3 years old after spending 1½ years in the ocean.

KEY WATERSHEDS: The Northwest Forest Plan (NWFP) designated key watersheds for BLM and USFS lands. These watersheds are to serve as refugia for anadromous and resident salmonid stocks. Watershed restoration projects on these public lands will concentrate on securing proper functioning of aquatic and riparian habitats in these watersheds.

LAND CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF OREGON (LCDC): Seven lay citizens, non-salaried, appointed by the Governor, confirmed by the Oregon Senate; at least one commissioner from each Congressional District; no more than two from Multnomah County.

LARGE ORGANIC (WOODY) DEBRIS: Any large piece of relatively stable woody material having a diameter greater that 10 cm and a length greater than 1 m that intrudes into the stream channel.

LIMITING FACTORS: Steam habitat conditions that limit potential production of salmonids.

MAINTAIN: Support, keep, and continue in an existing state or condition without decline.

MANAGEMENT UNIT: A discrete geographic area, defined by biophysical characteristics and features, within which particular uses and activities are promoted, encouraged, protected, or enhanced, and others are discouraged, restricted, or prohibited.

MAINTAINABLE YIELD: The largest catch that can be maintained from the population, at whatever level of stock size, over an indefinite period. It will be identical to the sustainable yield for populations below the level giving the MSY, and equal to the MSY for populations at or above the MSY.

MAXIMUM SUSTAINED YIELD (MSY): The largest average catch or yield that can continuously be taken from a stock under existing environmental conditions. For species with fluctuating recruitment, the maximum might be obtained by taking fewer fish in some years than in others.

MITIGATION: The creation, restoration, or enhancement of a biologically productive area. To maintain the functional characteristics and processes, such as its natural biological productivity, habitats, and species diversity, unique features and water quality.

NATURAL AREAS: Includes land and water that has substantially retained its natural character, which is an important habitat for plant, animal, or aquatic life. Such areas are not necessarily completely natural or undisturbed, but can be significant for the study of natural, historical, scientific, or paleontological features, or for the appreciation of natural features.

NATURAL RESOURCES: Air, land and water and the elements thereof which are valued for their existing and potential usefulness to man.

OFF-CHANNEL POND: A pond, not part of the active channel, but connected to the main stream by a short channel. Generally in old flood terraces.

ORGANIC DEBRIS: An accumulation of plant or animal material.

OROGRAPHIC COOLING: The cooling effect produced by expansion of downslope airflows as the cross mountain ranges. The cooling often induces precipitation of the downslope side, and reduced rainfall on opposite sides, creating contrasting vegetation patterns.

OVERHEAD COVER: Material (organic or inorganic) that provides protection to fish or other aquatic animals from above; generally includes material overhanging the stream less than a particular distance above the water surface. Values of less than 0.5 m and less than 1 m have been used.

PERMEABILITY: A measure of the rate at which water can pass through a given substrate. Depends upon composition and degree of compaction of the substrate (usually gravel). The apparent velocity per unit of hydraulic gradient. Units: cm/hr.

PHYTOSOCIOLOGICAL PLANT COMMUNITIES: A collection of plants of a specie that occupies a defined area, such as copses of oak, alder, juniper, thistle, etc. The plant communities may migrate into or out of an area, replacing existing vegetation.

POLLUTION: The violation or threatened violation of applicable state or federal environmental quality statutes, rules and standards.

POPULATION: This is a group of fish spawning in a particular area at a particular time which do not interbreed to any substantial degree with any other group spawning in a different area or in the same area at a different time. (Example - Klamath Mountain Province steelhead)

- Applegate River
- Hunter Creek
- Pistol River
- Chetco River
- Winchuck River

PRESERVE: To save from change or loss and reserved for a special purpose.

PRESMOLT: A juvenile anadromous fish which has fed and reared but is not yet a smolt. (See smolt)

PROTECT: Save or shield from loss, destruction, or injury or for future intended use.

PUSH-UP DAM: This is usually a dam of gravel pushed up by heavy equipment to divert water from the stream down an irrigation canal.

RAPIDS: A relatively deep stream section with considerable surface agitation and swift current. Some waves may be present. Rocks and boulders may be exposed at all but high flows. Drops up to one meter.

REACH: (a) Any specified length of stream. (b) A relatively homogeneous section of a stream having a repetitious sequence of physical characteristics and habitat types. (c) A regime of hydraulic units whose overall profile is different from another reach.

REARING AREA: An area in a stream or lake that provides suitable habitat for a fish to live from when it hatches from an egg to the time it smolts and begins its migration to the ocean.

RECRUITMENT: The addition of new fish to the vulnerable population by growth from among smaller size categories.

RECRUITMENT CURVE: A graph of the of a spawning at the time they reach a specified age (for example, the age at which half of the brood has become vulnerable to fishing), plotted against the abundance of the stock that produced them.

REDD: A nest where salmonids deposit their eggs and sperm during the act of spawning. The fish usually dig a hole in the gravel and cover it up after depositing their eggs

REDD COUNTS: Most salmonids deposit their eggs in nests called redds, which are dug in the stream bed substrate by the female. Most redds occur in predictable areas and are easily identified by an experienced observer by their shape, size, and color (lighter than surrounding areas because silt has been cleaned away).

RECOVERY PLAN: A plan required by the ESA that, when implemented, would provide for the recovery of a listed species to the point where it could be delisted (a recovery plan includes delisting criteria).

REHABILITATION: Short-term management actions which may include fish stocking, habitat improvement, harvest management, or other work, that restore fish populations depressed by natural or man-made events.

RESTORE: Revitalizing, returning, or replacing original attributes and amenities, such as natural biological productivity, aesthetic and cultural resources, which have been diminished or lost by past alterations, activities, or catastrophic events.

RIFFLE: A shallow rapids where the water flows swiftly over completely or partially submerged obstructions to produce surface agitation, but standing waves are absent.

RIPARIAN: Of, pertaining to, or situated on the edge of the bank of a river or other body of water.

RIPRAP: A layer, facing, or protective mound of stones randomly placed to prevent erosion, scour or sloughing of a structure or embankment.

SECONDARY (HIGH VALUE) COHO STREAM: A stream that contains significant coho spawning and rearing habitat so coho can survive from the egg through smolt life stages, but was not selected by the state as a Core Stream.

SIDE CHANNEL: Lateral channel with an axis of flow roughly parallel to the mainstem and which is fed by water from the mainstem; a braid of a river with flow appreciably lower than the main channel. Side channel habitat may exist either in well-defined watercourses flowing through partially submerged gravel bars and islands along the margins of the mainstem.

SIGNIFICANT OR SUBSTANTIAL: A condition of sufficient magnitude such that it is likely to influence continued natural production at optimum levels.

SINUOSITY: The magnitude of winding or meandering a stream undertakes while progressing along its course.

SIGNIFICANT HABITAT AREAS: A land or water area where sustaining the natural resource characteristics is important or essential to the production and maintenance of aquatic life or wildlife populations.

SMOLT: A juvenile salmon or trout that undergoes a physical or metamorphic change. The fish loses its parr marks and takes on a silvery color. It then initiates a seaward migration and is capable of living in the sea.

SPAWNING: The act of fish depositing their eggs or sperm for the purpose of reproduction.

SPAWNING AREA: The area in the stream or lake that provides suitable habitat for fish to deposit their eggs and sperm (spawn).

SPAWNING ESCAPEMENT GOAL: The numbers of adults spawning fish needed to perpetuate future runs at a desired level. Example: the number of spawners needed to produce enough fertilized eggs to fill a rearing pond with smolts.

SPAWNING SURVEYS: These are surveys that utilize counts of redds and fish carcasses, or live fish to estimate spawner escapement and identify habitat being used by spawning fish. Annual surveys can be used to compare the relative magnitude of spawning activity between years.

SPECIES: A category or biological classification of related organisms or populations potentially capable of interbreeding. (Example - coho salmon)

STOCK: This is an aggregation for management purposes of fish populations which typically share common characteristics such as life histories, migration patterns, or habitats. (Example - Illinois winter steelhead)

STREAM BED: The substrate plane, bounded by the stream banks, over which the water column moves. Also called the stream bottom.

STREAM CLASSIFICATION: A designation of streams by the State Forestry Department (private lands) and the USFS and BLM (public lands) based upon the stream's size and productivity. Streams that contain fish, provide a domestic water supply, or influence those types of streams, receive more protection from logging and other activities than streams that do not.

State Forestry Stream Classification:

Type F Streams - Streams that have fish use, including fish use streams that have domestic water use.
Type D Streams - Streams that have domestic water use but not fish use.
Type N Streams - All other streams.

STREAM CORRIDOR: A stream corridor is usually defined by geomorphic formation, with the corridor occupying the continuous low profile of the valley. The corridor contains a perennial, intermittent, or ephemeral stream and adjacent vegetative fringe.

STRUCTURE: Anything constructed or installed on land or in the water. It usually enhances the location by stabilization, protection or adds habitat to the area.

SUBSTRATE: The medium upon which an organism lives and grows. The surface of the land or bottom of a water body.

TAKE: to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect a listed species, or to attempt any such conduct. This includes destruction of habitat that results in the loss of the listed species.

THREATENED SPECIES: Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

TOTAL MAXIMUM DAILY LOAD (TMDL): The amount of a particular water quality limiting substance allowed by DEQ to enter a waterway during a 24 hour period.

TURBULENCE: The motion of water where local velocities fluctuate and the direction of flow changes abruptly and frequently at any particular location, resulting in disruption of laminar flow. It caused surface disturbance and uneven surface disturbance and uneven surface, and often masks subsurface areas because air bubbles are entrained in the water.

UNDERCUT BANK: A bank that has had its base cut away by the water or has been man-made and overhangs part of the stream.

UPPER SONORAN ZONE: Highland plains that assume a desert aspect, such as in central/southern Oregon. Plant communities include grasslands, thistle, saltbrush, sagebrush, cedars, alders, etc.

URBAN LAND: Urban areas are those places which must have an incorporated city. Such areas may include lands adjacent to and outside the incorporated city and may also:

(a) Have concentrations of persons who generally reside and work in the area.
(b) Have supporting public facilities and services.

WETLANDS: Land areas where excess water is the dominant factor determining the nature of soil development and the types of plant and animal communities living at the soil surface. Wetland soils retain sufficient moisture to support aquatic or semi-aquatic plant life. In marine and estuarine areas, wetlands are bounded at the lower extreme by extreme low water; in freshwater areas, by a depth of six feet. The areas below wetlands are submerged lands.

YEAR-CLASS: The fish spawned or hatched in a given year.