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OCSRI Plan
Appendix I: Discussion Issue Papers

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Appendix I - Discussion Issue Papers

Introduction

Oregon has developed a conservation plan to guide the protection and restoration of anadromous fish in coastal river basins. The plan is necessarily one that will be improved and will evolve over time. In attempting to make improvements to the plan in the near-term, Oregon worked with NMFS staff to explain aspects of agency programs that were not understood, and to answer questions and concerns that NMFS staff expressed regarding management measures proposed by the state agencies. A meeting was held on February 5, 1977 to clarify significant areas of disagreement or uncertainty that remained in relation to Oregon programs and NMFS staff. The meeting was attended by Oregon natural resource agency directors, members of the Governor's natural resources staff, Will Stelle (NMFS), and other NMFS staff members.

A series of briefing papers were prepared prior to the meeting to help focus discussion and seek resolution on areas of disagreement.

The issue papers were written in a collaborative process that included both Oregon and NMFS agency staff, and were presented to all participants present at the meeting.

Topics covered by the issue papers include:

- Policy
- Cumulative Effects
- Physical Habitats
  - * Quantitative Objectives
  - * Estuarine Habitat
  - * Adequacy of Oregon Department of Agriculture Programs With Respect to Physical Habitat
- Water Quantity
- Water Quality
  - * Adequacy of Oregon Department of Agriculture Programs With Respect to Water Quality
  - * Goal 5
  - * Water Quality (Sediment)
  - * Water Quality (Non-degradation)
- Fishery Management
  - * Hatchery
  - * Harvest
  - * Warmwater Species

Policy Issue

Statement of Issue

What are the policy considerations with regard to riparian protection strategies applied across the various ownerships and land uses?

Discussion

Riparian vegetation has been clearly demonstrated to be important for the maintenance of aquatic habitat, water quality and channel morphology. There is general technical agreement about the functions of riparian vegetation between NMFS and the State.

It is the position of NMFS that, for non-federal forest land, riparian protection should be as near "optimal" as possible. NMFS has also raised concerns about the level of protection provided by state measures on agricultural and urban lands, though they have not taken a specific position about what is "adequate."

It is the State's position that the combination of protection afforded on both federal and non-federal forest lands will be moving riparian habitat conditions toward aquatic habitat conditions well in excess of minimal (and well in excess of current levels), but somewhat less than the optimal level preferred by NMFS. The role of agricultural and urban lands is less certain and clearly longer-term.

Several policy considerations exist. For example, federal forest lands could be further burdened to achieve higher levels of riparian protection. Similarly, a policy choice to place a higher burden on non-federal forest lands over non-forest lands could be made. At this time, it appears that the difference in level of protection between federal and non-federal forest land is smaller than difference in the level of protection between non-federal forest lands and non-forest lands. It is most likely that the relative benefit from further burdening forest land is low compared to the benefit that would be derived from improving protection on other land uses at the same cost.

Policy choices also exist about the distribution of coho habitat. There are biological advantages to a broad distribution of adequate habitat across the various landscapes, landforms, habitat types and historic range versus distribution concentrating on a more limited scope.

Different levels of protection have been or are being adopted among the various non-federal forest ownerships, particularly between state and private lands. At this time an adequate evaluation about how the various possible strategies might play out in any given basin is lacking.

In addition to land use and ownership issues, policy needs to consider the differences in current condition of riparian areas. Also, policies that motivate federal landowners to restore stream and riparian conditions are different than policies that will motivate non-federal landowners. A policy supported by the State is to provide active management incentives to restore conifer to riparian

areas and to more quickly provide wood to stream systems depleted of large woody debris. However, NMFS is concerned that such a policy has short-and long-term risks and would prefer other incentives that do not pose the trade-offs they perceive.

There is also general agreement that assessment and monitoring is critical to evaluate current riparian condition and the effectiveness of different riparian strategies. A policy benefit from applying different strategies across different ownerships and land uses is that the relative effectiveness in terms of benefit and cost can be compared. In general, there is adequate information at this time to evaluate the relative effectiveness of protection and restoration strategies and to move ahead with their implementation.

Cumulative Effects Issue

Statement of Issue

Lack of a cumulative effects analysis and management process is a major plan-wide issue of the Oregon Coastal Salmon Restoration Initiative (OCSRI) raised by the National Marine Fisheries Service. The achievability of cumulative effects analysis and the wisdom of such an investment compared to watershed assessment is raised by the State.

Discussion of Issue

The National Marine Fisheries Service is concerned that the OCSRI Plan does not have an explicit process for assessing and managing cumulative effects, that watershed assessment methods and responsibilities that are assigned to watershed councils may lack adequate technical oversight, and that it is not obvious how the results of watershed analysis will be linked to decisions that state agencies make with regard to implementing their various programs.

The State is concerned that a technically sound and cost-effective process to analyze "cumulative effects" that may effectively guide management decisions for conditions in Oregon does not exist and the development of such a process is problematic at this time. However, watershed assessment can be developed and used to yield information sufficient to identify and correct limiting factors (stressors), and identify habitat and other restoration opportunities. The State is concerned that investments being made by federal agencies on watershed assessment are often yielding results that have very limited benefits and suggests a need to monitor the value of federal efforts.

Despite reservations about cumulative effects analysis, the State is willing to commit over the next several years to a collaborative process with National Marine Fisheries Service and other interests to incorporate scientifically sound cumulative effects methods/considerations into watershed assessment and monitoring efforts.

The state agencies, watershed councils and landowners have made and are making a substantial investment of resources through the implementation of key watershed assessment modules related to:

- Condition of roads and sediment risk.
- Location of unstable areas.
- Channel condition.
- Riparian condition
- Fish populations and distribution.
- Water withdrawals.
- Fish passage barriers.

These and other protocols will be accumulated in a watershed assessment package. A technical committee will be assigned the responsibility of developing and/or reviewing protocol.

Watershed assessment information will be linked to state and watershed council programs in several ways:

- Support the development and application of effective best management practices (BMPs).
- Support decision-making that may be made under state permitting authority.
- Correct identified problems through restoration actions.
- Support the development of appropriate quantitative habitat "objectives."

A second critical feedback loop relative to potential cumulative effects is the monitoring program. The State plan will monitor Best Management Practices and other actions to determine their effectiveness at minimizing immediate, intermediate and cumulative effects, off-and on-site. Priorities will be set based upon the relative importance of factors contributing to decline. The State is committed to adjusting Best Management Practices or program measures based upon monitoring results.

Physical Habitat Issues

Quantitative Physical Habitat Objectives Issue Paper
CSRI Physical Habitat Workgroup

March 9, 1997

Statement of Issue

Objectives that quantitatively define the habitat conditions which will reverse the identified physical habitat Factors for Decline are generally lacking in the OCSRI plan. NMFS believes the lack of such quantified objectives is a substantial weakness in the plan.

Discussion of Issue

NMFS believes that, in the absence of quantified habitat objectives, there is no basis for assessing the value of agency measures. They understand that the state does not currently have numerical standards defining desirable habitat parameters for channel morphology and substrate conditions. Using channel morphology as an example, NMFS has suggested that the CSRI might include quantified objectives, by channel type, for:

- Pool frequency and mean volume.
- Mean channel width-depth ratios.
- Percent of off-channel habitat and its connectedness to the stream.
- Sinuosity.

These objectives could be revised or replaced with watershed-specific objectives when and if those are developed. NMFS expects that local groups typically will not have the professional expertise required to develop quantified habitat objectives, and that not supporting local groups with interim or default objectives is a serious deficiency in the CSRI plan. While there are natural variations in physical habitat characteristics between geographic areas, there are also similarities and the relevant body of science is sufficient to develop appropriate default objectives for the geographic scope of the CSRI. NMFS does not believe that quantified objectives constitute any sort of rule or regulation.

The State believes that "desirable habitat conditions" should be defined in cooperation with all interested parties, such as watershed councils, affected local governments and landowners, and state and federal agencies. This is consistent with the underlying philosophy of CSRI, which emphasizes grassroots, grounds-up involvement.

Further, the numerical values for those conditions are likely to vary among and within streams. Where existing state laws and regulations or agency guidance documents include numerical values for the relevant habitat features, those will be made explicit in the CSRI plan. Examples include water quality standards and fish passage guidelines. However, for factors that lack established numerical values, the state's intention is to help local groups develop them as quickly as possible in concert with the affected state and federal agencies. The State is concerned that local citizens and groups will perceive publication of interim or default standards in the final draft plan as at

least Salem imposing a "one-size fits all" standard that violates the grassroots spirit of CSRI and at worst as new administrative rules adopted without public notice and hearings.

Estuarine Habitat Issue Paper

March 9, 1997

Statement of Issue

The OCSRI plan includes few measures directed to increasing properly functioning estuarine habitat. The National Marine Fisheries Service (NMFS) believes this is a substantial weakness in the plan.

Discussion of Issue

Historically, large segments of some estuaries, particularly Tillamook, Yaquina and Coos Bays, have been diked or filled to facilitate agriculture and urban development. Most of those fills occurred before the protections provided by Goal 16 and the estuarine resource replacement requirement of the Removal-Fill Law were enacted. The last large estuarine fill occurred in the late 1970s for the North Bend airport in the Coos estuary.

Estuaries provide important habitat during poor ocean conditions for salmonid species that inhabit the near-shore zone. Goal 16 and the Removal-Fill Law probably provide adequate assurances that existing estuarine habitat will not be degraded. However, the OCSRI plan includes few measures directed to increasing properly functioning estuarine habitat. These include the habitat restoration projects planned and underway at the Division of State Lands' (DSL) South Slough National Estuarine Research Reserve near Charleston. Additional projects may be planned by watershed councils or the Tillamook National Estuary Program; these need to be made explicit in the CSRI plan. NMFS believes that additional measures that would provide a net increase in estuarine habitat are necessary because most fills occurred before mitigation was required.

In addition, the state includes no measures addressing the elimination of estuarine (and freshwater) habitat due to over- and inwater structures such as houseboats, docks and marinas. The Division of State Lands, which leases state-owned submerged and submersible lands, including tidally-influenced areas for these purposes, circulates new leases and renewals to various agencies, including ODFW for comment. If an agency requests that a lease or renewal be denied, and provides scientific justification for doing so, DSL would comply. However, absent scientific evidence that over- and inwater structures have significant adverse impacts on salmonids, DSL cannot justify further limiting their numbers, or requiring either their removal or mitigation for their presence.

Finally, NMFS is concerned that approximately 3,000 estuarine acres are dedicated to aquaculture, yet the state proposes no measures to regulate the impacts of aquaculture on habitat areas such as eelgrass beds, or to control future aquaculture development.

Adequacy of Oregon Department of Agriculture's Programs
to
Address Physical Habitat Limitations
Physical Habitat Workgroup

February 11, 1997

Statement of Issue

ODA measures designed to address the influence of agricultural activities on the Objectives identified by the Physical Habitat workgroup do not:

- Quantitatively define the conditions which will reverse the identified physical habitat Factors for Decline on agricultural lands. NMFS believes that the absence of such quantified conditions constitutes a substantial weakness.
- Identify coast wide specific practices, riparian buffers or prohibited conditions which is NMFS method of choice to achieve physical habitat goals in a timely manner.
- Quantify the changes that will be achieved through implementation of ODA measures.
- Address restoration of natural conditions associated with stream banks, riparian areas and estuarine habitat.

NMFS believes that ODA measures may be inadequate in terms of content and application to overcome some physical habitat factors of decline in a timely manner.

Discussion of Issue

a) ODA's SB1010 and Confined Animal Feeding Operations (CAFO) program are the means by which agricultural activities affecting the objectives identified by the physical habitat workgroup will be addressed. A discussion of ODA's and NMFS's programmatic approaches to achieve objectives is presented in the Water Quality Workgroups Issues package (please see: Adequacy of Oregon Department of Agriculture's Programs to Address Water Quality Limitations-Water Quality Workgroup).

b) Senate Bill 1010 and CAFO are a response to requirements under the Federal Clean Water Act. Agricultural water quality management plans are developed under SB1010 to achieve compliance with state water quality standards required under the Federal Clean Water Act. Water quality standards include the beneficial use to be protected and numeric or narrative criteria designed to ensure the beneficial use is not impaired. State water quality standards include temperature and chemical criteria, antidegradation standards and a biological conditions standard. All of these standards work together to protect aquatic species and specifically salmonids, in addition to other beneficial uses. For this reason, agricultural water quality management plans developed under SB 1010 will address physical habitat and riparian function, as well as water quality chemical parameters, in order to adequately protect beneficial uses that rely on all of these factors to survive. Because riparian conditions affect water quality, SB1010 objectives will include:

- Need to establish proper functioning riparian communities to address beneficial use impairment.
- Prohibition of agricultural activities that prevent riparian function and function restoration.
- Protection of streambanks.

While SB1010 does not provide a means to mandate restoration to natural conditions, ODA believes it does provide a high level of certainty that streambank stability and riparian function to achieve the goal of maximizing riparian habitat conditions necessary for salmonid survival will occur.

NMFS feels that since SB1010 is not directly mandated to address riparian function and condition unless specified as a water quality standard, aquatic and riparian protection may not be sufficient for agricultural lands. NMFS feels that aquatic and riparian habitat along non-forested land is critical to salmonid recovery and thus requires state sponsored development of an up front aquatic protection program that would identify specific habitat practices and objectives until the effectiveness of the states SB1010 can be realized.

c) ODA administers the State's Oyster Program which can influence estuarine habitat. Considerable research needs to be done in the estuaries for us to gain a better understanding of the biotic interrelationships between vertebrate and invertebrate species, as well as their relationships with plant populations, plant population dynamics, positive and negative impacts of commercial oyster production on them, etc. The impact of commercial oyster production on eelgrass recruitment, production, sustainability, etc. is unknown and schools of thought differ on the benefit or detriment of oyster farming on salmonid rearing habitat.

Until results of research projects, such as one being initiated in Tillamook Bay that will address the eelgrass/commercial oyster production issue, ODA must continue to operate under the present guidelines. NMFS feels that until sufficient understanding of aquaculture effects on salmonid exists, the Oyster Program should act on the presumption that oyster production negatively impacts salmonids. Thus, oyster production should not be allowed to expand and existing program more rigorously controlled until research proves oyster production is not detrimental to salmonid survival.

Water Quantity Issue

Issue Overview

The Water Quantity Issue Team had few factors of decline as compared with the other issue teams. The three factors of decline are:

- Inadequate streamflow.
- Inadequate fish passage.
- Inadequate fish screening

For all of the factors of decline there are biological objectives which are established to address and reverse those factors. The biological objectives for factors of decline pertaining to water quantity can be broken down into two categories:

- Maintaining healthy conditions that exist.
- Restoring conditions where needed.

The Water Quantity Issue Team reached general agreement on the biological objectives for maintaining streamflows, and maintaining, restoring, and implementing fish passage and screening. The only significant difference of understanding is the expectations of the biological objectives for restoring flows. The State believes that NMFS is seeking quantifiable flow levels (with timelines), even though the only scientifically based quantifiable flow is an unattainable ideal flow which may result in all water being left instream and may preclude having water available for domestic use, municipalities, irrigation, and other existing consumptive uses.

Areas of General Agreement

The State's team agreed with NMFS in principle on the following biological objectives, and that the State's measures currently achieve these objectives:

- *Protect and Maintain Existing Streamflows*
  Continue to implement actions which ensure that the issuance of additional out-of-stream water rights will not adversely affect streamflows that provide significant salmon habitat values.

- *Protect, Maintain and Restore Adequate Fish Passage*
  Continue to implement actions which ensure that the issuance of additional water rights will not adversely affect fish passage and that existing fish passage problems are resolved.

- *Protect, Maintain and Implement Adequate Fish Screening*
  Continue to implement processes which ensure that all water intake and diversion structures in salmonid habitat areas have appropriate fish screening devices to prevent salmon from being entrained in water intake structures.

The Team had some very productive discussions with NMFS staff that focused on the measures to achieve these biological objectives; State agencies are realigning their measures to further support the attainment of these objectives in a manner that can be tracked and measured.

Flow Restoration: A Gap in Expectations

NMFS Expectations

It is the State's understanding that NMFS is expecting that the CSRI should:

1. *Identify current streamflow levels in streams which support fish.*

   The State agrees that monitoring streamflows is important, but there are not gaging stations on all streams which support fish, or even on all streams with instream water rights (ISWRs).

2. *Identify target flow levels using scientifically based numbers.* The established ISWRs represent the only existing data for determining all fish species life history needs.

   The State agrees that the ISWR amounts are the only scientifically based flows that currently have been determined. The State is concerned that setting ISWR levels as a recovery target is using them in a way in which they were not originally intended, nor for which they are appropriate.

3. *Identify the gap between the current flow levels and the target (ISWR) levels.*

   The State agrees that the seasonal gaps between the current flows and ISWR flows need to be locationally specific. Measures are being realigned to address this.

4. *Develop measures and a timetable to meet ISWR flows.*

   The flow levels set by many of the ISWRs were established at levels for the total value of the natural streamflow (streamflow without any consumptive uses). NMFS advocates that these ISWR target flow levels, with timelines, be used as the biological objective which identifies the flows required to recover the salmon. The State believes this is inappropriate since these are aspirational goals which are institutionally unobtainable.

Significance of Instream Water Rights (ISWRs) as Target Flows

ISWRs are the only available scientifically based instream flow amounts which currently exist that indicate salmon needs. These ISWRs are based on the flow levels salmon need to fully utilize the habitat. In most cases, the ISWRs are established with different instream flow amounts needed for each month. During late fall, winter, and early spring the ISWRs frequently do not require all of the natural streamflow, and the ISWRs are therefore met. However, during late spring, summer, and early fall, many of the ISWRs amounts are at the estimated average natural flow of the river, or in some cases, higher.

Meeting these flows would require that no consumptive uses of water occur during this time period, which would mean a return to presettlement conditions. These ISWR amounts were determined and adopted within the context of establishing water rights under the priority system of the Prior Appropriation Doctrine, with the understanding that an aspirational goal is to use all

the available instream habitat for fish life history functions, without regard to existing consumptive uses of water.

By adopting a restoration goal of meeting all ISWRs for all months of the year, the State is setting an aspirational, but regionally unachievable objective. The State believes that any biological objectives for flows must recognize the institutional constraints that have evolved around the Prior Appropriation Doctrine. A restoration plan should focus on the interrelationship of all factors of decline, rather than an ideal for any single factor of decline. Other interrelated ecosystem factors that play a critical role in creating suitable habitat necessary for salmon recovery include riparian conditions, habitat diversity, and stream morphology.

State's Proposals

1. Identify where there are informational gaps concerning whether an ISWR is being met, and develop a workplan to collect the needed data.

2. Recognize that the ISWR amounts are aspirational goals to strive for, but are inappropriate targets to attach timelines to since they are regionally unobtainable due to institutional constraints. The State's team believes that salmon recovery is not predicated on these instream water right targets being met. Rather, incremental streamflow recovery in combination with other actions will provide step-by-step targets for salmon recovery.

3. Prioritize streams on which to augment instream flows based on providing the maximum benefit to salmon, with a commitment to timed incremental improvements.

4. Develop measures that augment instream flows with realistic and quantifiable objectives.

Productive Discussions

Although there have been differences in understanding the streamflow restoration objectives, the discussions between the State and NMFS have been very productive. Clarification of how specific measures will benefit flow restoration have been discussed in detail, and there is general agreement on the importance of increasing enforcement to restore streamflows, as well as pursing instream leases and transfers on specific reaches. Based on these discussions, the State is realigning its measures to strengthen the overall goal of restoring streamflows.

Water Quality Issues

Goal 5 Issue Paper
Water Quality Work Group

Revised January 31, 1997

Summary Statement of Issues

NMFS has continuing concerns about the adequacy of Goal 5 to protect resources important for salmonids. NMFS' concerns are predominantly with the riparian area protections in Goal 5, but there are also concerns about the wetland rules. Specifically, NMFS has concerns about:

- Adequacy of the riparian buffer width in the "safe harbor" provisions.
- Timing of implementation according to the present Periodic Review schedule.
- Exemptions for streets, roads, paths, and utilities in the "safe harbor" provisions for riparian protection.
- Wetlands outside UGBs, which do not have additional protection from Goal 5.

Discussion of Issues

To give the discussion on Goal 5 some context, note that the comprehensive plan designations in 1987 for the lands inside the coastal hydrologic units are:

Forest:	89 percent
Agriculture:	5 percent
Urban, rural residential, etc.:	6 percent

These proportions have not changed appreciably since these data were developed.

- NMFS has concerns about the adequacy of the 50- and 75-foot buffers set out in the Goal 5 rules. NMFS has not specified what it feels would be adequate, although there has been reference to the standard implemented in the Forest Practices Act (FPA) rules. This would mean buffers over 100 feet in urban and exception areas. Presumably, the concern is based on the need for shade and a long-term supply of large woody debris.

  Note that the 50- and 75-foot buffers are to be measured from the top of the bank, defined in the rules as the same as "bankfull stage." OAR 141-85-010(2) defines "bankfull stage" as the stage at which water overflows the natural banks of a stream or river, and where it begins to inundate uplands. This elevation is usually well removed from the watercourse itself.

  If, in fact, the FPA is operating as a *de facto* standard for riparian area buffers, we are not certain that the buffers implemented in forested areas are appropriate in the lower watersheds. Since lands that the Goal 5 riparian rules will most affect are located at the bottom of the watersheds, the benefits of larger buffers are probably not as extensive as they would be further up the watersheds. There appears to be no clear evidence that the buffers need to be wider.

- NMFS has concerns about relying on the Periodic Review schedule for implementing the new Goal 5 rules in coastal areas. It is their opinion that implementation of new riparian provisions needs to proceed more rapidly than the 5- to 7-year timeframe under the present schedule.

  The OCSRI Implementation Team intends to request that the Land Conservation and Development Commission consider adopting an accelerated Goal 5 implementation schedule for areas subject to the CSRI. This will, however, make the new rules subject to the new Measure 30, which requires that the state provide funding for any new mandates to local governments. Implementation of the new rules will thus be subject to the availability of state funding.

- NMFS notes that the exemptions for streets, roads, paths, and utilities in riparian areas would allow for the construction of roads alongside a stream. NMFS would be more comfortable with language that permits crossings, but not construction parallel to the stream.

  The exemption is conditioned by the requirement that intrusions be minimized. The OCSRI Implementation Team intends to ensure that the model ordinance and local ordinances implementing the safe harbor integrate adequate criteria to ensure that intrusions are minimized. If development of stringent criteria for "intrusions" is not sufficient, the Commission could be asked to consider changing the exemption to only include crossings.

- NMFS is concerned that the new wetlands provisions under Goal 5 do not in fact increase protection for wetlands that are important to salmonids.

  It is true that the new rules do not add a layer of regulatory protection to isolated wetlands in rural areas. Isolated wetlands are those that are not hydrologically connected to a stream or lake. However, under the new riparian rules, wetlands that fall within the riparian corridor are protected by the expansion of the riparian corridor boundary to include the wetland. Where the riparian corridor includes all or part of a significant wetland, the corridor boundary is required to be measured from the upland edge of the wetland [OAR 660-23-090(5)(c)].

Sediment Biological Objectives Issue Paper
Water Quality Workgroup

Revised January 31, 1997

Summary Statement of Issue

The biological objectives developed by the Water Quality Workgroup do not include objectives that provide specific numeric criteria for stream attributes such as particle size composition and residual pool volume. These attributes relate to problems caused by excessive sediment loading. NMFS believes that the absence of these biological objectives and related measures in the OCSRI plan is a serious deficiency.

Discussion of Issue

Development of numeric criteria for stream attributes, such as particle size composition and residual pool volume, and incorporation of the criteria into biological objectives would provide valuable targets for watershed councils, state agencies, and federal agencies to use as they develop and implement measures to recover and protect salmonids. NMFS believes it is appropriate to set these targets for watershed councils to use in developing their watershed plans, rather than letting each council develop its own biological objectives. NMFS also thinks numeric criteria for sediment are important, because the scientific literature demonstrates that survival of salmonid eggs and fry are reduced when fine sediments are increased, and that pool filling by sediment reduces juvenile rearing habitat. Also, without numeric criteria, there are no standards to evaluate and monitor actions that generate fine sediment.

The Workgroup did develop biological objectives related to sediment issues as follows:

- Meet DEQ's Inter-Gravel Dissolved Oxygen water quality standard.
- Meet DEQ's Biological Criteria water quality standard.
- Identify stream reaches not meeting DEQ's IGDO and Biological Criteria standards by 2007.
- Review the state Sediment water quality standard during the next Triennial Review.

State agency staff are concerned with the technical difficulty of setting numerical criteria for attributes such as embeddedness, particle size composition and residual pool volume. There is significant natural variability in these stream attributes depending on the watershed being studied; EPA does not have water quality criteria for these attributes; and there are no examples of water quality standards developed by other states that can be used as a model. Idaho recently attempted to develop a water quality standard for cobble embeddedness, but abandoned the approach in favor of an inter-gravel DO standard. NMFS believes the development and application of numeric criteria for particle size composition and residual pool volume would not be a technically challenging task, but that the real challenge is gaining the acceptance of affected stakeholders.

State agency staff are also concerned about setting such criteria without the benefit of review and comment by stakeholders and the public, and the perception of top-down mandates from Salem. State agency staff would prefer to address the issue through the Triennial Water Quality

Standards Review process, and at the local level through Watershed Council development of watershed specific objectives for these stream attributes. Further, EPA Region 10 is considering undertaking a project, in cooperation with Region 10 states, federal agencies, academia, and others, to develop technical guidance on physical habitat indicators. This guidance would be based upon a thorough review of scientific papers that have attempted to describe desirable numeric criteria for physical habitat features such as embeddedness and particle size distribution. This scientific review should provide an excellent starting point for potential development of biological objectives or water quality standards.

Issues for SST/NMFS Discussion

Should additional biological objectives be included in the revised OCSRI that provide specific numeric criteria and implementation timelines for stream attributes like particle size composition and residual pool volume?

Nondegradation Biological Objectives Issue Paper
Water Quality Workgroup

Revised January 31, 1997

Summary Statement of Issue

The biological objectives developed by the Water Quality Workgroup include objectives that provide for no degradation of water quality where it is currently equal to, or better than, state water quality standards. NMFS has identified nondegradation of existing high quality waters as a high priority biological objective. The issue is how, and to what extent, this biological objective would be implemented by state and federal agencies.

Discussion of Issue

The proposed listing indicates that Coho are currently under great pressure in coastal basins. Areas with habitat and water quality that is good should be protected as a high priority, especially in core areas, to ensure the continued survival of the species in these areas while recovery efforts are underway.

While laudable, the nondegradation issue raises significant implementation issues. How the term "nondegradation" is defined is a significant concern. The Workgroup was unable to agree on a definition for nondegradation, but discussion did cover issues such as short-term discharges for emergencies or improvements to habitat, no net degradation in a watershed, and a higher level of protection for core areas.

Another issue is how will nondegradation be implemented by state and federal agencies. One obvious implementation mechanism discussed by the Workgroup is DEQ's anti-degradation WQ standard. DEQ's High Quality Waters Policy provides that water quality better than the standards must be maintained and protected. However, the Environmental Quality Commission can allow a lowering of water quality in these high quality waters if it finds:

- No other reasonable alternatives exist except to lower water quality; and
- The action is necessary and justifiable for economic or social development benefits and outweighs the environmental costs of lowered water quality; and
- All water quality standards will be met and beneficial uses protected.

To date, this policy has been applied by DEQ to point source discharges, and by ODF to forest practices through the FPA. It has not been applied by ODA as the SB 1010 plans developed to date have been targeted at 303(d) listed streams. It is unclear whether the existing High Quality Waters Policy would trigger SB 1010 (ORS 568.909) and the subsequent development of agricultural water quality management plans. However, Section 6217 of CZARA has triggered SB 1010 for all coastal basin streams, and ODA may be able to address nondegradation as it develops management measures for the Coastal Nonpoint Source Program. It is also unclear to what extent ODA has authority under SB 502 (ORS 561.191) to prohibit agricultural practices that would degrade existing high quality waters.

Federal agencies are responsible for meeting state water quality standards, so activities on federal lands in Oregon should be meeting the High Quality Waters Policy. Further, a current federal lawsuit may give the state 401 certification authority over grazing activities on federal lands, and ultimately over a broad array of other federal land management activities. This new 401 certification authority could be used by the state to implement the High Quality Waters Policy on federal lands.

Another mechanism that could be considered for use in protecting core areas is DEQ's Outstanding Resource Waters Policy. Potentially, the Environmental Quality Commission (EQC) could designate core areas for protection under this policy and adopt restrictions on activities in the designated watersheds to provide a high level of protection for core areas. State and federal agencies would be required to address these restrictions as provided in the EQC's rules. These rules could be written to specifically trigger Senate Bill 1010. A significant factor to consider with this approach, in addition to the significant resource implications it would have for agencies, is the inequity inherent in setting more severe restrictions on some landowners than others because of their proximity to core area watersheds.

Issues for SST/NMFS Discussion

- Where should the definition of "nondegradation" lie between the extremes of: No degradation at all for any period of time and Cumulative degradation over time down to the water quality standards?
- Is there adequate statutory authority for ODA to restrict water quality degradation due to agricultural practices throughout the coastal basins?
- Should core areas be given special protection in the plan, and, if so, should DEQ designate core areas as Outstanding Resource Waters as a mechanism to provide the desired level of protection?

Attachments

OAR 340-41-026(1)(a)(A) High Quality Waters Policy
OAR 340-41-026(1)(a)(D) Outstanding Resource Waters Policy

340-41-026(1)(a)(A) High Quality Waters Policy: Where existing water quality meets or exceeds those levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, and other designated beneficial uses, that level of water quality shall be maintained and protected. The Environmental Quality Commission, after full satisfaction of the intergovernmental coordination and public participation provisions of the continuing planning process, and with full consideration of sections (2), (3) and (5) of this rule, however, may allow a lowering of water quality in these high quality waters if they find:

(I) No other reasonable alternatives exist except to lower water quality; and

(ii) The action is necessary and justifiable for economic or social development benefits and outweighs the environmental costs of lowered water quality; and

(iii) All water quality standards will be met and beneficial uses protected.

340-41-026(1)(a)(D) Outstanding Resource Waters Policy: Where existing high quality waters constitute an outstanding state or national resource such as those waters designated as extraordinary resource waters, or as critical habitat areas, the existing water quality and water quality values shall be maintained and protected, and classified as "Outstanding Resource Waters of Oregon." The Commission may specially designate high quality waterbodies to be classified as Outstanding Resource Waters in order to protect the water quality parameters that affect ecological integrity of critical habitat or special water quality values that are vital to the unique character of those waterbodies. The Department will develop a screening process and establish a list of nominated waterbodies for Outstanding Resource Waters designation in the Biennial Water Quality Status Assessment Report (305(b) Report). The priority waterbodies for nomination include:

- National Parks
- National Wild and Scenic Rivers
- National Wildlife Refuges
- State Parks
- State Scenic Waterways.

(E) The Department will bring to the Commission a list of waterbodies which are proposed for designation as Outstanding Resource Waters at the time of each Triennial Water Quality Standards Review;

(F) In designating Outstanding Resource Waters, the commission shall establish the water quality values to be protected and provide a process for determining what activities are allowed that would not affect the outstanding resource values. After the designation, the Commission shall not allow activities that may lower water quality below the level established except on a short term basis to respond to emergencies or to otherwise protect human health and welfare.

340-41-006(40) "Critical habitat" means those areas which support rare, threatened or endangered species, or serve as sensitive spawning and rearing areas for aquatic life.

340-41-006(41) "High quality waters" means those waters which meet or exceed those levels that are necessary to support the propagation of fish, shellfish, and wildlife and recreation in and on the water, and other designated beneficial uses.

Adequacy of Oregon Department of Agriculture Programs To Address Water Quality Limitations Water Quality Workgroup

January 31, 1997

Summary Statement of Issue

ODA measures designed to address the influence of agricultural activities on the Biological Objectives identified by the Water Quality Workgroup do not:

- Quantitatively define the conditions that will reverse the identified water quality Factors for Decline on agricultural lands. NMFS believes that the absence of such quantified conditions constitutes a substantial weakness.
- Identify coast-wide specific practices, riparian buffers, or prohibited conditions to achieve water quality goals in a timely manner.
- Quantify the changes that will be achieved through implementation of ODA measures.

NMFS believes that ODA measures may be inadequate in terms of content and application to overcome some factors of decline in a timely manner.

Discussion of Issues

1. ODA worked with the agricultural community during the 1993-95 legislative session to develop SB1010, an agricultural water quality management program to achieve water quality goals and objectives that would maximize landowner involvement and commitment. The intent of Senate Bill 1010 is to provide a role for the Oregon Department of Agriculture to assist producers in addressing those agricultural activities in watersheds known to contribute to water quality problems, to prevent pollution problems wherever possible, and to mitigate any existing problems. This intent is achieved through providing for local ownership and responsibility to the Agricultural Water Quality Management Area Plans (AWQMP).

   NMFS feels that aquatic and riparian habitat along non-forested land is critical to salmonid recovery and requires state-sponsored development of an upfront aquatic protection program that would identify specific practices and objectives until the effectiveness of the states SB1010 can be realized. Because the state was able to establish a forest practices based program for private forested lands, NMFS feels that a state-sponsored aquatic protection program similar to the Forest Practices Act could be developed for nonforested lands to establish an aquatic protection program.

   State agency staff are concerned with the technical difficulty of establishing the type of aquatic protection program envisioned by NMFS for agricultural lands. ODA staff feel that SB1010 will achieve the same goal and has a better chance of success because of local involvement, better use of scarce resources, and because of the technical difficulty of developing one set of practices that could address the diversity of agricultural activities coast-wide. SB1010 does provide for enforcement action to deal with situations where

corrective action is needed but is not being taken by an operator. In those cases where a farmer or rancher refuses to take action, the law allows ODA to use civil penalties, if necessary, to encourage action to address the issue.

2. Based on existing resources, ODA will develop AWQMPs for Tillamook and the inland Umpqua and Rogue for completion by February 1998 and will continue intensified compliance assurance efforts by the CAFO program in the Tillamook, Coos, and Coquille Basins. If resources specified in the Governor's "Healthy Streams Partnership" are realized, AWQMPs for the entire coastal area will be completed and initiated by June 1998. After one year has elapsed from the date of adoption of a AWQMP, ODA shall begin the enforcement component of the plan. A baseline condition assessment of the contribution of agricultural activities to water quality concerns does not exist for the coastal basins. For this reason, state agency staff are not able to specify expected improvement in water quality or benefits to fisheries due to AWQMPs at this time. AWQMPs will provide for assessment and monitoring of progress once implemented.

Fisheries Management Issues

January 30, 1997
by
Bruce Schmidt
Oregon Department of Fish and Wildlife

This report is intended to summarize the issues raised by the National Marine Fisheries Service (NMFS) in their reviews of the Hatcheries, Harvest, and Predation portions of the first draft of the Coastal Salmon Restoration Initiative Plan. Most of the issues were resolved outright or by agreeing on followup actions, which are reported about herein. Two meetings were held to discuss the issues and concerns, and each will be summarized below. Steve Smith, NMFS, has been the designated contact for ODFW on these issues, and he participated in both meetings. The Hatchery issues meeting was also attended by Lauri Wheitcamp and Robin Waples of NMFS.

Harvest Issues

1. *NMFS supported the new Spawner Rebuilding Criteria matrix as a valuable concept for regulating allowable fishery impacts.*

   ODFW appreciates the recognition of the significance given this new approach. Since the meeting, the numerical criteria have been refined, with higher targets established in the mid-coast in relation to the larger amount of suitable spawning habitat there, but some other areas decreased slightly. These target numbers are based on the new habitat based population model, given them a more scientifically supportable basis. The concept of adjusting allowable fishing impact based on both ocean survival rates and demonstrated population rebuilding remains unchanged.

2. *Clarify that the rebuilding criteria relate only to wild fish.*

   Agreed that is the concept; final wording will be clarified.

3. *Indicate that further harvest restrictions will be imposed if escapements decline significantly below current low levels.*

   Agreed with the caution that impact cannot be reduced to zero due to incidental impacts from fisheries outside our control.

4. *NMFS should be included in the scheduled review of the adjustment criteria in 2000.*

   Agreed that this was the intent; it will be more clearly stated in final wording

5. *Smolt outmigration monitoring should include growth and condition in estuaries.*

   ODFW agreed with the need to establish a monitoring baseline that could be used to evaluate the effects on wild smolts if stocking rates are raised in the future to create terminal fisheries,

but felt growth and condition of smolts in the estuary was a poor indicator for that purpose. We **agreed** to collect baseline monitoring data suitable for this purpose as part of the monitoring program, but probably not in the estuary. Plans to evaluate the role estuarine habitat plays in coho dynamics remain unchanged.

6. *Clarify in the Spawner Rebuilding Criteria paper that fishing would not be allowed in a basin with a severe conservation problem even if the sub-aggregate as a whole achieved the criteria.*

   Agreed. This clarification will be made.

7. *Use a term other than "escapement goals" in relation to the fishery adjusting matrix, such as "Interim Escapement Objectives".*

   After discussing the issue of setting escapement targets, we agreed that there are different target levels describing "healthy" or "fully seeded" population levels, minimum viable population levels and fishery adjusting levels. We **agreed** to use the term "spawner rebuilding criteria" in relation to the fishery adjusting matrix. Wording will be changed in the "Spawning Escapement" measure in the plan to explain that a single spawner target number is not appropriate and to describe how population objectives will be approached.

   Agreement was reached on all of the issues discussed at the Harvest issues meeting. The minutes of that meeting are attached for slightly more detail.

Hatchery Issues

A variety of hatchery and predation issues were discussed, but serious concerns were raised primarily around four issues.

1. *Significant concern was raised about the Wild Fish Management Policy (WFMP)* and the fact that it indicates stray rates of hatchery fish on spawning grounds for hatchery stocks that are very similar to the wild stocks may range up to 50 percent.

   This concern over the WFMP raised a fundamental question about the policy itself. A good discussion was held, but evaluating the WFMP was beyond the scope of this meeting. Increased comfort resulted when we pointed out that although the hatchery stocks used along the coast are all derived from local wild fish, they are classified under WFMP in the category that allows no more than a 10 percent stray rate (see Response to NMFS Hatchery Issues, which is the following section in this Appendix)

   Agreed to clarify this point in the final version of the plan.

2. *There was concern raised over the measure related to temporarily using hatchery production derived from wild parents to re-introduce or boost seriously depleted stocks.* The issues seemed to revolve around concerns that this concept has not been thoroughly assessed and that we did not present enough details on how we would carry it out to evaluate our plans.

The level of concern was reduced when we pointed out that the first step in that measure is to develop the concept and scope of the program and develop a proposal for conducting such an approach. This proposed program would be subject to review, including NMFS, before any actual stocking would take place. We **agreed** that more time is needed to fully develop and evaluate the concept, and that the preparatory steps will be more clearly spelled out in the final version of the plan.

3. *Stocking of coho fry was raised as an issue of concern.*

   Discussion of this concern suggested that the NMFS perception was that the fry program was larger than it is. The significantly lower survival of fry stocking was also mentioned. We **agreed** to provide more specific information on the size, scope and intent of the fry stockings, and a brief report is under preparation now (see Response to NMFS Hatchery Issues, which is the following section in this Appendix). We also intend to provide more detail about the size, intent and conduct of these and all other coastal coho stocking programs as part of the CSRI action relating to preparing management objectives, including genetic guidelines, for all coastal hatchery programs.

4. *Concern was raised over effects from predation.* NMFS was particularly concerned about effects of introduced fish species. ODFW was concerned over effects from federally managed species such as marine mammals and migratory birds.

   There appears to be a need for more objectively obtained data relating to impacts from predators, and ODFW has proposed that studies be conducted as part of CSRI. ODFW does have some information on the issue of introduced fish, and **agreed** to prepare a report describing the situation with warm water predatory fish on the coast and the difficulties for applying any remedial actions. That report has been prepared and sent to Steve Smith for distribution within NMFS. We also **agreed** on holding a joint workshop to more fully explore this issue and determine what should or can realistically be done. NMFS **agreed** to look into what might be done to help determine effects from federally managed predators.

   The Hatchery Issues meeting concluded with agreement to provide the additional information mentioned. While some concern over several of these issues likely still remains, it appeared that when the actual scope of these programs is described, that the level of concern is substantially less than it was prior to the meeting. Additional follow up meetings will be held with NMFS staff once the reports have all been prepared and submitted, but there was insufficient time to accomplish all of this prior to finalizing the CSRI plan.

Oregon Department of Fish and Wildlife
Response to NMFS Hatchery Issues

At a December 13, 1996 meeting, NMFS staff raised three issues in regards to the hatchery portions of the CSRI. It appears their concerns can be addressed by clarification of past ODFW actions and intents for future actions. The three issues raised were:

1) ***Allowable stray rate for hatchery coho in regards to implementation of the Wild Fish Management Policy (WFMP).*** The WFMP establishes criteria for classifying hatchery stocks, and the maximum allowable stray rates for each stock classification. Although the most "Wild" type classification allows up to 50 percent hatchery strays, all the current coastal hatchery coho stocks are classified for maximum stray rates of 10 percent or less.

2) ***Clarification of the plans and decision making process for use of hatcheries in supplementing natural production***. The CSRI includes plans for evaluating the use of hatcheries to rebuild wild populations. Although this may be an important tool in helping to rebuild wild coho production, the techniques have not been fully evaluated. We are developing broad strategies to identify potential sites and evaluate various strategies to achieve this goal. Initial areas of concern include Nehalem, Tillamook, Salmon River and Alsea drainage basins. Specific plans for site selection, strategies, monitoring, and evaluation will be developed before projects are initiated.

3) ***Clarification of size, scope and plans for ODFW coho fry stocking program***. This information is being complied as part of the white paper response to the NMFS concerns.

   In response to these questions, we are developing a paper consisting of two parts. The first is an overview of the ODFW coastal hatchery program. This will include general information on hatcheries, as well as specific discussion of the Statutes and Administrative Rules governing hatchery operation, and an outline of developing evaluations for the use of hatcheries to supplement natural production. The second part of the paper will describe for each major coastal basin actions already taken, planned future actions, allowable stray rate based on Wild Fish Management Policy, and hatchery production levels (for both smolts and fry). We expect the paper to be finished by February 15.

ODFW/NMFS CSRI Harvest Actions Meeting Minutes

Draft - December 3, 1996

Attendees

National Marine Fisheries Service:
Steve Smith

Oregon Department of Fish and Wildlife:
Burnie Bohn
Don McIsaac
Neal Coenen
Tom Nickelson
Bruce Schmidt
Rod Kaiser

The meeting was held from 10:00 until 12:00 Noon at the ODFW Portland office.

The meeting was called to jointly review the outstanding issues and concerns of the National Marine Fisheries Service (NMFS) with the harvest and escapement goals portions of the ODFW actions under the Coastal Salmon Restoration Initiative (CSRI). Discussions centered around seven bullet statements (briefly restated below) provided earlier by NMFS relating to specific issues or concerns. Steve Smith indicated that he was representing the NMFS consolidated perspective.

1. NMFS indicated satisfaction with the latest draft of the proposed fishery management regime, as described in the report by Don McIsaac, and referred to it as the "shining star" of the salmon initiative.

   ODFW appreciated the recognition of the value of this new approach of managing future fisheries based on both increasing run sizes and improving ocean survival conditions. This is actually a significant new approach to establishing allowable fishery impacts.

2. NMFS requested improved clarification that the fishery rebuilding criteria relate only to naturally produced coho, or fish specifically produced to supplement wild populations.

   ODFW reaffirmed that this is the intent of the program, and will make sure that final wording adequately makes this clear. (NMFS feels we agreed to only apply this to wild origin fish. I need some clarification of this point for closure of the issue.)

3. The fishery criteria need to specifically indicate additional fishery restrictions will be imposed below the current 10-13% level indicated if populations decline "significantly" below current low levels.

   ODFW pointed out that we generally agree with this suggestion, but that it is not possible to reduce incidental harvest related impact to zero, since some impacts occur in locations or due

to causes outside ODFW control. A rough approximation was that it was likely impossible to go below about 5% impact due to the inability to control impacts from Canadian fisheries, treaty fisheries, bycatch in fisheries other than salmon, impacts in waters controlled by other states, etc. ODFW agreed to indicate $\leq$ 10-13% in the matrix and include narrative indicating that further reductions would be made if populations decline further from current low levels, but that there is a limit to how low impacts can be reduced.

4. NMFS should be included as a participant in the scheduled review of the fishery adjustment criteria in the year 2000.

   ODFW will add wording that clarifies that the review will take place with broad-based input, including NMFS.

5. Monitoring of smolt outmigration should include growth and condition of fish in the estuary as a means of providing a baseline for assessing any impacts from any future stocking for selective or terminal fisheries.

   Significant discussion of this point occurred. Smolt outmigration monitoring is planned for locations higher in the drainage where it is more feasible to trap outmigrants, and there wouldn't be any stocking of smolts for selective fisheries in those locations. While some investigation of the role estuaries play in coho survival is planned in Phase 2 of CSRI, the smolt production monitoring will not be done in the estuary due to logistics and the belief that coho spend relatively little time there (as opposed to chinook - ODFW believes that the estuary monitoring in the Coos and Coquille estuaries referred to by NMFS is for chinook, not coho).

   ODFW also believes that the greatest potential impact from stocking is straying, not competition in the estuary, especially given short coho residency in estuaries. Another concern was that many factors influence growth and condition, making those parameters poor for assessing competitive interactions, especially with the short duration in the estuary. Survival to adulthood is probably a better measure. It was also pointed out that major increases in stocking will not occur in the future. Coastal stocking has been reduced significantly from the past, down to 6 million, and has recently been reduced from 6 to 2.2 million. Stocking would not likely ever be raised above the 6 million level again.

   Agreement was reached on the need to be able to assess potential impacts from any new stocking programs, and that baseline information would be collected in basins where possible new stocking programs might be anticipated.

6. Wording was suggested for the fishing criteria paper to indicate that if a sub-aggregate achieved the adjustment criteria but a basin within the sub-aggregate still had a severe conservation problem, that additional harvest would not be allowed "within that basin". This wording was suggested in addition to the prohibition of advancing to the next tier for the sub-aggregate (which by definition includes any basin within it).

ODFW agrees. This is already intended in the existing wording, but we will make sure it is clearly stated.

7. NMFS suggested that the term "Interim Escapement Objectives" in the harvest matrix be changed.

   ODFW agreed, but discussion ensued on an appropriate term. All agreed on the need to differentiate between targets to achieve "full seeding" or "healthy population" levels from the criteria used to adjust fishing rates. This differentiation (or failing to make it) has caused significant controversy, both within NMFS and among the public. Agreement was reached that the wording in the harvest matrix will be changed to "spawner escapement rebuilding criteria". In addition, in the CSRI plan action for Escapement Goals, wording will be added to point out that objectives for target population levels are being established through basin planning. It will also be pointed out that the target levels for healthy populations are substantially different (higher) than those in the realm of an endangered species listing.

In conclusion, NMFS and ODFW reached agreement on all of the points discussed, and share optimism that the new approach to managing harvest impacts is a significant contribution to the restoration efforts.

Relationships Between Coho Salmon And Warmwater Fish Species In Coastal Lakes And Reservoirs Of Oregon

by
Ray Temple and Kin Daily

Part 1: Assessment of Interactions

Introduction

A number of lake systems on the Oregon coast support both indigenous populations of coho salmon and introduced populations of warmwater game fish. The impacts of introduced species on coho salmon are of particular concern because of the decline in coho populations and the proposed listing of coastal coho under the Endangered Species Act.

The purpose of this paper is to summarize what is known about the interactions between coho salmon and warmwater fish species in Oregon coastal lakes and reservoirs.

Background

Coastal lake systems historically supported strong runs of wild coho salmon. Lake systems that have coho runs, going from south to north, include Floras Lake, Tenmile Lake system (Tenmile, Eel and Clear lakes), Tahkenitch Lake, Siltcoos Lake, Woahink Lake, Sutton and Mercer lake system, and Devils Lake. All of these lakes have short outlet streams to the ocean that serve primarily as migration routes. Spawning and rearing habitat for coho is found in the many small tributaries to the lakes. The lakes themselves were once important rearing habitat for coho. Lake rearing once accounted for 80 percent of the coho production from the Tenmile System (Reese Bender, pers. comm.). Lake rearing of coho still occurs in some systems, but much of that value has been lost due to a combination of habitat degradation and/or competition and predation by introduced fish species. In the Tenmile System, all lake production has been lost.

Warmwater fish species were brought to Oregon late in the nineteenth century and were stocked into many of the coastal lakes in the 1930's (Lampman 1946). ODFW records show that Tahkenitch Lake was stocked with 20,000 warmwater fish of "unknown" species in 1935, followed by catfish, largemouth bass, crappie and bullfrog in 1937-38. Yellow perch must have been included with the "unknowns". It probably did not take long for these species to be carried the few miles to Siltcoos and other Florence area lakes.

ODFW stocking records for warmwater fish show that Devils Lake received 90,000 "catfish" in 1928 and thousands of "unknowns" in 1933, 1934, and 1935 followed by catfish, largemouth bass, crappie and bluegill in 1936.

The Tenmile Basin Fish Management Plan states that bullhead catfish were stocked in Tenmile Lakes in 1920. The district reports that yellow perch were present before the 1950s. Apparently other warmwater species were slower to arrive, as bluegill were not found there until 1964. The lake system was treated with rotenone in 1968 to eliminate bluegill, bullheads, and perch for the

benefit of coho. However bluegill soon reappeared, and largemouth bass were stocked in 1971 to prey on them. Crappie and yellow perch have also shown up in recent years.

All of the introduced warmwater species have the potential to compete with or prey on juvenile coho. Largemouth bass over six inches in length prey primarily on fish and crayfish. Adult crappie, bullheads, and yellow perch also prey on small fish at times. At some stage of their life histories, all of the warmwater species feed on the same zooplankton and invertebrates utilized by juvenile coho.

Evidence of Predation

The literature documents that warmwater fish will prey on salmonids, but little documentation is specific to the species or conditions found in Oregon coastal lakes. Tabor (1991) showed that smallmouth bass prey heavily on emigrating subyearling chinook in the Columbia River under certain conditions. Warner (1972) found that 30 percent of largemouth bass checked in Maine lakes had preyed on recently-stocked landlocked salmon fingerlings (*Salmo salar)*. Yellow perch (2.5% of those examined) had also taken salmon, but no salmon were found in bullhead stomachs.

Ben Hur Lampman (1946) reported that he "was able to identify fourteen silver salmon fry, together with a mass of partially digested food, obviously fish that couldn't be identified" in a four-pound bass caught from Devils Lake.

Largemouth bass were collected at the mouths of tributaries to Tenmile Lakes in April 1989 to check for predation on coho fry that were entering the lake. Downstream migrant traps were operated on the tributaries to document the migration of juvenile coho into the lake. Bass captured near the creek mouths were feeding heavily on subyearling coho. A strategy was tried in the late 1980s to collect coho nomads and fry, pen-rear them to presmolt size and then release them in the lake in November to rear to smolt size. However, the strategy failed for a number of reasons, not all of which were related to warmwater fish.

Impacts of Warmwater Fish on Coho Populations

Although warmwater fish prey on and probably compete with juvenile coho to some degree, their impact on coho populations is less clear because of the other factors limiting coho production. Also, coho populations have declined coast-wide, not just in some lake systems containing warmwater fish.

The benefits to coho from lake-type rearing habitat without warmwater fish is demonstrated by the production that occurs in Mill Creek (Yaquina System), which has a 15-acre mainstem reservoir. The adult return of nearly 500 adults to this system in 1996-97 far surpasses what the two small spawning streams could rear (Bob Buckman, pers. comm.).

A comparison of coho spawning escapement to changes in the warmwater fish community in the Tenmile Lakes system suggests some negative interaction. Coho run estimates dating back to 1955 were highest the first three years (1955-57), averaging 34,000 adults and 39,000 jacks. These runs occurred when the lakes had large populations of bullheads and yellow perch, but not

bass or bluegills. This was followed by three years of low runs (average = 8,400 adults and 15,900 jacks) that can be attributed to poor ocean survival (El Nino).

From 1961 through 1969, when bluegill appeared and increased in abundance, runs averaged 12,400 adults and 18,300 jacks. After the 1968 chemical treatment, the coho population rebounded for two years, averaging 21,000 adults and 34,000 jacks in 1970-71. However, runs have not approached that level since. By 1971, the bluegill population was again large and largemouth bass were introduced. The bass did extremely well, and by the late 1970s the lakes contained large populations of bass, bluegill, and bullheads. Coho escapement since 1980 has averaged 2,900 adults and 1,900 jacks. However, during this latter time period coho populations coastwide have declined drastically and have been affected by many factors other than those related to freshwater rearing (e.g., poor ocean conditions and harvest).

In the Tahkenitch and Siltcoos systems, the lakes have continued to have a positive influence on coho survival, despite the presence of warmwater fish.

Little information is available on the coho runs that existed in Tahkenitch and Siltcoos lakes prior to the introduction of warmwater species. However, since surveys began in 1960, coho spawning densities in tributaries to both lakes have been consistently higher than in systems without lakes (Will Beidler, pers. comm.). Also, the runs have been relatively stable, while runs in other stream systems have declined. Juvenile coho are much more common in population samples from these lakes than from Tenmile. In addition, many of the returning adults are smaller than average, possibly because large, lake-reared smolts return after only one year in the ocean. The high incidence of jacks may also be a result of lake rearing.

The apparent successful rearing of coho juveniles in Tahkenitch and Siltcoos lakes, versus little or no successful rearing in Tenmile Lakes, may be related to differences in the density of bass. Population samples show that bass density in Tenmile is consistently four to ten times greater than in the other two lakes.

Other differences in warmwater fish communities among lakes could account for differences in juvenile coho survival. Tahkenitch and Siltcoos lakes have contained a variety of warmwater species, including bass and bluegill, since the 1930s. However, yellow perch, rather than bluegill, are the dominant panfish. Life history (planktivorous as juveniles; predaceous on small fish as adults) suggests that yellow perch would compete with and prey on juvenile coho more than bluegill would, so this difference in species composition among lakes provides no answers.

Summer water quality in Tenmile Lakes may be more limiting to lake rearing of coho than is the interaction with warmwater fish. Tenmile contains more nutrients than Tahkenitch or Siltcoos, possibly because of inputs from the intensive shoreline development and runoff from the deforested slopes in the watershed (Tenmile Basin Fish Management Plan). Algal blooms are frequent, as is severe oxygen depletion of the bottom water. This, coupled with rapid warming of the shallow water, may make Tenmile uninhabitable by coho at times.

Devils Lake is a much smaller system than the others, but also supports coho salmon and warmwater fish. However, Devils Lake is of special interest because of habitat changes brought about

by the introduction of grass carp in 1986. All of the aforementioned coastal lakes have extensive beds of aquatic macrophytes. However, the severity of the weed growth at Devils Lake prompted community action that led to the grass carp introduction. By 1993, essentially all submergent vegetation in Devils Lake had been eliminated by the carp. This was accompanied by poor survival and recruitment of all species of warmwater fish (including largemouth bass, bluegill, yellow perch, black crappie, and bullhead) to the point that few remain, other than a low density of large bass and the young they produce each year. Juvenile bass do not appear to be surviving past age one at a level that will sustain a significant population.

The reduction in warmwater species coincides with a corresponding increase in incidental observations of coho outmigrants from Devils Lake (Dave Wagner, pers. comm.). The smolts observed have also been above average size (up to 14 inches), perhaps because of rapid growth in the lake and/or a tendency to hold over in the lake to become a two year old smolt. Coho spawning ground counts have been conducted on Rock Creek, the main tributary, for many years. These runs have been more stable than those in streams without lakes (Bob Buckman, pers. comm.). However, the only adult return since the reduction in the warmwater fish population has been from a single year with very low spawner abundance. Future returns will better reflect possible benefits to coho.

The way in which the reduction in aquatic vegetation in Devils Lake benefits coho is open to conjecture. Removal of cover in the littoral zone may be more detrimental to warmwater species than coho because juvenile warmwater fish are always associated with the shoreline and are therefore more vulnerable to predation by birds and large fish. The pelagic coho may be less vulnerable to the cormorants, herons, gulls and other avian predators that use the lake.

Food production following weed removal may also favor coho. Nutrients released by consumption of weeds by grass carp stimulate zooplankton production in the open water. This food source is effectively utilized by coho. The weeds are no longer present in the littoral zone to provide food and substrate for production of the macroinvertebrates important to panfish and juvenile bass.

Assumptions

- Largemouth bass in coastal lakes prey primarily on crayfish and warmwater prey species, but take juvenile coho when they enter the lakes and when they are in the littoral zone.

- The interaction resulting from the nearshore dependency of small nomad coho salmon when they enter the lakes and the presence of largemouth bass and bluegill in the littoral zone has a negative impact on coho survival (Tenmile Basin Fish Management Plan).

- Aquatic vegetation provides protective cover for juvenile fish of all species, but may be more important to warmwater species than coho.

- Release of nutrients tied up in aquatic macrophytes may improve survival and growth of juvenile coho by stimulating zooplankton production.

- Poor summer water quality from nutrient loading may be limiting to coho production in some lakes.

References

Daily, K. 1992. Smallmouth bass predation on indigenous fish species in the Umpqua, Rogue and John Day river basin. Oregon Department of Fish and Wildlife.

Lampman, B.H. 1946. The coming of the pond fishes. Metropolitan Press, Portland, OR.

Poe, T.P., H.C. Hansel, S. Vigg, D.E. Palmer, and L.A. Prendergast. 1991. Feeding of predaceous fishes on out-migrating juvenile salmonids in John Day Reservoir, Columbia River. Trans. Am. Fish. Soc., Vol 120, No. 4. Bethesda, Maryland.

Tabor, R.A., R.S. Shively, and T.P. Poe. 1991. Predation on juvenile salmonids by smallmouth bass and northern squawfish in the Columbia River near Richland, Washington. U.S. Fish and Wildlife Service, National Fisheries Research Center, Columbia River Field Station, Cook, WA 98605.

Warner, K. 1972. Further studies of fish predation on salmon stocked in Maine lakes. Prog. Fish Cult., Vol. 34, No. 4.

Notes:

(Daily 1992): Coho abundance tables for the Mainstem Rogue River show subyearlings available throughout year, but mainly from mid-February through mid-July with peak in April, May and June. Smolts are available from February-June above Grave Creek with peak in March and April. Below Grave Creek, subyearlings are not present. Smolts are available from February through early June with peak in April. Temperature data indicate that smallmouth bass would be feeding sparingly in the lower river from late March through mid-May (50-60°), actively from mid-May through mid-September (≥60°), and sparingly from mid-September through mid-October.

(Warner 1972): Studies were of stocked landlocked salmon (*Salmo salar).* Most of the salmon stocked were spring yearlings (4-6 inches). Of 558 yellow perch examined following 26 recent plantings in lakes, 14 fish (2.5%) had eaten stocked salmon. Of 76 smallmouth bass examined following 12 recent plantings in lakes, 10 (13%) had preyed on salmon. Of 10 largemouth bass examined following three recent plantings, 3 (30%) had eaten salmon. Of 14 bullheads examined following three salmon plantings, none contained salmon.

(Tabor et al. 1991): Juvenile salmonids made up 59 percent of smallmouth bass diet and were present in 65 percent of smallmouth bass stomachs in a freeflowing section of the Columbia River when large numbers of emigrating subyearling chinook were utilizing littoral habitat occupied by smallmouth bass. In a longer term predation study on John Day Reservoir (Poe et al. 1991), salmonids comprised only 4 percent by number of food items in smallmouth bass stomachs.

Part 2: Management Framework

Introduction

Warmwater game fishes, including striped bass, were introduced into coastal drainages in the last hundred years and have become widely distributed and locally abundant. In addition, sterile grass carp were introduced into Devils Lake in 1987 to control vegetation. Several of these species, particularly the black basses, crappies, and striped bass, are piscivorous. All warmwater species have the potential to compete with salmonids. This document examines not the biological mechanisms or extent of interaction, which are largely unmeasured, but the considerations for management actions intended to benefit coho salmon.

Introductions of New Species

Introduction of non-endemic species of fish into Oregon waters is regulated by policy defined in Oregon Administrative Rules and by ODFW internal policies. All of these policies are intended to place conservation of native fishes ahead of presumed benefits from introductions of exotic fishes.

Applicable Oregon Administrative Rules include:

- *Fish Management Goals* (OAR 635-07-510)
  (1) The overriding goal of fish management is to prevent the serious depletion of any indigenous fish species through the protection of native ecological communities, the conservation of genetic resources, and control of consumptive uses such that fish production is sustainable over the long term.

- *Operating Principles for Natural Production Management* (OAR-07-523)
  (2) Competition, predation and disease: Introductions of fishes of the same or different species as those already present may seriously reduce natural production through competition for food and space or through predation. Introduction of disease may also reduce natural production. The Department shall oppose any actions that allow competition, predation, or disease to prevent meeting natural production objectives of management plans.

- *Wild Fish Management Policy* (OAR's 635-07-525 through 635-07-529)
  Gives the highest consideration to the protection and enhancement of wild fish stocks.

- *Management Plans* (OAR 635-07-515)
  (1) Resources of the state shall be managed according to plans which set forth goals, objectives and operating principles for management of species, waters, or areas. Such plans are a primary means of implementing Department policies regarding fish management.

The internal ODFW policy pertaining to new introductions is in *Guidelines for Fish Introductions or Transfers*. This requires that proposals for new introductions go through the established fish introduction proposal review process and receive approval by the Chief of Fisheries.

Additional guidelines for introductions of warmwater game fish are in *The Warmwater Fish Plan* adopted under authority of OAR 635-07-515. These give first priority to the protection of endemic salmonids and contain a number of conditions and safeguards that must be met before an introduction can proceed.

In compliance with these policies and guidelines, the Department has been conservative in introducing new species of fish into Oregon waters. In the last 25 years, only two new introductions of species capable of reproducing have been made in coastal drainages. One was the introduction of largemouth bass into Tenmile Lake in 1972 to prey on the growing bluegill population. The other was of black crappie into Town Lake, a small sand dune lake near Pacific City that already contained largemouth bass.

The two other recent introductions of exotic fish into the coastal systems were of sterile or functionally sterile fish. One was of white-striped hybrid bass into North Tenmile Lake from 1982-88. This program was canceled due to concerns over fish straying into other waters. The other was of triploid grass carp into Devils Lake by the Devils Lake Water Improvement District in 1986, 1987, and 1993 to control aquatic vegetation.

Despite the Department's very conservative approach to introductions, the public is much less restrained. Illegal introductions of warmwater fishes is a chronic problem in Oregon and one which we are unsuccessful in reducing. Legal constraints are ineffective when the probability of being apprehended is very low. The willingness of the public to introduce fishes as they see fit compromises management strategies, including efforts to eradicate populations.

Areas of Overlapping Distribution Between Coho and Introduced Fishes

The potential for introduced species to have a negative impact on coho salmon populations exits where juvenile coho rear in or migrate through habitats occupied by the introduced species. This occurs in coastal lakes and reservoirs which have tributaries used by coho for spawning and which also contain warmwater fish populations. These waters include Floras Lake, Tenmile Lake system (Tenmile, Eel, and Clear lakes), Tahkenitch Lake, Siltcoos Lake, Woahink Lake, Sutton and Mercer lake system, and Devils Lake. All of these lakes have short outlet streams to the ocean which serve primarily as migration routes. Rearing occurs in the lakes and tributaries.

Other waters where introduced species could impact coho are the Coos and Umpqua estuaries and the Umpqua River system. Both estuaries contain striped bass. The Umpqua River also supports smallmouth bass in the mainstem and a few tributaries.

Discussion: Species Interactions in Lakes

Warmwater Fish

Eradication of warmwater fish from these systems to enhance coho production is not feasible. Efforts to do so would be expensive, controversial, and probably not permanent. The attempted eradication of warmwater fish from the Tenmile system in 1968 serves as an example. Despite complete treatment with rotenone to eradicate all fish, bluegill soon reappeared and were abundant by 1972. Only two years of enhanced coho production was achieved.

The warmwater fish populations in the coastal lakes support extremely popular and economically important fisheries. The coastal lakes are the most popular and productive largemouth bass fisheries in the state and also receive heavy use by those seeking panfish. Consequently, elimination of these fisheries would be very controversial, with strong public sentiment on both sides of the issue. If warmwater fish were successfully removed, it is certain they would be illegally reintroduced by the public. Illegal introductions of new species by the public is a growing problem throughout the state.

The likelihood of reducing predation through elimination of angling regulations on warm water fishes is scant. Of the warmwater fishes present, only the basses are subject to size or bag limits. Exploitation is low on largemouth bass (estimated at 7% in Siltcoos Lake, 9 % in Tahkenitch Lake, and 18% in the Tenmile Lakes), limiting the impact of regulation changes. Exploitation is low in part because anglers release 30-56 percent of the bass they catch regardless of the harvest allowed by angling regulations.

Triploid Grass Carp

There is some preliminary evidence that the reduction of submergent aquatic vegetation in Devils Lake by triploid grass carp has resulted in a decline in the warmwater fish population and an increase in coho smolt production. This has led to speculation that grass carp could be used to enhance coho production in other coastal lake systems containing warmwater fish.

Use of grass carp to remove vegetation in coastal lakes with the long-term goal of fostering coho production is problematic for several reasons. Among the problems are:

- *Uncertainty of benefits*. There has not been time to ascertain whether elimination of vegetation in coastal lakes by grass carp would ultimately result in ecosystems favorable to coho salmon.

- *Loss of recreational fisheries:* There is an increasing constituency for warmwater fishing which would react strongly to loss or diminishment of fisheries. Warmwater fishing in the coastal lakes contribute on the order of angler days annually.

- *Cost*. At the current cost of approximately $15 per fish and the same stocking rate used at Devils Lake (40 fish per acre), the cost of fish alone would exceed a million dollars to

stock any of the major lakes. Periodic restocking would be needed to maintain control of vegetation.

- *Pathogens*. Disease-free certification of grass carp would be required, but there is some risk of new diseases or parasites being introduced into Oregon waters where they could impact existing species of fish.

- *Water quality*. Recycling of nutrients currently tied up in aquatic plants stimulates the growth of algae, including noxious blue-green varieties. Decaying algae can release toxins and deplete dissolved oxygen. Water quality responses are not reliably predictable in large systems.

- Many waterfowl and shorebirds on coastal lakes depend on aquatic plants or invertebrates living on them for food. Waterfowl use of Devils Lake has markedly declined since the introduction of grass carp and particularly following near eradication of submergent vegetation.

- Other unknown ecological impacts.

Discussion: Species Interactions in Streams and Estuaries

Striped Bass

Striped bass were first recorded in Coos Bay in 1914. By 1931, commercial landings in Coos Bay exceeded 8,200 kg, and regulations governing the fishery were promulgated by the Fish Commission of Oregon (Lampman 1946). By the 1940s, striped bass supported major commercial and sport fisheries (Morgan and Gerlach 1950). The population peaked at estimated 43,400 adult fish in 1963 (Johnson et al. 1991). However, by 1975 the population had dwindled to the point that commercial fishing was legislatively prohibited. The population continued to decline into the 1980s (Temple and Mirati 1986). The cause of the decline is unknown, but may involve climatic instability and deteriorating water quality (Johnson et al. 1991). The population remains very low compared to historic levels. However, periods of high striped bass abundance in the past coincided with periods of high coho abundance.

The Department has conducted a modest enhancement program for striped bass in the Coos estuary since 1990. It involves the annual stocking of hatchery-reared juveniles at a level calculated to eventually reach a population of 20,000 to 25,000 adults. This is the minimum number considered necessary to provide a viable sport fishery.

Department records show that the first commercial production of striped bass in the Umpqua occurred in 1934, when 28 kg were landed during the shad fishery. By 1941, the catch was of 2,270 kg. It peaked in 1971 at over 25,450 kg (Bauer et al. 1979). The striped bass population in the Umpqua estuary is less cyclic than the Coos population, but is still driven by infrequent years of high recruitment. As in the Coos system, periods of high striped bass abundance have coincided with periods of high coho abundance. Examination of stomach contents from 258

striped bass collected in the Umpqua estuary from February 16-November 15, 1972, revealed that only 1.8 percent of those containing food contained salmonids.

Years of observation and analysis of the two populations clearly demonstrate that abundance is driven by unknown environmental factors, which eclipse any effects of fish management

Smallmouth Bass

Smallmouth bass in the Umpqua River system are mostly confined to the mainstem and portions of the South Umpqua which serve as coho migration routes (Daily et al. 1990). These reaches are generally unsuitable for coho rearing due to high summer water temperatures. Therefore, potential interaction between smallmouth bass and juvenile coho is limited to the spring smolt migration. Temperature data suggest that bass are inactive during most of this period, so predation on coho is thought to be minimal (Daily 1992).

Fall chinook salmon is the salmonid species most likely impacted by smallmouth bass in the Umpqua system because of small size of smolts and the overlap in habitat use between these subyearling salmon and adult bass. However, the fall chinook run continued to build during the time period that the smallmouth bass population was expanding and remains healthy (Dave Loomis, pers. comm.).

Even if eradication of smallmouth bass from the Umpqua River system was desirable, it is not feasible. Smallmouth bass occupy the entire freshwater portion of the mainstem (88 miles), at least 78 miles of the South Umpqua, 33 miles of Cow Creek and the lower reaches of a few other tributaries (Daily et al. 1990). They are also present in Galesville Reservoir on Cow Creek.

Smallmouth bass provide a popular and economically important fishery. It is the only mid-summer fishery in most of the mainstem and South Umpqua, which become too warm to support salmonids several months of the year. Angling opportunity in the Umpqua Basin was recently reduced by the closure of most streams to trout fishing to protect the endangered cutthroat trout. Therefore, the smallmouth bass fishery becomes even more important. Any attempts to eradicate or reduce smallmouth bass populations would be extremely controversial in light of the unproved benefits to other species that might accrue. Treatment to remove smallmouth bass would cause significant ecological impacts to other fish species present, cost would be prohibitive, and total effectiveness could not be assured.

Creel sampling on the Umpqua fishery indicates that exploitation is low, an estimated 12.5 percent in 1991. As with many other bass fisheries in Oregon, a large number of the bass caught are released (about 36% in 1991). The ability of regulations to shape those fisheries is very limited; likewise opportunity to reduce population size through elimination of regulation is negligible.

Conclusions

Lake systems on the Oregon Coast contain introduced warmwater fishes, and the Umpqua River also contains smallmouth bass. The Coos and Umpqua Rivers hold populations of striped bass as well. The Department of Fish and Wildlife has not introduced new species, nor expanded the

distribution of existing species, into waters containing coho salmon for many years and does not intend to do so. Existing populations prey on coho salmon to varying degrees. However, it is not feasible (for reasons of cost, public controversy, and impermanence) to eradicate existing populations of warmwater fish and striped bass from the major lake and stream systems. Also, the removal of angling regulations would not lead to substantive reductions in abundance of these species. Further, these species support popular and economically important fisheries. Their fishery value continues to increase as conservation needs require the curtailment of fisheries for native species.

References

Bauer, J.A., D.M. Anderson, and Ray Temple. 1979. The Umpqua River striped bass. Southwest Region Informational Report 78-1. Oregon Department of Fish and Wildlife.

Daily, K., R. Perkins, and J. Johnson. 1990. Umpqua River smallmouth bass investigation, 1987-1988. Oregon Department of Fish and Wildlife.

Daily, K. 1992. Smallmouth bass predation on indigenous fish species in the Umpqua, Rogue and John Day River Basins. Oregon Department of Fish and Wildlife.

Johnson, J.H., A.A. Nigro, and R. Temple. 1991. Evaluating enhancement of striped Bass in the context of potential predation on anadromous salmonids in Coos Bay, Oregon. North American Journal of Fisheries Management. 12(1): 103 -108.

Lampman, B.H. 1946. The coming of the pond fishes. Binfords and Mort, Portland. 177 pp.

Morgan, A. and A. Gerlach. 1950. Striped bass studies on Coos Bay, Oregon in 1949 and 1950. Joint report to the 46th Oregon Legislature by Oregon Fish Commission and Oregon Game Commission.

Temple, R. and A. Mirati. 1986. Striped bass and salmonid management issues in Coos Bay, Oregon. Section 1: Potential impacts of striped bass on salmonids. Oregon Department of Fish and Wildlife, unpublished report.

OCSRI Plan
Appendix II: Monitoring Program Documentation

- OCSRI Monitoring Background and working Documents
- Development of Benchmark Values for Analysis, Assessment, and Evaluation of Progress Toward Objectives
- Federal Measures that Support or Coordinate with OCSRI Monitoring

Appendix Section II
Monitoring Program Documentation

Contents

Section 1: OCSRI Monitoring: Background and Working Documents

1.1 Monitoring Group: Summary of Scoping Sessions and Major Accomplishments

From November 1996 until January 1997, the Monitoring Group of the Oregon Coastal Salmon Restoration Initiative (OCSRI) held a series of planning meetings and scoping sessions involve stakeholders and other interested parties in determining the common direction of the Monitoring Program. Representatives from state and federal agencies, watershed councils, private interest groups, tribes, universities, and others participated in each of two scoping sessions. These groups formed the Monitoring Plan Advisory Team. Their active participation, feedback, and contribution revealed an active commitment to an evolutionary process of refining and improving the state-wide Monitoring Plan. This process continues to date. Interest in the objectives, purpose, and logistics of the Monitoring Plan was keen and many excellent suggestions, ideas, and courses of action have been incorporated into the Monitoring Plan as a result of these scoping session forums.

Major accomplishments of the first Scoping Session (SSI) were:

- The identification of specific monitoring, research, and assessment questions that pertain to the health and recovery of coho salmon.
- An open and revealing discussion of trust between state, private, and federal participants.

A cross section of agency personnel from the Advisory Team left SSI with the task of integrating the identified questions into the Monitoring Proposal, gathering information on current efforts, and identifying information gaps.

Major accomplishments of the second Scoping Session II (SSII) were:

- The identification of existing efforts that specifically related to each of the Monitoring Plan Tasks in addition to known state, private, and federal agency efforts.
- The formation of protocol work groups to integrate the Factors of Decline with topics and questions identified by the Monitoring Plan and to develop monitoring methodologies for these areas of focus.

Key factors of success accomplished by the Scoping Sessions were:

- Increased communication about, participation within, and acceptance of the Monitoring Plan by groups who will be required to actively participate in the monitoring process.
- Synergism added to the Monitoring Plan by gathering coho habitat and health questions from a wide range of interests and backgrounds, collecting information about monitoring and

restoration efforts at all levels of participation, and using a broad range of resources to identify additional needs.

- A strong foundation for continued adaptive effort through protocol development, resource contacts, and commitment to the process.

The Scoping Sessions imparted a sense of common understanding and commitment to the coho monitoring effort. Individuals representing a wide variety of interests joined efforts to develop understanding, acceptance, and support for the Monitoring Plan. Despite the complex and daunting nature of the task, effort was focused during the scoping sessions. From this effort, group of representatives from agencies and interest organizations are continuing to move the Monitoring Plan forward. The idea of a state-wide integrated monitoring effort has grown not only more realistic but also conceivable.

Section 1.2: Synthesis #1

Review of Monitoring Issues

The Monitoring Group developed the following synthesis of information related to monitoring issues. The information was distributed to potential participants in the Scoping Sessions.

This review and synthesis of advice is related to assessment, monitoring, and research from the following key recent reports/studies related to decline of salmonids in the Pacific Northwest:
1. "Upstream, Salmon and Society in the Pacific Northwest" (NRC Report).
2. "Status and Future of Salmon of Western Oregon and California: Findings and Options, " The Center for the Study of the Environment, 1995 (Botkin Report).
3. "Gravel Disturbance Impacts on Salmon Habitat and Stream Health," Oregon Water Resources Research Institute, April 1995 (OWRI Report).
4. "Proposal for a Comprehensive Monitoring Program to Support Oregon's Coastal Salmon Restoration Initiative," August 1996. (Moore Report).
5. "An Ecosystem Approach to Salmonid Conservation; Part II: Planning Elements and Monitoring Strategies, Management Technology, draft May 1996 (ManTech Report).
6. "A Monitoring Strategy for Application to Salmon-Bearing Watersheds, Columbia River Inter-Tribal Commission, June 1996 (CRITFC Report).

Included is a "top ten" list, general advice, and specific advice organized under the topic areas of "Harvesting," "Habitat," and "Hatcheries," and when useful sub-components.

1. "Top Ten" List

The following is a list of "best recommendations" synthesized from the referenced reports:

a. Better utilize GIS capabilities.

b. Expand stratified random surveys of adult coho abundance in spawning habitat to provide adequate precision for estimates of adult coho abundance at the regional and basin levels.

c. Better assess reference conditions so that progress can be measured.

d. Integrative measures of "watershed productivity" are needed.

e. Determine what is the current state and trend in riparian condition, and correlate to water quality parameters.

f. Determine and prioritize restoration opportunities.

g. Adaptive management requires that we monitor the success or failure of most of our restoration actions. For example, LWD placement activities need to be monitored to measure their relative success.

h. Determine the implementation of required BMP measures and other planned actions.

i. Determine the effectiveness of BMP or other measures that are in place or planned.

j. Analyze the effects of water diversions from salmon habitat on salmon. Record by watershed the quantity of water removed per month for agricultural irrigation.

2. General advice

Assessment is the process of evaluating the current base line of conditions, trends and/or inventorying resources. Data gathered through assessment is often critical for implementation of regulatory programs and/or for setting program priorities. Watershed analysis or assessment is being given strong support by some parties as a key tool to assist in the "rehabilitation" of salmonid populations. The NRC Report provides this discussion about watershed analysis:

> "A recent development in forest-management planning has been the procedure of "watershed analysis" to evaluate resources and the potential environmental impacts of land-management proposals. The general goal of watershed analysis is to combine habitat-inventory information with environmental-hazard assessments over a relatively large area, usually encompassing a fourth- to sixth-order stream network, so that land-use prescriptions can be based on stewardship objectives and opportunities for habitat restoration can be identified on somewhat larger geographical scales than are normally used." NRC p. 213-214

The Moore Report describes that "watershed assessments" are currently being conducted by various landowners in many locations around the state. However, they report a need to improve the utility of these efforts. Thus, the Moore Report recommends:

> "Establish a full time monitoring staff position to develop watershed assessment protocols and to coordinate existing state, private, and federal programs." p. 19

Both the Botkin and National Research Council Reports expressed concern with the lack of baseline data about the status of salmon stocks and habitat in Oregon. The Botkin panel in developing their recent report noted that they found "that much of the available data was not useful for regional scale analysis." They also found that in some cases data retrieval was difficult despite cooperation from various agencies. As a result they recommend that "data availability should be improved, and in an electronic format"; and data collection be improved in such areas as "counts of fish, maps of all land use conditions, history of logging (geographic location, methods, size), and number of fish released by hatcheries."

Monitoring is the process of evaluating whether planned actions were implemented (implementation monitoring), whether actions had their desired results (effectiveness monitoring), or whether the assumptions upon which an action was developed are valid (validation monitoring).

The National Research Council Report concludes that:

> "Much of the uncertainty over the benefits of habitat-improvement projects, hatcheries, and other management and restoration approaches results from lack of scientific monitoring and evaluation." NRC p. 373

They also concluded that:

> "Even when monitoring has been undertaken, lack of replicates and controls, uneven measurement consistency, and lack of commitment to long-term study have constrained the opportunities to learn from these programs." NRC p. 373

The NRC report recommends the following:

> "[w]atershed analysis, adaptive management, and strong regional monitoring programs are needed to provide the context within which management decisions can be made. A systematic evaluation of the condition of Pacific Northwest watersheds and the status of salmon populations must be undertaken.... Watershed analysis should encompass multiple landuses throughout river basins. A regional network of reference sites should be established for adaptive-management experimentation similar to the trials now being implemented on federal forest land. Integrative measures of watershed productivity (such as smolt production) must be monitored at many more locations than is the case today. Finally a clearer picture of the status of salmon populations is needed to increase confidence in decisions about how to allocate financial and human resources to solve the salmon problem." NRC p. 373-374

The ManTech report suggests:

> "Develop a set of assessment questions or objectives that the monitoring should address. MacDonald, et al. (1991) consider this the most critical step in monitoring." p. 56

> "Establish reference conditions (e.g., historical or natural. relatively undisturbed stream segments) as standards against which conservation efforts can be measured." p. 58

The Moore Report offers that:

> "Properly supported and implemented, the OCSRI monitoring program will provide and unbiased data set for determining baseline conditions, cause and effect relationships, and trends in conditions over time. Data will also be used to assess current water quality standards and management practices, to determine the effectiveness of restoration activities, and suggest new actions." p. 3

Research is the process of experimentation or study aimed at discovering and interpreting facts, often focusing on cause and effect. Research is often critical in the development of predictive models used to forecast the affects of management actions.

The National Research Council Report concludes that research related to salmonids has been adequately funded but inadequately guided. This report recommends that an independent, standing scientific advisory board be established to ensure that the available research dollars are spent most productively to answer the most critical questions as soon as possible. p. 15

3. Specific advice related to topic areas

a. HARVEST

Both the Botkin and NRC Reports identify critical flaws with the past methods and stock recruitment models (maximum sustained yield) used for determining harvest levels. Methods to inventory salmon populations (escapement) were found to be statistically inadequate.

With regard to harvest issues, the Botkin Report recommends:

> "Historical records along with archeological and anthropological research might provide information about earlier catch of salmon on rivers in the study area. It is clear that a study is needed to determine an historical benchmark against which present conditions can be evaluated." (pg. 26)
>
> "Develop a set of realistic, pragmatic mathematical or computer models for forecasting adult returns and setting harvest levels. These models should be used with adequate monitoring." (pg. 159)
>
> "Map and maintain maps of the geographic status of salmon stocks." p. 161
>
> "Analyze data on salmon abundance in coastal rivers using econometric techniques and multivariate statistical analysis to increase the forecasting ability for each river." p. 161
>
> "Establish statistically-valid monitoring of **salmon abundance** on rivers where peak counts are made, eventually replacing the peak count method. A variety of new methods are available to monitor fish. These range from sonar devices as those used in Tokyo Harbor to visual counts from low-altitude aircraft. Continue both kinds of measurements until it is determined that: peak count data, in spite of violating basic sampling procedures, provides reliable information; a relationship between the valid method and peak counts is established, so that one can be used to forecast the other; or the peak count is shown to be inconsistent with the valid method and therefore rejected." p. 161
>
> "Develop a better definition of the minimum viable population for salmon through new research or a synthesis of existing information." p. 161
>
> "Sample populations in the ocean to determine age structure." p. 162

The ManTech Report recommends:

> "There is a substantial need for rigorous stock assessment through use of genetic and morphometric analyses of salmonids in all sub-basins of the Pacific Northwest: this data will aid in delineating ESUs and addressing biodiversity issues." p. 66
>
> "Monitoring of harvests is needed to document the successes and failures of various options." "A central fish database of historical information is needed" p. 66
>
> Determine where are the "spawning hot spots" and/or aquatic diversity areas if any; the habitat characteristics and other characteristics of these spawning hot spots/ aquatic diversity areas (if they occur) and how do they compare to more degraded reaches; and the historical and current distribution/abundance of salmonids and other fish on a basin by basin basis. Adapted from pages 56-66

The CRITFC Report recommends the following monitoring questions:

"What do the salmon redd count trends for all watersheds within the sub-basin indicate about the species/stock status? What are the trends in abundance and composition of the anadromous fish community; the listed species?" p. 30

The Botkin Report also recommends:

"Conduct counts of fish returning to specific rivers and caught commercially in the ocean. Obtain counts for wild fish by restricting ocean catch to terminal fisheries in which the fish spawn. This is one way to link wild populations with ocean catch. Continue to use coded wire tags to assess hatchery fish by river of origin." p. 162

"Investigate the amount of unregulated catch of salmon on the high seas and illegal catch of salmon within international treaty waters." p. 162

"...a thorough investigation into the impact of salmon **bycatch** is needed to make a critical conclusion." p. 132

[bycatch monitoring should be extended] "to all fisheries that might impact salmon and use the estimated total bycatch as one factor in setting annual legal harvest quotas." Botkin Overview p. 12

The Moore Report states:

"Expansion of ODFW Stratified Random Surveys of adult coho abundance in spawning habitat is needed to provide adequate precision for estimates of adult coho abundance at the regional and basin levels, rather than the current program that provides a coast wide estimate. ...the potential to evaluate steelhead and chinook spawning abundance is inherent in this proposal." p. 12

"Research studies are proposed that will identify sport fishing gear and techniques that select for chinook salmon and avoid coho salmon. Other studies will evaluate hook-and-release mortality rates." p. 14

With regard to **marine mammals**, the Botkin Report recommends:

"conduct a short-term research project on marine mammals to obtain a statistically-valid sample of pinnipeds' stomach contents to determine the percentage of diet that is salmon and the distribution of salmon consumption throughout the year" and "obtain statistically-reliable estimates of pinniped population sizes." (p. 162)

b. HATCHERIES

The various recent scientific reports generally recommend placing high priority on investigating possible negative hatchery effects that may be occurring.

The Botkin Report recommends:

"Conduct counts of fish returning to specific rivers and caught commercially in the ocean. Obtain counts for wild fish by restricting ocean catch to terminal fisheries in which the fish spawn. This is one way to link wild populations with ocean catch. Continue to use coded wire tags to assess hatchery fish by river of origin." p. 162

The ManTech Report suggests:

"Continued monitoring of adults and smolts is needed at dams and hatcheries, especially the effects of these perturbations on the timing and abundance of salmonid migrations. As dams are removed and hatchery practices modified, pre- and post-modification monitoring will provide useful information on their effects." p. 66

"We need to assess salmonid diseases within basins and at distribution breaks. Disease is a poorly studied limiting factor, and information on disease may also assist in defining ESUs." p. 66

The Moore Report offers:

"We recognize the need for **genetic monitoring** to support gene conservation strategies. Additional investigations of life history variability, and factors that limit the capacity to express that variability, are also needed. The objectives of a genetic monitoring program would include the ability to:

further refine of [sic] ESU and GCG boundaries,
detect introgression between hatchery and wild populations,
detect genetic drift in hatchery populations and small wild populations,
test new techniques of genetic evaluation, especially non-lethal approaches tailored to small population units." p. 13

"Maintain current program [for accountability of hatchery practices and provide records of other propagation efforts] and improve sharing and access to data." p. 14

c. HABITAT

(1) TOPIC: PHYSICAL HABITAT

Related to habitat, a common and strong recommendation among the various reports is the need for monitoring to link habitat changes with fish population responses.

The Botkin Report recommends:

"Monitor fish populations before and after forest operations: develop a reliable and statistically valid method to monitor fish populations in relation to the other factors that are monitored." p. 160

"Record the location of timber cuts and silvicultural treatments by geographical location, rather than by county." p. 160

"Establish a series of permanent measurement plots to monitor changes in forest conditions, using standard statistical sampling procedures. Establish a series of permanent forest plots on which the species, height and diameter of trees are measures. Add to the number of plots when new policies are planned, to provide baseline measurements." p.160

"Update GIS maps of land cover and land use at a minimum of five year intervals. Maps should include major cover types and amounts of fragmentation. This is especially important in watersheds where fish data are present." p. 161

"Develop methods for rapidly surveying channel habitat conditions and application of such data in a geographic information system (GIS)." p. 161

The ManTech Report recommends:

"...that the agencies adopt something like EPA's EMAP sampling design." p. 63

"Determine the proportion of wadeable stream miles in the region (or a particular basin) that support summer salmonid populations (or salmonid spawning)." p. 56

Determine where are the "spawning hot spots" and/or aquatic diversity areas if any; the habitat characteristics and other characteristics of these spawning hot spots/ aquatic diversity areas (if they occur) and how do they compare to more degraded reaches; and the historical and current distribution/abundance of salmonids and other fish on a basin by basin basis. Adapted from pages 56-66

The CRITFC Report suggests the following monitoring question:

"Are in-channel habitat standards and desired trends in habitat condition met...? p. 26

"What are the opportunities to undertake active restoration action." p. 29

"Are land use standards being implemented?" p. 32

"What do biotic indices reveal about the status and trends in habitat quality or progress in restoring the watershed?" p. 33

"Do [are] anadromous fish use streams or stream reaches previously considered to be resident fish only or non-fish bearing? Does the use of these streams or reaches by anadromous fish change over time with restoration?" p. 33

"What is the status and trend in abundance and composition of the macroinvertebrate community?" p. 34

The CRITFC Report recommends that the biotic responses of fish need to be linked to changes in habitat through the following measurements:

"What are the trends in redd counts in key spawning areas? What is the survival rate of eggs deposited in spawning gravel? What is the population density of the 0+, 1+, and 2+ age classes measured in the late summer or early autumn rearing habitats and how does it relate to habitat conditions? What are the overwintering densities of juvenile fish? Assess the magnitude of autumn migration of juvenile salmon? What are the trends in abundance and composition of the resident native fish community?" ...resident exotic fish community? p. 41-44

The Moore Report suggests:

A system is needed to "...make **statistically valid characterizations of physical and biologic conditions.**" p. 5

"Although direct measures of salmonid abundance and habitat quality are important components of the monitoring program, these measures must be supported by more comprehensive assessments of aquatic biota and water quality." p. 7

"Annual summer surveys for juvenile coho are proposed to assess utilization of freshwater habitat. Summer juveniles provide an estimate of the level of seeding and utilization of habitat potential. ...Determining the relative seeding level is an important component of evaluating the effectiveness of habitat restoration projects. Combined with adult sampling, juvenile surveys enable better predictions of recruitment rate and reduce the reliance on highly variable and uncertain egg to parr survival rates." p. 8

"Quantitative stream habitat information is needed to **evaluate habitat quality**, estimate juvenile coho seeding levels, develop and calibrate habitat based escapement models, and to expand the applicability of

abundance and habitat relationships to all coastal regions. The associated riparian surveys provide assessment of the future contribution of riparian trees..." p. 10

The Moore Report suggests an emphasis for habitat evaluation be "Core Areas."

With regard to **riparian vegetation**, the Botkin Report recommends:

"Monitor and evaluate on a continuing basis the effectiveness of ODF's Water Protection Rules (riparian rules) to determine if riparian zone buffers are adequate for the protection of salmon and their habitat." (pg. 159)

"Increase the amount of riparian zone restoration, and conduct experiments to test the ecological effectiveness and cost effectiveness of various techniques." (pg. 159)

"Test the FEMAT and ODF Water Protection rules (riparian rules) against each other by applying each on selected streams. Compare costs, ecological effectiveness and timber production, with before and after monitoring." p. 160

"Inventory conditions of riparian zones for stream reaches where salmon spawn and rear. Where funds are limited, focus the inventory on habitats of threatened and endangered stocks. Inventory riparian tree species abundance, individual tree sizes and ages, and amounts of LWD." (p. 160)

The ManTech report suggests with regard to **riparian vegetation**:

"Determine the relationship of riparian buffer width (or condition) and various measures of stream condition (e.g. sedimentation, temperature, LWD, channel complexity); and assess whether prohibited activities occurring and with what frequency (e.g. harvest activities in riparian buffers). p. 56

The CRITFC Report suggests the following monitoring question:

"What is the current state and trend in **riparian condition**?" p. 27

The Botkin Report offers several other specific recommendations with regard to **large woody debris (LWD)**:

"Develop a management strategy for an *adequate* loading of LWD such as bringing logs to areas that lack sufficient large streamside trees. Measurement must be part of this strategy, including before and after monitoring, to determine the ecological effectiveness and cost effectiveness of different methods." (p. 158)

"Monitor the status of woody debris by conducting stream surveys before and after forest operations: measure simple length and diameter of material in the stream above a certain diameter and indicate placement, note large debris dams and estimate their size, repeat at five year intervals." (p. 160)

With reference to **estuaries**, the Botkin Report concludes:

"[i]n spite of the many specific estuarine factors that are known to affect salmon, there are insufficient data at a regional level to determine what the actual quantitative impact of human alterations of estuaries has been on salmon in Oregon." The Botkin Report also notes that estuaries are the most likely place for salmon to interact with marine mammal and avian predators.

The Botkin Report strongly recommends that "scientific investigation of the relationships between salmon and estuaries and the effects of estuarine loss on salmon populations" be done. Similarly, the Moore Report suggests that:

> "Monitoring salmon populations and habitat use in coastal lakes and estuaries, again developed at the level of the Gene Conservation Group, will contribute to the understanding of other factors that influence coho, chinook, and cutthroat abundance." p. 17

With regard to **gravel and other instream mining**, the NRC Report notes that:

> "...there has been essentially no environmental monitoring and assessment by state agencies of resulting environmental impacts; most regulatory efforts by the state have simply focused on managing on-site impacts. Furthermore, little research has been undertaken to evaluate short- or long-term effects of aggregate removal upon either channel characteristics or anadromous salmon." NRC p. 183

Like the NRC Report, the Botkin Report concludes that **gravel mining** is a potentially important factor in the decline of salmonids and encourages further study of the issue.

Also with regard to **gravel mining,** the OWRI Report states:

> "1. Improve data collection related to removal-fill operations
>
> 1.a Conduct monitoring and research to evaluate impacts
>
> Despite the statement in Oregon's Removal-Fill Law mandating state officials to provide "protection, mitigation, minimizing, rectifying or reducing impacts," not a single Oregon-specific study was found to evaluate and/or monitor the environmental impacts of material extraction or filling. This lack of specific field data to support the removal-fill permit process thwarts the goals of protection, preservation, and best use of water resources stated under ORS 196.805....In addition to monitoring of permitted operations, a research and technology transfer program is needed to continually develop methods for removal-fill operations that result in reduced environmental impacts.
>
> 1.b Improve DSL database capabilities and use.
>
> DSL needs to develop methods for better removal-fill documentation and incorporate these records into Geographic Information System (GIS) supported analysis.... These database records should be readily available to assist outside agencies' planning efforts.
>
> 1.c Implement GIS-based resource management.
>
> DSL needs to further implement a GIS-based resource management system for removal-fill activities.... After the GIS is fully in place, permit records for the past decade(s) should be updated and geo-referenced as accurately as possible for inclusion.... To import the updated database information from DSL permit and royalty records into the GIS, an accurate geographic location must be associated with each permit.... The permit requirements need to be altered to require decimal latitude-longitude coordinates of the site obtained by a global positioning system (GPS). Inclusion of aerial photos in permit applications would assist in geo-referencing the site and could be used for measurements of extraction volumes and evaluation of impacts over time.
>
> 1.d Allocate sufficient financial resources and staff to monitor resource abundance, condition and use.

DSL personnel often lack time for site visits to monitor operations and verify extraction amounts and environmental safeguards.... All monitoring should be addressed toward testing specific, identified hypotheses. DSL resource management staff should develop long-term research plans that can be supported by the monitoring program. A linkage of monitoring and research would support an adaptive management approach for removal-fill operations. Such an improved information base could be achieved at nearly zero additional cost by proper coordination and planning."

(2) TOPIC: WATER QUALITY

The CRITC Report suggests the following general water quality monitoring questions:

"Are state and federal water quality laws being enforced?" p. 26

"Does handling, transport, and storage of toxic material conform to recommended guidelines?" p. 29

With regard to pesticide use, the Botkin Report states:

"...information is insufficient to determine the extent to which these **chemicals** are actually limiting salmon populations, increasing mortality, or affecting spawning and growth of young." p. 106

The Botkin Report recommends that:

"Several kinds of studies are needed, including: better information about the rate of transfer of **chemicals** from land to streams; decay rates of chemicals under the range of environmental conditions found in the study area, and statistically-reliable estimates of the concentration of specific chemicals as a function of season, water flow, and other variables. Because of the potential significance of these chemicals to salmon, these studies have high priority." p. 106

"Analyze the effects of agriculture, specifically ...and agricultural runoff, on salmon. ...Record by watershed chemical changes in streams due to urban and agricultural practices." p. 162

The Botkin Report also recommends:

"Make quantitative measurements of environmental conditions before and after forest harvesting such as: **stream temperature...**" p. 160
"Monitor the status of understory light levels before and after forest operations: lay out transects along edges of stream courses at the same time woody debris is being measures; take spot measurements of photosynthetically active light along the transect with a light meter; note time of day, cloud cover, and time of year to insure measurements are comparable over time." p. 160

"Monitor water temperature before and after forest operations: repeat at periodic intervals." p. 160

The CRITFC Report suggests the following monitoring questions related to **stream temperature**:

"Determine in-channel effectiveness of riparian restoration in improving the temperature regime on a set of stream reaches?" p. 47 "Monitor trends in the temperature profile measured longitudinally along the tributary." p. 48

With regard to **sediment,** the Botkin Report states:

"To the best of our knowledge, no studies have yet been conducted to measure the effect of recent technical and regulatory innovations in road siting and construction on sediment supply. Such studies would help us understand how to modify forest practices to improve salmon habitat." p. 88

"Assess the present gravel supply and stability of the landscape as a result of bedrock type and topography." p. 160

"Make quantitative measurements of environmental conditions before and after forest harvesting such as: ..., gravel and sediment accumulations, ..." p. 160

"Analyze the effects of agriculture, specifically, ...and agricultural runoff, on salmon. Record by watershed physical changes in stream structure due to urban and agricultural practices." p. 162

The CRITFC Report suggests the following monitoring questions related to **sediment**:

"Estimate the sediment loading rate... Estimate the LWD loading rates concurrently. Estimate the rate of sediment and LWD delivery to, storage in, and transfer from zero- and first-order channels. Monitor trends in residual pool volume, pool frequency and total pool volume." p. 47-48

(3) TOPIC: WATER QUANTITY

The Botkin Report recommends:

"Analyze the effects of agriculture, specifically water diversion from salmon habitat, ..., on salmon. Record by watershed the quantity of water removed per month for agricultural irrigation and urban water use." p. 162

The CRITFC Report suggests the following monitoring questions:

"What is the current condition and extent of wetlands? Are wetlands being lost? Is wetland area... ...less than occurred historically? Is surface water or groundwater being withdrawn to the detriment of fish production? Are current holders of water rights using more than allowed amounts of water? Are new water rights being issued? Does existing water flow and timing fully meet the biological needs of salmon?" p. 28-29

(4) TOPIC AREA: FISH PASSAGE

The Botkin Report recommends:

"Analyze the effects of agriculture, specifically water diversion from salmon habitat, ..., on salmon. Record by watershed the quantity of water removed per month for agricultural irrigation and urban water use." p. 162

The CRITFC Report suggests the following monitoring question:

"Are fish being lost in the irrigation systems?" p. 29

Agency Actions Specific to OCSRI Monitoring

1. Department of Agriculture

a. Project title: Tualatin Basin Water Quality Management Plan

Monitoring questions: *Is the phosphorous loading decreasing in the Tualatin River? What are the trends in water quality parameters of concern for this basin?* A number of water quality parameters are monitored, but phosphorous is the parameter of concern.
Time Frame: ongoing
Protocols developed: yes
Funding status: year to year
Availability of reports: A "Tualatin river Basin Watershed-Wide monitoring plan" is produced annually by the Unified Sewage Agency (contact Jan Miller, 503-693-4493).
Coordination: A DMA monitoring subcommittee reviews and evaluates the past year's monitoring results and makes changes to the plan when needed. All data is uploaded on the EPA/DEQ STORET database.

b. Project title: CAFO Program

Monitoring Questions. *What is the level of compliance with the WPCF No. 0800 General Permit? Are individual CAFOs in compliance with the WPCF No. 0800?* Done through site specific sampling.
Time Frame: ongoing
Protocols developed: yes
Funding status: firm
Availability of reports: Quarterly status reports are provided to EPA (contact Dave Wilkinson (ODA) 503-986-4712).
Future: We expect that as SB1010 plans are developed, a monitoring program will be included in each plan. However, since the driving force behind SB1010 is water quality, ODA's authority may be limited to water quality monitoring and may have limited application to habitat monitoring programs, though plans can always encourage these efforts.

2. Department of Environmental Quality

a. Project Title: REMAP

Monitoring Questions: *What is the current status of and trends for water chemistry and habitat conditions in waters of the state?* This project gathers data for trend analysis.
Scale: State-wide 57 sites
Data Parameters: Water chemistry, habitat, fish and macroinvertebrates
Time Frame: Once every 4-5 years
Protocols: Yes
Data management: STORET and ACCESS database at DEQ
Funding Status: No funding for 1997
Reports: Summary reports available Feb. 1997
Coordination: Landowner cooperation

b. Project Title: Coastal Reference Sites

Monitoring Questions: *What is the current status of and trends for water chemistry and habitat conditions in waters of the state?* This project gathers data for trend analysis.

Scale: Coast-wide 36 sites
Data Parameters: Water chemistry, habitat and microinvertebrates
Time Frame: Once between 1992 and 1993
Protocols: Yes
Data management: STORET and ACCESS database at DEQ
Funding Status: No funding for 1997
Reports: Summary reports available Feb. 1997
Coordination: Landowner cooperation

c. Project Title: Ambient Water Quality Monitoring

Monitoring Questions: *What are the long-term trends in water quality?* This project gathers data for trend analysis.
Scale: State-wide 60 sites
Data Parameters: Water chemistry
Time Frame: Ongoing 4- 8 times per year
Protocols: Yes
Data management: STORET database at DEQ
Funding Status:
Reports: Basin summary reports available
Coordination: Landowner cooperation

3. Department of Fish and Wildlife

a. Project Title: Aquatic Habitat Inventory Project

Monitoring questions: *What is the amount and condition of salmonid habitat in selected stream reaches? What habitat components are limiting salmonid production in specific stream reaches?*
Data parameters: Physical measures of stream habitat features (stream size, flow, physical configuration, substrate, cover including large wood, water type and distribution [pools, riffles, etc.], fish population composition, etc.) and riparian conditions. Data are stored in electronic format, but in a number of different configurations and software. The different kinds of data are pulled together to create the final reports which present the findings of each survey project.
Time Frame: Ongoing accumulation of data. Surveys are generally conducted on new sites each year. There has been little repetitive monitoring of individual sites, although enough data has been collected that this is becoming possible, as in the resurveying being done in 1996 to evaluate changes from the previous winter's floods.
Protocols Developed? Yes. Protocols and procedures have been developed for survey methods and data entry/storage and are contained in a methods handbook.
Funding Status: Core project staff are securely funded by ODFW. Survey project costs are mostly covered by contracting partners (other state and federal agencies, large landowners, etc.)
Availability of Reports: Reports are prepared for each survey project and provided to the funding or cooperating agencies and to district biologists. The reports are in the form of three ring binders, not as published reports. Information in the reports is available on a request basis, with reimbursement charged for the time to prepare copies.
Coordination: There is extensive coordination with non-federal landowners and federal land management agencies, as in the past much of the project funding has come from these sources. Comparability and compatibility of information between these surveys and habitat surveys conducted by the land management agencies is only moderate.

b. Project Title: Coastal Salmon Inventory Project - Stratified Random Coho Spawning Surveys and Standard Index Site Spawning Surveys

Monitoring Questions: *What is the number of spawning coho salmon returning to the major river basins and the OCN sub-aggregate areas? How are spawning populations changing over time?* Develop statistically valid estimates of wild coho escapement in coastal drainages.
Data parameters: Enumerates returns of adult coho salmon to Coast Range drainages using two approaches: Index surveys at 48 standard sites, and stratified random surveys. The index surveys provide a continuation of long standing surveys that provide a historical comparison over years, while the new random (SRS) surveys allow expansion of mean
spawner abundance to the entire coastal range to produce estimates of total spawner abundance. Data from both surveys are being compared to establish a relationship, and in a few years only the SRS will be used. Plans under OCSRI call for expanding the number of SRS surveys to allow estimation of escapement in individual basins. Data are maintained in an electronic data base (MS ACCESS)
Time Frame: Annual
Protocols Developed: Yes. Procedures manual, updated annually. Statistically valid procedures have been established.
Funding Status: Secure for existing level of effort. As part of OCSRI are proposing to more than double sampling effort. Funding is from a number of different sources (check w/Steve or Rod on funding)
Availability of Reports: Annual progress report available. (1993 is last one completed)
Coordination: Surveys are coordinated within ODFW fish districts. Field activities are coordinated with landowners along sampling reaches.

c. Project Title: Summer Juvenile Coho Abundance Assessments

Monitoring Questions: *What is the population of juvenile coho salmon in selected stream reaches, and how are populations changing over time? Are alcove construction and other specific habitat improvements improving juvenile coho populations?*
Data parameters: Monitors juvenile fish abundance in selected reaches by snorkel observation, with calibration by multiple pass electro-shocking. Data are stored in electronic format, resident with the individual projects and districts. No summary data base has been developed.
Time Frame: Annual
Protocols Developed? Yes for sampling methodology (follows Hankin and Reeves). No overall protocol for coordinated approach to monitoring consistently coast wide.
Funding Status: Funding is fragmented, with existing efforts secure in participating project (Coho Habitat Study) and districts. Not all districts conduct these surveys. Additional funding is needed to expand the scope of juvenile coho monitoring.
Availability of Reports: Annual progress report for the Coho Habitat Study. No formal reports from participating districts, and no overall annual summary reports (?).
Coordination: Field activities are coordinated with landowners along sample reaches. Little coordination within ODFW internal units. Only a few districts participate in collecting this data.

d. Project Title: Genetic Monitoring (Inventory)

Monitoring Questions: *What is the genetic makeup of salmonids in specific streams, and how does it differ among streams, watersheds and regions?*
To inventory the genetic make-up of individual fish populations to define the boundaries of gene conservation groups and describe the relationships among populations.
Data Parameters: Genetic descriptions of individual populations is maintained in a multi-state, multi-agency electronic data base maintained by the National Marine Fisheries Service. Data are also maintained in the individual labs which conduct the genetic determinations and by
Time Frame: Ongoing accumulation of data.
Protocols Developed? Protocols for collection and processing of genetic samples are well developed and quite precise. Standards for how to interpret and apply genetic information are developing along with this rapidly advancing field.

Funding Status: Funding for collection and analysis has been and remains intermittent. Much has been done by using funding from cooperating partners to address specific issues. NMFS funding for maintaining the data base appear secure, given the overall interest in better understanding of salmonid population genetics throughout the Northwest.
Availability of Reports: Reports on specific genetic projects are produced intermittently. Occasional reports are prepared as data are updated. At the present time, no overall reports synthesizing data over a wide area are routinely available.
Coordination: There is extensive coordination among agencies throughout the Northwest regarding data standardization and storage. Individual projects are coordinated on a case-by-case basis.

e. Project Title: In-Hatchery Monitoring

Monitoring Questions: *How many fish, of what species, broodstock, size, timing and with what mark return to hatcheries and in individual streams and stream reaches?* Maintain data on spawning and rearing of fish.
Data: Extensive data are collected on: spawning run timing; run composition; timing and quantity of spawn taking; fecundity; egg size; and various production records, which include lot sizes and locations, feeding records, disease checks, loading rates and densities, growth records, marking, and final production. Data are maintained in a centralized mainframe computer system.
Time Frame: Annual
Protocols Developed? Yes. Procedures are contained in hatchery procedure manuals and various texts and manuals. Data are collected on standardized forms.
Funding Status: Declining. ODFW revenue declines have caused staff reductions, including staff responsible for maintaining hatchery records. Funding for monitoring at each hatchery is secure for those hatcheries remaining funded. ODFW revenue declines and cuts in the federal Mitchell Act hatchery program have necessitated closure of several hatcheries.
Availability of Reports: (?)
Coordination: Collection of hatchery monitoring data is coordinated centrally by Fish Propagation staff in the Portland office. Monitoring efforts are coordinated with cooperators, including USFWS and several tribes.

f. Project Title: Stocking Records

Monitoring Questions: *What types of fish are stock; when and where?* Maintain records of location, timing and other details of all fish stocked.
Data Parameters: Data recorded include species, size, broodstock, origin, numbers, weight, marks, condition, location and date for all fish stocked.
Time Frame: Annual
Protocols Developed? Data recording is standardized through the use of standard forms.
Funding Status: Declining. ODFW revenue declines have caused staff reductions, including staff responsible for maintaining stocking records.
Availability of Reports: (?)
Coordination: Collection of stocking data is coordinated centrally for all hatcheries by Fish Propagation staff in the Portland office.

g. Project Title: Coded Wire Tag Monitoring

Monitoring Questions: *What is the performance and survival of stocked fish. How should these characteristics be modified to assist in the management of fisheries?*
Data Parameters: Representative groups of fish from all hatchery production are marked with coded wire tags, which allow identification of individual groups by hatchery, species, lot, number in marked group, raceway, location stocked, and any other specific characteristic of value in assessing performance (e.g. size group, strain, stocking time, experimental group, etc.). Data are maintained in an electronic data base by the National Marine Fisheries Service and are available via modem or the Internet.

Time Frame: Annual
Protocols Developed? Yes. Data standards and format are well established by a Data Standards Working Group.
Funding Status: Secure for the funded hatchery programs.
Availability of Reports: Two annual reports are prepared, one funded by contract with BPA for stocking in the Columbia R. and one funded by contract with NMFS for most other stocking, including coastal areas. These reports contain tabular data on the CWT. marked groups stocked and on the recovery of CAW Tagged fish. Analyses of the data are left up to those receiving the reports.
Coordination: This is a regional, multi-agency effort which provides a consistent, standardized approach to recording and monitoring hatchery marking and return data.

h. Project Title: Harvest Monitoring

Monitoring Questions: Harvest Monitoring: *How many salmon, of which species, were harvested in commercial and sport fisheries in specific areas and river systems? How are harvest levels changing over time? What is the encounter rate of coho in fisheries for other species? Which gear types minimize capture of coho while remaining effective for other species? What is the mortality rate for released coho taken on different gear types?*
Maintain records of the fish harvested or landed in Oregon waters.
Data Parameters: A variety of data sets are obtained. Port sampling records the quantity and composition of the catch landed in Oregon ports, including biological information regarding the catch, recovery of coded wire tags and other marks, and as part of specific studies collects other specific data, such as genetic samples. At sea monitoring collects information on the effects of gear type on the catch of target vs. non target species, encounter rates for non-target species (i.e. coho encountered while fishing for chinook), and hooking mortality for released fish. Monitoring is also conducted for specific time and area terminal fisheries directed at specific strong stocks. Freshwater harvests are monitored through surveys based on salmon/steelhead permits. Data are stored electronically, with initial analysis and storage at the Marine Program office in Newport, and overall data coordination and storage through the Fisheries Information Services program in the ODFW main office. Regional data, including that collected by ODFW, are maintained by the Pacific Fisheries Management Council.
Time Frame: Annual
Protocols Developed? Yes.
Funding Status: Generally stable, from three sources: ODFW funds, federal sources (e.g. BPA), and matching funds (e.g. Sport Fish Restoration [Wallop-Breaux], anadromous fishery funds from NMFS, and Pacific Salmon Commission).
Availability of Reports: Annual reports are prepared at several levels, including results of the port sampling, results from specific time and area fisheries, and individual investigations.
Coordination: Data collection and analysis is coordinated on a regional basis through the Pacific Fisheries Management Council. Data collection and analysis is coordinated on a regional basis through the Pacific Fisheries Management Council.

4. Departments of Fish and Wildlife, and Forestry

a. Project Title: Fish presence/absence

Monitoring Question: *What is the maximum extent of fish (salmonids, game fish, T&E fish) distribution in streams?*
Scale: State-wide
Data Parameters: Absence or presence of fish, fish species, other vertebrates, fish passage problems, and reason for end of fish presence (natural or artificial barriers).
Time Frame: Ongoing
Protocols: Yes
Data management: Files and database at ODF, fish presence maps at 1:24,000 at ODF and ODFW field offices.
Funding Status: Variable sources: ODF, ODFW, and grants.
Reports: Not applicable
Coordination: Landowner cooperation

5. Department of Forestry

a. Project Title: Statewide Implementation of the Forest Practice Rules

Monitoring Question: *What percentage of forest practice operations result in proper implementation of the Forest Practice rules?* This project will be a statewide sample of forest operations. A variety of rules will be assessed for proper implementation and reasons for proper or improper implementation.
Scale: State-wide, site-specific
Data Parameters: Depends on the particular rule being tested: Road construction and drainage condition, fish passage, sensitive sites, high risk site protection, down woody debris etc.
Time Frame: 1998
Protocols: Draft
Data management: To be developed
Funding Status: FPMP
Reports: Not applicable
Coordination: Landowner cooperation

b. Project Title: Riparian Condition and Implementation

Monitoring Question: This study addresses two effectiveness questions from the 1994 Monitoring Strategic Plan: *What levels of large wood will be maintained in channels and through a watershed under the vegetation retention standards? Are the vegetation retention rules resulting in conditions that are consistent with the goal of achieving mature forest conditions within the next rotation?* The specific objectives designed to answer these questions are to test if the 1994 stream protection rules:
1) provide future recruitment of large woody debris at levels comparable to mature forest conditions,
2) maintain overstory canopy cover and understory shrubs such that 75% shade or greater is provided to the stream channel,
3) retain stand productivity and structure at levels predicted to mimic mature forest conditions in the future,
4) and provide snags and down woody debris for wildlife habitat.
This project is designed to assess the effect of the forest practice rules on riparian function and structure. While the protocol is intensive, one possibility is to couple intensive ground-based data collection with aerial interpretation such that a greater geographic area can be sampled.
Scale: State-wide, reach-level
Data Parameters: Stand structure (height, diameter, stand density, species), down woody debris, snags, aquatic large woody debris, LWD recruitment potential (distance from stream, lean of tree) shade, and channel morphology were measured at 30 sites throughout western and eastern Oregon.
Time Frame: Through 1988, possibly coordinate with private consultant for longer term Statewide GIS project to map riparian conditions
Protocols: Field data collection
Reports: Pre-harvest data was collected at 30 sites during the summer of 1996. The project will continue through 1998. Preliminary reports will be available in 1997.
Funding Status: Through 1998
Coordination: Involved private landowner cooperation

c. Project Title: Protection of Waters of the State during Pesticide Application

Monitoring Question: *Is water quality including the integrity of aquatic communities and public health, being effectively protected when forest management chemicals are applied?*
This project is designed to test the chemical rules adopted in 1996 as well as the effect of increasing the miles of stream that receive greater protection due to the 1994 reclassification of streams.
Scale: State-wide, site-specific

Data Parameters: Water column samples before, 1st 24 hours, and runoff sampling; operation application documentation; community water sampling; vegetation surveys
Time Frame: Spring 1997/Fall 1998
Protocols: Draft Protocol
Funding Status: FPMP 25 sites funded
Reports: Not applicable yet, final report one year following end of data collection
Coordination: Private landowners, community water sampling programs, PARC, ODA

d. Project Title: Statewide Basin and Reach-level Stream Temperature Monitoring

Monitoring Questions: *Are the stream protection rules effective in maintaining stream temperature within the context of the inherent basin trend? What stream, basin and vegetation characteristics influence the temperature regime and how do these vary across the state?*
These projects are designed to assess stream temperature at a reach and basin scale.
Scale: State-wide, basin- and reach-level
Data Parameters: Hourly stream temperature, hourly air temperature, stream depth, width, gradient, substrate, buffer width, riparian vegetation height, canopy cover, aspect, elevation and distance from divide.
Time Frame: Long Term, undefined
Protocols: Thermistor placement, site characteristics
Funding Status: Forest Practices Monitoring Program (FPMP), Funded
Reports: 1993 Harvest Unit Monitoring;
Small Type N Streams and Brush Creek 1995; and
Small and Medium Type F Streams: Effectiveness of HWC's and RMA's
Coordination: Brush Creek Landowner/ Watershed Group Cooperative

e. Project Title: Road Sediment Monitoring; Protocol Development and Road Sediment Component of the Kilchis Watershed

Monitoring Questions: *Are road related best management practices minimizing the delivery of sediment to waters of the state?* This project was designed to inventory roads throughout the state. Data were used to develop a protocol designed for use by landowners to assess the condition of their roads and potential delivery of sediment to stream channels.
Scale: State-wide, basin- and site-specific
Data Parameters: Road drainage; fill, cutslope and road prism erosion; sediment delivery to channels; stream crossing structures; fish passage; evaluation of sidecast failure potential.
Time Frame: Through 1997
Protocols: A protocol for assessing sediment delivery to stream channels from roads will be available in winter of 1996. In addition a modified protocol is being developed for the risk assessment portion of the CSRI.
Funding Status: This program has been funded by the Forest Practices Program and DEQ. Funding ends in 1997
Reports: 1997
Coordination: OSU, ODF and DEQ have coordinated on this project

f. Project Title: 1996 Storm Impacts Monitoring Project

Monitoring Questions: *Were the forest practices in the sample areas appropriate for the time of the operation and did they minimize or contribute to storm related impacts (e.g.; slope failure or channel impacts)? How are hillslope processes and forest practices linked to channel responses or impacts?* To answer these questions ODF, in cooperation with others, has:
1. Developed a field-based, comprehensive, relational database for detailed ODF monitoring analysis and for subsequent (non-ODF) cause and effect type research.
2. Collected sound information on the specific forest practices applied at the sites of landslides, flood-altered streams and riparian areas.

3. Prepared for future major storms by identifying forestry-related situations which may have contributed to impacts and also determine which forest practices and designs successfully minimized storm effects. Use this information to develop and/or communicate those cost effective tools which minimize storm impacts.
Scale: Storm-impacted areas, Basin and reach-level
Data Parameters: Protocols were implemented on 5-10 square miles at 6 study sites within the storm-impacted region of Oregon. Using the stream network to search for landslides and debris torrents, ODF crews walked all stream segments within the sample areas until the channel gradient exceeded 40%. They collected channel, riparian, and torrent jam data every 100 to 200 feet. Landslide and flow path dimensions of all landslides that delivered to the stream channel were measured. ODF&W crews assessed fish habitat on all fish bearing streams within the study areas. ODF crews surveyed all roads and road related landslides. Stereo-pair aerial photographs, flown at 1:6,000 scale, were analyzed for all six study sites. Land management history for all six study sites was gathered by ODF. This includes harvest and regeneration schedules as well as road construction history and specifications.
Time Frame and Reports: One field season. Field collection is complete and ODF is in the process of analyzing the data. Preliminary results will be published in American Institute of Hydrology Annual Meeting Proceedings. Final reports will be available in Fall of 1997.
Funding Status: This project was funded largely from the Forest Practices general fund and FPMP budgets. In addition Oregon Forest Resources Industry and The State Lands Program of the Oregon Department of Forestry contributed funding. More funds are needed.
Coordination: This project has been coordinated with private landowners, DEQ, ODF&W, OSU, OFRI, Forest Service and BLM.
Protocols: Six field protocols were developed to address the different components of the study. Protocol development and implementation has been shared with Oregon Department of Fish and Wildlife and Oregon State University. These protocols address: Road Drainage (OSU); Road-related landslides (OSU); non-road related landslides (ODF); channel impacts (ODF); torrent jams (ODF); and fish habitat (ODF&W).

g. Project Title: Determining Fish Passage through Culverts

Monitoring Question: *Are water crossing structures (designed consistent with design standards) passing fish as anticipated?* This project helps define easy to measure parameters that landowners and operators can use to install culverts properly and determine if existing culverts pass fish. It can also be expanded to a monitoring project to determine percent of stream crossings which pass fish.
Scale: Site-specific
Data Parameters: Parameters which effect fish passage through culverts such as: culvert dimensions, gradient, slope, degree of perch, velocity, and roughness were measured.
Time Frame: Undetermined
Protocols: The main goal of this work has been to develop a tool for landowners and operators to determine if culverts are passing fish. At the same time data were collected to determine if culvert sites were passing fish.
Funding Status: FPMP
Reports: Guide for proper placement of culverts to allow fish passage
Coordination: Data collection and information sharing was coordinated at a regional scale.

h. Project Title: Yaquina Basin Watershed Assessment

Monitoring Questions: *What are the land use and ownership patterns in the basin? What is the extent and location of human modifications to riparian areas? Where is designated coho habitat or potential coho habitat? What are the benefits of the protection measures provided under different scenarios? Where are areas with a high potential to deliver sediment to stream from road failures? What are the comparative forest harvesting rates in CSRI core areas with other watersheds in the basin? What methods best examine the causes of factors that may limit fish production (i.e., water temperature)?*
Scale: Yaquina Basin

Data Parameters: Hydrological layer, Stream classification, fish presence/absence, stream habitat conditions, high risk sites, land use, ownership
Time Frame: Undetermined
Protocols: The main goal of this work has been to develop procedures and examples that can be use in watershed assessments
Funding Status: Funded though end of June.
Reports: Report due by end of June.
Coordination: Coordinating with CSRI

i. Project Title: Forest Assessment Project

Monitoring Question: *What are the implications of current policies and management activities for sustainability of long-term productivity of Oregon's forest resources and for the health of forest-related socio-economic systems? How do Oregon's forests meet the needs of present and future generations as measured by common frameworks for describing, assessing and evaluating forest resources?*
Scale: Statewide
Data Parameters: Will be developing data sets to describe forest sustainability as measured by the criteria and indicators contained in the Santiago Declaration.
Time frame: Completed by 2001
Protocols: Not developed at this time.
Funding Status: Program option package for 1997.
Reports: Reports and symposium planned for 1999.
Coordination: ODF, OSU College of Forestry, and PNW Research Station (CLAMS Project)

j. Project Title: Road Risk Assessment

Monitoring Questions: *What and where are road related risks to salmon recovery? What is the relative priority of remediating the risk?* Forest roads built prior to the development of the Oregon Forest Practices Act or prior to the current BMPs continue to pose increased risk to fish habitat. Industrial forest landowners have proposed a voluntary program for forest landowners to identify risks to salmon form roads and address those risks. The purpose of this project is to: Implement a systematic process to assess road related risks to coastal salmon recovery; establish priorities for problem solution; design and implement actions to reduce road related risks.
Scale: All roads in the coastal zone on non-federal forest land used as part of an industrial or state forest operation since 1973, regardless of when they were constructed. Emphasis will be given to road systems in Core Areas and constructed prior to current forest practice standards.
Data Parameters: Road drainage; fill, cutslope and road prism erosion; sediment delivery to channels; stream crossing structures; fish passage; evaluation of sidecast failure potential, fill volume, drainage system configuration, culvert size and gradient, drainage area, culvert outlet drop.
Time Frame: Ongoing and for at least ten years.
Protocols: Under Development
Data management: Under Development
Funding Status: Reliant upon landowner effort.
Coordination: ODF, OSU College of Forestry, Landowners, NMFS

6. Division of State Lands

a. Project Title: South Slough Estuary Monitoring

Monitoring Questions: The South Slough National Estuarine Research Reserve will continue to implement its estuary conservation strategy, which includes conducting onsite research and monitoring of critical coastal habitats.
Scale: South slough estuary off Coos Bay

Data Parameters: Water quality, effects of oyster cultivation on eelgrass habitat, fish populations, tidal amplitude, bottom temperature, salinity, dissolved oxygen, pH, soil, vegetation and turbidity.
Time Frame: Ongoing
Protocols: ?
Data management:
Funding Status: Reliant upon federal grants and contracts. Declining

b. Project Title: Removal-Fill Permit Monitoring

Monitoring Questions: *Are removal-fill laws being complied with? Are permit conditions being complied with? Were the projects' design effective in achieving project goals (e.g.; erosion control, avoiding adverse environmental impacts)?*
Scale: Statewide
Data Parameters: Variable
Time Frame: Ongoing coincidental to other field work.
Protocols: ?
Data management: DSL database
Funding Status:

7. Department of Land Conservation and Development

a. Project Title: Farm and Forest Land Divisions

Objectives: Monitor decisions affecting resource (farm and forest) lands to ensure compliance with statewide planning goals and administrative rules.
Data: Resource land divisions, dwellings, and "other uses".
Counties are required to report decisions affecting farm and forest lands to DLCD (a copy of the reporting form is available). Decisions reported are dwellings, divisions, and other uses. Counties fill out a one-page form and attach the relevant findings for each decision. The data is entered into a data base and is used to create the annual reports on farm and forest land divisions. The data is complete and accurate for decisions on land zoned for farm and forest use. *Note that local jurisdictions are only required to report on decisions affecting lands zoned under statewide planning Goals 3 and 4 pertaining to farm and forest lands.*
Reports on resource land decisions are developed annually.

b. Project Title: Local Comprehensive Plan Amendments

Objectives: Ensure that amendments to acknowledged local comprehensive plans comply with the requirements of the Statewide Planning Goals.
Data: Proposed changes to a local comprehensive plan.
Cities and counties file notices with DLCD on proposed amendments to their comprehensive plans. DLCD reviews the proposed amendments and participates in the plan amendment process as appropriate. Jurisdictions then file reports on adopted plan amendments.
Note that plan amendments can include comprehensive plan inventory data, comprehensive plan text changes, new or amended comprehensive plan policies, and changes to implementing ordinances such as zone changes, zone text changes, and changes to standards for land divisions and land development.
No reports on plan amendments are issued, although all plan amendments are to be filed with DLCD.

c. Project Title: Pacific Northwest Coastal Ecosystem Regional Study

Monitoring Question: *What are the historical variations in oceanic and atmospheric conditions in the Pacific Northwest that may have affected salmonid productivity?* Other studies will address the effectiveness of coastal-resource policy, management programs and policies in relation to natural variability, and ecosystem processes.

Scale: Coast-wide 1997-2001
Data Parameters: To be developed
Protocols: To be developed
Funding Status: Will use $5.5 million in NOAA Coastal Ocean Program funds over five years.
Reports:
Coordination: Data collection and information sharing will be coordinated at a regional scale with NOAA, DLCD, Oregon and Washington Sea Grants, and NMFS

8. Water Resources Department

a. Project title: Hydrograph Monitoring

Monitoring Question: What are the seasonal flows of Oregon's Rivers.
Scale: State-wide, with coastal emphasis for staff gages. Gaging stations are continuous; staff gages are grab samples.
Data Parameters: Flow and time
Protocols: Yes
Funding Status: Inadequate. The number of gaging stations has declined.
Reports: Statistical Summaries of Streamflow Data in Oregon, USGS Open-file Report 90-118. Water Resources Data Oregon Water Year 1991, USGS Water-Data Report OR-91-1.
Coordination: USGS

9. Department of Transportation

a. Project Title: Wetland Mitigation Monitoring

Monitoring Question: *Is compensatory mitigation meeting its performance and success criteria, and what, if any remedial actions are necessary?* Currently monitoring is focused on ascertaining that the mitigation site is meeting its success criteria and the planned for
functions are actually functional. In the future more technical aspects of mitigation design and implementation would be included in the mitigation goals.
Scale: ODOT projects state-wide. Monitoring is usually done once a year
for 5 years, but other monitoring frequencies and durations can be
specified in the permit.
Data Parameters: Monitoring usually consists of assessing vegetative cover and diversity, and post construction hydrology. More rarely, habitat values may be assessed.
Protocols: Formal monitoring protocols for ODOT have
not been developed, but other agencies and DOTs have protocols that
can be used as deemed appropriate.
Funding Status: Funding for monitoring usually comes out of Environmental's IN budget, since project specific funding for monitoring has yet to be established. Monitoring of
ODOT's mitigation wetlands has usually been a stand-alone activity up
to now.
Reports: The actual mitigation plan is proposed by ODOT, with the permit conditions being
the final say. The data is incorporated into mitigation reports (which present an evaluation of the condition of the mitigation site) that are sent to the permitting agencies, DSL and the Corps, and other agencies as requested. Data, photos etc. are kept by the ODOT Environmental staff member responsible for the work for as long as monitoring is taking place.
Coordination: DSL, ACE

b. Project Title: Assessing Fish Passage Through Culverts

Monitoring Question: *Are water crossing structures on state highways consistent with design standards for passing fish?* This project identifies culverts that do not meet current fish passage standards.
Scale: Coast-wide
Data Parameters: Culvert dimensions, gradient, slope, degree of perch, velocity, and roughness are measured.
Time Frame: Undetermined
Protocols: Yes developed by ODFW.
Funding Status: ODOT
Reports:
Coordination: Data collection and information sharing was coordinated at a regional scale between ODFW and ODOT.

Summary of Existing Databases

A summary of existing databases relevant to the monitoring program. These may reside within the respective agencies or may be available from other sources. Includes the content of the database, the physical location, description of field structure, file format (or other format if not a digital system), and assessment of availability, sensitivity of information etc.)

1. Oregon Department of Agriculture

a. Tualatin River monitoring is captured in the DEQ/EPA STORET database.

b. The ODA CAFO program maintains a database of the permitted operations. This database includes:

Business Name, Business Address, County, Contact, Phone, Location City, Facility Address, Firm #, Fac ID#, Tract #, Permit Status, Zip Code, Section, Township, Range, 1/4 1/4 Sec, Waste Mgmnt Plan/Date, Leased, # of Animals/AIS, Animal Type, Facility Type, acres (Cropland, Pastureland), Rapid Screen, Complaints, Dimensions, Days Liquid Store, Days Solid store, Drainage Basin, Sub Basin, Fac/Lat Long (degrees, minutes, seconds and in decimal degrees), BMP, Complaint, Comments, Tile, Acres Served, Size, Acres Own, Acres/Flood Plain, Photos, Water Samples, Proj. Area, NON Issued, Tax Lot #, Date of NON, Date of NON, aerial Photo#, Honey\312Wagon, Solids\312Spreader, Application Method, Adult Type, Count, Adlscnt Type, Count, Juv Type, Count, Lic_num, Type, Storage Time, State, Date of Compliance Inspection, Date of Compliance Inspection.

The CAFO database is located at ODA and was created and is maintained in FileMaker Pro.

2. Water Resources Department

a. Hydrographic data including:
Mean daily flows for rivers and streams throughout Oregon. (A map is available which shows the location of active and non-active USGS and state gaging stations.) Miscellaneous measurements of flow located at various rivers and streams. Miscellaneous groundwater data accumulated from approximately 650 monitoring sites located throughout Oregon. Water use reporting data. Approximately 1000 public entities report water use each year.

3. Department of Land Conservation and Development

a. Comprehensive plan designations, circa 1986:

The general comprehensive plan designation for all lands in western Oregon have been recorded and digitized at 1:100,000 scale. These data were captured in about 1986; they have *not* been updated except for some 1993 data that focused on resource land activities in most of the counties in the I-5 corridor. These coverages are available through the State Service Center for GIS; the data are not sensitive. Data consists of polygons. The associated data includes the county and the comprehensive plan designation.

b. Estuary Habitats and Zoning
Estuary habitat types were mapped in the late 1970s. These maps provide the only record of substrate composition in Oregon's estuaries *at that time*. Local estuary management plans designate different estuary use categories for all estuarine areas. Data fields include substrate type, estuary zoning, specially protected Goal 17 sites (major marshes, dredged material disposal sites, and lands that are especially suited to waterfront development.) These data are polygons. They are in the process of being converted to useable projections by the State Service Center for GIS. Some processing to delete unnecessary work files is necessary.

4. Department of Environmental Quality

a. Water Chemistry
EPA s STORET database is used for storing all water chemistry data collected by DEQ. This data base is managed by EPA. Access to the data base requires a user ID provided by EPA. Many other state and federal agencies also store their water chemistry data in STORET.

b. Stream Habitat Data
Most of the stream habitat data at DEQ is currently stored in EXCEL spreadsheet files at the DEQ laboratory. Data for the REMAP project has been entered into a FOXPRO and/or ORACLE database by EPA, and is available to any interested groups or agencies. This includes data for both Oregon and Washington coastal streams.

c. Macroinvertebrate and Fish Data
These data are currently being switched over from EXCEL files to an ACCESS data base at the DEQ laboratory. Once the data base is completed and all data up loaded ACCESS files will be available to any interested parties. This should be completed by March or April 1997. For now EXCEL files are available.

5. Division of State Lands

a. Removal-fill permits
All removal-fill permits are entered into a DSL database (WANG). All active permits are in the database; historical information on expired permits is limited and of dubious quality. Reporting ability is minimal. DSL is in the process of migrating to an open architecture system, and this database will be completely replaced.

6. Department of Forestry

a. FACTS database
The Forest Activity Computerized Tracking System (FACTS) contains information collected by the Oregon Department of Forestry since 1/1/90. By law, the Department must be notified of planned forest operations, and it takes information from the notification forms and enters it into a relational database. An operation can be any combination of the following activities: harvest of forest crops; road construction or reconstruction; site preparation; chemical application; clearing land for use change; treatment of slash; pre-commercial thinning, or other activities.

There are two types of information in the Central Database - PLANNED operations and ACCOMPLISHED operations information. The majority of the data is information on PLANNED operations. Data is entered in field offices and collected weekly by Salem and added to the Central Database. The field databases are updated daily with corrections or additions so totals for any type of activity will shift up or down. Since harvest operations often

pause during winter and continue in the spring, some operations won t be completed for one or two years. The F.A.C.T.S. Central Database is created in Paradox 4.5 for DOS.

7. Department of Transportation

a. Wetland mitigation database
ODOT Environmental Wetland Team is working to set up a wetland mitigation tracking database. The primary purpose is to ensure that monitoring is taking place as required. The database will be set up either on an Excel spreadsheet or in an Access database. Items in the database will include at a minimum site location, construction date, type of wetland, monitoring frequency, and dates monitored. Other information that may be added includes the level of detail of the monitoring and site condition.

8. Department of Fish and Wildlife

a. Stream habitat and riparian vegetation.
Collected, analyzed and maintained by the Aquatic Inventory Project and the Habitat Analysis and Application Project within the Research Section in Corvallis.
Example Variables: Channel form, valley form, riparian stand composition, large woody debris abundance, pool characteristics, etc.
Format: dBase IV relational files, Quattro graphic files, ArcInfo GIS (partial)
Extent: Over 7000 miles of streams surveyed throughout the state, approximately 4,000 miles in coastal basins.
Availability: Reach summary files maintained on servers at Forest Science Lab, OSU and at ODFW Portland.

b. Adult Spawner Surveys - "Standard Index" Surveys and "Stratified Random Surveys".
Some data goes back to 1940's, expanded random surveys of coastal basins began in 1990.
Example Variables: Number of spawners/mile in coastal streams. Primarily for coho salmon, also some information on chinook. Peak counts and estimates of total run size. Statistically valid at coast wide level, further expansion to provide resolution at GCG level proposed.
Format: Advanced Revelation 1990-1994, MS Access 1995-present, some spreadsheets, GIS summaries.
Extent: Coastal coho basins, primarily north of Cape Blanco, expanded into Rogue in 1996.
Availability: Summary files maintained on PC's at ODFW Corvallis Research Lab and at ODFW Newport.

c. Stream Fish Distribution
The Aquatic Inventory Project has developed fish distribution and abundance estimates in a limited number of coastal basins. In addition, there are Upstream Fish Distribution maps available at most ODFW and ODF field offices.
Example Variables: Fish species, number, location, etc.
Format: Varied- dBase IV relational files, maps, ArcInfo GIS (partial), forms.
Extent: Unknown.
Availability: Limited, could be expanded with funding by ODF.

d. Stream Net
Both general and specific information on streams, fish populations and habitat. Program funded through BPA and is focused on Columbia Basin. However significant potential exists for expansion into coastal basins. Interfaces with ORIS, Oregon Rivers Information System, a flat file database that summarizes some fish distribution and habitat information. Streamnet and ORIS databases have internet access.

e. Salmon Core Areas/Essential Habitat/Source Areas
Various systems designed to identify important habitats.
Example Variables: Location within coastal basins of important spawning and rearing habitats.
Format: ArcInfo GIS.
Extent: Coastal Basins.

Availability: ODFW GIS services, Portland.

f. Stream Habitat Restoration Projects
Details and summaries of habitat projects conducted 1990-present, primarily on non-federal lands. Collected, analyzed and maintained by the Habitat Analysis and Application Project within the Research Section in Corvallis. Project initiated by the Oregon Forest Resources Institute (OFRI) in 1995, initially targeted at industrial forest landowners, expanded to include watershed councils and smaller private landowners. Proposed for continued funding.
Example Variables: Stream name, project location, project type, landowner, cooperators, fish species targeted, costs, etc.
Format: dBase IV relational files. Report summaries.
Availability: Reports available from OFRI. Database maintained at ODFW Research, Corvallis.
g. Commercial Fish Harvest - Recreational Fish Harvest - Incidental Mortality - Ocean Bycatch of Coho
Various important databases developed by ODFW and located in Corvallis, Newport, and Portland.

ODFW needs to provide details on database structure, organization, and availability.

h. Hatchery Releases - Stock Assessment - Rates of Return
Information of performance and production of artificially propagated fish. Various important databases developed by ODFW and located in Corvallis, Newport, and Portland.

ODFW needs to provide details on database structure, organization, and availability.

9. The Northwest Aquatic Resource Information Network (StreamNet)

a. Online Data @ www.streamnet.org
(1) Anadromous Adult Abundance - (dam counts, natural spawning ground counts, estimates of spawner populations, and spawner/recruit estimates).
(2) Anadromous Harvest (both freshwater and marine).
(3) Anadromous Hatchery (both releases and returns, numbers and CWT information)
(4) Facility (both hatchery and dams).
(5) Anadromous Distribution (presence / absence data) at 1:250,000 scale:
  (a) Columbia Basin includes use type and subjective habitat quality.
  (b) Coastal areas includes presence/absence only.
(6) Reference (StreamNet specific plus other agency bibliographies).

b. Data available through request to regional data manager (Duane Anderson duanea@psmfc.org - data will be available on-line in next 3-6 months)
(1) Tributary Flow Data - entire USGS flow record.
(2) Mainstem Dam Flow Data - conditions (flow, spill, etc. at Federal mainstem dams).
(3) Nearshore Ocean Upwelling Indices.
(4) Sea Surface Temperature and Pressure.

c. FY 97 data priorities (schedule variable)
(1) Updated distribution, use type, and barriers for all anadromous species at 1:100,000, explore adding irrigation diversions and other blockages region-wide.
(2) Mitigation project data (federal, state, private).
(3) EPA 303d streams (water quality limited streams for OR, ID, WA, MT).
(4) Anadromous juvenile abundance data.
(5) Anadromous age data.
(6) Enhanced hatchery return data.

(7) Habitat layers (USFS/BLM Eastside assessment, historic data, GAP, National Wetland Inventory, Natural Heritage data, Wild and Scenic Streams).
(8) Enhanced mainstem/system data (gas saturation, temp, smolt transport, etc.
(9) Enhanced library services, collection, and on-line bibliographies.

Developing Issues Identified by Monitoring Group Representatives

1. Department of Agriculture

Resources should be directed to implementation of existing BMPs and propose no new agricultural research pertinent to this effort.

We need more accurate delineation of agricultural activities and type of agricultural production/use from the delineated acres. We believe this base data will become available when the GAP program completes initial projection and summary classification of the most recent imagery. When the GAP program releases this information, classification of the land use in the agricultural class could be pursued. This base layer would be very useful in implementation of the SB1010 agricultural water quality management planning program, in improving understanding of relationships of ag., water quality and fisheries issues, and in monitoring changes in land use over time.

How can we, and who will be responsible for determining riparian conditions associated with agricultural lands or activities over large areas (i.e. basins and subbasins)? What protocols will be used? This information will be useful as the basis for planning and implementing BMPs and for reporting progress.

What is the best way to document the extent to which ag operations are operating under farm/ranch plans and what BMPs are being practiced at this time and sometime in the future.

What information is available from NRCS (they help many individuals develop and implement plans) and how do we merge and use this information with the state CSRI.

2. Department of Environmental Quality

Many agencies, as well as private groups and landowners, are collecting continuous temperature data. This work creates very large files of thousands of data points. It would be useful to determine how this type of data should be summarized and reported, and provide protocols for people to follow if they wish.

GIS always sounds attractive, but never seems easy to utilize. A description of the type of site location data and other parameters needed for GIS applications might help assure that sampling sites can be added without a lot of difficulty.

3. Division of State Lands

Field research is needed on the effects of gravel mining on stream hydraulics and morphology. We believe this is appropriate for the Corps to fund, possibly through OSU graduate students.

4. Department of Fish and Wildlife

The ODFW representative to the OCSRI Strategic Planning Team made the following comments:

a. Salmon Core Area Monitoring: What is the annual production of salmon smolts from the core areas? How does smolt production relate to specific habitat conditions in the core areas? How is salmon production changing in response to habitat restoration projects in the core area?

b. Estuary Populations and Habitats Assessment: What is the importance of the estuary habitat to coho populations? What estuarine habitat components are most important to coho survival?

Can (and should) the various data sets be made accessible to all agencies, constituent groups, landowners and watershed councils? The data presently are stored in a variety of formats on different kinds of systems (from PCs to mainframes) using different software. Is it technically feasible to do this? Is the data actually useful to others directly from the data bases, or is synthesis and analysis necessary before it could really be used by others? (For example, the ODFW habitat inventory electronic data stored in various data base, word processing and GIS software is probably not of much value, but the synthesized reports, including maps, for each project area would be, but the reports are not in electronic format).

Editors note: The preceding statement is an inaccurate representation of the habitat inventory data and report information. All reports, including electronic summaries of the data, are available from Kim Jones, Project Leader, Aquatic Inventories, ODFW Research Section, Corvallis, (541) 737-7619.

Watershed assessments should be conducted by watershed councils or large landowners. The monitoring questions that they should address would include: What and where are the major limiting factors for salmonids in a given watershed? What specific habitat limitations should be addressed first to have the greatest benefit to salmon restoration in that watershed?

Section 1.3: Scoping Session I. December 18, 1997. LaSells Stewart Center, Oregon State University

List of Advisory Team Organizations for SSI and SSII.

Watershed Councils

Applegate River Watershed Group
Coos Watershed Association
Coquille Watershed Association
Euchre Creek Watershed Council
Floras Creek Watershed Council
Lower Butte Crk Watershed Council
Mid-Coast Watershed Council
Ten Mile Basin Partnership
Tillamook / Nestucca Watershed Council
Umpqua Basin Fisheries Res
Upper Nehalem Watershed Council

Non-Government/Private Organizations

Association of Clean Water Agencies
Association of Oregon Counties
Boise Cascade
Columbia River Intertribal Fish Commission
David Heil & Associates
4 Sake 'O Salmon
Natl. Council for the Paper Ind. on Air and Stream Imp.
Oregon Assoc of Conservation Districts (SW)
Oregon Cattlemen's Association
Oregon Coastal Zone Management Agency
Oregon Concrete & Aggregate
Oregon Forest Industries Council
Oregon Small Woodland Association
Oregon Trout
Oregon Wildlife Heritage Foundation
Pacific Coast Federation of Fishermen's Association
Pacific Rivers Council
Rogue Valley Council of Governments
Sierra Club NW
Water for Life
Water Watch of Oregon Inc
Weyerhaeuser Company

Oregon Dairy Farmer's Association

State Agencies

Coastal Oregon Productivity Enhancement
Department of Environmental Quality
Department of Land Conservation and Development
Department of State Lands
Department of Water Resources
GIS Service Center
Governor's Natural Resources Office
Governor's Watershed Enhancement Board
Oregon Department of Agriculture
Oregon Department of Fish & Wildlife
Oregon Department of Forestry
Oregon Department of Transportation
Oregon Farm Bureau
Oregon Progress Board
Oregon State Police
Oregon State University
Oregon Water Res Congress

Tribal Groups

Confederated Tribes of the Siletz

Federal Agencies

Army Corps of Engineers
Bureau of Land Management
Environmental Protection Agency
Nat. Marine Fisheries Service
Natural Resources Conservation Service /NRI
Regional Ecosystem Office
US Forest Service
US Fish & Wildlife Service
US Geological Survey

Letter announcing Scoping Session 1.

December 3, 1996

Thank you for agreeing to participate in the development of the Coastal Salmon Restoration Initiative (CSRI) Monitoring Plan as a member of the advisory team. The Monitoring Plan will be a very critical component of the final Governor's Coastal Salmon Recovery Plan that will be delivered to the National Marine Fisheries Service prior to their April 25th decision about the coho salmon.

Enclosed is a *Backgrounder* describing the project and development process. The major role we are asking you to perform is to provide thoughtful input about important monitoring questions and protocol, the adequacy of current efforts, and how we might better organize our future efforts. Your participation will be required at two separate full day "scoping sessions". To be most effective you will need to review some background material that will be sent to you prior to each scoping session. We also hope that you will serve as a liaison to the interest group you represent and other similar stakeholders about this effort. If you need additional clarification about this project or your role, please call Kelly Moore or myself (phone numbers are in the *Backgrounder*.)

The first scoping session has been scheduled for Wednesday, December 18. A major objective of this first scoping session is to come to agreement about the monitoring questions that should be priority for the monitoring effort. A second major objective is to gather information about how well the current efforts address the priority questions and what changes, if any, may be appropriate.

To help you provide thoughtful input at the first scoping session, we have enclosed "Synthesis #1." The information in this will be critical to our discussions at the scoping session. It will also be helpful to this process if you have a working understanding of the draft CSRI Recovery Plan.

The scoping session will be held at the LaSells Stewart Center on the campus of OSU in Corvallis from 8:00 a.m. to 5:00 p.m. We will begin with a general review of "recommended" monitoring questions, existing monitoring efforts and data storage systems, desired outcomes of the monitoring plan, and of alternatives to existing data storage systems. Input on these issues will be gathered through working sessions and group reports. We will conclude the session with an overall synthesis and comments by the larger group.

Also enclosed is a list of invited participants to the first scoping session.

The LaSells Stewart Center is located on the corner of Western and 27th (across from and south of Gill Coliseum). Parking is available without a permit in the parking lot across the street.

Again, thank you for agreeing to participate in this process. We are looking forward to seeing you and to a productive scoping session.

Agenda for Scoping Session I

Coastal Salmon Restoration Initiative Monitoring Plan

Scoping Session #1

December 18, 1996
LaSells Stewart Center, Corvallis, OR

AGENDA

8:00-9:45 **Logistics.**
Introduction. Why we need monitoring for the CSRI.
Objectives. To determine monitoring questions and prioritize them.

- What are assessment, monitoring and research?
- Definition of a "good" question.
- Presentation of advice received so far.

Instructions for breakout groups. Objective: To provide Advisory Team input on the importance, focus and quality of the CSRI monitoring questions to assist the Monitoring Team in developing the Monitoring Plan.

10:00-12:00 **Breakout groups** (broken up into 5 groups by the number on your name tag.) Identify most important questions, focusing on top 10, and decide whether they are research, monitoring or assessment questions. Add additional questions if needed. Suggest refinement of question(s).

12:00-1:00 **Lunch** (on your own).

1:00-1:30 **Prioritization voting** with 10 "dots" per person. New questions will be read out loud before voting occurs. Each person individually votes for his/her top questions using dots as they best see fit.

1:30-3:00 **2nd Breakout Session.**

- What questions require common (inter-agency) protocol and effort (based on issues of scope/scale)?
- What key questions remain to be addressed by any monitoring efforts?
- How well do current monitoring efforts/questions address or correspond with the key (top 40) CSRI questions?
- Advise and modification suggestions for existing programs.

3:15-4:30 **Group Presentations.**

4:30-5:00 **Close.** Next step - Synthesis #2 and Scoping Session #2.

Trust Issues and Goals

Mutual fairness used in all actions with people and process - Some groups have developed trust through time by working with **Fair Process**
Respect for what others are bringing to table
Involve landowners up front
Scales of monitoring and their effects on trust
    Georegion
    WS = some threat
    Reach = landowner threat perceived
Landowners trust increases when:
    Involved from beginning
    Have equality in participating groups
    Longevity of public employees in local positions
    Agreement on question
    Agreement on process to answer questions
    Agreement of use of answers
Communication within peer group about personal objectives and intent
Identification of 'baggage' or perceived 'baggage'
Long-term agency representative in regions
Maintain local presence
Give evidence that voices are heard despite recognized differences
Opportunity to act on the problem rather than waiting for more advice
Admit or confront differences between regulation standards at different levels of government (i.e., local vs. state vs. federal)
Acknowledge of efforts
Communicate difference between trend vs. site monitoring. Trend monitoring seen as less personally threatening
State coordinated trend monitoring and WS/local level site coordinated monitoring
Give opportunity to comply without enforcement threat (e.g., safe harbor)
Alternative methods to achieve compliance - cooperation with watershed councils, etc.
Focus on opportunities present in 'problems'
Improve/build trust and communication from state → local → citizen
State take accountability for regulations and information that local governments must communicate to citizens
Reduce jargon and write for 'non-experts'
Data trust - Apply new data in a meaningful, rapid way
    Proactive protocol agreement

Flexibility with protocol inf. and data
Consistent standards for data use
Agree on a consistent and common response to problems
State Agencies
MOU
Need to enforce or use punitive measures?
Allow local levels to respond initially to a problem before regulatory agencies intercede.
Agreement to common protocol - and actually use it.
Positive feedback and recognition for doing 'things' well
Play the media
Work with local groups by basin. May differ from WS councils based on their activity, influence, and local history.
Use local groups to organize dispersal of information and gain consensus.
Land owner must be comfortable with process
Understanding of use, purpose, and accessibility of information collected
Agency reps need to recognize the situation privateers sometimes sit in such meetings and forums. Private landowners tend to be outnumbered by public agency personnel/under-represented.
Recognize difficulty for private landowners to participate in public process
Short-term action available while long-term studies are in process
Understand implications for cooperative landowners if coho are listed.
- Punished for cooperating - fear that they are making the noose to hang themselves by inviting monitoring on their land
Make opportunities for input more accessible to concerned private parties
- meetings on coast
Concept of 'no-fault' monitoring
- "inspections" without "citation"
"Safe harbor" process for landowners
Identification of side boards governing degree of "safe harbor"
Recognize and retain focus on common ground and goal among all groups?
Rely on a common set of information
- everyone uses same data
Issue of liability for actions done on private land
- historically had government safety net
Re-evaluate decisions based on limited data when more data is available.
- i.e., streams on 303(d) list from a single measurement but require different standards to de-list.
Public agencies need to admit wrong
Obvious efforts to involve more landowners
Agree to achieve agreed upon objectives, not standards.
-Standards tend to be regulatory

SUGGESTIONS TO GAIN TRUST

√ Bruce S. will contact Gov. Office about the legalities of "safe harbor"
Praise each other's good work
√ Add people from private sector to advisory planning group
Have 'local people' scoping sessions by/within regions
Get federal agencies involved (NMFS) and start building trust with them
Create ownership in the process for private landowners
√ Put trust on agenda for advisory/planning groups
Communicate desire for input from local groups and individuals
WS coordinators should be individuals who already are trusted/trustable

Results of Group Process to Develop Consensus

CORE IDEAS

- Achieve balance between adaptive management and consistency of monitoring
- Points of redefinition allowed for/evaluation/redesign where and if appropriate
- Recovery objectives should reflect local conditions and capacities
- Habitat restoration should focus on causes not symptoms
- "Safe harbor process" for landowners to distinguish regulation from monitoring - don't use monitoring to drop regulatory hammer.
- Continually determine if management is adequate or can be improved by monitoring a range of treatment levels over different time scales
- Individual agency or organized action reflects goals and objectives
- Adequate and perpetual funding mechanisms - Cost-effective program

DATA

- Monitoring program provides data that will save salmon
- Right questions are asked, data reflect meaningful answers
- Data are broad enough to apply to wide landscapes. Reduce extrapolation of data from one area to another.
- Data accessibility with storage in one place
- Standardized data be provided by and available to WS - level groups
- Universal, accurate, and defined metadata to facilitate analysis
- Collect data that reflect current practices
- Collect data that truly answer/address regulatory criteria

POLICY

- Clear vision of the public policy decisions relying on standardized data
- Reduce regulations association with monitoring - work through discussion not regulation
- Mutually agreed upon target / definition of 'restoration'
- Agencies agree to remain open to and/or will change with new data

COOPERATION

- Common, visible commitment by private and public land partners
- Achieve a true collaborative effort by:
  - talking to one another
  - consistency of data collection
  - no effort duplication
- Coordinate efforts bioregionally rather than by agency
- Ask neutral questions without bias toward a land user group
- Sense of joint commitment requires:
  - a sense of common commitment
  - that the process gives personal benefit to all sides (i.e., useful inf.)
  - support of the Governor's Plan (in its entirety)
  - a common vision of the need to implement a state-wide monitoring strategy
  - trust and lack of fear (** see below for further discussion)
  - reassuring landowners the agencies have a common investment and a share in responsibility
  - formation of non-partisan, neutral group to do monitoring/collect-analyze data
- Equal voice of participants regardless of representation. Level playing field.

PROTOCOL

- Consistency of monitoring across land uses. DO NOT focus on a single land use.
- Methods that are accepted by and credible with a number of groups
- Supported by sound experimental design geared toward objectives

GENERAL SUGGESTIONS

- Process leads to creation of independent management body to implement adaptive management
- Need a clear institutional structure for implementing plan
- Limited public resources go toward addressing long-term projects
- Priority to activities that produce in short-term/change rapidly
- Process for getting more 'bang for the buck' with a master monitoring effort:
  - enlist private land owners, watershed councils, SCS, etc.
  - focused and concentrated effort (rather than piece-meal).
- Assess baseline information - 'where are we starting?'
- Move toward statewide monitoring project - application to concerns beyond fish & streams
- Regionalize decision making process

Strategy Questions

Strategy and process related questions raised during SSI. Because discussion of these questions was critical to bring participants on board, these were answered and returned to the Advisory Team during SSII.

The questions have not been prioritized.

Does the monitoring plan have clear, concise, quantifiable goals and objectives? *Yes, given the scope of the CSRI effort. They are to: develop accurate information on the status of salmon populations and their habitats; detect declines or increases in abundance; and, determine the effectiveness of measures designed to improve conditions for salmon (Executive Summary, The Governor's Coastal Salmon Restoration Initiative p. 4). These objectives are directly tied to the process of adaptive management.*

How will the monitoring data be used to make decisions that will restore fish populations? *The answers revealed by the data collected through effectiveness monitoring will be communicated throughout the state agencies responsible for overseeing the areas/practices/policies that were monitored. These communications will then result in policy review, further identification of salmon population requirements, and management changes which should assist in improving fish populations. Whether they do or do not will then be monitored to follow through.*

If the contents of the Plan will likely dictate monitoring needs, how can the monitoring plan be drafted before The Plan itself has been articulated? *The Plan or Coastal Salmon Restoration Initiative, has been articulated in draft format. It is referred to as a draft because it is subject to change and improvement as new information is made available. The monitoring plan, much like the management affecting salmon, is adaptive. That is, it can change and add emphasis as more information is brought to light. Currently, there is general agreement about baseline requirements for salmonid habitat, i.e., large woody debris, cool streams, available refugia, high pool/riffle ratios, etc. The baseline data that exists on these habitat requirements is patchy and disperse. The monitoring plan can serve an important initial function by consolidating the available data and by preparing common state-wide protocols for measurement of certain parameters which will improve the quality and quantity of data on parameters already linked to salmon habitat.*

What are the issues? the products needed to address the issues? and the information needs to produce the products? Upon what scale are all these applied to monitor the Plan? Do stakeholders share a sufficiently precise "global vision" about the broad and specific goals we are trying to achieve? *The "issues" are the current decline in salmon health and numbers. The necessary "products" are increased information and techniques applicable to improving salmon life histories and habitat and their success and abundance. The information needs are numerous and range from organizing already gathered information to developing questions that will better address problems and new methods for collecting that information. The current spatial scale is set for all levels of stream networks within the range of coastal coho. Initial efforts will be stratified by Core Areas, Gene Conservation Groups (GCG's), and Evolutionarily Significant Units (ESU's). The temporal scale is what will be necessary to observe improvements in salmon*

populations and fully implement the measures taken to achieve the improvements. Because the question about 'global vision' was asked, apparently not. Greater communication is planned by state agencies. All stakeholders should take responsibility for reading the Plan and monitoring documents to come up to speed with the monitoring goals.

Do we have an understanding of where our monitoring efforts/focus fall(s) in the salmonid system continuum (i.e., often we conclude success or failure based on a lack of understanding of natural population/habitat cycles [temporal and spatial])? *Not yet. Hopefully this question will be addressed with current population research and examinations of historical records. However, the best we can do is to develop a state-wide, long-term monitoring plan to attempt to capture some of that temporal and spatial cyclical variability.*

Is the main objective to pull together the various government data bases or to examine the condition of the landscape and the genetic diversity of wild salmon populations? *The main objective is two-fold and it is to both examine habitat and population conditions and quality and to maximize utilization of current data bases.*

Are we monitoring to develop baseline information or to provide a political impetus for further regulation? Do we have baseline information? Is what we have currently being used effectively? *We are monitoring to develop baseline information, improve current knowledge about salmonid populations and their habitat, and to provide information on critical factors that are limiting salmon recovery. The process is not designed to provide political impetus to increase regulation. In fact, it is the expressed intent of the CSRI to prevent new regulation by proposing an action plan that would lead to the restoration of the health of coastal salmon and trout population. It is hoped that the CSRI offers federal officials an alternative to an Endangered Species Act listing for Coho, thus preventing increased regulation. Hopefully, no new, additional regulation will be necessary and the data will serve to improve current regulation and management standards. Incredible amounts of baseline data exist; however, the data is often disassociated from those who can use it, is difficult to access, and is of questionable quality. What is there can be used better by developing a state-wide system of data sharing, access, and analysis.*

Do we know *how* to decide where we have enough information to begin taking action or where we need to do more research? I*mplementation and effectiveness monitoring questions designed to specifically address this issue will be necessary to determine where action is appropriate and more research is necessary. Depending on the situation, both may be conceivably appropriate at the same time. There are components of habitat condition which are currently well accepted among researchers and managers alike as key in providing high quality salmonid habitat. A lack of such components (adequate riparian cover, cool streams, large woody debris, and appropriate pool/riffle ratios) would indicate an opportunity for restoration or action.*

Do we have a strategic plan for the monitoring plan written with goals and timelines? *No, no formal written strategic plan specific to developing the Monitoring Plan was developed prior to beginning this process. The state agencies decided that, given the constrained timeline, proceeding with developing a monitoring plan was paramount. An unwritten plan with particular focus on the absolute deadline and general goals appears to be mutually understood.*

Are we monitoring for cause and effect or trends? Demand different hypotheses. *Depending on the particular resource issue and parameter, either or both may be appropriate. Questions and hypotheses will be phrased according to the monitoring method best able to meet the Plan's objectives.*

What management decisions or regulatory standards are to be influenced by monitoring, research, and/or assessment information? What infrastructure will make and enforce the adaptive management changes suggested by the monitoring plan? *Under the concept of adaptive management, all management decisions and regulatory standards related to salmon habitat and populations will be subject to influence by information provided through assessment, monitoring and research. Each individual agency will be responsible for making and enforcing the adaptive management changes relevant to their resource focus. No new agencies will be formed at this time.*

Are there any collaboration models to assist in addressing the organizational issues associated with successfully monitoring the Plan? What are the organizational issues? What are the criteria used to evaluate action items within the CSRI? *There is no precedent in the State of Oregon. Many state agencies have monitoring programs some of which incorporate cooperative monitoring efforts. This is the first attempt at bringing all the agencies and vested*

parties together to monitor a specific issue. Washington DNR has formed a group to develop a state wide interagency/landowner monitoring program but is still in the development process. Organizational issues include how the monitoring program will be implemented, where the data will be housed, who will have access to the data, how will it be used outside the context of the CSRI, and reporting procedures. The criterion are numerous and depend on such parameters as fish numbers, wild fish mortality, sediment and temperature loads in streams, compliance with clean water laws, and improvement in range of high quality habitat (riparian and instream) conditions. Each agency was asked to develop measures and benchmarks of effectiveness and implementation of the CSRI. These will be used as criterion as well.

How can we encourage landowners to cooperate in data collection and monitoring project implementation? *Excellent question which may be answered best by contacting and working with watershed councils and other local organizations involved at the grass-roots level. Equally important is to keep landowners involved in the development of the monitoring program.*

Will there be a state and agency-wide standard of practices developed? *In order to collect reliable and consistent data, standard data definitions and protocols must be developed. How this will translate to practices will depend on the participants.*

Is there a plan to systematically include critics of the CSRI in the process to 1) learn from their criticisms, 2) adapt our methods in response when appropriate, 3) potentially neutralize their opposition, and 4) increase credibility with public and legislature? *The agencies have begun a series of scoping sessions and invited all vested parties to attend. The intention is to improve on the monitoring proposal and build upon the knowledge and experience of the participants as well as build consensus and ownership on the monitoring plan.*

What mechanisms will be used to consolidate, implement, and distribute results, findings, and various efforts so that cooperators can learn about, revise, and update monitoring efforts? *Part of the monitoring plan includes the development and organization of a data base system operating on the internet that will be responsible for the collection and dispersal of monitoring data and results. An annual report will be published to inform landowners and managers about monitoring results and changes in land management. Individual agencies will also be responsible for informing those that use the resources of changes and updates.*

Will the data bases be flexible enough to change when firm data becomes available (replacing estimated data)? *Definitely.*

Is there a plan to monitor the monitoring elements so that critical information gaps can be identified? *Inherent in the adaptive monitoring program is a feedback system to assess monitoring efforts, changing priorities, and gaps in information.*

How does this effort plan to coordinate/fit in with other efforts (e.g., NW Forest Plan Monitoring and Research Team, California's efforts) to reduce effort duplication, to 'mesh data,' and address the biological habitat that crosses political boundaries? *By developing a state-wide inter-agency monitoring plan, the hope is to reduce data duplication, increase data sharing, and monitor the biological rather than the political as much as possible. With a reduced number of state agencies reproducing data and an increased number sharing data, more effort can be focused on communicating with federal agencies and other states.*

Are we working with Province Advisory Committees to find out about existing state/fed coordinating mechanisms and proposals? *If the province committee is coordinating with state or federal agencies then yes they have been included in the process. All agencies have been surveyed for existing monitoring efforts. The results of the survey were attached to scoping session 1 materials.*

If each agency's existing monitoring program is EPA rule driven vs. internally driven, which protocol will have precedence if we go to a state-wide protocol? Are existing data standards and monitoring programs expected to be refined to reflect new protocol standards? *Each agency's program is not driven by EPA rules. In many cases EPA standards may be used as a criterion of effectiveness, but goals and objectives are driven by the agency objectives.*

Protocol precedence will be based on which protocol efficiently answers the monitoring question. Yes, existing data standards and monitoring programs are expected to be refined only if they are improved upon. If an agency believes the state-wide protocol reduces the effectiveness of their information collection, then the state-wide protocol needs to be improved to that agency's standards state-wide.

Will watershed councils be able to live up to the level of commitment of solving watershed problems that is expected? What is the best way to utilize watershed councils and other local groups? *Ideally, yes. Expectations and utilization will need to be developed in conjunction with the watershed councils. Each council will undoubtedly have objectives to meet outside of the CSRI and this will need to be accounted for when councils are asked to participate.*

Is it necessary to have a comprehensive monitoring program or can smaller, individual watersheds serve the same purpose? Will we be able to tell or know the difference in results between the two? *A comprehensive monitoring program is necessary to assist in the distribution of monitoring results to all involved parties and to assist in crossing political boundaries that are biologically fluid. In some cases, no difference in the information collected will be apparent. In others, a state-wide program will provide more thorough, consistent and powerful information by being able to group and/or compare results from different watersheds. Since any two watersheds may have different objectives, a coordinated effort would more likely result in a more cohesive data set.*

Do we need all of the multiple 'watershed' efforts if we coordinate/standardize a monitoring plan? *Yes. Each watershed has conditions that differ from the perspective of salmon. Data will need to be collected within multiple individual watersheds and then coordinated state-wide.*

Will monitoring focus on the entire system or critical areas which may give us immediate results/information? What is the appropriate scale for coordinated strategies? *Monitoring will initially focus on Core Areas and GCU's as designed in the current proposal. The monitoring proposal calls for monitoring efforts on the reach, stream and watershed scales.*

Will there be enough funding to complete a long-term salmon recovery process given the many social needs? *This is yet to be determined and more will be known as the legislative session convenes. The CSRI is the governor's top natural resource priority, and will most likely be addressed early in the process.*

How will the various issues surrounding economic effects, growth, environmental needs, etc. be balanced? *The CSRI has incorporated an incentives program into the plan to help address economic and growth issues. It also specifically addresses the growth in population and industry, the associated demands on natural resources, and the complexity of balancing environmental concerns with social concerns.*

If we only focus on coho, will some habitat monitoring efforts be counter productive or an inefficient use of money? *The monitoring plan will be developed in a way so that it may be applied statewide to consider the population health and habitat needs of all Oregon's game fish. To focus and streamline the process and to develop a template for future efforts, this current effort concentrates on coho. Applicability to other species and georegions should only become easier after this base is built.*

Monitoring Questions

Questions are listed by major topic and subtopic headings. The question type, where appropriate, is identified after it: R = research, M = monitoring, A = assessment.

Protocol

Volunteer Monitoring

1. What water quality data has historically been collected and can it be collected/replicated by volunteers? A If certain information is critical, we must continue to be able to collect it as a measure of watershed health, and it should be able to be collected by volunteers.

2. To what degree will volunteer monitoring efforts be used in data collection?

3. What benchmarks that are measurable by volunteer efforts are reliable indicators of watershed and habitat quality? R

Appropriate Landscape Units (Scale)

4. Should "baseline conditions" and "trends in conditions" be assessed for different spatial and temporal scales?

5. What data standards are needed to make certain that data collected at a watershed level can be aggregated across larger areas, and vice versa?

6. What is the level of information specifically necessary to provide factual data base-i.e., scale of mapping?

7. What are the appropriate landscape units for aggregating existing habitat data for monitoring purposes?

8. What is a feasible methodology for evaluating freshwater habitat across land uses and over time?

Documentation Protocols

9. What are the protocols that will be used to document riparian condition and determine if riparian conditions are adequate?

10. Do we have enough statistical expertise to properly interpret the data we're generating?

11. How can we improve the quality and credibility of the statistical analysis?

12. Are there outside (non-environ) experts who could be brought in to help?

13. If there is a proposed project on a stream with little data available, how long do we need to collect information before we can decide whether the stream reach is needing enhancement or restoration?

14. What are our biological objectives?

15. How do we measure our ability to meet these goals?

16. How will standardized protocols be developed, adopted, and published?

17. How do our investigative methodologies (i.e. electro-shocking and destructive) sampling impact salmonid survival?

18. Have we developed specific guidelines for the surveys that will satisfy both state and federal criteria? Are they being done to a "common" standard acceptable to all participants?

19. What monitoring programs/data collection programs will be necessary in order to separate and identify the limiting factors affecting salmonid survival at all stages of the salmonid life cycle? R

20. What habitat classification protocols effectively measure characteristics important to coho and other species survival? R

21. What is a feasible methodology for quantifying a watershed's productive capacity in a way that can be useful for public policy development and decision making? M

22. Define a set of reference sites.

Life History

23. What is the pattern of freshwater, estuarine, and ocean survival of wild anadromous salmonids originating from Oregon coastal basins? A

24. Is the historic diversity of life history strategies still present in current populations? R

Population

25. What is the pattern of distribution and abundance for anadromous salmonids in Oregon coastal basins? How do land uses, habitat conditions, and riparian conditions correlate to distribution and abundance? A

26. What are the current trends for coastal salmonid populations and distribution? What are the trends for the different life stages? A

27. What population level of wild anadromous salmonids is self-sustaining and what level do we wish to achieve? R

28. What is the metapopulation structure for each ESU for each of the anadromous salmonid populations? R

Harvest

29. What are the impacts from harvest (commercial, sport, freshwater, ocean) on non-target salmonids? A

Predation

30. How does predation (marine mammals & birds) effect population of anadromous salmonids in each coastal basin? R

Hatchery

31. Do hatchery raised salmonids have complimentary microbial fauna to their wild counter parts? How does this impact survival? R

32. To what extent can wild salmonid populations be supplemented with hatchery raised fish without having a detrimental affect? R

Oceanic Conditions

33. What are the impacts of different ocean conditions on anadromous salmonid survival? R

34. How do estuaries contribute to life cycle requirements of each anadromous species? R

35. How much of the decline in salmonid populations is related to instream conditions versus marine conditions? R

Water Quality

Sediment

36. What is the sediment loading by source and location from each stream in each watershed? M What influences erosion of these materials? R

37. How can the degree of sediment transfer be measured to document current conditions and future degree of change? R

Temperature

38. How do fish respond to changes in water temperature in stream ecosystems where a variety of other habitat variables may mitigate or magnify effects? R

39. What is the degree of improvement in water temperature conditions in coastal streams that have the greatest rate of recovery in riparian shade conditions? M

40. What are the salmonid population dynamics and stream temperature regimes in harvest reaches of streams? R

41. Where are instream temperatures impairing survival of salmonids and in particular coho? M

42. How many 303 WQL streams would have likely complied with temperature guidelines in pre-settlement times (1850's), recognizing the role of pre-settlement, natural disturbance? M

43. If temperatures currently limit coho survival at some point in a life stage, at what frequency do temperature measurements need to be taken to determine changes which may result from riparian restoration (hourly-daily-weekly, etc.)? R

44. How can we regulate land and water use practices in the future in order to reduce stream temperatures to acceptable levels? R

Chemical Pollution

45. What impact do aquatic chemical pollutants have on juvenile salmon survival? R

46. How are benthic micro and macro communities affected by point source and non-point source pollution? R

Water Quality/Water Quantity Integration

47. How are scientists going to integrate water quality and quantity data with regards to the recovery effort? R

48. What are the status and trends in water quality? M

Water Quantity

Streamflows

49. What are the seasonal flows of Oregon's Rivers--what flows are needed for coastal coho populations? A/R

50. Is water quantity important? R Are peak flows needed seasonably for survival? R

51. Is it important to know how much water is being withdrawn from the system-inflow/outflow timing? R

Instream Water Rights

52. Are instream water rights sufficient to recover the coastal coho? M

53. Is coverage of instream rights adequate in core productions areas? M In core non-production areas? M

Flooding

54. What effect does flooding have on coho salmon? R

Measurement and Enforcement

55. Is monitoring/enforcement of instream rights adequate? M

56. Has anyone determined the appropriate level and location of hydrologic monitoring (stream gages, rain gages, temp., etc.) needed by river basin? R

57. Should water users be required to measure and report their water use? R

Aquatic Biota

58. Are there quantifiable correlations between macroinvertebrate community structure and function and salmonid community structure and abundance? R

59. What are the status and trends in; fish numbers, habitat quality, and biotic health? M

60. How do benthic micro communities contribute to egg to smolt survival? R

61. Do benthic micro communities play a role in adult homing? R

62. What level of variation exists in coastal streams of similar type and level of degradation in the resident fish populations? R In macro-invertebrate populations? R

63. What are temporal and spatial trends in stream ecosystem function as measured by appropriate indices, e.g. benthic index of biotic integrity? M

64. What is the biodiversity of stream reaches/systems as measured in a statistically valid manner? R

65. What are the favorable cycles (i.e. climate, ocean condition) for coho survival? R

Habitat

Habitat Capacity and Historical Condition

66. What was the historical and what is the current capacity of the landscape to produce anadromous salmonids and how does this capacity compare to escapement levels? A/R

67. What was the historical pattern of landscape characteristics and what is the current pattern? A

68. What watershed conditions are needed to achieve healthy salmonid populations? R

69. What is the system's capacity for habitat restoration in terms of location, land practices, impending future trends, and resource availability? R

Baseline Habitat Condition

70. What is the current status of available, intact habitat? A

71. What is the structure of the riparian plant community by watershed? A

72. What is the condition of stream segments (aggrading, degrading) for each watershed? A

73. What is the baseline riparian condition (vegetation structure and function) for both reference and managed streams? A

74. What is the baseline instream condition for both reference and managed streams? A

75. What are the physical conditions of streams? A

Large Woody Debris

76. What levels of instream wood produce/support what levels of fish population by life stage? R

Spatial Distribution

77. What is the distribution of habitat types that play key roles in the life history of coho in various watersheds? A/R

78. How are key habitat types (above) related to the distribution of riparian, geomorphic and vegetation conditions? R

79. How do conditions (land use, geology, stream size, elevation) vary regionally within the coast range? R

80. Where are streams in good condition located throughout the Coast Range? A/R

81. What are the habitat factors in each watershed/stream reach which limit juvenile salmon survival? R

82. Where (specific watersheds) are habitat related elements limiting coho production? M/R

83. What is the actual range of instream riparian and watershed conditions associated with good local populations of each salmonid species? M/A

Restoration

84. What is the quality of restoration projects and how can they be evaluated? M

85. How have specific enhancement projects in each watershed changed fish habitat? R/M

86. What implications do restoration alternatives hold for future land/resource managers? M/R What will limit the success of each alternative over the long term? M/R

87. What effect do improvements to riparian habitat conditions have on salmonid life cycles? R

88. What is the distribution of past and current habitat restoration projects and how have these projects influenced salmonid populations? M/R

89. Where and what type of restoration work is being conducted by watershed councils, state, and federal agencies, NRCS etc.? A/M

90. Have the restoration activities in a watershed resulted in a positive change in salmonid production? R

Effects of Management and Disturbances

91. What are the relationships between various forms of disturbance, habitat quality, and fish community health at multiple spatial and temporal scales? R

92. Are the changes in habitat conditions related to natural or human actions? R

93. How do we integrate and evaluate disturbance factors and land use classes at multiple spatial scales? R

Benchmarks

94. What are habitat, water quality, biotic community and fish number targets? R

95. How do we know when a stream reach has been restored relative to stream flow, water temperature, dissolved oxygen, riparian cover, and channel structure? What are the benchmarks or reference conditions for documenting success? R

Definition of Terms and Parameters *(These are questions we may have a good understanding of from current state of knowledge.)*

96. What is the definition of "relatively undisturbed stream segments" on which "baseline conditions" are assessed? R Is this an assumption of static conditions in the natural world? Is "relatively undisturbed" an appropriate categorization for natural resources? (i.e., disturbance is an important element in natural environs.)

97. How is a stream determined to be in "good condition"? R

98. What is healthy riparian habitat? R

99. What habitat factors/elements are most critical (i.e., need to be monitored) for predicting salmon production and survival? R

100. What are the specific factors which are limiting salmonid production in individual watersheds? R

101. What habitat variables are important/critical to the monitoring and evaluation of fish populations? R How do these variables interact? R

102. What are the environmental conditions that affect salmon survival? R

Instream Habitat

103. What stream health indices are most closely correlated with salmon population increases over the long term? (temp, substrate, % roaded and % clearcut) R

104. What kinds of streams (size, position in watershed) and attributes (LWD, pools, etc.) are critical for overwinter rearing coho? R

105. What is the pool/riffle ratio for each stream segment by watershed? M

106. What is the impact of changes in stream geomorphology on salmonid populations? R

Riparian

107. What are the site conditions of riparian vegetation and how do they relate to stream temperature? A/R

108. What are the effects of channel simplification/riparian simplification on aquatic ecosystems? R

109. What is the range of riparian and instream habitat conditions along streams? A

110. What are riparian conditions: type, density of vegetation? location condition of roads? amount of riprap or other artificial bank surfaces? past channelization? dikes? A

111. How does temporal diversity of riparian stands vary across watersheds and how does it reflect forest succession patterns and management history? M

112. What is the increase in salmon abundance after riparian shade is reestablished? Is there a decrease in abundance of salmon after riparian shade is removed? What is the following increase throughout the recovery phase? M

113. What is the correlation between the management of riparian areas and salmon habitat improvement or decline? What is the variability of influence between management types? R

114. What is the trend of instream and riparian conditions (to be broken down) across the range of land uses? M

115. What habitat/land use changes outside of riparian areas and stream corridors benefit or harm Coho and other sensitive species? R

116. What levels of shade, LWD, future recruitment of LWD, sediment, etc. are provided by current practices in riparian areas across all land uses? M

117. Are riparian protection rules being implemented? M

Land Use Practices

General

118. Have salmon populations declined and/or increased under existing rules and regulations (divide up by agency and resource focus)? Why and where? M

119. What land use changes have occurred by watershed in the range of coastal salmon? What percentage of land has been converted from one land use type to another? How many type successions (e.g., forest to field to managed forest)? What area of land is in a particular land use? M

120. What are the disturbance factors affecting salmon and their frequency and intensity at different spatial and temporal scales by land use class? R

121. What is the current condition of freshwater habitat on regional, basin and watershed scales by land use class? A

122. What is the compliance rate of significant environmental protection rules, such as forest practices, CAFO, etc.? M

123. Are management prescriptions perceived by landowners to be feasible 'solutions'? M

124. How does the management of floodplains affect salmon habitat? Do buffer strips reduce the high flow retention capacity of riparian areas? R/M

125. Can the relative quantity and location of land use activities be correlated to a watershed's aquatic habitat productivity? R

126. What has been the status of land use patterns over the past 5/10/50 years and what is planned for the future? M

127. Have currently legislated land use and water use practices contributed to salmon decline? How? Where might managers focus to improve their performance? M/R

128. What are the existing regulatory standards for factors which may adversely affect anadromous salmonids? What are historical and present levels of compliance with these regulatory standards? Are they being implemented correctly? M

129. What is the population trend of salmon in DEQ's 303(d) streams with no action taken compared to those which alter management plans to comply? M

Reference Conditions

130. What mechanisms, either natural or induced, balance the effects of land management? What conditions should managers manage for? What amount of LWD, riparian shade, pools, etc. increases habitat productivity when applied in conjunction with land use practices? R

131. What is the natural background variability present in salmon habitat associated with temperature, flow, channel morphology changes, and riparian condition? How do land use activities add to this variability? R

132. How do the current requirements for stream and riparian protection across all land uses compare to the habitats that actually support good runs of each salmonid species? M

Diversions and Structure

133. Where in the stream channel and/or watershed do diversions effect fish the greatest? R

134. Do dams higher up in the watershed affect fish negatively or positively? How? R

135. Are pools created by boulder weirs used by juvenile Coho? To what extent? M

136. Does added stream complexity (all types) improve salmonid health and increase populations? M

137. What is the reach level habitat before and after installation of "tied and glued" vs. "uncabled" structures? M

Agriculture

138. What is the riparian condition of agricultural streams? A

139. What is the increase in salmon abundance after livestock is excluded? What habitat factors also improve or reestablish? Are these habitat factors correlated with salmonid survival and increase? M/R

140. How do agricultural riparian areas function in terms of providing LWD recruitment, shade, channel stability, stream temperature protection and cool, humid microclimates? R

141. What is the land area of agricultural riparian areas with 50% or greater vegetative canopy and structure? A

142. What is the land area of agricultural riparian areas with exposed stream banks as a result of historic anthropogenic activities? As a result of existing agricultural activities? Where are these? A

143. What is the land area of agricultural streams which are degraded? as a result of historic anthropogenic activities? As a result of existing agricultural activities? Where are these? A

144. What is the social and economic value of agricultural land in potentially prime salmon habitat vs. the social and economic value of the salmon these areas could provide? R

145. Will Senate Bill 1010 result in changes in riparian or stream function within ten years? M

146. What changes in agricultural practices would be most beneficial to stream habitat quality? How much change? R

147. How are agricultural lands distributed across the state? What are the practices associated with those lands? (GIS) R

148. Is Senate Bill 1010 effective and is it being implemented correctly? M

149. What are the enforcement actions the ODA undertakes to enforce SB 1010 and are they effective? M

150. What are the measures of success for water quality management plans under SB 1010? A

Mining

151. Can gravel mining in stream beds be conducted in location, time and amounts that are not detrimental to salmonid production? R

152. What are the effects of deep dredging for sand and gravel on various salmonid life cycles? R

153. How does industrial gravel bar scalping affect stream condition (actual vs. theoretical)? M

Forestry

154. What are the impacts of present logging practices by stream type and size and acreage logged? R How long do impacts persist? M

155. How have intensive alder conversion treatments effected carbon inputs to streams? R

156. What are the impacts of alder conversion by stream type and size? R

157. Can changes in logging practices improve channel structure, including pool number and depth, grain-size distribution of bottom sediments, bank erosion, channel width, etc.? M

158. Do forest practices rules provide adequate measures to limit delivery of sediment to salmon producing streams? M

159. What are the differences in fish populations and health and habitat quality under streams managed under FEMAT's Option 9 vs. those managed under ODF's FPA? M

Social

160. What are the most important actions watershed councils can take to improve habitat conditions? A/R/M

161. How can compliance with existing watershed protection regulations and laws be assessed and improved? M

162. How will private lands know when they have done "enough" without facing a constantly changing goal of what they need to do? M/R Relates to "certainty" of expectations (biological, management, business and legal).

163. What are the impacts on private land managers/user's personal use of their resources as compared to restoration benefits? R

Section 1.4: Scoping Session II. January 22, 1997. Corvallis Public Library

Memorandum

To: Scoping Session Participants
Subject: **Scoping Session I Summary and Scoping Session II Agenda**
From: Liz Dent and Jenny Walsh
Date: January 13, 1997

The purpose of this memo and attachments is to provide you with information and feedback from the first scoping session and an agenda for Scoping Session II. Enclosed you will find an executive summary of the Coastal Salmon

Restoration Initiative (CSRI) and a summary of the draft CSRI Monitoring Proposal. One of the goals of Scoping Session II is to provide participants with a background and solicit feedback on the Draft Monitoring Plan.

At Scoping Session I, participants discussed the need for establishing and maintaining trust between vested parties and those who are carrying out agency-sponsored monitoring endeavors. Enclosed is a summary of the afternoon discussion concerning trust. A memo was forwarded from ODF&W to the governor's office recommending the "safe haven" concept as an action item to address the issue (enclosed). Building trust is considered germane to all levels of the CSRI Process, meaning it must be addressed by the governor's Planning, Education and Outreach, Implementation, Science and Monitoring Teams.

At the first scoping session participants produced a list of monitoring questions to be considered in the context of implementation and effectiveness monitoring of the CSRI. Enclosed in this package is a synthesis of the monitoring questions. Since all the questions addressed a priority task in the Monitoring Proposal it was not necessary to prioritize them. This summary is a culmination of work by representatives from Oregon Departments of Forestry, Water Resources and Fish and Wildlife.

In addition, the oversight group generated a series of questions pertaining to the overall strategy of the CSRI and Monitoring Proposal. The strategy questions have been enclosed and were answered based on information from the CSRI itself, input from CSRI planning and science team members and information presented in the CSRI monitoring proposal.

In the next phase a synthesis of current monitoring efforts will be presented to Scoping Session participants. Gaps in current efforts will be identified. The primary goal of Scoping Session II will be to get input from the group on existing programs or projects that may fill the gaps and identify any gaps which may have been overlooked. Draft protocols will also be presented.

Scoping Session II is planned for January 22 in Corvallis at the public library.
See the attached agenda for details. The effectiveness of the next scoping session will depend on your participation. We look forward to seeing you there.

Agenda for Scoping Session II

9:00 Introduction

- Summary of Session I
- Goals for the Day
- Introductions

9:15 Background on the CSRI goals and objectives

- Link to Monitoring Proposal

9:30 Summary of The CSRI Draft Monitoring Proposal

- Goals and Objectives, Organization, Scale, Timelines, Accountability of the CSRI
- Monitoring Questions
- Existing Monitoring Efforts
- Current Participants in the Governor's CSRI Teams and Agency Monitoring Programs

11:00 Identifying gaps

- Questions or Tasks Not Currently Addressed
- Sign Up for Given Issues

12:00-1:00 Lunch (on your own)

1:15 **Identifying gaps** (continued)

3:00 **Protocol development**

- Strategy for Development
- Existing Protocol Examples: Temperature, Road Inventory...

4:00 **Conclusions**

- Time Lines
- Implementation Formation
- Keeping Informed

Monitoring Questions Organized Under Monitoring Tasks

Questions are organized under task headings developed in the Draft Monitoring Plan. The question type, where appropriate, is identified after it: R = research, M = monitoring, A = assessment. The number in parentheses corresponds to the question number on the initial questions list.

Task 1: Stratified Probability Design (applies to all tasks)

Scale

- What is the level of information specifically necessary to provide a factual data base-i.e., scale of mapping? (6) *Will vary by monitoring objective. Will set hexagon size based on this identified level of desired information.*

Statistics

- Do we have enough statistical expertise to properly interpret the data we're generating? (10)
- How can we improve the quality and credibility of the statistical analysis? (11)

Stratification Factors

- How do land use, geology, stream size, elevation, etc. vary regionally within the Coast Range? R (79)
- How does temporal diversity of riparian stands vary across watersheds and how does it reflect forest succession patterns and management history? M (111)
- What is the trend of instream and riparian conditions across the range of land uses? M (114)
- What is the distribution of land use changes, by watershed, in the range of coastal salmon? What percentage of land has been converted from one land use type to another? How many type successions (e.g., forest to field to managed forest)? What area of land is in a particular land use? M (119)
- Should "baseline conditions" and "trends in conditions" be assessed for different spatial and temporal scales? (4)

Task 2: Stream Biotic Condition and Ambient Water Quality

Data and Protocol

- What water quality data has historically been collected and can it be collected/replicated by volunteers? A (1)
- How are scientists going to integrate water quality and quantity data with regards to the recovery effort? R (47)
- Has anyone determined the appropriate level and location of hydrologic monitoring (stream gages, rain gages, temp., etc.) needed by river basin? R (56)

Sedimentation

- What is the sediment loading by source and location from each stream in each watershed? M What influences erosion of these materials? R (36)
- How can the degree of sediment transfer be measured to document current conditions and future degree of change? R (37)

Stream Temperature

- How do fish respond to changes in water temperature in stream ecosystems where a variety of other habitat variables may mitigate or magnify effects? R (38)
- How have water temperatures improved in streams that have the high recovery rates of riparian shade? M (39)
- What are the salmonid population dynamics and stream temperature regimes in harvest reaches of streams? R (40)
- Where are instream temperatures impairing survival of salmonids and in particular coho? M (41)
- How many 303 WQL streams would have likely complied with temperature guidelines in pre-settlement times (1850's), recognizing the role of pre-settlement, natural disturbance? M (42)
- If temperatures currently limit coho survival at some point in a life stage, at what frequency do temperature measurements need to be taken to determine changes which may result from riparian restoration (hourly-daily-weekly, etc.)? R (43)

- How can we regulate land and water use practices in the future in order to reduce stream temperatures to acceptable levels? R (44)

Water Quality/Chemical Pollution

- What impact do aquatic chemical pollutants have on juvenile salmon survival? R (45)
- How are benthic micro and macro communities affected by point source and non-point source pollution? R (46)
- What are the status and trends in water quality? M (48)

Water Quantity/Flooding

- What are the seasonal flows of Oregon's Rivers--what flows are needed for coastal coho populations? A/R (49)
- Is water quantity important? R Are peak flows needed seasonably for survival? R (50)
- Is it important to know how much water is being withdrawn from the system-inflow/outflow timing? R (51)
- What effect does flooding have on coho salmon? R (54)

Aquatic Biota

- Are there quantifiable correlations between macroinvertebrate community structure and function and salmonid community structure and abundance? R (58)
- What are the status and trends in; fish numbers, habitat quality, and biotic health? M (59)
- How do benthic micro communities contribute to egg/smolt survival? R (60)
- Do benthic micro communities play a role in adult homing? R (61)
- What level of variation exists in coastal streams of similar type and level of degradation in the resident fish populations? R In macro-invertebrate populations? R (62)
- What are temporal and spatial trends in stream ecosystem function as measured by appropriate indices, e.g. benthic index of biotic integrity? M (63)
- What is the biodiversity of stream reaches/systems as measured in a statistically valid manner? R (64)

Stream Condition

- What is the baseline instream condition for both reference and managed streams? A (74)
- What are the physical conditions of streams? A (75)
- How is a stream determined to be in "good condition"? R (97) Where are streams in good condition located throughout the Coast Range? A/R (80) What is the range of riparian and instream habitat conditions along streams? A (109)
- What are the specific factors which are limiting salmonid production in individual watersheds? R (100) What are the environmental conditions that affect salmon survival? R (102)
- What stream health indices are most closely correlated with salmon population increases over the long term? (temp, substrate, % roaded and % clearcut) R (103)
- What kinds of streams (size, position in watershed) and attributes (LWD, pools, etc.) are critical for overwinter rearing coho? R (104)
- What is the natural background variability present in salmon habitat associated with temperature, flow, channel morphology changes, and riparian condition? How do land use activities add to this variability? R (131)

Diversions and Structure

- Are pools created by boulder weirs used by juvenile Coho? To what extent? M (135)
- Does added stream complexity (all types) improve salmonid health and increase populations? M (136)

Enhancement

- How do we know when a stream reach has been restored relative to stream flow, water temperature, dissolved oxygen, riparian cover, and channel structure? What are the benchmarks or reference conditions for documenting success? R (95)
- What are habitat, water quality, biotic community and fish number targets? R (94)

Task 3: Summer Juvenile Abundance

Protocol

- What monitoring programs/data collection programs will be necessary in order to separate and identify the limiting factors affecting salmonid survival at all stages of the salmonid life cycle? R (19)

Population Structure and Abundance

- What is the pattern of freshwater, estuarine, and ocean survival of wild anadromous salmonids originating from Oregon coastal basins? A (23)
- What are the current trends for coastal salmonid populations and distribution? What are the trends for the different life stages? A (26)
- What is the pattern of distribution and abundance for anadromous salmonids in Oregon coastal basins? How do land uses, habitat conditions, and riparian conditions correlate to distribution and abundance? A (25)
- What population level of wild anadromous salmonids is self-sustaining and what level do we wish to achieve? R (27)
- What is the metapopulation structure for each ESU for each of the anadromous salmonid populations? R (28)
- What are the status and trends in; fish numbers, habitat quality, and biotic health? M (59)
- What level of variation exists in coastal streams of similar type and level of degradation in the resident fish populations? R (62)

Predation

- How does predation (marine mammals & birds) effect population of anadromous salmonids in each coastal basin? R (30)

Task 4: Stream Channel and Habitat Assessments

Data and Protocol

- What are the appropriate landscape units for aggregating existing habitat data for monitoring purposes? (7)
- What is a feasible methodology for evaluating freshwater habitat across land uses and over time? (8)
- What are the protocols that will be used to document riparian condition and determine if riparian conditions are adequate? (9)
- If there is a proposed project on a stream with little data available, how long do we need to collect information before we can decide whether the stream reach is needing enhancement or restoration? (13)
- What habitat classification protocols effectively measure characteristics important to coho and other species survival? R (20)

Habitat-Fish Links

- What was the historical and what is the current capacity of the landscape to produce anadromous salmonids and how does this capacity compare to escapement levels? A/R (66)
- What levels of instream wood produce/support what levels of fish population by life stage? R (76)
- What are the habitat factors in each watershed/stream reach which limit juvenile salmon survival and salmon production? R (81) What habitat factors/elements are most critical (i.e., need to be monitored) for predicting salmon production and survival? R (99)
- What habitat variables are important/critical to the monitoring and evaluation of fish populations? R How do these variables interact? R (101)
- What stream health indices are most closely correlated with salmon population increases over the long term? (temp, substrate, % roaded and % clearcut) R (103)
- What kinds of streams (size, position in watershed) and attributes (LWD, pools, etc.) are critical for overwinter rearing coho? R (104)
- What is the impact of changes in stream geomorphology on salmonid populations? R (106)
- Are pools created by boulder weirs used by juvenile Coho? To what extent? M (135)
- What is the increase in salmon abundance after riparian shade is reestablished? Is there a decrease in abundance of salmon after riparian shade is removed? What is the following increase throughout the recovery phase? M (112)

Target Conditions and Current Status

- What was the historical pattern of landscape characteristics and what is the current pattern? A (67)
- What watershed conditions are needed to achieve healthy salmonid populations? R (68)
- What is the current status of available, intact habitat? A (70)
- What is the structure of the riparian plant community by watershed? A (71)
- What is the distribution of habitat types that play key roles in the life history of coho in various watersheds? A/R (77)
- How are key habitat types (above) related to the distribution of riparian, geomorphic and vegetation conditions? R (78)
- What are the status and trends in; fish numbers, habitat quality, and biotic health? M (59)
- What is the condition of stream segments (aggrading, degrading) for each watershed? A (72)
- What is the baseline riparian condition (vegetation structure and function) for both reference and managed streams? A (73)
- What is the baseline instream condition for both reference and managed streams? A (74)
- How do conditions (land use, geology, stream size, elevation) vary regionally within the coast range? R (79)
- What are habitat, water quality, biotic community and fish number targets? R (94)
- What is the definition of "relatively undisturbed stream segments" on which "baseline conditions" are assessed? R Is this an assumption of static conditions in the natural world? Is "relatively undisturbed" an appropriate categorization for natural resources? (i.e., disturbance is an important element in natural environs.) (96)
- Where are streams in good condition located throughout the Coast Range? A/R (80) How is a stream determined to be in "good condition"? R (97) What is healthy riparian habitat? R (98) What is the range of riparian and instream habitat conditions along streams? A (109) What are riparian conditions: type, density of vegetation? location condition of roads? amount of riprap or other artificial bank surfaces? past channelization? dikes? A (110)
- What is the pool/riffle ratio for each stream segment by watershed? M (105)
- What are the site conditions of riparian vegetation and how do they relate to stream temperature? A/R (107)
- What is the natural background variability present in salmon habitat associated with temperature, flow, channel morphology changes, and riparian condition? How do land use activities add to this variability? R (131)
- How does temporal diversity of riparian stands vary across watersheds and how does it reflect forest succession patterns and management history? M (111)

Management Effects/Land Use

- What are the effects of channel simplification/riparian simplification on aquatic ecosystems? R (108)
- What mechanisms, either natural or induced, balance the effects of land management? What conditions should managers manage for? What amount of LWD, riparian shade, pools, etc. increases habitat productivity when applied in conjunction with land use practices? R (130)
- How do the current requirements for stream and riparian protection across all land uses compare to the habitats that actually support good runs of each salmonid species? M (132)
- Where in the stream channel and/or watershed do diversions effect fish the greatest? R (133)
- Do dams higher up in the watershed affect fish negatively or positively? How? R (134)
- Does added stream complexity (all types) improve salmonid health and increase populations? M (136)
- What is the reach level habitat before and after installation of "tied and glued" vs. "uncabled" structures? M (137)
- What levels of shade, LWD, future recruitment of LWD, sediment, etc. are provided by current practices in riparian areas across all land uses? M (116)

Restoration

- What is the quality of restoration projects and how can they be evaluated? M (84)
- How have specific enhancement projects in each watershed changed fish habitat? R/M (85)
- Have the restoration activities in a watershed resulted in a positive change in salmonid production? R (90)
- How do we know when a stream reach has been restored relative to stream flow, water temperature, dissolved oxygen, riparian cover, and channel structure? What are the benchmarks or reference conditions for documenting success? R (95)

Task 5: Spawner Abundance Surveys

Protocol

- Have we developed specific guidelines for the surveys that will satisfy both state and federal criteria? Are they being done to a "common" standard acceptable to all participants? (18)
- What monitoring programs/data collection programs will be necessary in order to separate and identify the limiting factors affecting salmonid survival at all stages of the salmonid life cycle? R (19)

Task Issues

- What population level of wild anadromous salmonids is self-sustaining and what level do we wish to achieve? R (27)
- What is the metapopulation structure for each ESU for each of the anadromous salmonid populations? R (28)
- How does predation (marine mammals & birds) effect population of anadromous salmonids in each coastal basin? R (30)
- What are the status and trends in fish numbers? M (59)
- What level of variation exists in the resident fish populations in coastal streams of similar type and level of degradation? R (62)
- What is the pattern of freshwater, estuarine, and ocean survival of wild anadromous salmonids originating from Oregon coastal basins? A (23)
- What are the current trends for coastal salmonid populations and distribution? What are the trends for the different life stages? A (26)

Task 6: Genetic and Life History

Protocol

- What monitoring programs/data collection programs will be necessary in order to separate and identify the limiting factors affecting salmonid survival at all stages of the salmonid life cycle? R (19)

Task Issues

- To what extent can wild salmonid populations be supplemented with hatchery raised fish without having a detrimental affect? R (32)
- What population level of wild anadromous salmonids is self-sustaining and what level do we wish to achieve? R (27)
- What is the metapopulation structure for each ESU for each of the anadromous salmonid populations? R (28)
- What are the status and trends in; fish numbers, habitat quality, and biotic health? M (59)
- What level of variation exists in coastal streams of similar type and level of degradation in the resident fish populations? R (62)
- What is the pattern of freshwater, estuarine, and ocean survival of wild anadromous salmonids originating from Oregon coastal basins? A (23)
- What are the current trends for coastal salmonid populations and distribution? What are the trends for the different life stages? A (26)
- Is the historic diversity of life history strategies still present in current populations? R (24)
- What is the pattern of distribution and abundance for anadromous salmonids in Oregon coastal basins? How do land uses, habitat conditions, and riparian conditions correlate to distribution and abundance? A (25)
- Do hatchery raised salmonids have complimentary microbial fauna to their wild counter parts? How does this impact survival? R (31)

Task 7: Fish Propagation Monitoring

Protocol

- How do our investigative methodologies (i.e. electro-shocking and destructive) sampling impact salmonid survival? (17)

- What monitoring programs/data collection programs will be necessary in order to separate and identify the limiting factors affecting salmonid survival at all stages of the salmonid life cycle? R (19)

Task Issues

- Do hatchery raised salmonids have complimentary microbial fauna to their wild counter parts? How does this impact survival? R (31)
- What is the pattern of freshwater, estuarine, and ocean survival of wild anadromous salmonids originating from Oregon coastal basins? A (23)
- What are the current trends for coastal salmonid populations and distribution? What are the trends for the different life stages? A (26)
- To what extent can wild salmonid populations be supplemented with hatchery raised fish without having a detrimental affect? R (32)
- How does predation (marine mammals & birds) effect population of anadromous salmonids in each coastal basin? R (30)

Task 8: Harvest Monitoring

- What are the impacts from harvest (commercial, sport, freshwater, ocean) on non-target salmonids? A (29)

Tasks 9 & 10: Salmon Core Area and Index Monitoring (now combined as Task 9)

Data and Protocol

- What is a feasible methodology for quantifying a watershed's productive capacity in a way that can be useful for public policy development and decision making? M (21)
- What are the appropriate landscape units for aggregating existing habitat data for monitoring purposes? (7)
- What is a feasible methodology for evaluating freshwater habitat across land uses and over time? (8)
- What are the protocols that will be used to document riparian condition and determine if riparian conditions are adequate? (9)
- How do our investigative methodologies (i.e. electro-shocking and destructive) sampling impact salmonid survival? (17)
- What monitoring programs/data collection programs will be necessary in order to separate and identify the limiting factors affecting salmonid survival at all stages of the salmonid life cycle? R (19)
- Define a set of reference sites. (22)

Habitat Conditions and Distribution

- Where (specific watersheds) are habitat related elements limiting coho production? M/R (82)
- What is the actual range of instream riparian and watershed conditions associated with good local populations of each salmonid species? M/A (83)
- What are the relationships between various forms of disturbance, habitat quality, and fish community health at multiple spatial and temporal scales? R (91)
- What was the historical and what is the current capacity of the landscape to produce anadromous salmonids and how does this capacity compare to escapement levels? A/R (66)
- What watershed conditions are needed to achieve healthy salmonid populations? R (68)
- What is the current status of available, intact habitat? A (70)
- What is the structure of the riparian plant community by watershed? A (71)
- What is the distribution of habitat types that play key roles in the life history of coho in various watersheds? A/R (77)
- How are key habitat types (above) related to the distribution of riparian, geomorphic and vegetation conditions? R (78)
- What habitat classification protocols effectively measure characteristics important to coho and other species survival? R (20)
- What are the status and trends in; fish numbers, habitat quality, and biotic health? M (59)

- What is the baseline riparian condition (vegetation structure and function) and instream condition for both reference and managed streams? A (73)
- What levels of instream wood produce/support what levels of fish population by life stage? R (76)
- How do conditions (land use, geology, stream size, elevation) vary regionally within the coast range? R (79)
- Where are streams in good condition located throughout the Coast Range? A/R (80) How is a stream determined to be in "good condition"? R (97) What is healthy riparian habitat? R (98)
- What are the habitat factors in each watershed/stream reach which limit juvenile salmon survival? R (81)
- What are habitat, water quality, biotic community and fish number targets? R (94)
- What is the definition of "relatively undisturbed stream segments" on which "baseline conditions" are assessed? R Is this an assumption of static conditions in the natural world? Is "relatively undisturbed" an appropriate categorization for natural resources? (i.e., disturbance is an important element in natural environs.) (96) .
- What habitat factors/elements are most critical (i.e., need to be monitored) for predicting salmon production and survival? R (99)
- What are the specific factors which are limiting salmonid production in individual watersheds? R (100)
- What habitat variables are important/critical to the monitoring and evaluation of fish populations? R How do these variables interact? R (101)
- What are the environmental conditions that affect salmon survival? R (102)
- What stream health indices are most closely correlated with salmon population increases over the long term? (temp, substrate, % roaded and % clearcut) R (103)
- What kinds of streams (size, position in watershed) and attributes (LWD, pools, etc.) are critical for overwinter rearing coho? R (104)
- What is the natural background variability present in salmon habitat associated with temperature, flow, channel morphology changes, and riparian condition? How do land use activities add to this variability? R (131)

Management and Land Use

- What effect do improvements to riparian habitat conditions have on salmonid life cycles? R (87)
- How have specific enhancement projects in each watershed changed fish habitat? R/M (85)
- Have the restoration activities in a watershed resulted in a positive change in salmonid production? R (90)
- What mechanisms, either natural or induced, balance the effects of land management? What conditions should managers manage for? What amount of LWD, riparian shade, pools, etc. increases habitat productivity when applied in conjunction with land use practices? R (130)
- How do the current requirements for stream and riparian protection across all land uses compare to the habitats that actually support good runs of each salmonid species? M (132)
- Does added stream complexity (all types) improve salmonid health and increase populations? M (136)
- What is the increase in salmon abundance after riparian shade is reestablished? Is there a decrease in abundance of salmon after riparian shade is removed? What is the following increase throughout the recovery phase? M (112)
- Can the relative quantity and location of land use activities be correlated to a watershed's aquatic habitat productivity? R (125)

Fish Population-Watershed Links

- What is the pattern of freshwater, estuarine, and ocean survival of wild anadromous salmonids originating from Oregon coastal basins? A (23)
- What are the current trends for coastal salmonid populations and distribution? What are the trends for the different life stages? A (26)
- What is the pattern of distribution and abundance for anadromous salmonids in Oregon coastal basins? How do land uses, habitat conditions, and riparian conditions correlate to distribution and abundance? A (25)
- What population level of wild anadromous salmonids is self-sustaining and what level do we wish to achieve? R (27)
- What level of variation exists in coastal streams of similar type and level of degradation in the resident fish populations? R In macro-invertebrate populations? R (62)

Task #11: Estuary Populations and Habitats

Protocol

- What monitoring programs/data collection programs will be necessary in order to separate and identify the limiting factors affecting salmonid survival at all stages of the salmonid life cycle? R (19)
- What habitat classification protocols effectively measure characteristics important to coho and other species survival? R (20)

Task Issues

- What is the pattern of freshwater, estuarine, and ocean survival of wild anadromous salmonids originating from Oregon coastal basins? A (23)
- What are the status and trends in; fish numbers, habitat quality, and biotic health? M (59)
- What are the impacts of different ocean conditions on anadromous salmonid survival? R (33)
- How do estuaries contribute to life cycle requirements of each anadromous species? R (34)

Task #12: Land Use Monitoring and Assessment

Protocol

- What is a feasible methodology for quantifying a watershed's productive capacity in a way that can be useful for public policy development and decision making? M (21)
- What are the protocols that will be used to document riparian condition and determine if riparian conditions are adequate? (9)
- What habitat classification protocols effectively measure characteristics important to coho and other species survival? R (20)

Temperature

- What are the salmonid population dynamics and stream temperature regimes in harvest reaches of streams? R (40)
- Where are instream temperatures impairing survival of salmonids and in particular coho? M (41)
- How many 303 WQL streams would have likely complied with temperature guidelines in pre-settlement times (1850's), recognizing the role of pre-settlement, natural disturbance? M (42)
- What is the population trend of salmon in DEQ's 303(d) streams with no action taken compared to those which alter management plans to comply? M (129)
- How can we regulate land and water use practices in the future in order to reduce stream temperatures to acceptable levels? R (44)

Regulation and Land Use History

- Have salmon populations declined and/or increased under existing rules and regulations (divide up by agency and resource focus)? Why and where? M (118)
- What land use changes have occurred by watershed in the range of coastal salmon? What percentage of land has been converted from one land use type to another? How many type successions (e.g., forest to field to managed forest)? What area of land is in a particular land use? M (119)
- What are the disturbance factors affecting salmon and their frequency and intensity at different spatial and temporal scales by land use class? R (120)
- What is the current condition of freshwater habitat on regional, basin and watershed scales by land use class? A (121)
- What has been the status of land use patterns over the past 5/10/50 years and what is planned for the future? M (126)
- What was the historical pattern of landscape characteristics and what is the current pattern? A (67)
- How do conditions (land use, geology, stream size, elevation) vary regionally within the Coast Range? R (79)
- What are riparian conditions: type, density of vegetation? location condition of roads? amount of riprap or other artificial bank surfaces? past channelization? dikes? A (110)
- How does temporal diversity of riparian stands vary across watersheds and how does it reflect forest succession patterns and management history? M (111)
- What is the correlation between the management of riparian areas and salmon habitat improvement or decline? What is the variability of influence between management types? R (113)

- What is the trend of instream and riparian conditions (to be broken down) across the range of land uses? M (114)
- What habitat/land use changes outside of riparian areas and stream corridors benefit or harm Coho and other sensitive species? R (115)
- What levels of shade, LWD, future recruitment of LWD, sediment, etc. are provided by current practices in riparian areas across all land uses? M (116)

Habitat Enhancement and Restoration

- What effect do improvements to riparian habitat conditions have on salmonid life cycles? R (87)
- What is the distribution of past and current habitat restoration projects and how have these projects influenced salmonid populations? M/R (88)
- Where and what type of restoration work is being conducted by watershed councils, state, and federal agencies, NRCS etc.? A/M (89)
- Are the changes in habitat conditions related to natural or human actions? R (92)
- How does the management of floodplains affect salmon habitat? Do buffer strips reduce the high flow retention capacity of riparian areas? R/M (124)
- What is the system's capacity for habitat restoration in terms of location, land practices, impending future trends, and resource availability? R (69)
- What stream health indices are most closely correlated with salmon population increases over the long term? (temp, substrate, % roaded and % clearcut) R (103)
- How do the current requirements for stream and riparian protection across all land uses compare to the habitats that actually support good runs of each salmonid species? M (132)
- Does added stream complexity (all types) improve salmonid health and increase populations? M (136)
- What is the reach level habitat before and after installation of "tied and glued" vs. "uncabled" structures? M (137)
- What is the quality of restoration projects and how can they be evaluated? M (84)
- How have specific enhancement projects in each watershed changed fish habitat? R/M (85)
- Have the restoration activities in a watershed resulted in a positive change in salmonid production? R (90)
- How do we know when a stream reach has been restored relative to stream flow, water temperature, dissolved oxygen, riparian cover, and channel structure? What are the benchmarks or reference conditions for documenting success? R (95)

Forestry

- What are the effects of present logging practices by stream type and size and acreage logged? R (154) How long do impacts persist? M
- How have intensive alder conversion treatments effected carbon inputs to streams? R (155)
- What are the impacts of alder conversion by stream type and size? R (156)
- Can changes in logging practices improve channel structure, including pool number and depth, grain-size distribution of bottom sediments, bank erosion, channel width, etc.? M (157)
- Do forest practices rules provide adequate measures to limit delivery of sediment to salmon producing streams? M (158)
- What are the differences in fish populations and health and habitat quality under streams managed under FEMAT's Option 9 vs. those managed under ODF's FPA? M (159)

Agriculture

- What is the riparian condition of agricultural streams? A (138)
- What is the increase in salmon abundance after livestock is excluded? What habitat factors also improve or reestablish? Are these habitat factors correlated with salmonid survival and increase? M/R (139)
- How do agricultural riparian areas function in terms of providing LWD recruitment, shade, channel stability, stream temperature protection and cool, humid microclimates? R (140)
- What is the land area of agricultural riparian areas with 50% or greater vegetative canopy and structure? A (141)
- What is the land area of agricultural riparian areas with exposed stream banks as a result of historic anthropogenic activities? As a result of existing agricultural activities? Where are these? A (142)
- What is the land area of agricultural streams which are degraded? as a result of historic anthropogenic activities? As a result of existing agricultural activities? Where are these? A (143)

- What is the social and economic value of agricultural land in potentially prime salmon habitat vs. the social and economic value of the salmon these areas could provide? R (144)
- How are agricultural lands distributed across the state? What are the practices associated with those lands? (GIS) R (147)

Mining

- Can gravel mining in stream beds be conducted in location, time and amounts that are not detrimental to salmonid production? R (151)
- What are the effects of deep dredging for sand and gravel on various salmonid life cycles? R (152)
- How does industrial gravel bar scalping affect stream condition (actual vs. theoretical)? M (153)

Compliance and Implementation Issues

- What is the compliance rate of significant environmental protection rules, such as forest practices, CAFO, etc.? M (122)
- Have currently legislated land use and water use practices contributed to salmon decline? How? Where might managers focus to improve their performance? M/R (127)
- What are the existing regulatory standards for factors which may adversely affect anadromous salmonids? What are historical and present levels of compliance with these regulatory standards? Are they being implemented correctly? M (128)
- Are instream water rights sufficient to recover the coastal coho? M (52)
- Is coverage of instream rights adequate in core productions areas? M In core non-production areas? M (53)
- Is monitoring/enforcement of instream rights adequate? M (55)
- Should water users be required to measure and report their water use? R (57)
- Will Senate Bill 1010 result in changes in riparian or stream function within ten years? M (145)
- What changes in agricultural practices would be most beneficial to stream habitat quality? How much change? R (146)
- Is Senate Bill 1010 effective and is it being implemented correctly? M (148)
- What are the enforcement actions the ODA undertakes to enforce SB 1010 and are they effective? M (149)
- What are the measures of success for water quality management plans under SB 1010? A (150)
- How can compliance with existing watershed protection regulations and laws be assessed and improved? M (161)
- Are riparian protection rules being implemented? M (117)

Task #13: Watershed Assessment for Mixed Ownerships

Protocol

- What is a feasible methodology for quantifying a watershed's productive capacity in a way that can be useful for public policy development and decision making? M (21)
- What data standards are needed to make certain that data collected at a watershed level can be aggregated across larger areas, and vice versa? (5)
- What are the appropriate landscape units for aggregating existing habitat data for monitoring purposes? (7)
- What is a feasible methodology for evaluating freshwater habitat across land uses and over time? (8)
- How do we integrate and evaluate disturbance factors and land use classes at multiple spatial scales? R (93)

Habitat and Water Quality

- What are the salmonid population dynamics and stream temperature regimes in harvest reaches of streams? R (40)
- Where are instream temperatures impairing survival of salmonids and in particular coho? M (41)
- How many 303 WQL streams would have likely complied with temperature guidelines in pre-settlement times (1850's), recognizing the role of pre-settlement, natural disturbance? M (42)
- Where (specific watersheds) are habitat related elements limiting coho production? M/R (82)
- What is the range of instream riparian and watershed conditions associated with good local populations of each salmonid species? M/A (83)
- Are the changes in habitat conditions related to natural or human actions? R (92)
- What was the historical pattern of landscape characteristics and what is the current pattern? A (67)
- What watershed conditions are needed to achieve healthy salmonid populations? R (68)

- What is the current status of available, intact habitat? A (70)
- What is the structure of the riparian plant community by watershed? A (71)
- What is the distribution of habitat types that play key roles in the life history of coho in various watersheds? A/R (77)
- How are key habitat types (above) related to the distribution of riparian, geomorphic and vegetation conditions? R (78)
- What are the status and trends in; fish numbers, habitat quality, and biotic health? M (59)
- What is the condition of stream segments (aggrading, degrading) for each watershed? A (72)
- How do conditions (land use, geology, stream size, elevation) vary regionally within the coast range? R (79)
- Where are streams in good condition located throughout the Coast Range? A/R (80) What is healthy riparian habitat? R (98) What are the environmental conditions that affect salmon survival? R (102) What is the range of riparian and instream habitat conditions along streams? A (109) What are riparian conditions: type, density of vegetation? location condition of roads? amount of riprap or other artificial bank surfaces? past channelization? dikes? A (110)
- What are the habitat factors in each watershed/stream reach which limit juvenile salmon survival? R (81)
- What are the specific factors which are limiting salmonid production in individual watersheds? R (100)
- What is the pool/riffle ratio for each stream segment by watershed? M (105)
- How does temporal diversity of riparian stands vary across watersheds and how does it reflect forest succession patterns and management history? M (111)
- What levels of shade, LWD, future recruitment of LWD, sediment, etc. are provided by current practices in riparian areas across all land uses? M (116)

Enhancement and Restoration

- What is the distribution of past and current habitat restoration projects and how have these projects influenced salmonid populations? M/R (88)
- Where and what type of restoration work is being conducted by watershed councils, state, and federal agencies, NRCS etc.? A/M (89)
- What is the system's capacity for habitat restoration in terms of location, land practices, impending future trends, and resource availability? R (69)
- What is the quality of restoration projects and how can they be evaluated? M (84)
- How have specific enhancement projects in each watershed changed fish habitat? R/M (85)
- Have the restoration activities in a watershed resulted in a positive change in salmonid production? R (90)
- Does added stream complexity (all types) improve salmonid health and increase populations? M (136)
- What implications do restoration alternatives hold for future land/resource managers? M/R What will limit the success of each alternative over the long term? M/R (86)
- What are the most important actions watershed councils can take to improve habitat conditions? A/R/M (160)
- How will private lands know when they have done "enough" without facing a constantly changing goal of what they need to do? M/R (162)
- What are the impacts on private land managers/user's personal use of their resources as compared to restoration benefits? R (163)

Management and Land Use

- What land use changes have occurred by watershed in the range of coastal salmon? What percentage of land has been converted from one land use type to another? How many type successions (e.g., forest to field to managed forest)? What area of land is in a particular land use? M (119)
- What are the disturbance factors affecting salmon and their frequency and intensity at different spatial and temporal scales by land use class? R (120)
- What is the current condition of freshwater habitat on regional, basin and watershed scales by land use class? A (121)
- How does the management of floodplains affect salmon habitat? Do buffer strips reduce the high flow retention capacity of riparian areas? R/M (124)
- What has been the status of land use patterns over the past 5/10/50 years and what is planned for the future? M (126)

- What are the differences in fish populations and health and habitat quality under streams managed under FEMAT's Option 9 vs. those managed under ODF's FPA? M (159)
- What is the correlation between the management of riparian areas and salmon habitat improvement or decline? What is the variability of influence between management types? R (113)
- What is the trend of instream and riparian conditions (to be broken down) across the range of land uses? M (114)
- What habitat/land use changes outside of riparian areas and stream corridors benefit or harm Coho and other sensitive species? R (115)
- Are management prescriptions perceived by landowners to be feasible 'solutions'? M (123)
- What is the population trend of salmon in DEQ's 303(d) streams with no action taken compared to those which alter management plans to comply? M (129)
- How can compliance with existing watershed protection regulations and laws be assessed and improved? M (161)

Task #14: Coordinate and Facilitate Distributed Monitoring

Task Issues

- To what degree will volunteer monitoring efforts be used in data collection? (2)
- Are there outside (non-environ) experts who could be brought in to help? (12)
- What are our biological objectives? (14) How do we measure our ability to meet these objectives? (15)
- How will standardized protocols be developed, adopted, and published? (16)
- Should "baseline conditions" and "trends in conditions" be assessed for different spatial and temporal scales? (4)
- Where and what type of restoration work is being conducted by watershed councils, state, and federal agencies, NRCS etc.? A/M (89)
- What are the most important actions watershed councils can take to improve habitat conditions? A/R/M (160)
- What are the impacts on private land managers/user's personal use of their resources as compared to restoration benefits? R (163)

Task #15: Information Collection and Sharing

Cooperative Issues

- What are the most important actions watershed councils can take to improve habitat conditions? A/R/M (160)
- How will private lands know when they have done "enough" without facing a constantly changing goal of what they need to do? M/R (162)
- Where and what type of restoration work is being conducted by watershed councils, state, and federal agencies, NRCS etc.? A/M (89)

Data Issues

- Should "baseline conditions" and "trends in conditions" be assessed for different spatial and temporal scales? (4)
- What is the level of information specifically necessary to provide factual data base-i.e., scale of mapping? (6)
- Do we have enough statistical expertise to properly interpret the data we're generating? (10)
- How can we improve the quality and credibility of the statistical analysis? (11)
- What data standards are needed to make certain that data collected at a watershed level can be aggregated across larger areas, and vice versa? (5)

Task A: Oceanic Conditions (now identified as Task 10 of the Monitoring Plan)

- What are the favorable cycles (i.e. climate, ocean condition) for coho survival? R (65)
- What is the pattern of freshwater, estuarine, and ocean survival of wild anadromous salmonids originating from Oregon coastal basins? A (23)
- How much of the decline in salmonid populations is related to instream conditions versus marine conditions? R (35)

Section *1.5: OCSRI Programs and other Efforts Related to Monitoring Tasks.*

The list is not intended to be complete. Complete agency efforts are identified in more detail in other sections of the Plan. Question percent represents proportion of 163 total questions addressing each individual task, not all tasks.

Task in Monitoring Plan	Current Agency Efforts	Additional Needs	Questions (%/#)
Task 1. Stratified Probability Sampling Design	• ODF&W, EPA, OSU, PNW	Application of developmental pilot & example	5% (8)
Task 2. Stream Biotic Condition, Ambient Water Quality, & Stream Quantity	• DEQ status and trends of water quality and habitat conditions (REMAP) • DEQ coastal reference sites • DEQ Ambient Water Quality • EPA EMAP • WRD gauging stations	DEQ has requested increasing sample size. Usefulness of water quality information thus far.	23% (37)
Task 3. Summer Juvenile Abundance	• ODF&W summer juvenile abundance	Others to do complimentary surveys	5% (9)
Task 4. Stream Channel and Habitat Assessment	• ODF&W Aquatic Habitat Inventory • USFS Region 6 survey protocol • BLM protocol		27% (44)
Task 5. Spawner Abundance Surveys	ODF&W Spawner Surveys and site surveys	Volunteer surveys	5% (9)
Task 6. Genetic Life History Monitoring		Develop functional program	7% (11)
Task 7. Fish Propagation Monitoring	• ODF&W Hatchery Monitoring • ODF&W stocking records • ODF&W Tag Monitoring		4% (7)
Task 8. Harvest Monitoring	• ODF&W Harvest Monitoring		0.6% (1)
Tasks 9&10. Salmon Core Area & Index Monitoring <u>Population</u> • Juvenile abundance • Adult spawner • Adult movement • Smolt outmigration <u>Habitat</u> • Summer and winter habitat condition • Instream and riparian restoration • Road/culvert surveys • Flow	 • ODF&W summer juvenile surveys • ODF&W spawner surveys • Pilot ODF&W, FS weir projects • ODF&W Aquatic Habitat Survey • ODF riparian condition • ODF road risk/condition and fish passage, ODOT	No projects address permanent reference sites or watershed assessments May need to change focus/funding May need to change focus/funding May need to change focus/funding	28% (45)

Task in Moore Monitoring Plan	Current Agency Effort	Additional Needs	Questions (#/%)

Watershed Assessment (WA) • Geomorphic measures • Temperature • Channel reference sites • Core area pilot WA • Water quality, channel condition • Adaptive mngmt. options • Develop reference sites	fish passage, ODOT wetland mitigation • ODF effectiveness studies • DEQ reference sites?	State & federal protocols/ projects exist which may help to develop a watershed assessment method	
Task 11. Estuary Populations and Habitat	• DSL South Slough Project • Salmon River Estuary Proj. • Tillamook Bay Estuary Proj.		4% (7)
Task 12 Land Use Management Monitoring (formerly forest practices monitoring) • Forestry, agriculture, mining, urban, federal land practices	• ODF Monitoring • Monitoring of SB1010 • FS Watershed Assessment • DLCD farm/forest land divs. • DOA CAFO monitoring • Tualitin Water Quality	Implementation Work Team	40% (66)
Task 13. Watershed Assessment for Mixed Ownership	• Yaquina Watershed Assmt. • DOA Tualitin Basin Water Quality Mngmt. Plan	Watershed assessment strategies and project organization	30% (49)
Task 14. Coordinate and Facilitate Distributed Monitoring			5% (8)
Task 15. Information Collection and Sharing		Protocol Work Team (data standards developed eventually)	5% (8)
Task A. Oceanic Conditions	• DLCD oceanic and atmospheric conditions affecting salmonid productivity		1% (2)

How do current efforts specifically address CSRI?

- Scope and funding will need to be expanded.
- Focus agency monitoring efforts in the Coast Range versus state-wide.
- What improvements can be made on current efforts?
- How useful have the data been thus far? How can data be made more useful?
- What sort of analyses have been done that may aid in improving/adapting protocols to CSRI?

Section 1.6: Working Outline of Tasks, Current Efforts, Needs, and Contacts Topics identified during scoping sessions used to direct further efforts Monitoring Group. This information in neither complete nor exclusive of other efforts. Ongoing revisions are underway.

Task in Monitoring Plan	Current Agency Efforts	Additional Needs	New Contacts
Task 1. Stratified Probability Sampling Design	• ODF&W, EPA, OSU, PNW • FEMAT (for stratification factors) • OSU Statistics Dept.	• Application of developmental pilot & example • Link between CSRI & FEMAT • Direction to WSC • Decision of scale to detect effects • Workplan to determine resource allocation & need. • Need to mapped elements as a tool to stratify sample • Think of survey design relative to needs and each task (e.g., fish prop may need different design)	CSU - Dr. Lee McDonald Ft. Collins, 80523 (970) 491-6109 Theresa Valentine (GIS Serv. Center) Scott Urguhert (OSU Stat.)
Task 2. Stream Biotic Condition, Ambient Water Quality, & Stream Quantity	• DEQ status and trends of water quality and habitat conditions (REMAP) • DEQ coastal reference sites • DEQ Ambient Water Quality • EPA EMAP • WRD gauging stations, points of diversion for over & illegal use and compliance, groundwater studies, artificial barriers monitoring, and hydrographic training • Water Resources Training • Tualatin Ag. Work • Tillamook NEP • COE • New Alsea Watershed Study	• DEQ has requested increasing sample size. • Usefulness of water quality information thus far. • Reference condition/baseline assessment • Biologic Criteria • UW Index (HQI) • Volunteer monitoring protocols & training • QA work • Inventory of existing data • Identify usefulness protocols for watershed groups • Develop young citizens monitoring teams through GWEB; seeking grounding - would benefit from in-kind contributions and partnerships with agencies	Jim Karr (UW) Avis Newell (DEQ) George Ice (NCASI) Dr. John Stednick (CSU) jds@CNR.ColoState.edu Jo Miller (503) 251-3201 (USGS) Tom Downey (CTSI) Steven Robertson (503)245-2102 Fisher programs: Tom Shafer Tillamook: Richard Felley Lincoln: Lana Brodziak Lane: Noland Huntington Coos: Anne Donnelly Coquille: Bob Kinyon Curry: Derek Goodwin Douglas: Walt Barton

	• ODF stream temp monitoring • USGS water gauges • Confederated Tribes of the Siletz • PP&L (PacifiCorp) • Fisher programs in Tillamook, Lincoln, Lane, Coos & Curry counties		
Task 3. Summer Juvenile Abundance	• ODF&W summer juvenile abundance • Alsea measurements (OSU) • Fisher programs in Lincoln, Lane, and Coos	• Others to do complimentary surveys • Baseline assessment • Deciding how to use destructive methods • Abundance criteria?	Stan Gregory (OSU) Stream Steam Studies Gordon Reeves USFS PNW research studies.
Task 4. Stream Channel and Habitat Assessment	• ODF&W Aquatic Habitat Inventory • USFS Region 6 survey protocol • BLM Proper Functioning Condition • Rogue Council of Govt. • Weyerhaeuser Riparian TOOL • Boise Cascade protocol • OSU Riparian Monitoring Procedure • Fisher programs in Tillamook, Lincoln, Lane, Douglas, Coos & Curry counties • EMAP/REMAP	• Organize protocol into one usable, accepted form • Identify appropriate uses for methodologies/protocol • Development of reference protocols • Incorporation of youth teams • Habitat criteria	OSU - Dr. Paul Adams (model and protocol) Dale Gunther (USFS, Portland) Stan Allan (PSMF) Kate Sullivan (WeyCo) Domoni Glass (BoisCd) (208)384-6670
Task 5. Spawner Abundance Surveys	• ODF&W Spawner Surveys and site surveys • Boise Cascade • Fisher programs in Tillamook, Lincoln, Lane, Coos & Curry counties	• Volunteer surveys • Incorporation of youth teams	Steve Jacobs ODFW Corvallis Cedric Cooney ODFW Corvallis Travis Hunt Boise Cascade Monmouth
Task 6. Genetic Life History Monitoring	• Rogue R. GSI Study • Proposed PNCERS study	• Develop functional program • Synthesis and characterization of life history diversity (freshwater, estuarine, marine) in relation to environmental variability	Dan Bottom ODFW Corvallis Rod Kaiser ODFW Newport
Task 7. Fish Propagation Monitoring	• ODF&W Hatchery Monitoring • ODF&W stocking records	• Need to analyze spatial patterns of hatchery activity related to core populations and stock	

	• ODF&W Tag Monitoring	diversity patterns	
Task 8. Harvest Monitoring	• ODF&W Harvest Monitoring • Boise Cascade		Rod Kaiser ODFW Kim Teising (541)858-6765
Tasks 9. Salmon Core Area & Index Monitoring	• ODF&W summer juvenile surveys • ODF&W spawner surveys • Pilot ODF&W, FS weir projects • ODF&W Aquatic Habitat Survey • ODF riparian condition • ODF road risk/condition and fish passage, ODOT wetland mitigation • DNR Watershed analysis • Kilchis WA (ODF) • Coastal WSA • ODF effectiveness studies • DEQ reference sites? • IRIS Road Culvert Surveys (county level) • BLM/USFS road inventories • USFS Watershed Analysis	• No projects address permanent reference sites or watershed assessments • Effect on moneys for resource enhancement projects already out there? • Incorporation of youth teams • Why is this a separate task? Isn't is just a class of aquatic resources like gene conservation areas at a broader scale? • State & federal protocols/ projects exist which may help to develop a watershed assessment method • Wetland mitigation and inventory other than ODOT • Need an effort to validate "core area" concept as related to "source" populations and potential metapopulation structure.	Association of Oregon Counties (T. Valentine) Keith Mills (ODF) Mid-Coast WS Association (Newport) Wetlands: COE? DSL? Hydrogeomorphic wetland analysis - Bill Fletcher 986-3509 Watershed Associations: Mid-Coast: Lana Brodziak Siuslaw: Bob Buzzard Coos: Anne Donnelly Coquille: Bob Kinyon South East: John Wilson, Lacy LeBonte SWCD's
Task 10. Ocean Conditions	• DLCD oceanic and atmospheric conditions • NOAA database • DEQ • OSU Oceanography	• Need to identify a lead individual to access available information and integrate with OCSRI monitoring effort	Greg McMurray (DEQ, Prtlnd)
Task 11. Estuary Populations and Habitat	• DSL South Slough Project • Salmon River Estuary Proj. • Tillamook Bay Estuary Proj. • Lower Columbia COE Wetland Assessment & National Estuary Proj. • Local govt. landuse plans	• Need assessment of salmon/habitat relationships in estuaries, tidewater reaches, and marsh restoration. • What is role of large woody debris in estuarine and tidewater habitats • Information on salmonid survival at critical	Deb Marriott (DEQ) Carey Phillips (USFWS) Tom Downey Neil Maine - Seaside Steve Rumrill (SSNERS) Dan Bottom (ODFW)

	• Estuary reclamation • Siletz R. Estuary Proj • Proposed PNCERS research.	riverine : estuarine, and estuarine : marine interfaces.	
Task 12 Land Management Monitoring (Formerly forest practices monitoring. Group will work to develop more inclusive effort on land use.)	• ODF Monitoring • Monitoring of SB1010 • FS Watershed Assessment • DLCD farm/forest land divs. • DOA CAFO monitoring • Tualatin Water Quality • NRCS/NRI coverage • Photo coverage from Farm Agency. • Local govt. landuse plans • Landslide Hazard Assessment Study (UC Berkeley) • USDA SLC & NMAP (air photos) • WACs • other satellite imagery	• Implementation Work Team • Models: BASIN (EPA), EPIC/AGNUPS (NRI) • Pacific Meridian • Why just land uses? Why not point sources as well. • Integration of data from public, private lands and different sources • Develop objective, non-affiliated monitor of agency actions (T. Shafer volunteered himself)	T. Valentine for Farm Agency contact Dr. Bill Dietrich (UC Berkeley) Jim Stark, WeyCo Mark Tilton, NRCS (503)414-3239 mtilton@or.nrcs.usda.gov Tom Shafer (OCZMA) Ward Carson (OSU) Pacific Meridian State GIS Groups OSU Geoscience
Task 13. Watershed Assessment for Mixed Ownership	• Yaquina Watershed Assmt. • DOA Tualatin Basin Water Quality Mngmt. Plan • GWEB • DEQ Umpqua R. Basin Team • DEQ Rogue R. Basin Team • BLM/USFS watershed analysis • EPA • DLCD work on Coos Basin • Willamette Livability Forum • Umpqua Land Exchange • Tillamook Bay NEP • NRCS Hydrologic Unit Water Quality Tools software • DNR watershed Analysis • Boise Cascade WS Analysis • All active coastal watershed councils	• Watershed assessment strategies and project organization • More resources to coordinate basin teams in other areas • Common/ compatible methods • Make assessments in context of cumulative effects.	T. Valentine (378-4163) Steve Hobbs (OSU) Mark Tilton Domoni Glass (208)384-6670 Oregon Coastal Zone Management Assoc. - Tom Shafer (541)528-7451; Onno Heising (541)265-8918
Task 14. Coordinate and		• Hire Coordinator	

Facilitate Distributed Monitoring		• Assign a lead agency • Use GWEB • Education & Outreach on design, protocols, interpretation.	
Task 15. Information Collection and Sharing	• 5th Field Watershed Effort (Regional Ecosystem Office) • IRICC (council to assist information coordination between state & fed) • OSU Information Center • NWS interest pages like http:\\snow.nohrsc.nws.gov • NRCS-NRI data • GWEB for funding and contacts	• Protocol Work Team • Assessment of information • Develop plan of action for distribution, updating, base assessments, etc. • Use GWEB to get info. out to WSC • Sample surveys/questionnaires • Mechanism to feed back data interpretation to interested parties	T. Valentine Duanne Dippon (BLM, Portland) Logan Norris Dan Edge Mark Tilton Rick Craiger (GWEB) OSU Stat. Dept - Ginny Lesser

Section 2: Development of Benchmark Values for Analysis, Assessment, and Evaluation of Progress Toward Objectives

SECTION 2.1 OREGON COASTAL SALMON RECOVERY INITIATIVE/HEALTHY STREAMS PARTNERSHIP

Salmon Benchmark:	percent wild salmon and steelhead populations in key subbasins, which are: (a) at or above target levels; (b) below target levels but with an increasing five-year population trend
Coho Benchmark:	percent wild Coho populations in coastal gene conservation groups which have populations within target ranges (defined in the population rebuilding schedule)
Water Quality Benchmark:	percent monitored stream sites with significant water quality trends: (a) increasing, (b) decreasing [per new Oregon Water Quality Index (OWQI)]

Agency/Role	Interim Indicators	Performance Measures
Agriculture (ODA) Primary agency for prevention and control of water pollution from agricultural activities and soil erosion: • develop and implement water quality management plans for agricultural lands • regulate agricultural activities that contribute to non-point source pollution • regulate any permitted confined animal feeding operation	• Percentage of stream miles along agricultural lands with adequate vegetative buffers • Percentage of stream miles along agricultural lands with exposed streambanks • Percentage of stream miles along agricultural lands in compliance with state water quality standards	• Number of stream basins monitored for adequate vegetative buffers and exposed banks • Number of basin water quality management plans developed and implemented • Number of farm/ranch water quality management plans developed and implemented
Environmental Quality (DEQ) Primary agency overseeing water quality: • plan for water quality in water quality-limited basins • regulate point-source discharges • set standards for subdivision sediment discharges in large cities • monitor and report water quality data to EPA	• Percentage of monitored stream sites on the coast with significantly increasing trends in water quality • Percentage of monitored stream sites on the coast with significantly decreasing trends in water quality • Percentage of stream miles in compliance with state water quality standards • Percentage of water quality plans in place	• Number of stream sites monitored • Number of water quality plans put in place

Agency/Role	Interim Indicators	Performance Measures
Fish and Wildlife (ODFW) • Assess and monitor the status of fish stocks through collection, analysis and dissemination of critical biological data • Manage fisheries to assure protection and rebuilding of wild stocks • Guide and direct habitat restoration, and increase ability to make sound environmental decisions, by educating and providing technical information to landowners, watershed councils, educators, constituents, local government, state and federal partners and the public	• Percentage of basins achieving population goals as defined in basin plans and fishery rebuilding criteria • Percentage of index streams with increasing trends in freshwater production and ocean survival • Percentage of escapement goal achieved in each of four coastal Coho areas • Percentage of stream miles cumulatively assessed to determine habitat quality and limitations • Percentage of naturally-accessible stream miles blocked by artificial barriers • Percentage of diversions identified as adequately screened • Percentage of decisions on permitting, other regulatory or habitat restoration projects, which incorporate appropriate salmonid habitat protections	• Number of basins surveyed to determine population trends and status • Number of stratified random surveys of spawner escapement in each area • Number of index streams set up and monitored for smolt out-migration and adult return • Number of stream miles of habitat surveys completed • Number of structures inventoried for fish passage and information provided to responsible party • Number of diversion operators recruited into screening program • Mortality from fishing and related activities • Percentage of requests for technical information or review of permits which are accommodated by ODFW staff • Percentage of restoration-related groups with formal participation by ODFW
Forestry (ODF) • Regulate forest practices on non-federal forest land to achieve state water quality standards and protect fish and wildlife habitat • Promote the enhancement of aquatic and riparian habitat	• Percentage of forest operations inspected found in compliance with forest practice rules • Percentage of stream miles inventoried with riparian vegetation in properly functioning condition (providing shade, large woody debris, and bank stability) • Percentage of stream miles inventoried with adequate large woody debris loading • Percentage of forest road system miles inventoried for "risks" to salmonids • Percentage of streams with completed fish presence surveys	• Number of forest operation inspections • Number of road miles with completed road risk surveys • Number of stream miles of fish presence surveys completed • Number of miles of streams with completed stream habitat surveys • Number of stream crossing structure inventories completed

Agency/Role	Interim Indicators	Performance Measures
Governor's Watershed Enhancement Board (GWEB) • Fund cooperative projects for watershed restoration • Facilitate watershed council formation and watershed assessment & action plans	• Percentage of major basins represented by a watershed council • Percentage of major basins with watershed assessment and action plans developed • Percentage of (planned) cooperative watershed restoration projects • Percentage of (planned) miles affected by cooperative watershed restoration projects • Percentage of restoration projects found to be effective (by monitoring)	• Number of watershed plans reviewed • Number of cooperative watershed restoration projects • Number of public meetings held • Number of volunteer hours • Number of in-stream restoration projects • Number of stream miles affected by restoration projects • Number of restoration projects being critically reviewed • Number of restoration projects being monitored • Number of stream miles with access by anadromous fish restored
Land Conservation and Development (DLCD) Implement the coastal non-point source program, including urban management measures, in the coastal zone	• Percentage of coastal jurisdictions that implement measures to reduce water quality and habitat degradation resulting from land development • Percentage of coastal jurisdictions that implement measures to reduce habitat degradation resulting from managing road systems	• Number of assessments of provisions in coastal comprehensive plans to address polluted runoff and runoff rates from developed and newly developing areas • Number of consultations with local governments resulting in a local government work task to implement non-point source management measures • Number of federal conditions for NON-POINT SOURCE approval that are successfully fulfilled
State Lands (DSL) Implement the removal-fill law to ensure protection and enhancement of fish habitat	• Percentage of total stream miles of habitat created, enhanced, or restored • Percentage of total acres of wetland habitat created, enhanced, or restored • Percentage of removal-fill violations resolved	• Number of fish habitat restoration/enhancement permits and General Authorizations issued • Number of stream miles of habitat created, enhanced, or restored • Number of acres of wetland habitat created, enhanced, or restored
Water Resources (WRD) • Restore and protect streamflows, groundwater, and watersheds • Address water supply needs • Regulate water allocation and use	• Percentage of critical streamflows measured • Percentage of stream miles inventoried for water use • Percentage of core habitat streams with leases, conservation projects, and transfers benefiting in-stream flows • Percentage of push-up dams eliminated through new methods of diversion • Percentage of watershed councils receiving technical assistance	• Number of streamflow monitoring sites added • Number of stream miles inventoried for diversions • Number of subbasins with groundwater supplies and surface groundwater interconnection quantified • Number of cubic feet per second of flow secured from leases, conservation projects, and transfers • Number of streamflows and diversions measured or monitored • Number of push-up dams replaced with other method of diversion

Stream Channel and Riparian Habitat Benchmarks/Example Analysis

The development of quantitative criteria for habitat quality provides an important tool for evaluation of current habitat condition and for setting goals for improved habitat values. Benchmark values, derived from reference conditions, analysis of variable distribution, and compiled from published values, provide the initial context for evaluating measures of habitat quality. Comparison of habitat measures to benchmark values, however, must be made with caution, taking into consideration both the geomorphic template that defines the potential of the system and the combination of natural disturbance and management history that influence the expression of that potential.

The ecological potential of each stream should be considered when comparing values to the benchmarks. The ecological potential for performance will vary depending on the ecoregion, geology, natural disturbance history, local geomorphic constraints on habitat, and the size and location of the stream within its watershed.

When interpreting stream habitat data in the context of these benchmarks, it is important to recognize that the capacity of a stream reach meet benchmark values is a function of both its ecological setting and the patterns of land use and management that modify "performance" of the stream relative to benchmark values.

Conceptually, it would appear valuable to further develop benchmark values specifically targeted to streams within individual strata of ecoregion, geologic, disturbance, etc. However, our experience with analysis of stream data from over 5,000 miles of surveys located in all regions of Oregon has led away from this approach. We have found that as the strata for interpretation becomes more limiting, each stream or small group of streams needs to be interpreted in terms of their individual characteristics and land use history as compared to general performance values. It also becomes more useful to look at combinations and interactions of features rather than single out individual values. At this level, each stream is essentially unique. In addition, as attempts to "fine tune" benchmark values focus on smaller geographic areas and sample sizes, the limited availability of reference sites and insufficient information on the range of natural conditions within the sample make such an attempt at precise development of benchmarks impractical and a misapplication of the approach.

Benchmark values are best applied to the evaluation of conditions in individual streams or stream reaches. The benchmarks provide a context for interpretation and as a starting point for more detailed and meaningful analysis. For each habitat variable that meets or fails to meet desirable habitat benchmarks, the investigation and analysis should focus on both proximal and historic causes. An important part of this work is to interpret channel and riparian conditions in a broader landscape context.

Benchmark values are also very useful at looking as overall conditions within a watershed, basin, or region. Whenever aggregating reach information to this level, however, it must be remembered that under natural condition some percentage of a watershed, basin, or region may always be classified as below desirable condition. Land use and management activities will modify this percentage, commonly increasing the amount of habitat demonstrating undesirable conditions. The impact of current land use and management designed to improve these conditions is difficult to assess against the background of natural disturbance and past management and use. At the basin and region level in particular, the analysis required to evaluate these relationships has not been done.

Given these qualifications, the use of the ODFW Habitat Benchmarks requires the application of common sense and openness to further analysis. Proper use can reveal important trends in habitat condition and suggest appropriate management action.

Development of Benchmark Values:

The Habitat Benchmark values for desirable (good) and undesirable (poor) conditions are derived from a variety of sources. Habitat characteristics representative of conditions in stream reaches with high productive capacity for salmonid species are used as a starting point. Values from "reference" reaches were used to develop standards for large woody debris and riparian conditions. These reference values were then compared to the overall distribution of values for each habitat characteristic expressed as a frequency distribution within a basin or region. From this analysis, it was generally apparent that values from the 66th or higher percentile could represent desirable or good conditions and values from the 33rd or lower percentile represent desirable or poor conditions. This development of benchmarks from the frequency distributions was made specific to appropriate stream gradient, regional, and geologic groupings of the reach data. Finally, values for habitat characteristics such as pool frequency, silt-sand-organics, and shade were developed from a comparison between the distributions and generally accepted or published values.

Benchmark Values and Example Distributions:

The Habitat Benchmark values developed for use for evaluating Oregon streams and watersheds are summarized in Table 1. Where appropriate, the values have been adapted for application to large or small stream reaches with high or low gradient. Values for fine sediments in riffles reflect differences in parent material and channel gradient. Stream shading refers to the percent of the total horizon shaded by topography and vegetation and are adjusted for stream width and geographic region. Large woody debris and riparian conifer values apply only to reaches within forested basins. A summary analysis of habitat values relative to the benchmarks is shown in Table 2 and Figure 1.

Note: This information excerpted from Moore, K. M. S. and K. K. Jones (in prep.) Analysis and application of stream survey data for restoration planning and quantification of change at the watershed scale. ODFW Research Section. Corvallis, OR Draft 12/96.

Table 1: ODFW Aquatic Inventory and Analysis Projects: Stream Channel and Riparian Habitat Benchmarks

	UNDESIRABLE	DESIRABLE
POOLS		
POOL AREA (% Total Stream Area)	<10	>35
POOL FREQUENCY (Channel Widths Between Pools)	>20	5-8
RESIDUAL POOL DEPTH		
SMALL STREAMS(<7m width)	<0.2	>0.5
MEDIUM STREAMS(≥ 7m and < 15m width)		
LOW GRADIENT (slope <3%)	<0.3	>0.6
HIGH GRADIENT (slope >3%)	<0.5	>1.0
LARGE STREAMS (≥15m width)	<0.8	>1.5
COMPLEX POOLS (Pools w/ wood complexity >3)km	<1.0	>2.5
RIFFLES		
WIDTH / DEPTH RATIO (Active Channel Based)		
EAST SIDE	>30	<10
WEST SIDE	>30	<15
GRAVEL (% AREA)	<15	≥35
SILT-SAND-ORGANICS (% AREA)		
VOLCANIC PARENT MATERIAL	>15	<8
SEDIMENTARY PARENT MATERIAL	>20	<10
CHANNEL GRADIENT <1.5%	>25	<12
SHADE (Reach Average, Percent)		
STREAM WIDTH <12 meters		
WEST SIDE	<60	>70
NORTHEAST	<50	>60
CENTRAL - SOUTHEAST	<40	>50
STREAM WIDTH >12 meters		
WEST SIDE	<50	>60
NORTHEAST	<40	>50
CENTRAL - SOUTHEAST	<30	>40
LARGE WOODY DEBRIS* (15cm x 3m minimum piece size)		
PIECES / 100 m STREAM LENGTH	<10	>20
VOLUME / 100 m STREAM LENGTH	<20	>30
"KEY" PIECES (>60cm dia. & ≥10m long)/100m	<1	>3
RIPARIAN CONIFERS (30m FROM BOTH SIDES CHANNEL)		
NUMBER >20in dbh/ 1000ft STREAM LENGTH	<150	>300
NUMBER >35in dbh/ 1000ft STREAM LENGTH	<75	>200

* Values for Streams in Forested Basins

Table 2: Key habitat characteristics for streams of the Nehalem River Basin expressed as percent of total length surveyed for each of the three ecoregions identified in the Nehalem basin. Total stream length in survey: 740 km, 238 reaches.

Characteristic	Rating (Percent stream length)		
	Undesirable	Intermediate	Desirable
Pool Area (% total stream area)			
Astoria - Willapa	5.4	35.4	59.2
Sitka Spruce	2.8	37.5	59.7
Coast Range Volcanic	3.7	62.8	33.5
Pool Frequency (channel width/pool)			
Astoria - Willapa	13.7	54.9	31.3
Sitka Spruce	7.7	44.8	47.5
Coast Range Volcanic	13.3	59.2	27.5
Gravel Availability (% gravel in riffles)			
Astoria - Willapa	5.3	19.7	75.0
Sitka Spruce	3.0	30.8	66.2
Coast Range Volcanic	1.1	52.6	46.3
Gravel Quality (% fines in riffles)			
Astoria - Willapa	59.8	34.0	6.2
Sitka Spruce	20.0	67.4	12.6
Coast Range Volcanic	24.2	40.0	35.8
Large Woody Debris (LWD) Pieces			
Astoria - Willapa	6.2	59.4	34.4
Sitka Spruce	11.5	56.0	32.5
Coast Range Volcanic	25.6	40.6	33.8
LWD Volume			
Astoria - Willapa	30.2	40.0	29.8
Sitka Spruce	47.2	40.6	12.2
Coast Range Volcanic	38.4	16.2	45.4
LWD Recruitment (riparian conifers > 20 in. dbh)			
Astoria - Willapa	98.3	1.5	0.2
Sitka Spruce	97.5	2.5	0.0
Coast Range Volcanic	93.1	6.9	0.0

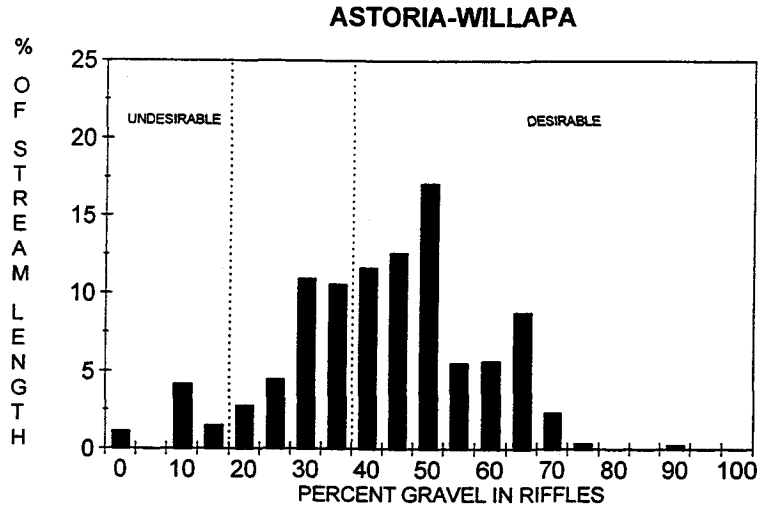
(Nehalem River Basin (cont.)

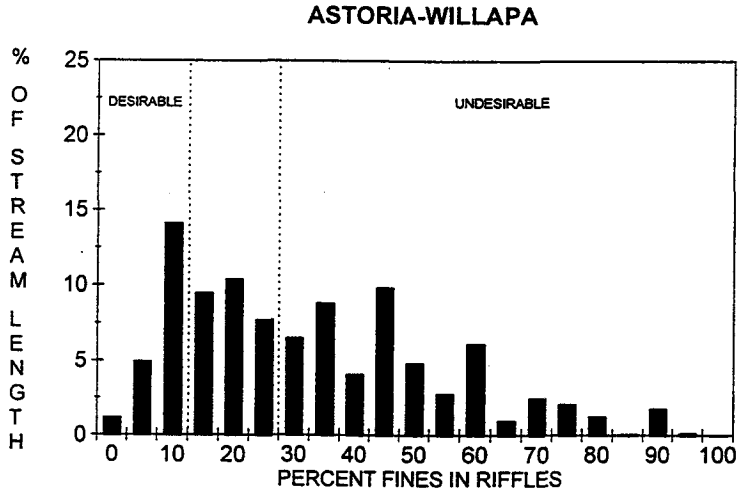
Characteristic	Rating (Percent stream length)		
	Undesirable	Intermediate	Desirable
LWD Recruitment (riparian conifers > 35 in. dbh)			
Astoria - Willapa	100.0	0.0	0.0
Sitka Spruce	98.8	1.2	0.0
Coast Range Volcanic	100.0	0.0	0.0
Stream Shade (% canopy closure)			
Astoria - Willapa	0.2	0.2	99.8
Sitka Spruce	4.3	1.4	5.7
Coast Range Volcanic	0.5	0.1	99.5

Figure 1: Frequency distributions of key habitat variables within Nehalem Basin Coastal Sub-ecoregions.

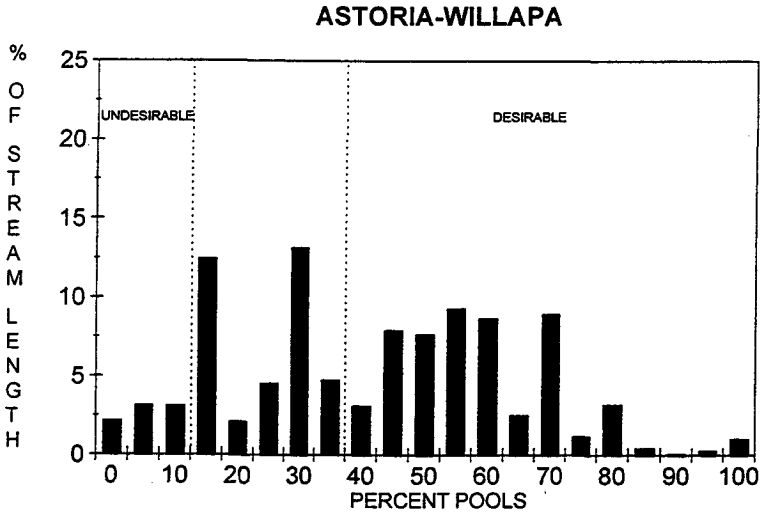
Astoria-Willapa Sub Ecoregion

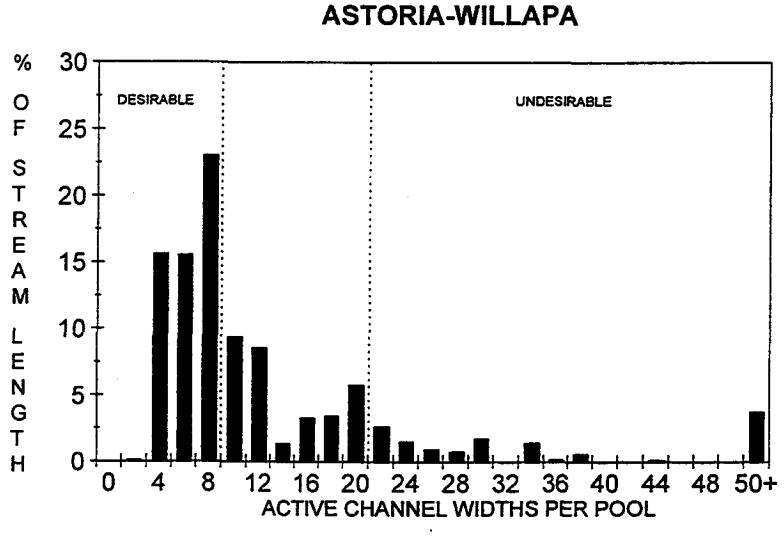
(total number of reaches = 120, total channel length = 259.0 km)

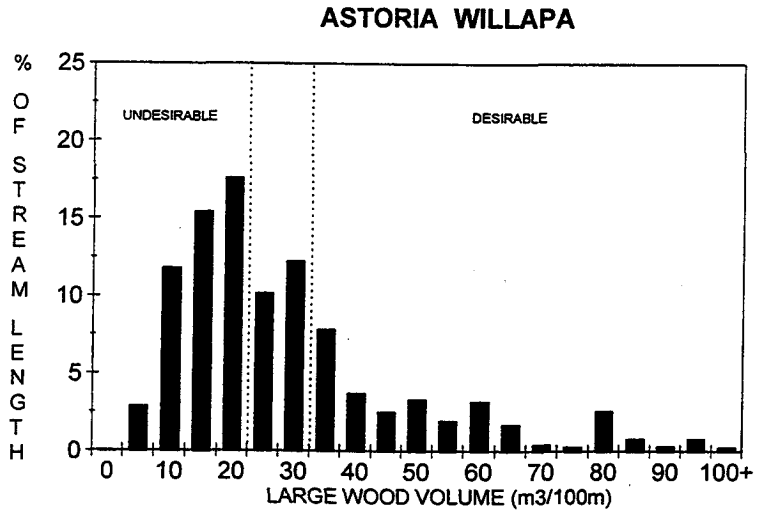


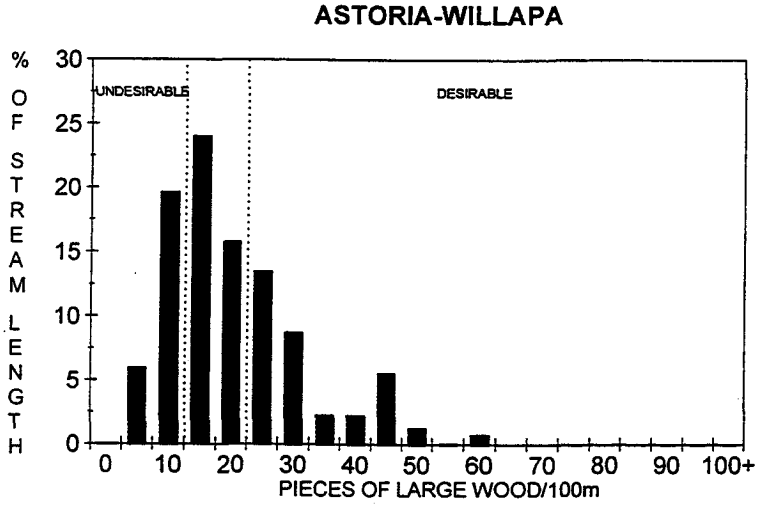


Ecoregion: Astoria-Willapa (cont.)

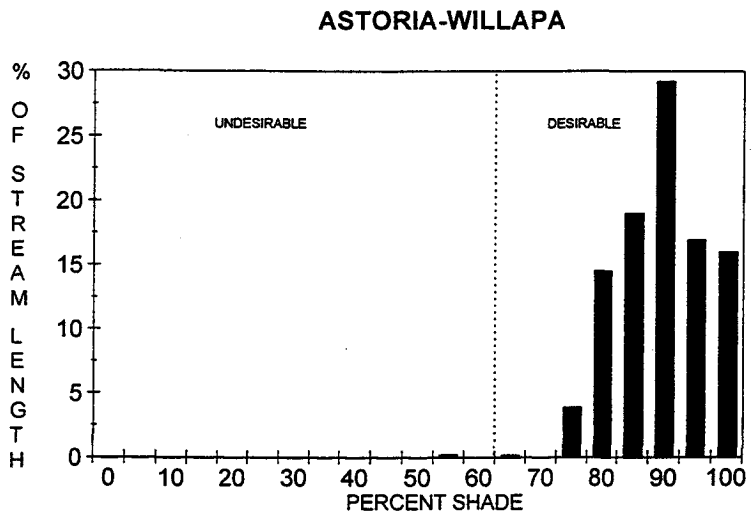


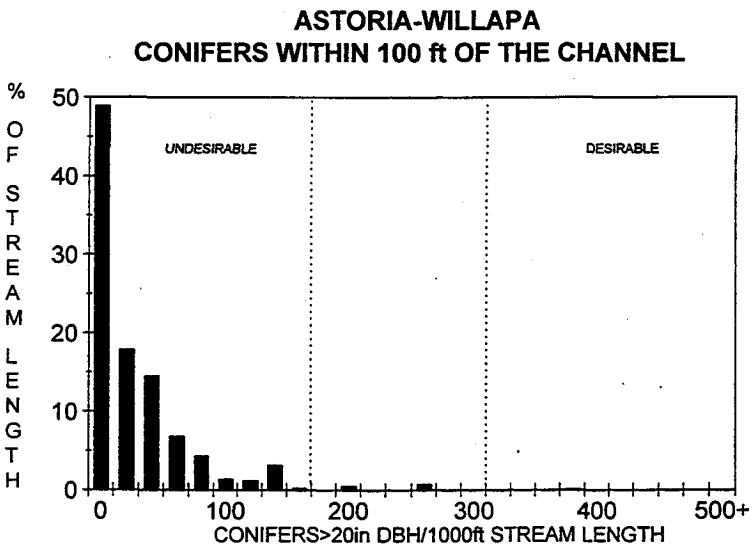



ASTORIA WILLAPA
% OF STREAM LENGTH
25
20
15
10
5
0
UNDESIRABLE
DESIRABLE
0 10 20 30 40 50 60 70 80 90 100+
LARGE WOOD VOLUME (m3/100m)

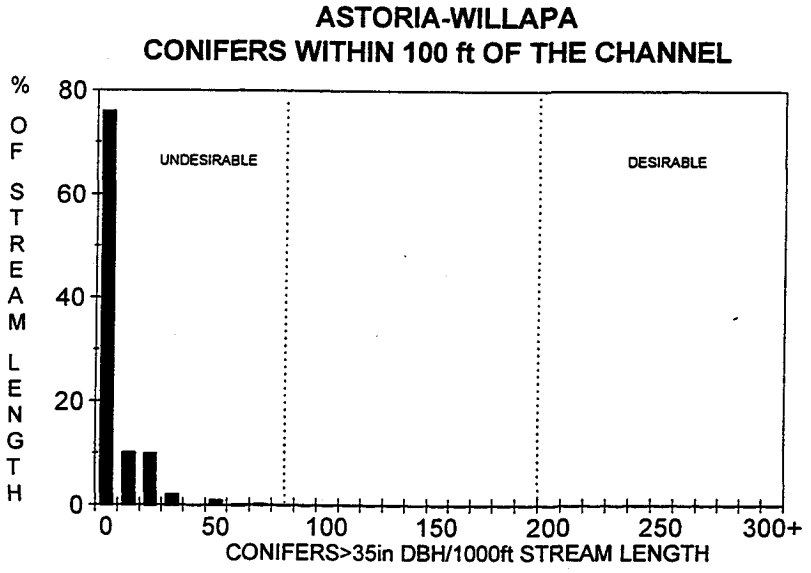

ASTORIA-WILLAPA
% OF STREAM LENGTH
30
25
20
15
10
5
0
UNDESIRABLE
DESIRABLE
0 10 20 30 40 50 60 70 80 90 100+
PIECES OF LARGE WOOD/100m

Ecoregion: Astoria-Willapa (cont.)



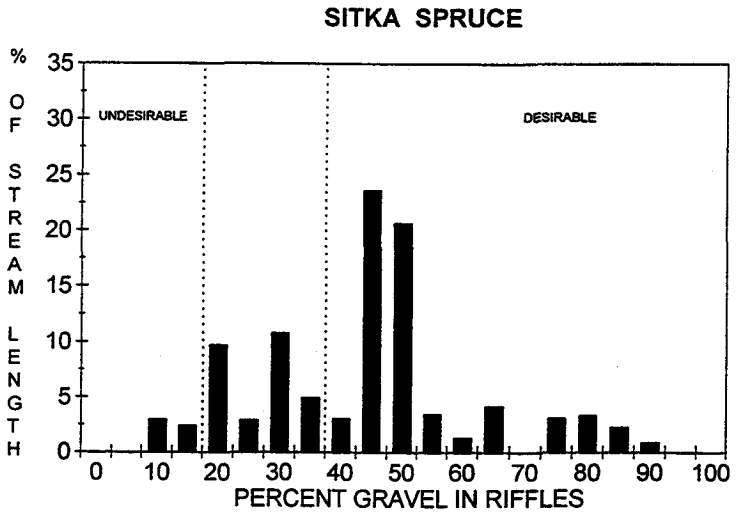


Ecoregion: Astoria-Willapa (cont.)

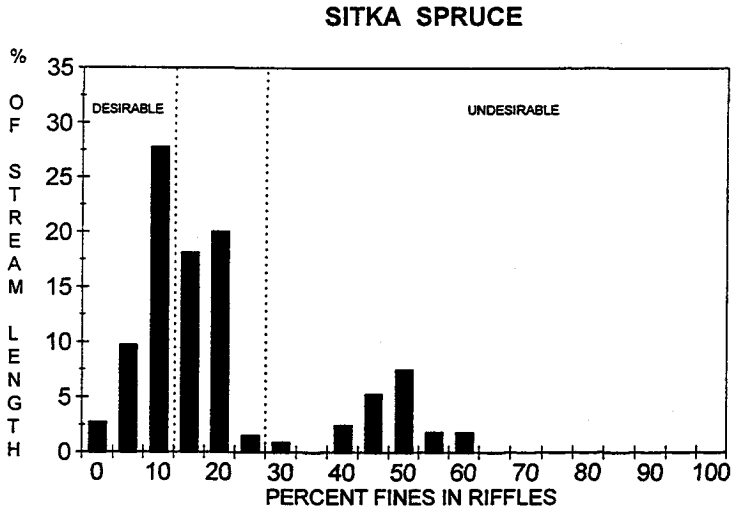


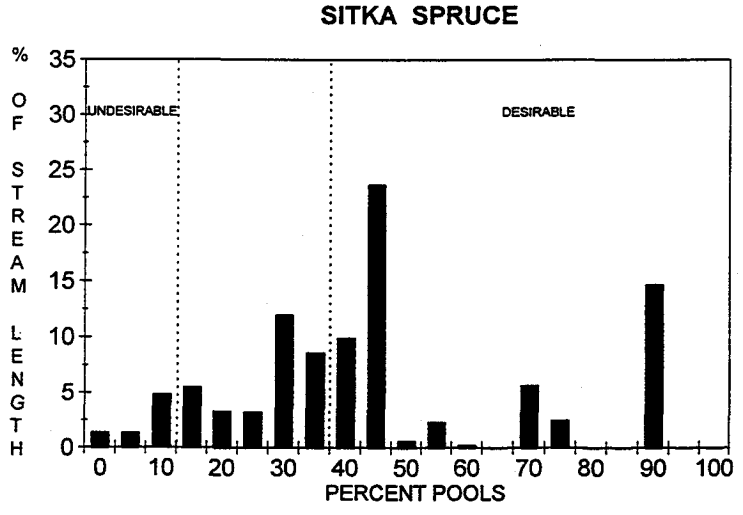
Sitka Spruce Sub Ecoregion

(total number of reaches = 48, total channel length = 343.5 km)

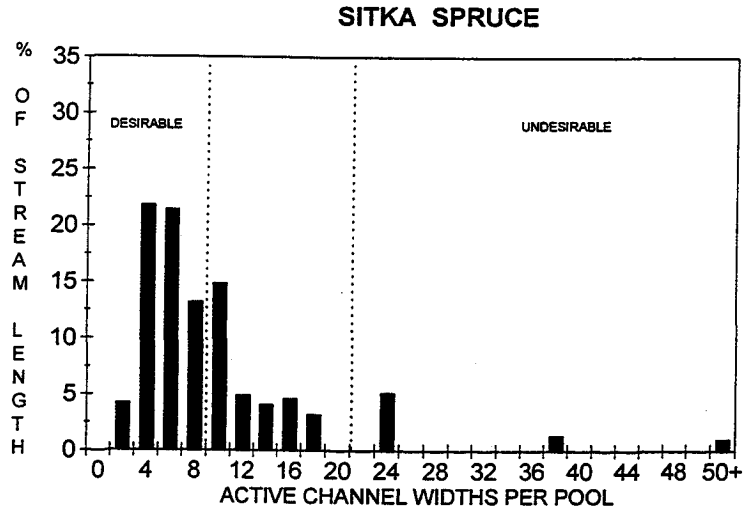


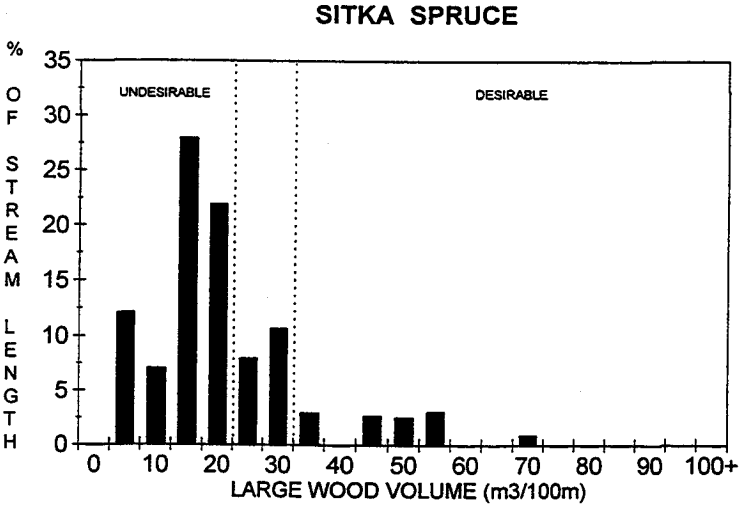
Ecoregion: Sitka Spruce (cont.)



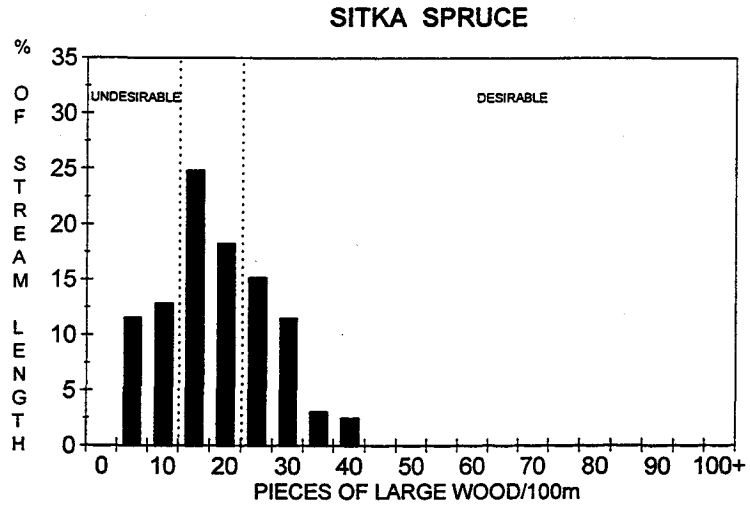


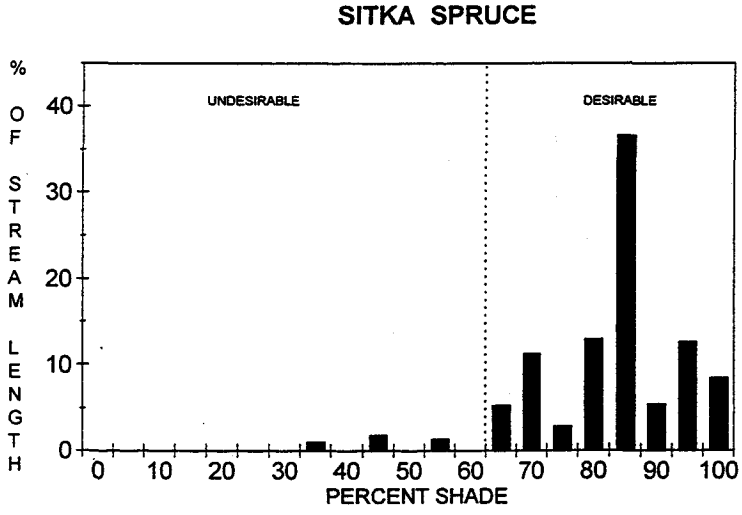
Ecoregion: Sitka Spruce (cont.)



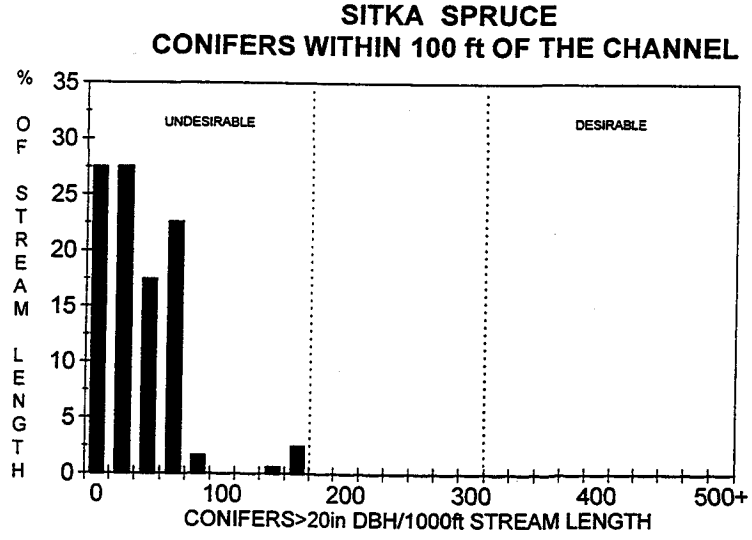


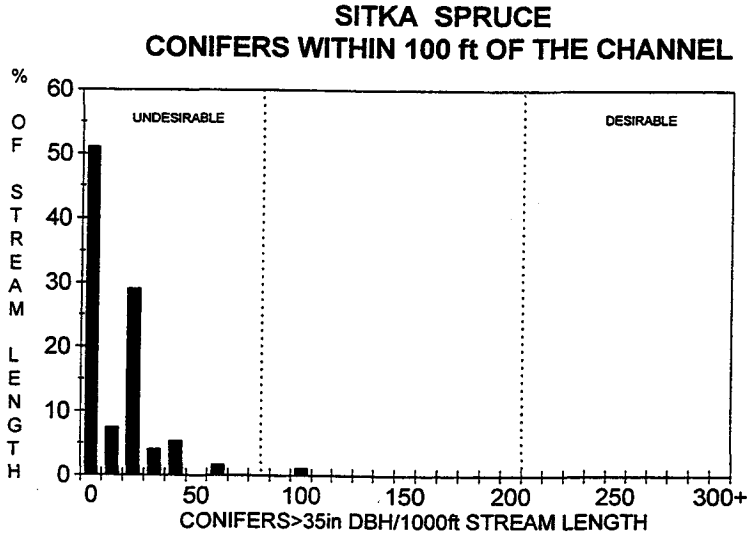
Ecoregion: Sitka Spruce (cont.)





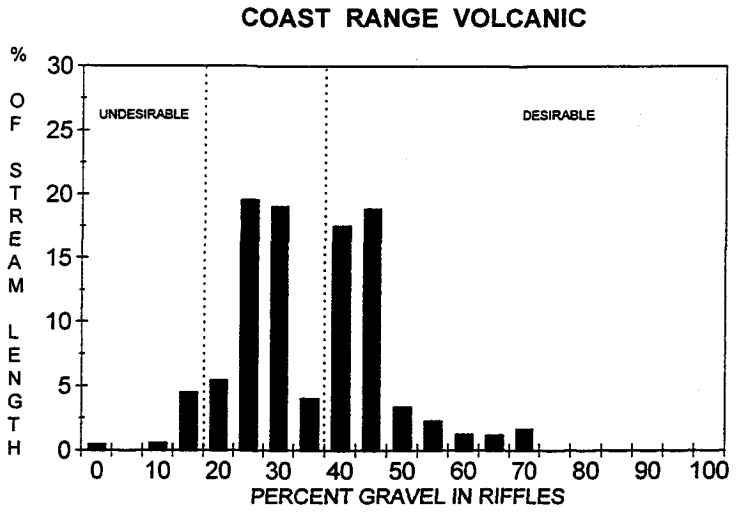
Ecoregion: Sitka Spruce (cont.)

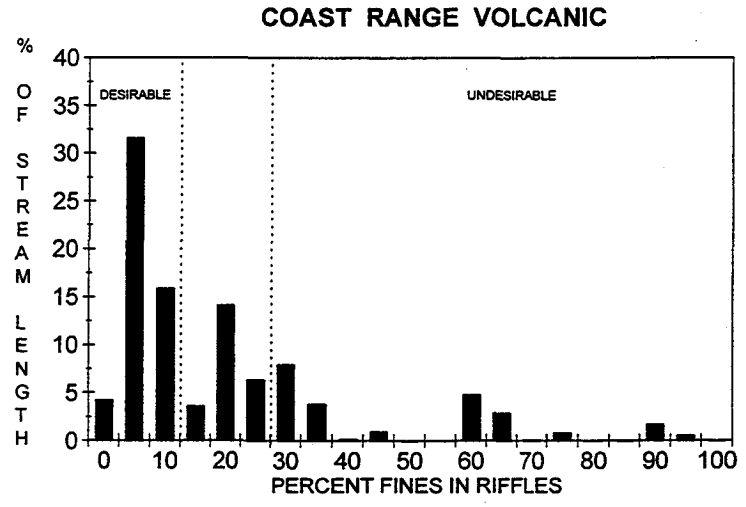


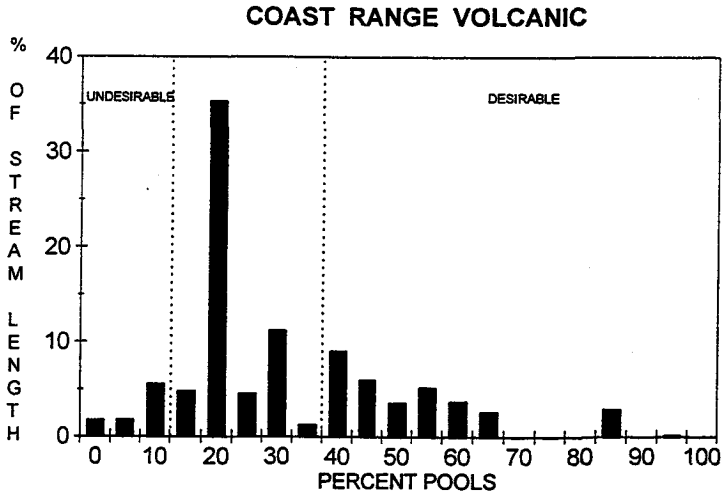


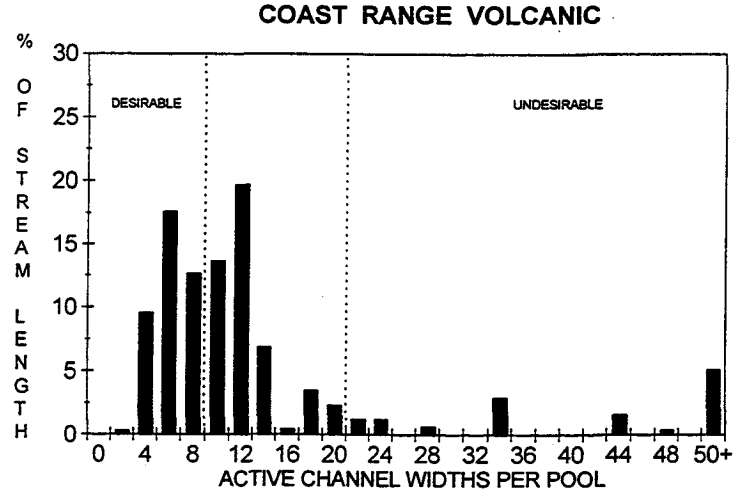
Coast Range Volcanic Sub-ecoregion

(total number of reaches = 66, total channel length = 121.4 km)

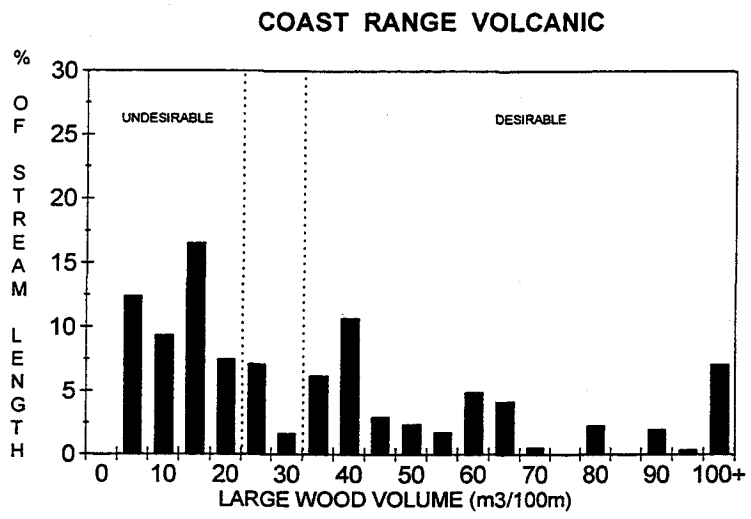


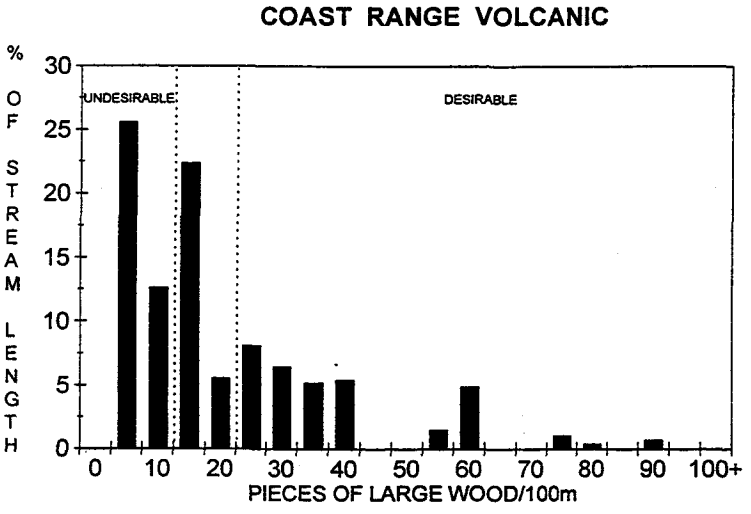


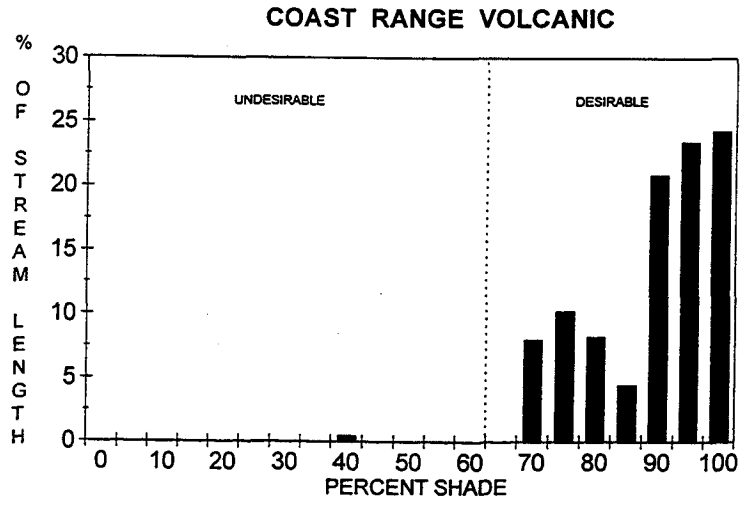

COAST RANGE VOLCANIC
% OF STREAM LENGTH
40
30
20
10
0
UNDESIRABLE
DESIRABLE
0 10 20 30 40 50 60 70 80 90 100
PERCENT POOLS

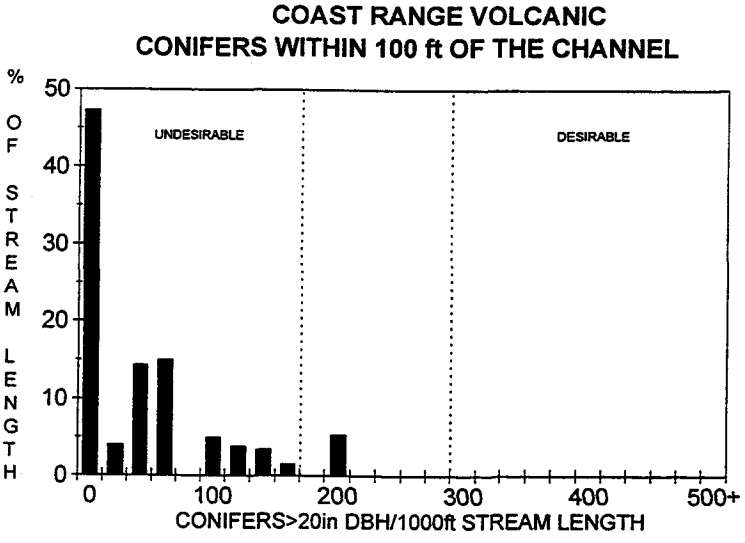

COAST RANGE VOLCANIC
% OF STREAM LENGTH
30
25
20
15
10
5
0
DESIRABLE
UNDESIRABLE
0 4 8 12 16 20 24 28 32 36 40 44 48 50+
ACTIVE CHANNEL WIDTHS PER POOL

Ecoregion: Coast Range Volcanic (cont.)

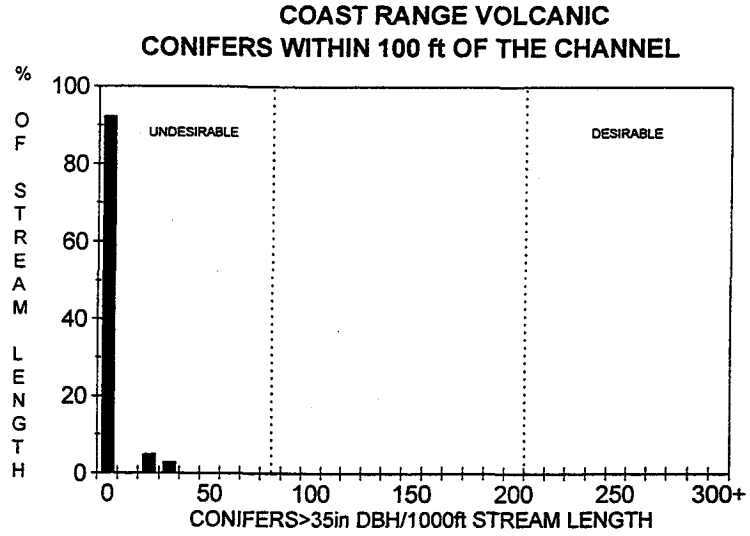


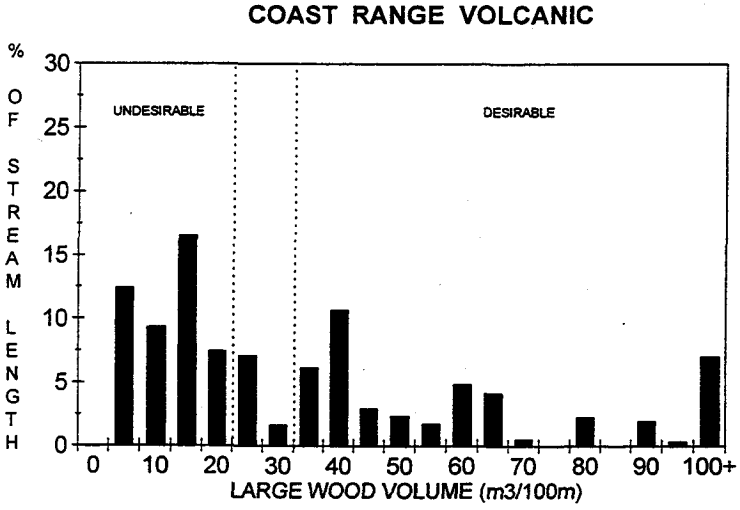



COAST RANGE VOLCANIC
% OF STREAM LENGTH
30
25
20
15
10
5
0
UNDESIRABLE
DESIRABLE
0 10 20 30 40 50 60 70 80 90 100
PERCENT SHADE

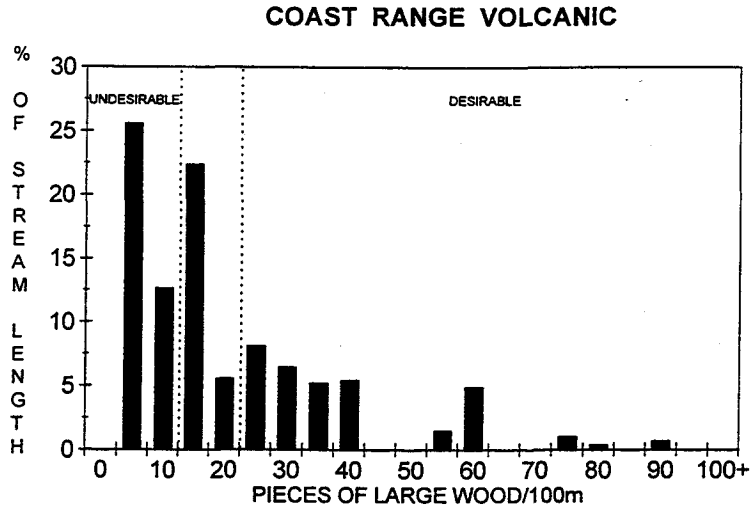

COAST RANGE VOLCANIC
CONIFERS WITHIN 100 ft OF THE CHANNEL
% OF STREAM LENGTH
50
40
30
20
10
0
UNDESIRABLE
DESIRABLE
0 100 200 300 400 500+
CONIFERS>20in DBH/1000ft STREAM LENGTH

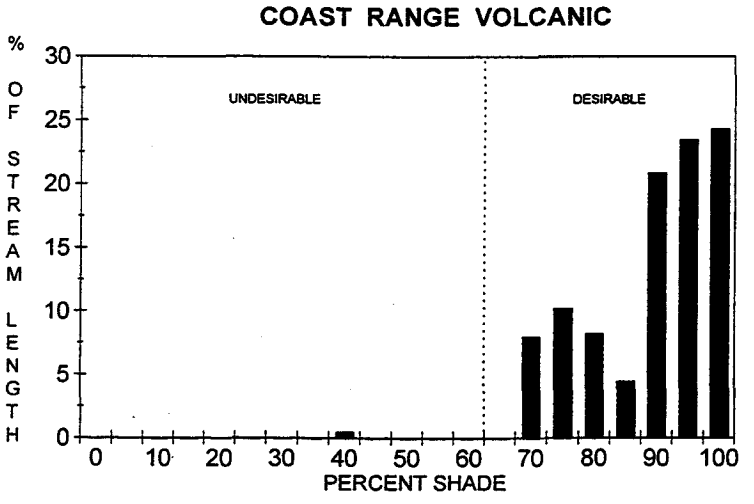
Ecoregion: Coast Range Volcanic (cont.)

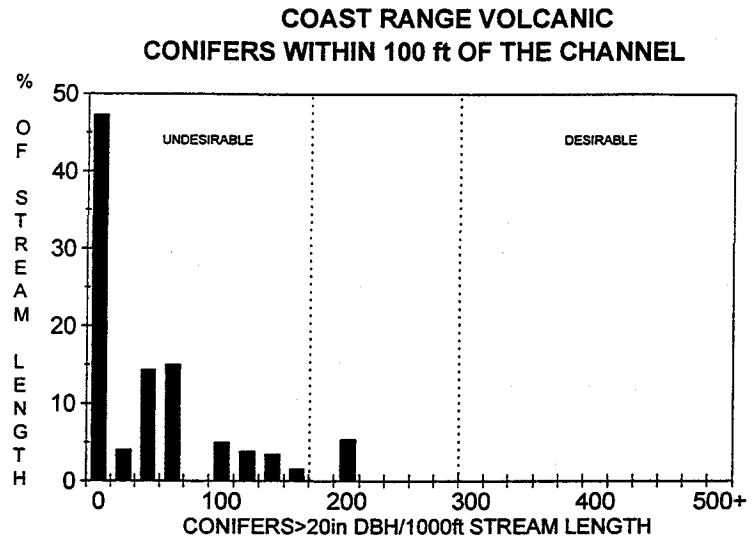


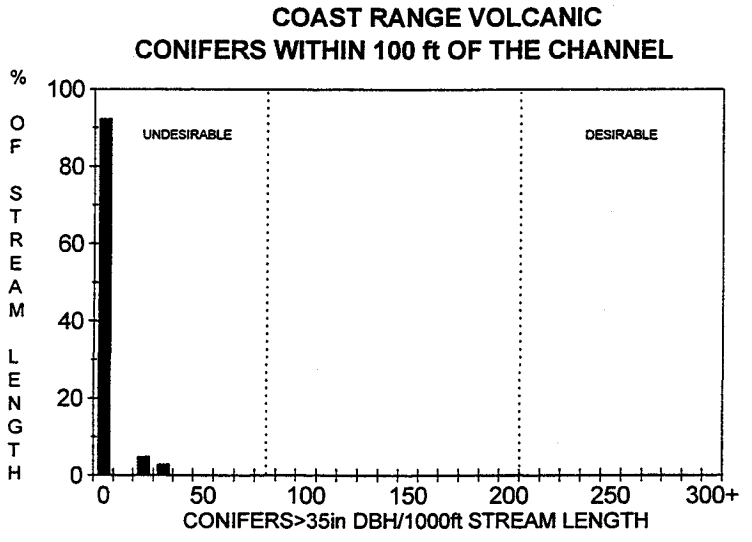


Ecoregion: Coast Range Volcanic (cont.)






COAST RANGE VOLCANIC
CONIFERS WITHIN 100 ft OF THE CHANNEL
% OF STREAM LENGTH
UNDESIRABLE
DESIRABLE
0
10
20
30
40
50
0
100
200
300
400
500+
CONIFERS>20in DBH/1000ft STREAM LENGTH


COAST RANGE VOLCANIC
CONIFERS WITHIN 100 ft OF THE CHANNEL
% OF STREAM LENGTH
UNDESIRABLE
DESIRABLE
0
20
40
60
80
100
0
50
100
150
200
250
300+
CONIFERS>35in DBH/1000ft STREAM LENGTH

Section 3: Federal Measures that Support or Coordinate with OCSRI Monitoring

Section 3.1: USDA - Natural Resources Conservation Service - National Resources Inventory

Background and Potential Uses in CSRI Monitoring Program

The National Resources Inventory (NRI) is an inventory of land cover and use, soils, soil erosion, prime farmland, wetlands, and other natural resource characteristics on non-Federal rural land in Oregon and the United States. The NRI was conducted in 1982, 1992, and data will be collected in 1997. From this time series, changes and trends in land use and resource characteristics over these periods can be estimated and analyzed. Standard data definitions and data collection protocols are utilized nationally to allow multi-state, regional, and national analysis.

Many of the data elements and definitions used to collect the 1992 data were developed to be compatible with data contained in the Commerce Department's Census of Agriculture and with databases managed by the USDA Forest Service, USDA National Agricultural Statistics Service, and the Interior Department's U.S. Geological Survey and U.S. Fish and Wildlife Service.

To obtain statistically valid NRI data for Oregon, NRCS employees evaluate about 12,000 randomly selected points within approximately 4,000 Primary Sampling Units in Oregon that occurred on non-Federal lands. This point data is then expanded to provide estimates on natural resource conditions. Resource conditions may be estimated for several geographic units, including 2,4,6, and 8 digit hydrologic units, counties, and NRCS Major Land Resource Areas. The NRI sampling grid includes federal lands, but little data is currently taken for samples that fall on federal lands.

The NRI is scientifically designed and conducted and is consistent with recognized statistical methods. The NRI data is available in a database format both in flat files on CD-ROM and as an Informix database. NRI data analysis software is available which allows 95% confidence intervals to be constructed for each unique query.

Portions of the NRI data potentially useful in the Coastal Salmon Restoration Initiative (CSRI) Monitoring Program include trends in land use, soil erosion (including total tons lost), wetlands, specific cropping histories, soils characteristics, and earth cover (tree, shrub, grass, etc.) characteristics. The sampling intensity within target watersheds could potentially be increased where greater accuracy in estimates was desired. In addition, sampling could be expanded to include those NRI points that fell on federal lands to facilitate complete watershed analysis across public and private ownership's.

It would also potentially be possible to add additional items to the Photo Interpretation or field samples to meet the CSRI Monitoring Program objectives. This additional data would then be linked to all other NRI data.

The NRI is transitioning to a continuous inventory after the 1997 sample is collected. This will entail a portion of the points being sampled every year. The foundation sample is a Photo Interpretation sample of all the Oregon NRI points on non-Federal lands. In addition, soil quality and grazing land health field subsamples will be taken beginning in 1998.

Section *3.2: Southwest Oregon Province Proposal for Conducting Basin Scale Assessments*

I. Proposal:
This proposal outlines how public agencies (federal, state, and local) working with both private and non-profit interests can collaboratively develop basin-scale technical assessments as a basis for furthering development of salmon and water quality recovery strategies. The proposed basin-scale assessment would function as a coarse screen to identify key aquatic resource areas and their susceptibility to risk factors over large geographic areas. This will require characterization of both the conditions and uses of the basin. It is intended that these basin assessments should provide the basis for a coordinated strategy for conservation and recovery of both water quality and salmonid resources. With the described assessment in hand, local managers would be able to begin to develop consensus on a framework for prioritizing both protection and restoration elements of an aquatic recovery strategy.

II. Objectives:
The objectives of these basin assessments and anticipated conservation strategies include:

- Building common understanding and vision for stabilizing and restoring aquatic resources and water quality among the various land and resource management interests within the basin. This would help both public agencies and private landowners understand how individual management options may affect the larger watershed;

- Compiling essential data layers for characterizing basin processes across land ownership patterns. This focused compilation of information would support the development of integrated salmonid and water quality recovery strategies across land ownerships within each basin;

- Considering key elements of an interagency monitoring strategy for the basin that would support implementation of basin-scale recovery efforts.

III. Background/Rationale:
The proposal is being initiated within the Southwest Oregon Province Interagency Executive Committee (SWPIEC) in their efforts to fully implement elements of the Federal Northwest Forest Plan (NWFP) while supporting Oregon's Coastal Salmon Recovery Initiative (CSRI) and local watershed management forums.

IV. Approach:
The proposed assessment is based on a synthesis approach which integrates both biological and physical processes. This approach will provide a framework for incorporating water quality improvement efforts into salmonid recovery efforts. The proposed assessment is functionally very similar to the type of assessment proposed by Senator Bradbury and the Pacific Rivers Council. In short, the approach seeks to identify the existing areas of the basin that are considered essential for anchoring long term recovery strategies and then assessing the landscape scale risk factors that are likely to threaten the function of the essential areas identified. Specific elements of the approach are outlined below.

- The approach is driven by basin-scale indicators of physical and biological processes.
- Indicators of physical and biological processes may be selected by basin to reflect basin-specific issues or questions.
- Data layers associated with key indicators are displayed via GIS to illustrate risk to key habitat and water quality components at a scale generally between 1:24K and 1:100K.
- The resulting assessment could also provide summary comparative statistics, graphic data presentation, and other data base products for comparative watershed evaluations
- Outcome of risk-based assessment may serve as a foundation for basin-scale restoration and protection planning.
- Landscape characterizations support basin-scale risk assessment approaches.

Basin assessment scoping discussions were held with interested parties from both the Umpqua and Rogue Basins. These discussions provided a wealth of background information but also specifically addressed the

- overall structure of a basin assessment;
- development of the key issues regarding aquatic resource recovery; and
- identification of core information needs.

IV. Scoping Process

Identification of Key Issues
Identification of General Core Questions / Attribute Descriptions
Identification of General Basin Indicators
Identification Data Coverages, Sources, and Formats
Design of Data Distribution and Compilation

Assessment Outline and Schedule	**Delivery Date**
Data Provision (individual coverages)	2/15/97
Data Compilation (basin-wide coverages)	3/15/97
Assessment Derivatives (responding to specific queries)	4/15/97

Scopin

Assessment Applications

Basin Scale Restoration Strategy Development	6/1/97

(TMDL/ ESA/ Monitoring Design)
Watershed Analysis Support

V. Initial Key Issues for Basin Scale Assessment of the Umpqua and Rogue Basins

Rogue Basin

1. Where are both existing and recoverable salmonid habitats across the basin? Of the existing habitats, which ones are considered most functional?

2. Characterize basin-specific risk factors to both existing and recoverable salmonid habitats

3. Characterize land ownership patterns and uses across the basin.

4. How are both current and historic water quality sampling stations, flow gauging stations, and salmon count and population survey locations distributed across the basin?

Umpqua Basin

1. The Umpqua River Basin has several runs of native anadromous and resident fish whose numbers are low and/or declining. Trends in anadromous and resident fish distribution and abundance are good indicators of general aquatic health.

2. Water quality conditions (notably temperature, sedimentation, flow, dissolved oxygen) across much of the basin have declined to a level that is impairing beneficial uses (ecological functions and human benefits) of the river as defined by the Clean Water Act and State Water Quality Standards.

3. Land ownership patterns (past, present, and future)
- strongly affect existing management strategies;
- were not established based on sound ecological thinking;
- are complex and a result of historical needs;
- could be rearranged to better optimize the balance of environmental functions and uses.

4. How are current water quality sampling stations, flow gauging stations, and salmon count and population survey locations distributed across the basin?

5. Structural alterations of the river (including water diversions, instream barriers, channel modifications, etc.) can affect both water quality and fish life history needs. What is the status and history of these type of physical alterations?

6. Both hatchery related mitigation facilities and species interactions affect salmonid population fitness and genetic fitness. What is known about these factors and important might they be?

V. Indicators and Data Coverages to Address Key Issues

Key Issue #1 - Where are both existing and recoverable salmonid habitats across the basin? Of the existing habitats, which ones are considered most functional?

Core Question/ Attribute Description	**Basin Indicator**	**Spatial Coverage:** available | needed	**Scale of Source Data:** available | needed	**Data Format:** (i.e. digital format type, paper, image)	**Source**
a.) current/historic distribution and upper extent by individual species and life history	- fish presence - barriers - existing habitat - habitat function	coastal basins	point / historical record point / historical record line life history needs		ODFW/Corvallis
	- natural barriers - artificial barriers	statewide	point		ODFW
b.) anadromous Core Areas (for all species)	- highly productive habitats	coastal basins	1:100K		ODFW/Corvallis
c.) aquatic diversity areas	- high aquatic biodiversity	statewide			American Fisheries Society - Oregon
d.) NWFP Key Watersheds	- aquatic refuge value	western OR & WA	1:100K	arc info/GIS	EPA et al
e.) healthy stocks	- stable population	OR & WA	1:250K		Oregon Trout
f.) stream gradient	- source/ transport/ response reaches (>20%; <20% & >4%; <4%)	constructed by basin/watershed	1:100K		EPA; USGS
g.) restoration guide sites	- reaches/ sites w/ restoration potential	Umpqua & Lower Rogue	1:100K streams w/ points		ODFW

Key Issue #2 - Characterize risk factors to both existing and recoverable salmonid habitats.

Core Question/ Attribute Description	**Basin Indicator**	**Spatial Coverage:** available | needed	**Scale of Source Data:** available | needed	**Data Format:** (i.e. digital format type, paper, image)	**Source**
a.) road location /length	- density by road type & age	- federal lands network - local & private lands	1:24K	Line File/ GIS	USFS/BLM/Douglas County

		network	1:100K	tiger file/ GIS	SSC
b.) mass wasting potential; current mass wasting location and frequency;	- DEM slope - geology - soils - precipitation	1:24K 1:400K 1:100K 1:24K 1:100K			EPA/USFS/BLM USGS/USFS/BLM NRCS/USFS SSC
c.) status of key water quality parameters	- impaired waters - waters of concern - areas w/o information	statewide	1:100K	arc info/GIS	ODEQ
d.) watershed morphology	-floodplain - wetlands - channel confinement -watershed area and drainage density				FEMA/DOGAMI SSC/USFS/BLM aerial photos diking districts USGS/USFS/BLM
e.) fragmentation	- barriers - riparian canopy breaks - temperature				ODFW aerial photos USFS/BLM seral stage
f.) flow	- peak/base flows - channel forming flows -flood frequency - minimum flows - min. rec. flows		period of record		USGS/OWRD USGS/OWRD ODFW
g.) seral stage/riparian condition	- age of vegetation - canopy closure				USFS/BLM
h.) land cover/vegetation class	- vegetation type		320 ac min. Mapping unit	landsat mss	ODFW
i.) age/date of harvest pattern	- disturbance pattern - cumulative effects	ECA ARP			BLM USFS
j.) fire history					
k.) rain on snow zone	-peak flow vulnerability	elevation band			BLM / USFS

Key Issue #3 - Characterize land ownership patterns and uses across the basin.

Core Question/ Attribute Description	**Basin Indicator**	**Spatial Coverage:** available | needed	**Scale of Source Data:** available | needed	**Data Format:** (i.e. digital format type, paper, image)	**Source**
a.) landuse	landuse management regime				
b.) NWFP land allocations	landuse management regime	western OR & WA	1:100K	arc info/GIS	EPA et al
c.) ownership blocks	number and size of land parcels				ODF/Counties
d.) local zoning	predicted land use				Counties
e.) NPDES locations	river use		point		ODEQ
f.) dams/diversions	river use		1:24K		OWRD
g.) available water rights	river use		1:24K		OWRD
h.) groundwater management areas			1:24K		OWRD

Key Issue #4 - How are current water quality sampling stations, flow gauging stations, and salmon count and population survey locations distributed across the basin?

Core Question/ Attribute Description	**Basin Indicator**	**Spatial Coverage:** available | needed	**Scale of Source Data:** available | needed	**Data Format:**	**Source**
a.) stream gauge locations	flow parameters		point (aggregate and cumulative)		USGS/OWRD
b.) water quality sampling locations			point		ODEQ USGS USFS BLM
c.) restoration project location			point		many

d. biota/ salmonid data collection					

Basin Base Map

Attribute Description	**Basin Indicator**	**Spatial Coverage:** available | needed	**Scale of Source Data:** available | needed	**Data Format:**	**Source**
a.) streams			1:24K 1:100K	arc info/GIS	USFS/BLM/ODF ODEQ/EPA
b.) 4th & 5th field watershed boundaries		statewide	1:24K		EPA et al
c.) major roads			1:100K	tiger file	
d.) 7.5' topography grid overlay	map grid	statewide		arc info/GIS	USGS/EPA

Cooperating Federal Agencies from SW Oregon Province Interagency Committee (SWPIEC)
Measure Number: 1

ESU	[ ] North-mid-coast	[X] South coast					
Mgmt. Category	[ ] Harvest related	[ ] Hatchery related	[X] Habitat related	[ ] Other			
Life Stage	[X] Upstream migr.	[X] Spawning	[X] Incubation	[X] Summer rearing	[X] Winter rearing	[X] Downstrm migr.	[ ] Ocean rearing

Action description

Measure
Coordinated federal agency support of basin-scale aquatic recovery assessments for the Rogue and Umpqua Basins.

- In concert with state and local interests, cooperating federal agencies will compile a basin-specific information base to support development of aquatic species conservation and water quality recovery strategies within each basin.

- These basin-scale technical assessments would provide a foundation for considering key elements of an interagency monitoring strategy that would support implementation of recovery efforts.

Implementation assurance

Implementation Time Frame
Information compilation and assessments would largely be complete by 6/97

Assurance of Action
The PIEC represents the federal agencies responsible for implementing the Northwest Forest Plan in Southwest Oregon. The charter of the PIEC's advisory body (established through 1998) includes the roles of :

- providing advice on provincial level analysis and monitoring;

- providing a forum for information exchange across the province (i.e. Southwest Oregon);

- encouraging complementary ecosystem management between federal and non-federal land managers.

Obstacles to Implementation
Lack of concurrent effort. Redundant effort.

Predicted effect of action

Geographic Scope of Effect
Initially Rogue and Umpqua Basins. Smaller southcoast basins (e.g. Sixes, Pistol, Chetco) also could possibly be included in this initial effort if data and level of effort allow.

Expected Lag Time in Effect
Process is underway in both basins.

Expected Effect
- Enhanced alignment of both federal and non-federal approaches to prioritization, watershed analysis, and watershed restoration within each basin.

- Enhanced integration of salmonid recovery and water quality recovery.

- Building common understanding and vision for stabilizing and restoring salmonid populations and water quality across land ownership patterns and among various stakeholders within each basin.

Proposed monitoring benchmarks

Verification of Anticipated Impacts

Section 3.3: Draft Proposed Framework for Regional/Provincial-Scale Assessment of Aquatic Conservation Strategy Effectiveness

Working Outline of the Aquatic Conservation Strategy Assessment Team

N.B.- This 3/9/97 outline is rapidly evolving and the details are changing daily.

Watershed condition (watershed analysis scale, generally 5th field) will be the basic unit of determination and reporting. Watershed condition determinations are to be based on the suite of conditions, processes and functions important to creating and maintaining aquatic and riparian habitats in each watershed.

Primary hypothesis: If the ACS is effective at Regional/Provincial scales, we expect a positive shift over time in the frequency distribution of watershed condition. (Expected timescale ~0.5-2 decades).

Primary questions: What is the frequency distribution of watershed condition (physical and biological) by province and in the region, and what is the trend in watershed condition?

A common (superset) of stressors and indicators will be used throughout the NWFP region, but their relative importance will vary among provinces, basins, sub-basins and watersheds. Individual watersheds may employ a subset of indicators.

I. **Step 1:** INTEGRATIVE ASSESSMENT OF WATERSHED CONDITION

A. Year one: An assessment of watershed condition and trend for each of the ~520 watersheds affected by the NWFP. Watersheds to be determined to be in "good, fair, or poor" condition, relative to their potential condition (not relative to each other). Expected trend will be based on assumption of full implementation of the ACS and a standard climatic regime. Trend will be expressed in decades (or fractions thereof) for "fair or "poor" rated watersheds to move up to next better category.

1. Thereafter: a proportion (e.g., 20% of watersheds) revisited each year using the same process.

B. Determinations are made by local experts, at a series of Province-scale "watershed workshops," and based on a common set of assumptions and considerations. Determinations are intended to be strictly technical and objective.

1. Workshop format will provide:

a) Standard watershed maps

b) Generalized criteria for determination of the ecological condition of watersheds (e.g., Naiman et al, 1992).

c) Standard database format for watershed characteristics, common stressors and indicators, and findings of Watershed Analysis; e.g.,
   (1) dominant geomorphic setting
   (2) land ownership
   (3) land allocations under the NWFP
   (4) timber harvest history
      (a) proportion of the Interim RR in native vegetation
   (5) Road miles (and history)
      (a) Number of stream crossings
   (6) Primary impact mechanism(s)
      (a) for anadromous fish habitats
      (b) for other riparian aquatic habitats
   (7) Other locally-important stressors (e.g., water diversions, recreation development and use) and indicators (e.g., channel conditions, PFC)

d) Classify watersheds by bio-geo-climatic setting; ownership-allocation, land-use history, primary impact mechanism, etc., for use in Step 2 and 3, and to enable adaptive development and focus of future monitoring efforts.

e) Quality control will be incorporated in three ways:

   (1) Peer review system for each determination

   (2) Quality of determination rating (based on condition of data and analysis support the determinations.)

   (3) Verification of determination by quantitative methods (Step 2).

2. Local experts will consist of local people most familiar with watershed values and conditions.

   a) For each province/basin, we expect to include an interdisciplinary/inter-agency (and in some places inter-governmental) group. The emphasis for participation will be on actual experience, knowledge, recent analysis efforts, and active technical involvement in local watershed and fisheries management; NOT based on advocacy positions, jurisdiction-sans-experience, or general interest. May include public (e.g., watershed council reps) where they possess technical expertise.

C. Where available the determinations will utilize the results of Watershed Analysis and may inform and guide future analysis efforts.

II. **Step 2:** QUANTITATIVE ASSESSMENT AND MODELS DEVELOPMENT: On a subset of watersheds taken from watershed classifications developed in Step 1: (Concurrent with Step 1. Pilots begun in 1997)

A. Verify Step 1 determinations

B. Develop quantitative indicators that may be commonly applied in the Region/Province/basin. Refine and test against predictive models.

C. Initial efforts will be in data-rich basins/provinces with ongoing research that will be expanded and integrated. (e.g., southern Oregon Coast, South Fork Trinity River).

1. Include development of large-scale designs for:

a) Remote sensing of riparian vegetation characteristics

b) Monitoring indicator herpetofauna

c) Monitoring indicator riparian-dependent birds and mammals

D. Maintain centralized databases of common (superset) stressors and indicators

III. **Step 3:** SHORT-TERM MONITORING FOR ADAPTIVE MANAGEMENT: On a subset of watersheds, monitor the effectiveness of watershed analysis ==> project planning ==> implemented practices; determine proximal cause and effect relationships.

A. Determine whether watershed analysis is effective in identifying the impacts and impact mechanisms influencing aquatic and riparian environments.

B. Determine whether this information is used effectively to develop management plans.

C. Determine whether the resulting project plans for restoration and other activities are effective in meeting the Aquatic Conservation Strategy Objectives (ACSOs) and are consistent with other needs of Riparian Reserves and Key Watersheds.

1. Because effectiveness of practices can only be judged if they have been carried out, each of these monitoring phases is contingent upon the results of the preceding monitoring phases in a watershed.

D. Implementation: A team of experts samples completed watershed analyses and, with the help of an objective checklist or template, monitors their effectiveness in meeting the objectives set for them. The same team develops monitoring plans for a selection of on-the-ground projects to determine the extent to which they, as implemented, meet the requirements of the Northwest Forest Plan.

A diagram illustrating the ACS assessment process is shown on the following page.

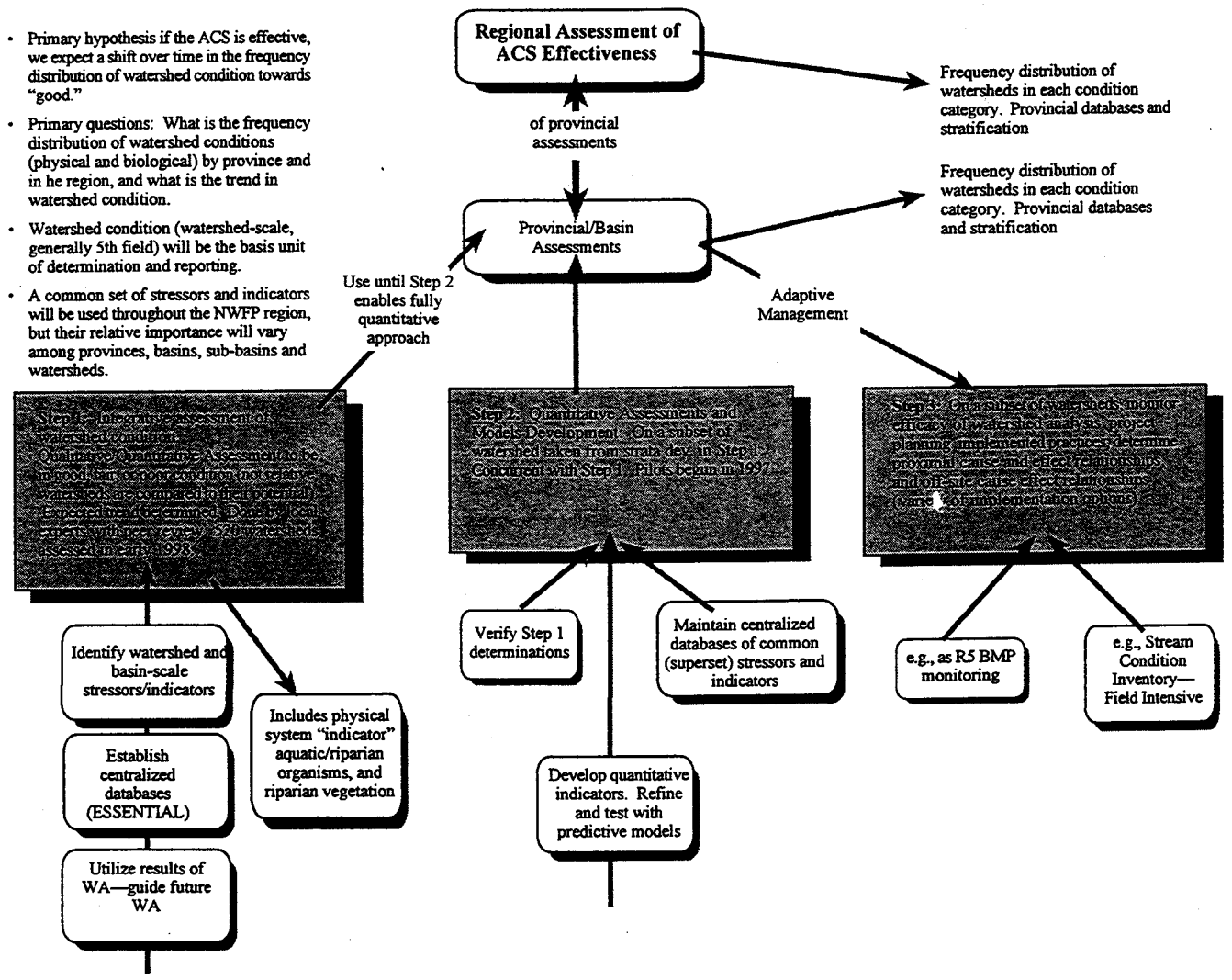


Figure 1: Description and flow chart showing relationships between elements of the Draft ACS Monitoring Proposal.