Oregon Plan for Salmon and Watersheds
Agency Annual Reports 2000
July 1, 2001

Oregon Department of Forestry
Forest Practices Monitoring Project Summary

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What follows is a brief summary of ODF monitoring project status and results. Technical reports are available for some of these projects and are listed at the end of this document. Numbers in parentheses represent the Oregon Plan Monitoring Measure Numbers.

- 1999 Fish Presence Surveys (ODF32S): 561 miles of stream were surveyed. 361 miles were newly identified as fish bearing while, 79 miles of stream previously identified as fish-bearing were determined to be non-fish bearing. 174 impassable culvert were identified. There was a net gain of 282 stream miles receiving Forest Practices Act protection.

- Fish Passage and Stream Crossing Compliance Monitoring (ODF1): A pilot study was completed on 57 stream crossings. This is part of a 3-year study in which an additional 100 randomly selected crossings will be monitored. The objective of the study is to determine if culverts and bridges are installed to provide for passage of juvenile fish and a 50-year streamflow event. A pilot study report is available (ODF Technical Report #6). 78% of the crossings met the installation design criteria as described in the written plans. An average of 67% of the crossings are likely to allow upstream passage of juvenile fish. 91% of the installations were estimated to pass a 50-year peak flow. Opportunities for education and training and needs for improved implementation of ODF fish passage guidelines were identified in the pilot study report. A final project report will be available in 2001.

- Riparian Function (ODF11S): The Oregon Department of Forestry monitored 27 sites to determine if the forest practice riparian rules are effective at maintaining function and structure that will promote the recovery of fish habitat. ODF was also investigating if the assumptions that were used to craft the riparian rules were valid. Both shade and large wood recruitment potential are reduced on small streams as compared to pre-harvest conditions. Results indicate that stand characteristics of these riparian forests vary greatly across the landscape making a single regulatory target or

goal problematic. However, it appears that the current rules underestimated the prevalence of conifer trees within the first 20 feet of small and medium streams, thereby underestimating the amount of coniferous basal area that is available on these streams. A final report will be available in spring 2001. Recommendations were made to the forest practices advisory committee for increasing leave tree requirements along streams.

- ODF/DEQ Shade Study: This study was designed to evaluate the range of stream shade conditions provided under the current forest practice rules and how those shade conditions relate to riparian stand structure. 30 sites were monitored in Northeast Oregon and 30 sites in Northwest Oregon. Preliminary results suggest that shade is most strongly related to aspect, valley form, stocking density (basal area or trees per acre) and the average live crown ratio. Final results will be available in 2001.

- Stream Temperature (ODF14S): ODF has been monitoring stream temperature at a sub-basin scale at four sites and seven reach-level sites. Pre- and post-harvest data were collected. Preliminary results indicate the rules are generally effective at preventing increases in stream temperature on large Type F streams, beyond background variability.

- Strategic Monitoring Plan: The last revision was completed in 1998 and will be revised again in 2001. The premise of the monitoring program will not change and is based on the adaptive management model. Under this model monitoring and research findings are reported to the Board of Forestry. When needed improvements are identified, recommendations are made for rules revision. The monitoring program results described in this document have also been reported to the Governor's forest practices advisory committee. This committee has representation from environmental, landowner and agency groups and is currently assessing the adequacy of the ODF rules in promoting the recovery of salmon populations and fish habitat. Some changes being considered include: increasing sample sizes, utilizing a probabilistic sampling design, reprioritizing monitoring needs.

- Best Management Practice (BMP) Compliance Monitoring Project (ODF23S): The focus of this study is on water-quality and fish-habitat protection rules. A pilot study was completed on 52 randomly selected harvest units. This was part of a 3-year study in which an additional 200 randomly selected stream crossings will be monitored. A pilot study report is available (ODF Technical Report #5). 57% of harvest units had 100% compliance. However, the average compliance rates on a rule-by-rule basis were 98.5% and on a unit-by-unit basis (average = 98%). A few of the rule divisions that were monitored are reported below.

  Road Construction and Maintenance Rules (OAR 629-625). Compliance averaged 97% with rules that establish standards for locating, designing, constructing, maintaining and vacating forest roads, rock pits and quarries in such a manner as to provide the maximum practical protection of water quality and fish habitat.

Harvesting Rules (OAR 629-630). Compliance averaged 95% for rules that establish harvest practice standards that will minimize soil and debris from entering waters of the state and protect wildlife and fish.

Water Protection Rules: Vegetation Retention along Streams (OAR 629-640). The compliance rate averaged 95% with streamside vegetation retention rules. The purpose of streamside vegetative requirements is to produce the desired future conditions for the wide range of stand types, channel conditions and disturbance regimes that exist throughout forestlands in Oregon. The desired condition varies depending on the site conditions. In general the goal is to grow and retain stands that mimic mature forest conditions on fish-bearing streams. The goal along non-fish bearing streams is to support the functions and processes that are important to downstream fish and domestic uses.

Water Protection Rules: Riparian Management areas and Protection Measures for "Other Wetlands", Springs and Seeps (OAR 629-655). Compliance with rules designed to protect soil and understory vegetation around "other" wetlands springs and seeps averaged 91%.

Oregon Department of Forestry Monitoring Reports

ODF Technical Report Number	Report Title
1	OFPA Water Protection Rules: Policy And Scientific Considerations
2	Cooperative Stream Temperature Monitoring Project Completion Report For 1994 - 1995 (Small Type N Streams)
3	Effectiveness Of Riparian Management Areas And Hardwood Conversions In Maintaining Stream Temperature.
4	ODF Storm Impacts And Landslides Of 1996
5	ODF Forest Practices Compliance Monitoring Project: 1998 Pilot Study Results
6	ODF Compliance With Fish Passage And Peak Flow Requirements At Stream Crossings: Pilot Study Results
7	ODF Aerial Pesticide Application Project Final Report
8	Evaluation of the Effectiveness of Forest Road Best Management Practices to Minimize Stream Sediment Impacts
9	Forest Roads, Drainage, and Sediment Delivery in the Kilchis River Watershed.
10	Forest Road Sediment and Drainage Monitoring Project Report for Private and State Lands in Western Oregon

For a copy of the executive summaries and/or full reports please contact: Ray Gress: rgress@odf.state.or.us, (503) 945-7470, ODF 2600 state Street, Salem, Oregon, 97310. They can also be downloaded from the Oregon Department of Forestry Web Page: http://www.odf.state.or.us/FP/MonitoringBMPs/default.htm

Oregon Department of Fish and Wildlife
Oregon Plan Monitoring Program

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Introduction

The Oregon Department of Fish and Wildlife (ODFW) implements several fish population and habitat monitoring programs in support of the Oregon Plan for Salmon and Watersheds (OPSW). These programs are implemented at all levels of the agency, from Fish Division to Regional staff. Formal efforts directly linked to the original development of the OPSW are largely located in Fish Division and the Northwest and Southwest Regions. ODFW's coastal monitoring programs are focused on providing statistically rigorous estimates of the status and trends in anadromous fish populations and their habitats at the scale of each of the five coastal coho gene conservation areas (GCAs, see link for map, http://osu.orst.edu/dept/pacrim/GCAs.htm). Additional monitoring programs are conducted in other parts of the state but have not been formally integrated into ODFW's OPSW Monitoring Program to date. Annual reports for most of the coastal monitoring programs are available at the websites listed below.

Fish Division
Aquatic Inventories Project
Selective Fishery Modeling and Monitoring
Oregon Plan Monitoring Coordinator

Northwest Region
Coastal Salmonid Life-Cycle Monitoring
Coastal Salmonid Adult Monitoring
Coastal Salmonid Juvenile Monitoring

Southwest Region
Klamath Mountain Province Juvenile Steelhead Monitoring
South Coast Smolt Monitoring

Summary of Major Fish Population and Habitat Monitoring Projects

Because it is too costly (and probably inefficient) to conduct a complete census of large areas, it is important to design a monitoring system that will produce estimates that statistically represent each area. Scientific sample surveys are designed to meet this need. The fundamental feature of surveys is that a representative sample of the target resource (streams) is selected, using randomization to avoid bias in the selection process.

Measurements made on the sample, such as the number of coho juveniles at each reach selected as part of the sample of reaches, are used to make inferences about the resource as a whole. If the appropriate design principles are followed, the results derived from measurements on the sample produce an accurate representation of the entire resource, e.g., the average density of juvenile coho in the North Coast GCA.
Developing an efficient monitoring system often entails balancing conflicting goals. Monitoring design requirements to optimize our ability to estimate status differ from design requirements to optimize our ability to estimate trends. To estimate status, the larger the sample the better. For example, we could monitor 100 different sites each year for five years, giving us a total sample size of 500 for that period of time. For trend detection, it is best to revisit sites each year, consequently, in the above example, we would revisit the 100 sites visited the first year in each of the subsequent four years, yielding a total sample of 100 sites over the 5-year period. A variety of ways have been developed to balance the requirements for both status estimation and trend detection. One of the most promising is a rotating panel design which entails sampling a new set of sites each year over a particular cycle, say three years, then repeating the cycle by revisiting the first year's sites during the first year of the second cycle, and so on. Various versions of a rotating panel design allow for visiting a subset of sites every year, revisiting some sites on longer cycles, or incorporating new sites each year along with the revisit schedule.

ODFW, in cooperation with EPA, has developed a rotating panel sample design (*http://osu.orst.edu/dept/pacrim/pdf's/rotating.pdf*) for monitoring salmonid habitat and population indicators for the OPSW. In this design, there are 14 panels (the vertical columns); rows indicate years, with row 1 the first year of the monitoring plan. The first panel consists of a set of sites visited every year (S_0). The last panel consists of a set of new sites selected each year from the pool of sites not selected for any of the other panels (S_4). Between these "bookend" panels are three sets of panels that make up a three-year rotating design, patterned after the three-year coho spawning cycle. These three sets are grouped as blocks. S_{10} , S_{20}, and S_{30} consist of a set of sites that would be visited every three years, with S_{10} sites visited the first year, S_{20} sites the second year, and S_{30} sites the third year, then every three years thereafter. Within each of these three year panels is an additional set of sites that would be visited on a nine-year cycle (i.e. S_{11}, S_{12}, S_{13}, S_{21}, S_{22}, S_{23}, S_{31}, S_{32} and S_{33}).

This fairly complicated looking design is flexible and meets several needs. The allocation of sampling effort can be adjusted across panels, although an initial suggestion is that equal effort be allocated to each. Only shaded panels would be visited the year indicated. The total number of sites each year is the sum allocated to each of the panels, and is used for that year's status estimate. For example, during year 1, 25 sites could be allocated to each panel (i.e. 25 S_0, 25 S_{10}, 25 S_{11}, and 25 S_4) for the North Coast GCA, for a sample size of 100 to estimate the number of coho spawners. The sites visited every year (S_0) provide good trend detection capability; with this allocation of sampling effort, 25 sites would be visited each year. Trend detection capability is augmented by the sets of sites making up the rotating panels (three-year and nine-year cycles). Finally, the new sets of sites (S_4) allow an expansion of the sampling effort by adding sites that would not

be considered in the basic fixed and rotating panel design, improving overall representation of the resource of interest, and allowing for a buffer in the event that budgets change. Sample sites could be added or deleted from S_4 without markedly disturbing the trend detection capability of the basic design.

This design also provides flexibility in allocating sample sizes for different indicators over different geographic areas within a GCA. For example, the initial requirement is that coho spawner densities will be estimated with the greatest number of sites, followed by juveniles, then habitat. An added complication is that the spawners occupy a more restricted set of stream miles than do the juveniles, and physical habitat inventories are needed over additional stream miles not occupied by adult and juvenile coho. Furthermore, monitoring designs should be flexible should the need arise for additional indicators (biological integrity, steelhead, etc.). This design layout is compatible with the need for variable sample sizes and spatial extent for a variety of indicators.

The EMAP randomized sampling design not only permits statistical estimates of the status and trends of each resource. It also allows habitat, water quality, adult escapement, and juvenile population data from variable sample sizes to be directly compared because overlap of sampling sites is built into the selection process. Each of the parameters monitored by Oregon Department of Fish and Wildlife's Western Oregon Rearing Project, Aquatic Inventories Project, and Coastal Salmon Inventories Project partially overlap, while some survey sites are specific to the needs of each resource, creating a partially nested design. Spawning surveys encompass the greatest number of sites (120) within the GCAs. These sites are selected from a subset of all streams where adult coho spawn. A smaller number of sites (50) for the summer rearing surveys overlap with adult surveys, but also extend to salmonid rearing habitats outside the distribution of adult coho spawners. Finally, the 45 habitat survey sites overlap with sites sampled for adult spawners and juvenile coho and steelhead populations, but also include other habitats upstream. In this way, the rotating panel design provides an organizational structure for integrating the results of otherwise separate sampling activities.

Through the Interagency Monitoring Team, state and federal agencies are also coordinating their field activities to avoid duplication of effort and to make better use of limited resources. For example, the habitat surveys of the Oregon Department of Fish and Wildlife monitor conditions in smaller first through third order streams (as derived from the digital 1:100,000 GIS stream coverage). Biologists of the Environmental Protection Agency's EMAP program will complement these activities by surveying larger fourth-order streams. In a small subset of the stream reaches surveyed for habitat, the Oregon Department of Environmental Quality will collect data on fish presence-absence, water quality, and other habitat conditions. Their selection of sites will also follow the rotating panel design and their site-specific habitat methods should provide some useful comparison to the larger-scale methods used by the Oregon Department of Fish and Wildlife.

Coastal Salmonid Adult Monitoring

The Coastal Salmonid Inventory Project is responsible for conducting monitoring and research to assess the status of wild stocks of coastal anadromous salmonid populations. Duties include coordinating and conducting coastal salmon spawning ground surveys as well as implementing special studies to improve inventory methods. Current inventory projects focus on coho, chinook, and steelhead with methods to monitor steelhead currently in development. Our survey programs are divided between Standard Surveys and EMAP Random Surveys. Project reports can be found at (http://osu.orst.edu/Dept/ODFW/other/spawn/index.html).

Standard Surveys - ODFW estimates the number of returning fall chinook, coho, and chum salmon adults annually at 107 sites that have been sampled for the last 30-50 years. This dataset represents ODFW's best long-term information base to monitor trends in salmon populations.
EMAP Random Surveys – were initiated by ODFW in 1998 to monitor the status and trends in adult coho salmon populations for each of the five coastal GCAs with a statistically rigorous method. Using the EMAP design, 120 randomly selected stream reaches have been sampled annually for coho spawners in each the five coastal GCAs since 1998. From these surveys we are able to estimate the abundance of adult coho in each GCA with a precision of ±30%.

Coastal Salmonid Life Cycle Monitoring

ODFW has been conducting a Life-Cycle Monitoring Program in eight coastal watersheds since 1998. The eight watersheds are used as index sites to trap adult and juvenile salmonids of all species and to monitor trends in the freshwater and marine survival of coho. These data are used to estimate smolt out-migration and adult returns to specific streams in order to index freshwater and ocean survival rates of the fish. They are also used to characterize the smolts and adults and monitor annual changes in migration timing and related parameters. Data on these parameters helps determine whether freshwater survival rates are being improved by public and private efforts under the Oregon Plan for Salmon and Watersheds as represented by the index basins. The data on ocean survival rates help the State track changes in ocean conditions that may mask improvements in freshwater conditions by keeping adult returns to rivers at low levels (or that give a false sense of success by returning larger numbers of adults without much improvement in freshwater conditions). Project reports can be found at (http://osu.orst.edu/Dept/ODFW/life-cycle/index.html)

Coastal Salmonid Juvenile Monitoring

In 1998, ODFW initiated annual summer surveys to monitor juvenile coho salmon in Oregon Coastal streams. The objectives of these surveys are to: 1) monitor trends in the

abundance and distribution of juvenile coho in each of five coastal coho Gene Conservation Areas (GCAs); and 2) provide information needed to investigate the relationships between freshwater habitat characteristics, adult spawner abundance, and juvenile recruitment. Within each GCA, 50 1-km reaches are randomly selected annually for juvenile sampling. Project reports can be found at (http://osu.orst.edu/dept/pacrim/index.htm).

Klamath Mountain Province Juvenile Steelhead Monitoring

A National Marine Fisheries Service status review concluded that Klamath Mountain Province (KMP) steelhead was threatened with extinction. In contrast, an ODFW evaluation concluded that summer steelhead (STS) populations were depressed, but the winter steelhead (STW) populations were healthy. Subsequent discussions lead to a deferral of the proposed ESA listing. Oregon agreed to terminate STW harvest in KMP streams (except the Rogue River Basin remained open) and to improve population assessments. Oregon also committed to development of population health goals for steelhead, with trial efforts first attempted for KMP steelhead.

The KMP includes coastal basins from Cape Blanco to just south of the Klamath River in California. In Oregon, all basins produce STW, but STS are produced only in the Rogue River Basin. In 1999, ODFW developed and implement assessment methods to determine the status of wild steelhead in the Oregon portion of the KMP. Monitoring has focused on characteristics of fresh water habitat in areas accessible to steelhead, densities and distribution of juvenile steelhead in late summer, annual adult counts at Gold Ray Dam should be a minimum of 4,000 wild summer steelhead and 4,000 wild winter steelhead, and the proportion of half-pounder life histories in the late-run adult summer steelhead in the Rogue River. Project reports will be available at the website in the near future (http://osu.orst.edu/dept/pacrim/KMPindex.htm).

Aquatic Inventories Project

The Aquatic Inventories Project provides habitat data in support of the OPSW though basin inventories and EMAP surveys. These data are used to quantify and qualify various habitat parameters in Oregon watersheds and assess their effects on fish populations, identify habitat restoration needs, and monitor the extent of habitat improvement accomplished under the Oregon Plan for Salmon and Watersheds. Project reports can be found at (http://osu.orst.edu/Dept/ODFW/freshwater/inventory/invent.html).

The basin-wide census surveys provided information on the quality of local aquatic habitat throughout a stream or watershed. The continuous-survey approach provides

estimates of habitat conditions throughout a stream, supplies a complete inventory of barriers to fish passage (e.g. falls or culverts) and other spatially patchy features, describes habitat and hydrologic relationships among streams or landscape features, and estimates potential influences on fish distribution and survival by life stage.

The randomly selected sites are a sample survey. The sites are selected randomly across the landscape to monitor status and spatial distribution of aquatic habitat, and to assess change in habitat conditions over time. Surveys are conducted in 45 randomly selected, 1-km reaches within each of the five GCAs along the Oregon coast. The sample survey provides the most statistical power to describe conditions across a broad geographic area. The surveys also provide additional opportunities for comparing aquatic habitat conditions with other landscape features such as geology or land management. To better interpret landscape patterns in habitat quality, the Aquatic Inventories Project has sought to improve the definition of a set of reference conditions for streams in western Oregon. The sites surveyed in 2000 represent a reference conditions for a variety of ecoregions, geologic types, and basin area. Habitat conditions from random surveys in each GCA can then be compared to reference conditions to assess the status and trends in habitat conditions for each GCA in relationship to reference conditions.

Selective Fishery Modeling and Monitoring

Under the OPSW, ODFW initiated a selective fishery modeling and monitoring program for coastal coho to regulate selective ocean fisheries on hatchery coho to meet the wild coho rebuilding criteria in the Oregon Plan. Extensive ODFW sampling and analysis has indicated the mortality rate on wild coho has been less than 1% in the small selective fishery off the central Oregon coast, with around 100 wild coho dying in a fishery that harvested over 6,000 hatchery coho in 1999. Sampling in the selective coho fisheries also provided new information on gear-types being used by anglers, the location of hooking wounds on fish, and verified pre-season assumptions about percentage of finclipped coho present, encounter rates with fish, and the rate that hooked fish "dropped off" before reaching boats. ODFW also analyzes returning hatchery coho with "double-index tags" to improve estimates of hooking mortality on non-finclipped coho in selective sport fisheries targeting finclipped hatchery coho.

Monitoring of Predator Impacts

ODFW monitors the abundance, movement, and diet of marine mammals in select Oregon bays since 1999. Work was coordinated with salmonid stock assessment work (i.e., estimates of adult spawners) at both the Rogue and the Alsea bays and with a study of migrating salmon smolts in the Alsea Bay. Project reports will be available on the Web in the near future.

Department of Environmental Quality

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What Does Stream Monitoring Data Tells Us About the Condition of Coastal Oregon Streams?

Two Objectives of Oregon Plan Monitoring:

- What is the current range of stream conditions or "health" in the Coast Range?
- What are the main factors causing impaired fish and other biological communities?

Stream "Health"

The condition or "health" of a stream can be thought of as having three major components: the biological condition of the stream, the chemical quality of the water, and the condition of the physical habitat. We know that coho salmon and other important salmonid species have been in serious decline in recent times. By monitoring the different components of stream "health" we hope to document some of the reasons behind this decline.

Monitoring Design

DEQ and ODFW have been conducting stream monitoring using a probabilistic or stream "polling" approach as an accurate and cost-effective way to describe streams on a regional basis without the great expense of trying to take a "census" of all coastal streams. Since the conditions of the randomly selected stream sites are representative of the larger regional stream population, the data can be used to answer questions about regional conditions.

Data Evaluation

Biological condition of stream fish, amphibians, and macroinvertebrates are evaluated using species data from reference streams of known good quality from the same range of stream types as the random sites. Streams are categorized as being in good, poor, or very poor condition depending on how closely they support species present at reference sites. Habitat, temperature, and water chemistry conditions are evaluated as being in desirable or undesirable condition using benchmark conditions known to sustain healthy biological communities. The biological, chemical and habitat conditions of Coast Range streams are summarized in the graphs below. The data are from the most recent year available.

Results

Figures 1a and 1b show that only about a quarter of the stream miles are considered to be in good biological condition. Both the macroinvertebrate and fish assemblages indicate the same number of stream miles are biologically impaired. Figure 2 summarizes the chemical water quality data of a dozen chemical parameters. It shows that the chemical

water quality tends to be good to excellent. When water quality problems do exist it is usually due to low dissolved oxygen. Figure 3 shows the results for the physical habitat factors that frequently affect biological communities. The majority of stream miles are most often impaired due to lack of large woody debris or excessive fine sediment.

Primary Factors Affecting Stream Biological "Health"

What does the monitoring data tell us about the condition of coastal Oregon streams? It tells us that about three-quarters of our coastal streams show some level of biological impairment and that habitat quality is the major problem. For the majority of coastal Oregon stream miles, chemical quality and water temperatures are not major sources of impairment in coastal streams. Continued monitoring over the years will tell us how well we are doing in restoring habitat quality and biological condition.

Figure 1a
Macroinvertebrate Biotic Condition
Percent of Coast Range Stream Miles

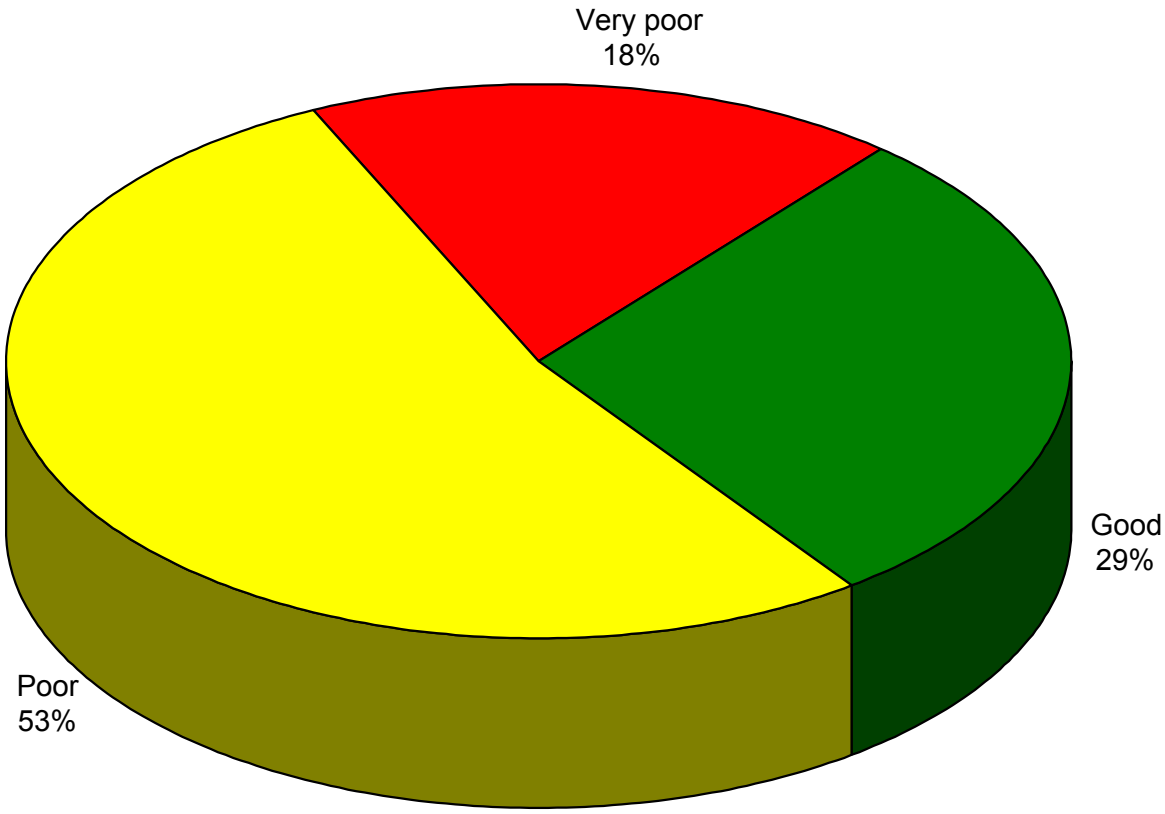


Figure 1b

Vertebrate Biotic Condition
Percent of Coast Range Stream Miles

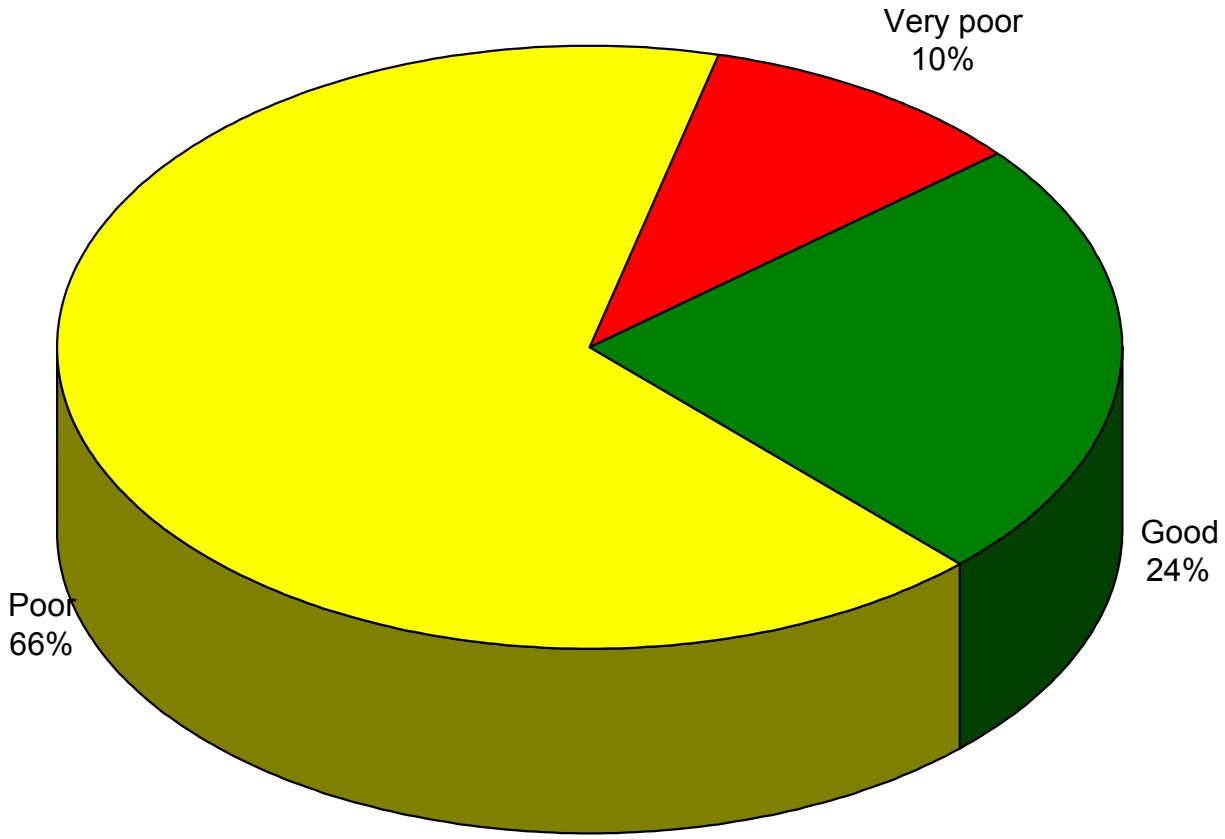


Figure 2
Chemical Water Quality
Percent of Coast Range Stream Miles

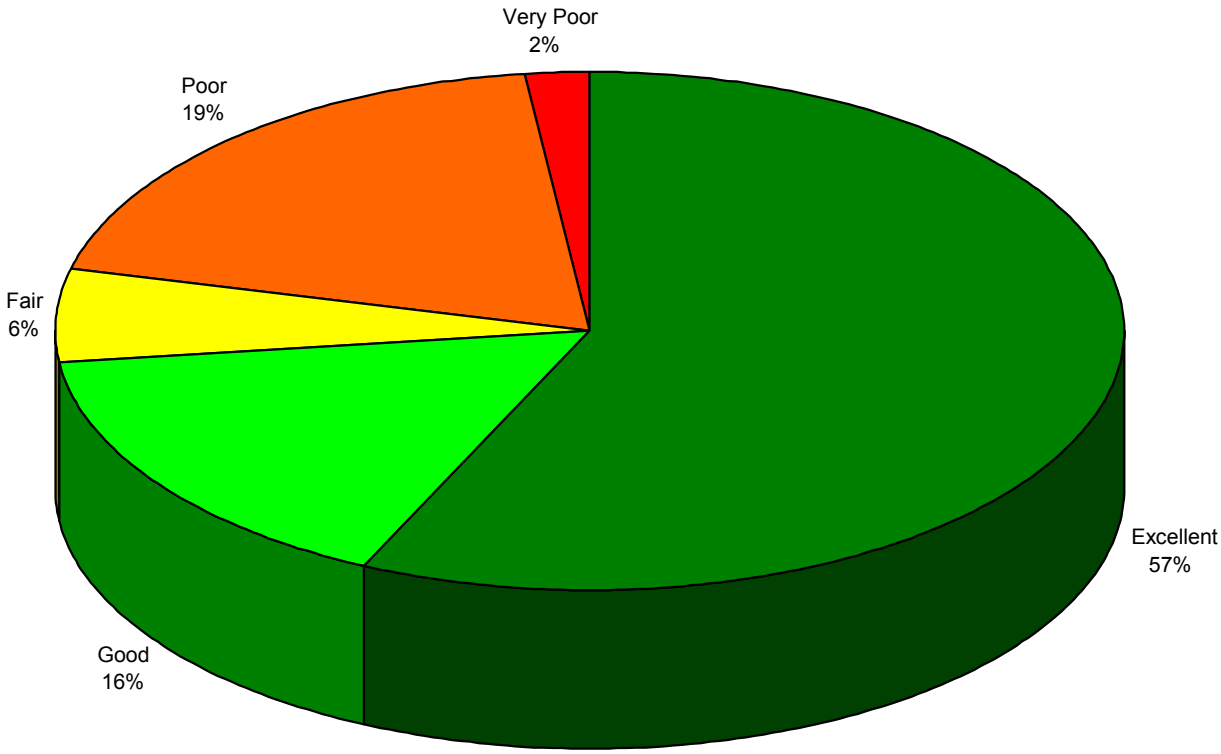
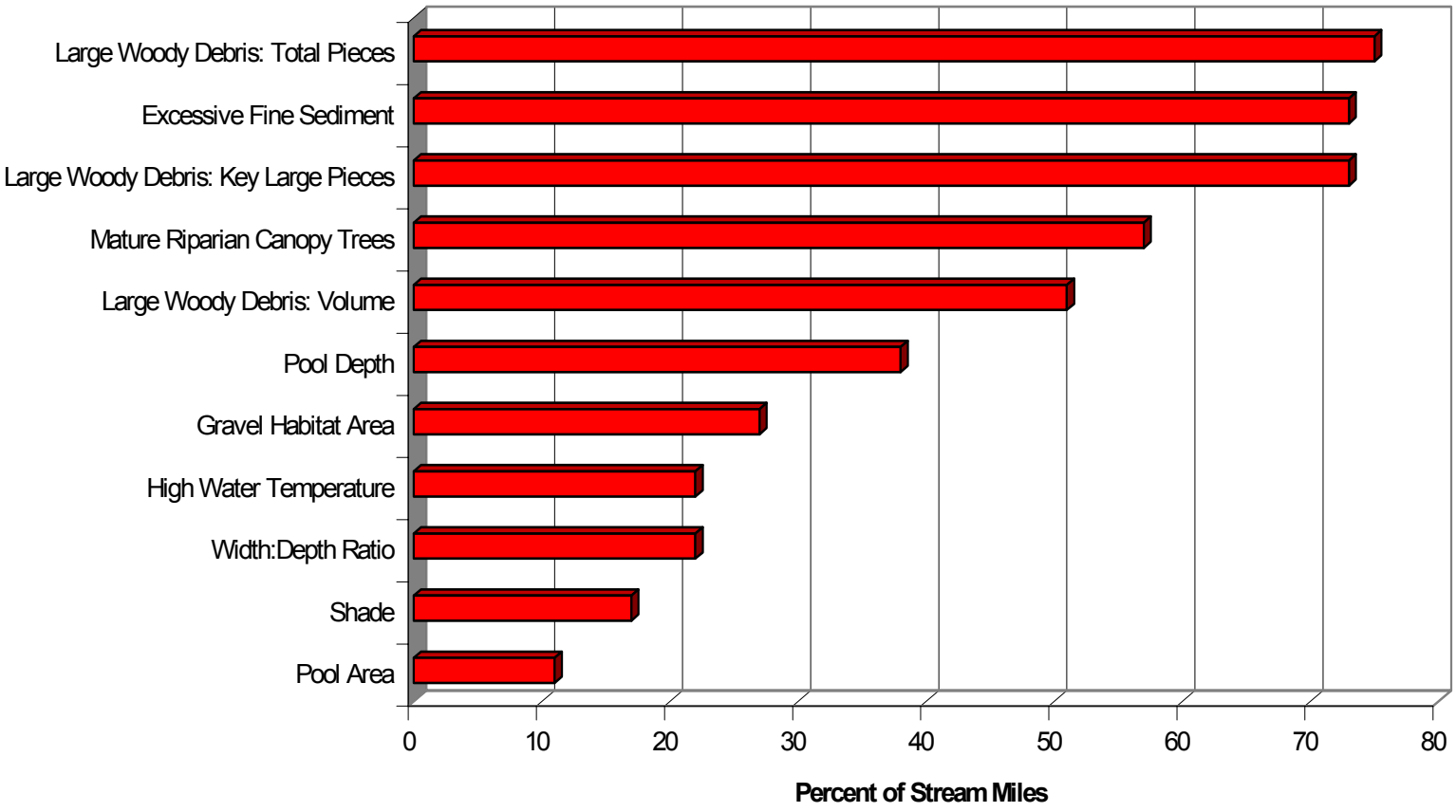


Figure 3
Physical Habitat Factors
Percent of Coast Range Stream Miles in Poor or Undesirable Condition



Department of Environmental Quality (DEQ) Strategy Comments

DEQ Oregon Plan Monitoring strategy needs to address three major needs:

- Status and trend assessment of fish populations and stream conditions (physical, chemical and biological) over large geographic areas.
- Targeted intensive sampling to evaluate the effects of restoration work, new management approaches and the implementation of new pollution controls such as TMDLs and 1010 plans.
- Applied Research: Ex. Evaluate the most effective monitoring protocols to assess freshwater and ocean survival of key salmonids; determine expected or "reference" conditions for streams within basins or watersheds.

Status and Trend Assessments

A probability sampling design is the primary monitoring approach being used by ODFW and DEQ. The purpose or goal of this monitoring approach is to characterize the status and trends of fish populations, stream habitat conditions, chemical conditions and biological functions of streams within priority regions. This sampling approach will provide for the first time useful information about the status and trends in fish populations and stream conditions over large geographic areas.

Current Oregon Plan probability monitoring is focused in the Coast Range (Coast and South Coast ESUs). Other areas of the state have limited sampling (DEQ samples a small number of sites in the Willamette and Lower Columbia ESUs) or no sampling at all. These limitations are the result of limited funding and resources.

Within the coastal ESUs, ODFW and DEQ sample at different scales. For example, DEQ samples at the ESU scale within the Coast, South Coast, Willamette and Lower Columbia ESUs. On the other hand, ODFW samples at the GCG (Gene Conservation Group) scale within the Coastal ESUs. Sampling at different scales limits the ability to integrate the data collected by DEQ and ODFW. Additional funding would be needed to increase the sampling intensity of DEQ to the GCG scale used by ODFW.

Primary Objectives:

- Develop accurate status and trend data for fish populations, habitat, water quality and biological conditions for streams at geographic scales useful for management decisions (ESU and GCG scales).
- Important for evaluating and making management decisions.

Limitations:

- Does not provide data to determine the status or trends at small scales (individual streams, watersheds, or basins).
- It will take many years, if not decades, to see trends for certain parameters (fish populations for example).
- Not useful for site specific or project specific effectiveness monitoring.

Targeted Intensive Sampling

More targeted intensive sampling is often designed to evaluate the effectiveness of specific projects or management activities. This monitoring work generally occurs over a small area (a few individual streams or watersheds) for a well defined set of parameters.

Primary Objectives:

- Determine the effectiveness of specific management activities, pollution controls or restoration projects.
- Determine what types of activities provide the most benefits to stream conditions.

Limitations:

- Difficult to extrapolate to large geographic areas.
- May take many years to see responses in some parameters (changes in water temperature for example, will depend on how quickly riparian vegetation grows and how large an area of the stream is treated.).

DEQ will be using this approach to determine the effectiveness of TMDL implementation as TMDLs are completed.

Applied Research

Specific research projects are often necessary to test how well certain sampling protocols measure conditions, or to answer critical life history questions or environmental requirements of certain species.

Primary Objectives:

- Answer questions that will improve sampling methods or our understanding of the needs of specific species.

Limitations:

- Narrow focus.
- Difficult to extrapolate to large geographic areas.
- May be limited in affecting management decisions.

Monitoring work at DEQ that fall into this category, is mostly directed at evaluating and refining specific monitoring protocols to improve data quality.

Integrating these three monitoring approaches into a comprehensive monitoring plan is an important goal of the Oregon Plan interagency monitoring effort. Agency monitoring programs are currently being evaluated to determine where changes can be made to better integrate data and results to take full advantage of monitoring work.

Department of Environmental Quality: Oregon Plan Volunteer Monitoring Support

Contact: Karen Font-Williams, Volunteer Monitoring Coordinator, DEQ (503) 229-5983 x273

DEQ supports local volunteer monitoring efforts, particularly for water quality parameters such as temperature, pH, nutrients, and bacteria. DEQ uses standard protocols for sample collection, analysis, and quality control that are that basis for the Water Quality Monitoring Guide developed by the Oregon Plan Monitoring Team and distributed by OWEB.

Typical implementation of local volunteer monitoring efforts involve training and support from DEQ, equipment either loaned by DEQ or provided through OWEB grants. OWEB has supported numerous local monitoring using review and guidance from the Oregon Plan Monitoring Team.

Volunteer groups holding equipment:	**41**
New groups in 2000:	**4**
Groups with QA Plans:	**23**

The groups that have submitted QA plans are those with whom I am most actively involved. During the winter months I contact those groups holding equipment that have not indicated to me that equipment is being used. Often there has been a change in leadership and the new coordinator is not aware that DEQ loaned them equipment.

Submitted 1999 data:	**19**
Submitted 2000 data:	**4**

I expect an equal number of data submission in 2000 as we attained in 1999.

My main activities this year have been:

Trainings:	**9**
Split samples:	**7**
Speaking at conferences/meetings:	**6**

I find the split samples extremely useful. They help me understand potential problems with equipment, allow me to see the volunteers' sites, and dedicate a day to assessing and commenting on their techniques and methods. I have also been reviewing quality assurance plans, providing technical assistance with equipment, performing equipment maintenance, creating volunteer stations in the DEQ database (LASAR), and assisting volunteers with data processing and downloading. I also wrote one newsletter and sent it to watershed councils and other volunteer groups with whom I have been working.

I attended the National Volunteer Monitoring Conference in Austin, TX this spring and learned a great deal about volunteer programs in other states. While our program is particularly strong in generating high quality data, I would like to improve our communication with volunteer groups and show them that their data are being used and their efforts are appreciated. My 2001 goals reflect ideas for improving communication.

I received an $88,000 grant from OWEB this summer for equipment purchase and re-supply. In addition to ordering expendable supplies such as DO reagents and pH supplies, I increased the volunteer equipment for habitat monitoring, such as flow meters, solar pathfinders, clinometers, and macroinvertebrate supplies. Currently I have spent about $20,000.

Goals for 2001 Reporting and Integration:

- Comprehensive summary report of volunteer-collected data (1998-2000)
- volunteer monitoring page on the DEQ website
- data interpretation guide
- newsletter
- volunteer data into LASAR data management system
- retrieve equipment from inactive groups

Division of State Lands: Oregon Plan Monitoring – Permit Compliance Monitoring and Effectiveness Monitoring

Monitoring Team Member: Steve Morrow (503) 378-3805

Permit Compliance Monitoring: In the current biennium the Division of State Lands (DSL) has a total of 16 FTE for implementation of all field operations programs. Those programs include the proprietary responsibilities of managing state owned land and resources for the purpose of garnering revenue for the Common School Fund and the regulatory responsibilities of administering the State Removal-Fill Law. At this time 3 FTE are assigned to administer the proprietary program and 13 FTE are assigned to administer all elements of the Removal-Fill program, of which 1 FTE is assigned to administer all of the issues that entail wetland compensatory mitigation. At present, DSL has 1.5 FTE dedicated for permit compliance monitoring (3 staff positions, half-time dedicated to monitoring). Since November 1997, DSL has made a concerted effort to monitor permits issued for compliance with the permit and conditions of the permit. Presently, permit compliance monitoring is not yet statewide, but has been initiated in 26 out of the 36 counties. The counties that have not yet had permits monitored for compliance are in the central and southeast portions of the state. Permit compliance monitoring is an on-going effort where the goal is to site visit and monitor at least 10% of the permits we issue per year.

DSL is in the process of re-organization. One of the aspects of that re-organization would be to remove the 3 staff positions involved in permit compliance monitoring half of their assigned time (the other half of their assigned time is spent on enforcement of un-permitted activities) to full-time enforcement of un-permitted activity. The 12 FTE involved with issuance of permits, leases and enforcement of un-permitted activity would now be separated, 4 FTE would focus on issuance and enforcement of leases and other proprietary responsibilities of DSL. The remaining 8 FTE would focus on removal-fill permit review, issuance and monitoring. The goal of the 8 FTE assigned to removal-fill permitting would be to spend one-fifth of their assigned time monitoring the permits they issued for compliance with the conditions of the permit and monitor the effectiveness the permitting program is having in achieving the desired landscape objectives. This re-organization would result in a small gain in the permit monitoring effort. In the past, permit monitoring has focused on compliance monitoring. Now the people who issue the permits will be monitoring those permitted activities. We feel there will be a feedback loop to the permit program in that we will learn to write more effective permits through direct experience.

Information and results from the DSL permit compliance monitoring program is available in the Annual Removal-Fill Report (used to be biennial, now is annual) and the DSL Biological Assessment for the State Programmatic General Permit (SPGP) under Section 404 of the Clean Water Act. In the past, articles have been published in the *Wetlands Update* (a bi-annual newsletter published by DSL) that address items and issues that have been noted in compliance monitoring that approach effectiveness monitoring.

Oregon Department of Agriculture: Monitoring Activities Associated with the Oregon Plan Monitoring Effort, Calendar Year 2000

Contact: Paul Measles, ODA Monitoring Team Representative (503) 986-4778

Project Title: Upper Grande Ronde Basin Site Capability/Gap Analysis
Upper Grande Ronde River Basin.
Contact: Mack Barrington
Final report pending.
ODA began this project in November, 1999 to assess the impact of our Grande Ronde AgWQM Rules on providing riparian vegetation and satisfying the total maximum daily load allocation for heat (shade) (OAR 603-095-0440). This monitoring involves using information obtained on soils, water availability, historical plant communities, climate, and other factors to model how much, what types, and how dense vegetation will be in a given riparian zone. The methodology developed from this project is intended to be used in agricultural basins throughout the state. The first phase of this project is completed, but the report has not been finalized.

Project Title: Food Safety Bacteria Sampling
Various estuaries along Oregon Coast.
Contact: Deb Cannon, Food Safety Division
Hard copy reports available
The Food Safety Division of ODA regularly monitors bacteria concentrations in eleven estuaries along the Oregon coast, from Neskowin to Gold Beach. Information collected from this monitoring is primarily used to determine if shellfish harvest restrictions should be in place.

Project Title: Confined Animal Feeding Operation (CAFO) Inspection Program
Locations throughout Oregon.
Contact: Al Youse
Hard copy reports available.
The Confined Animal Feeding Operation Program conducts inspections of all permitted and many permitted CAFOs to determine compliance with water quality laws. In 2000, a total of 648 inspections were completed by the CAFO program. These included

- 18 Educational Review inspections, where a CAFO operator requested ODAÕs assistance in evaluating this operation.
- 313 Routine inspections, which are announced regular inspections of CAFO operations.
- 234 Follow-up inspections, where operators previously found in violation are revisited.
- 41 Complaint investigations, where ODA inspectors investigated a written complaint received about a permitted or non-permitted CAFO.
- 8 Joint unannounced ODA/EPA inspections of CAFOs.
- 34 Other inspections of operators which failed to pay permitting fees.

These inspections resulted in a total of 106 corrective actions which were required of operators to address existing or impending water quality problems. The overall compliance rate for permitted and non-permitted CAFOs in 2000 was 57%. No civil penalties were issued in 2000.
The number of permitted CAFOs ranged from 610 at the beginning of the year to 517 and the end of 2000. Besides ODA and joint ODA/EPA inspections, the EPA also conducted additional inspections of CAFOs. Currently, ODAÕs CAFO regulations are less stringent than the EPAÕs, and ODAÕs definitions of CAFOs do not cover all the facilities that fall under EPAÕs definition.

Project Title: Coos & Coquille Basins Macroinvertebrate Monitoring
Coos, Coquille, and Pistol River Basins in agricultural development.
Contact: Laura Tesler.
Hard copy reports available.
This monitoring program is being performed at 13 sites in the Coos and Coquille watersheds, and one site in the Pistol River watershed. Each sampling location is on property with a recently approved farm plan. Sampling done in 1999 and 2000 was considered to give baseline conditions, and monitoring will continue in 2001 and beyond. This information will be used to track the effectiveness of the pending Agriculture Water Quality Management Plan and Rules, in addition to giving landowners feedback on the local conditions of the streams. Besides macroinvertebrates, water samples are analyzed for dissolved oxygen and temperature. General fish habitat conditions are also described.

Project Title: General Baseline Monitoring for AgWQM Plans and Rules
Umatilla, Yamhill, Middle Deschutes, Lost River, and North Coast Basins (as of January, 2001)
Contact: Paul Measeles
Reports not yet available.
In October, ODA began a concerted effort to collect existing water quality and riparian condition data for basins where AgWQM Plans and Rules are currently in effect. This monitoring is being performed to assess water quality conditions at the initiation of AgWQM Plans, so that a starting point for water quality trend monitoring can be established. Currently, ODA does not have the resources to fulfill its obligations for complete monitoring of water quality trends or the effectiveness of their AgWQM Plans and Rules. Baseline monitoring is being done with the anticipation that resources for monitoring will available sometime in the future. As of January, DEQÕs LASER database has been the most useful. EPAÕs STORET database has not been found to be very reliable. Additional data has also been obtained from the Bureau of Reclamation and irrigation districts.

Project Title: Tualatin Basin Water Quality Trend Monitoring
Tualatin Basin
Contact: Stephanie Page or Paul Measeles
Hard copy or electronic data available.
ODA has contracted with Oregon Analytical Laboratory (now North Creek Analytical) and previously Oregon Graduate Institute to do water quality monitoring in the Tualatin Basin annually since 1994. Data collected from this monitoring is being used to assess water quality trends related to agricultural operations

in the basin. Seven tributaries to the Tualatin River are monitored every two weeks from the mid to late summer as part of a large water quality program conducted in cooperation with other management agencies. The Tualatin is the only AgWQM area where historically ODA has had resources available to fund trend monitoring.

Oregon Plan for Salmon and Watersheds: Monitoring Issues and Objectives

The Oregon Plan for Salmon and Watersheds proposed draft quantifiable objectives for biological and physical attributes of healthy watersheds and salmon populations. These objectives became the basis for the sensitivity needed to develop monitoring protocols and implementation of sampling designs. Current development of an expanded Monitoring Strategy will use these objectives as the starting point for program development. Progress towards meeting these Objectives is documented in the Oregon Plan for Salmon and Watersheds Annual Progress Report 2001.

Water Quality Biological Objectives

Temperature:

1. To identify waterbodies not meeting the water quality standard for temperature through biennial updates to the 303(d) List according to the following milestones (% of waterbodies identified):
   2002 - 50%
   2007 - 95%

2. To meet DEQ's water quality standard for temperature in coastal waterbodies that support salmonids, or have historically supported salmonids, according to the following milestones (% of stream miles meeting numeric criteria for temperature):
   1997 - unknown (18.4% of stream miles assessed)
   2007 - 35%
   2012 - 45%
   2017 - 65%
   2027 - 90%

3. In coastal waterbodies that support or have historically supported salmonids, where water quality currently is equal to or better than DEQ's water quality standard for temperature, manage activities such that water quality is not degraded.

4. Review the numeric criteria in the temperature standard during each Triennial Review Period to determine if the standard needs to be scheduled for revision to ensure it remains protective of beneficial uses based upon the most current scientific information.

Sediment:

1. To identify waterbodies that are water quality limited for sediment through biennial updates to the 303(d) List according to the following milestones (% of waterbodies identified):
   2002 - 15%
   2007 - 65%
   2012 - 90%

2. To meet DEQ's water quality standard for inter-gravel dissolved oxygen in spawning gravel beds for coastal waterbodies according to the following milestones (% of streams that meet numeric criteria for inter-gravel dissolved oxygen):

1997 - unknown
2007 - 15%
2012 - 40%
2017 - 70%
2027 - 90%

3. In coastal waterbodies that support or have historically supported salmonids, where water quality currently is equal to or better than DEQ's water quality standard for inter-gravel dissolved oxygen, manage activities such that water quality is not degraded.

4. Review the numeric criteria in the inter-gravel dissolved oxygen standard during each Triennial Review Period to determine if the standard needs to be scheduled for revision to ensure it remains protective of beneficial uses based upon the most current scientific information.

5. During the next Triennial Review Period (1997-99 biennium) review and revise, as appropriate, the state narrative water quality standard for sedimentation to determine if numeric criteria can be developed to improve protection of aquatic species and to make the standard easier to implement.

6. To identify stream reaches with excessive sediment loads and mitigate the major sources of increased sediment by 2007.

Dissolved oxygen:

1. To identify waterbodies not meeting the water quality standard for dissolved oxygen through biennial updates to the 303(d) List according to the following milestones (% of waterbodies identified):
2002 - 50%
2007 - 95%

2. To meet DEQ's water quality standard for water column dissolved oxygen in coastal waterbodies that support, or have historically supported salmonids, according to the following milestones (% of streams meeting the numeric criteria for dissolved oxygen):
1997 - unknown (73.2% of stream miles assessed)
2007 - 35%
2012 - 70%
2017 - 90%
2027 - 95%

3. In coastal waterbodies that support or have historically supported salmonids, where water quality currently is equal to or better than DEQ's water quality standard for dissolved oxygen, manage activities such that water quality is not degraded.

4. Review the numeric criteria in the dissolved oxygen standard during each Triennial Review Period to determine if the standard needs to be scheduled for revision to ensure it remains protective of beneficial uses based upon the most current scientific information.

Biological Conditions:

1. To identify stream reaches not meeting biological criteria, 150 stream sites will be randomly selected to evaluate the overall biological condition of coastal streams. Thirty sites will be sampled per year (20%) or sixty sites per biennium (40%). Results for the 150 sites will be evaluated every five years to determine the percentage of sites that are biologically impaired.

2. Support and maintain a balanced, integrated, adaptive community of organisms, in coastal streams that support salmonids, which have a species composition, diversity, and functional organization comparable to that of the natural habitat of the sub-basin as determined by accepted biomonitoring

techniques provided under DEQ's biological criteria water quality standard. Based on the evaluation of randomly selected sites the percent of coastal streams not meeting the biological criteria will be calculated. The goal will be to reduce the percent of biologically impaired streams according to the following milestones.
1997 - 35% impaired
2007 - 30% impaired
2014 - 15% impaired

3. In coastal waterbodies that support or have historically supported salmonids, where resident biological communities currently have a species composition, diversity, and functional organization comparable to that of the natural habitat of the sub-basin, manage activities such that water quality is not degraded.

4. Use accepted biomonitoring techniques to develop metrics descriptive of the natural habitats found in coastal watersheds used by salmonids to ensure a complete set of reference sites is available for implementation of the biological criteria water quality standard. Sixty sites will be selected in the coast range as reference sites. Twenty sites (33%) will be sampled per year. Every three years the metrics and impairment criteria will be evaluated for the biological water quality standard.
1997 - 33% of 60 sites
1998 - 66% of 60 sites
1999 - 100% of 60 sites

Toxics:

1. To identify waterbodies not meeting the water quality standards for toxics through biennial updates to the 303(d) List according to the following milestones (% of waterbodies identified):
2002 - 50%
2007 - 95%

2. To meet DEQ's water quality standards for toxic substances contained in Table 20 of OAR Chapter 340, Division 41 for all coastal streams that support or have historically supported salmonids, according to the following milestones (% of streams meeting the numeric criteria for toxics):
1997 - unknown (10.9% of stream miles assessed)
2007 - 35%
2012 - 70%
2017 - 90%
2027 - 95%

3. In coastal waterbodies that support or have historically supported salmonids, where water quality currently is equal to or better than DEQ's water quality standards for toxic substances, manage activities such that water quality is not degraded.

4. Review the numeric criteria in the toxics standard during each Triennial Review Period to determine if the standard needs to be scheduled for revision to ensure it remains protective of beneficial uses based upon the most current scientific information.

5. Identify stream reaches where there are sources of toxic substances.

pH:

1. To identify waterbodies not meeting the water quality standard for pH through biennial updates to the 303(d) List according to the following milestones (% of waterbodies identified):
2002 - 50%
2007 - 95%

2. To meet DEQ's water quality standard for pH in coastal waterbodies that support, or have historically supported salmonids, according to the following milestones (% of streams meeting the numeric criteria for pH):
   1997 - unknown (79.5% of stream miles assessed)
   2007 - 35%
   2012 - 70%
   2017 - 90%
   2027 - 95%
3. In coastal waterbodies that support or have historically supported salmonids, where water quality currently is equal to or better than DEQ's water quality standard for pH, manage activities such that water quality is not degraded.

4. Review the numeric criteria in the pH standard during each Triennial Review Period to determine if the standard needs to be scheduled for revision to ensure it remains protective of beneficial uses based upon the most current scientific information.

Stream Fertility:

1. To the maximum extent practicable, minimize alterations to stream fertility that adversely affect salmon.

Physical Habitat Biological Objectives

Loss/degradation of riparian areas

1. The interim habitat objective for trees in riparian areas capable of growing trees is to provide 200 trees of functional size per 1000 feet of stream along 60% of the fish-bearing stream length. Functional size means trees with an adequate diameter and length to provide stable key pieces.

2. In cooperation with local groups and federal agencies, refine, by reach or stream type, all the riparian conditions needed to support healthy stocks of salmonids in all coastal streams by 2002.

3. Inventory existing riparian conditions in 20% of coastal salmonid streams per biennium. Re-inventory at a rate of 5% per biennium.

4. Ensure that existing programs prevent, minimize or mitigate the effects of human activities that would adversely affect riparian functions important to salmonids beyond present (1997) conditions.

5. Restore riparian conditions so that 75% of all coastal streams have riparian areas capable of supporting healthy stocks of salmonids over the next two decades.

Channel morphology:

1. The interim stream channel habitat objectives are:
   For 60% of the stream channel length (stream orders 2 -5), 35% of the total stream area is pool; and
   For 60% of the stream length (orders 2-5) there will be no more than 5-8 channel widths between pools.
   (Note: while not quantified, improvement in residual pool depth should also occur over time.)

2. In cooperation with local groups and federal agencies, refine, by reach or stream type, all the channel morphology parameters needed to support healthy stocks of salmonids in all coastal streams by 2002.

3. Inventory existing channel morphology elements in 20% of coastal salmonid streams per biennium. Re-inventory 5% per biennium.

4. In coastal streams, ensure that existing programs prevent, minimize or mitigate the effects of human activities that would modify channel morphology, or the upstream and upland processes that generate various morphological features and morphological diversity, to the detriment of salmonids beyond present (1997) conditions.

5. Where channel morphology in coastal streams has been altered by human activities to the detriment of salmonids, actively restore those channel morphology elements necessary to support healthy salmonid populations, and/or the upstream and upland conditions that will restore those elements naturally, in 5% of altered stream miles per biennium.

Substrate changes in streams

1. The interim habitat objectives for substrate condition are to provide:
   Greater than 35% gravel availability in 70% of the stream length;
   In volcanic parent material, less than 8% fines (% area); and
   In sedimentary parent material, less than 10% fines (% area).

2. In cooperation with local groups and federal agencies, refine, by reach or stream type, all the substrate elements needed to support healthy salmonid stocks in all coastal streams by 2002.

3. Inventory existing substrate conditions in 20% of coastal streams per biennium. Re-inventory 5% of the coastal streams per biennium.

4. Ensure that existing programs prevent, minimize, or mitigate the effects of human activities that would modify substrate composition in coastal streams, or the upstream and upland processes that generate instream substrate diversity, to the detriment of salmonids beyond present (1997) conditions.

5. Restore substrate abundance and distribution elements necessary for healthy salmonid stocks, and/or the upstream and upland processes that would replenish them naturally, in 2 to 5% of altered stream miles per biennium.

Loss of instream roughness

1. The interim habitat objectives for instream roughness are 50% of the stream length (orders 2-5) will have more than 3 functional key pieces/100 meters of stream length. A functional key piece is woody debris that has adequate length and diameter to be "stable" within a channel.

2. In cooperation with local groups and federal agencies, refine, by reach or stream type, the amount of instream roughness necessary to support healthy salmonid stocks in all coastal streams by 2002.

3. Ensure that existing programs prevent, minimize or mitigate the effects of human activities on present (1997) instream roughness elements important to salmonids.

4. Ensure that instream roughness elements important to salmonids created during floods and other natural events remain in place to the extent consistent with public health and safety.

5. v.)In coastal streams deficient in instream roughness elements important to salmonids, actively restore those elements and/or the upstream and upland processes that will restore them naturally, in 5% of deficient stream miles per biennium.

Passage impediments

1. Identify all human-created passage impediments to coastal stream segments usable or potentially usable by salmonids, and categorize those segments according to the amount and/or quality of potential habitat, by 2010. Establish and maintain a list of "significant" barriers for restoration priority. "Significant" barriers are barriers that block access to overwintering habitat or that block access to more than 600 feet of stream.

2. Ensure that human activities in coastal streams currently accessible to salmonids do not block or otherwise segment those streams so as to limit accessibility.

3. Remediate 15% of the significant human-created impediments to fish passage in coastal streams per biennium.

Loss of estuarine rearing habitat

1. In cooperation with local groups, academe and federal agencies, identify estuarine habitat parameters and functions necessary to support healthy stocks of salmonids and their relative importance by 2002.

2. Survey the extent to which estuarine habitat has been altered and how, by 2007.

3. Ensure that existing programs prevent or mitigate the detrimental effects to salmonids of human activities on the present (1997) estuarine habitat.

4. Where estuarine habitat has been eliminated or altered to the detriment of salmonids, actively restore habitat features that contribute to healthy stocks of salmonids, prioritized according to the 4(a) identification of relative importance of habitat types, in 5% of each estuary per biennium.

Loss of wetlands

1. Identify, by stream reach or type, the functions, sizes and locations of wetlands necessary to support healthy stocks of coastal salmonids on all coastal streams by 2001.

2. Complete 5% of the remaining coastal wetland inventories per biennium, including the identification of those wetlands that contribute to healthy salmonid populations (all inventories complete by 2014).

3. Ensure that existing (1997) coastal wetlands are not filled or otherwise altered by human activities to the detriment of salmonids, or that compensatory mitigation for such filling or alteration is adequate to replace the lost wetland resources.

4. Actively restore, enhance or create 100 acres of wetlands that contribute to healthy stocks of salmonids in coastal streams per biennium until there are sufficient wetlands of various types (based on Habitat Objective 5(a)) to support healthy stocks of salmonids.

Water quality degradation/sedimentation

[see water quality chapter]

Changes in flow

[see water quantity chapter]

Elimination of habitat

1. Identify and inventory development-related features that have eliminated coastal salmonid habitat or created habitat for predator or competitor species by 2002.

2. Ensure that existing programs prevent, minimize or mitigate the reduction of (1997) coastal salmonid habitat, and prevent, minimize, or mitigate the creation of habitat beneficial to predator or competitor species.

3. Restore coastal areas that have been altered by development-related activities either to degrade their habitat value to salmonids or to increase the value to predator or competitor species.

Direct take of salmonids

1. Provide adequate enforcement of land use, fishing and other regulations to ensure that activities associated with land use activities, recreational mining and fishing do not lead to take.

Water Quantity, Fish Passage and Fish Screening Objectives

Inadequate streamflows to complete salmonid life history

1. To protect and maintain the existing streamflows in areas providing significant salmon habitat value.

   IA-1: Ensure that the issuance of additional out-of-stream water rights will not adversely affect streamflows that provide significant salmon habitat value.

   IA-2: Ensure that water right transfers do not adversely affect streamflows that support significant salmon habitat value.

   IA-3: Ensure that existing ISWRs are fulfilled in accord with priority date of issuance.

   IA-4: Establish ISWRs on streams, rivers, and lakes that can provide significant salmon habitat values in order to protect existing streamflow amounts.

2. Restore streamflows in areas providing significant salmon habitat value which is dependent on flow by securing incremental additions to existing streamflow amounts on a prioritized basis and according to an established schedule.

   IB-1: Identify areas providing significant salmon habitat which is highly dependent on flow restoration, and establish a schedule for restoring identified flow amounts.

   IB-2: Ensure compliance with existing water right laws on a ranked priority basis with the objective of increasing stream amounts.

   IB-3: Ensure that adequate flow measurement and monitoring data collection occurs, and that the data are disseminated and used to support restoration of flows in key areas.

   IB-4: Provide technical assistance and appropriate incentives to existing water right holders with the objective of increasing streamflow amounts in a manner consistent with Objective IB-1.

   IB-5: Preserve peak flows which are necessary for access to and from winter spawning grounds, for triggering biological responses, and for habitat maintenance.

Obstructions to fish passage necessary to access habitat during critical life stages

1. Eliminate artificial obstructions to fish passage necessary to access key habitat for critical life stages of salmon.

   IIA-1: Protect and maintain existing barrier-free passage to access habitat during critical salmon life stages.

   IIA-2: Restore adequate fish passage at diversion and push-up dam structures where it does not presently exist.

   II-3: Maintain and restore adequate fish passage on all exempt ponds and permitted reservoirs located in habitat areas.

Salmonid mortality

1. Prevent juvenile salmon mortality caused by entrainment in water intake structures.

   IIIA-1: Ensure all existing diversion intake structures are appropriately screened to prevent mortality.

   IIIA-2: Ensure that all new water right permits are appropriately conditioned to prevent mortality.

2. Prevent direct salmonid mortality due to loss of habitat by reservoirs.

   IIIB-1: Ensure that any new reservoirs are environmentally responsible and do not have a net negative impact on salmon.

Fish Management Objectives

Harvest Impacts to Spawner Escapement

1. Manage harvest impacts to strive for attainment of the spawner rebuilding criteria (as defined in ODFW IA1) for wild OCN coho on the timetable in Table 1.

   ODFW will *c*ritically review the factors of ocean mixed-stock and terminal targeted harvest impacts on OCN coho stocks so that the collective impacts do not prevent meeting the appropriate OCN coho spawner escapement rebuilding criteria. However, ocean survival conditions play a large role in determining smolt to adult survival and escapement. Two sub-aggregate groups are already at or near the escapement criteria and should be able to reach the criteria by 1998 barring further declines in ocean conditions. The other groups are farther from the criteria and ocean survival will control the time required to meet them.

Table 1: Coho escapement rebuilding objectives - year expected for populations to reach or exceed the spawner rebuilding criteria.

	With Good Ocean Survival	With Poor Ocean Survival
2 Groups meet criteria	1998	1998
All groups meet criteria	2004	2040

2. To critically review and adjust spawning escapement targets for OCN coho stocks to ensure they are adequate to fully rebuild sustainable levels of natural production that utilize the available spawning and rearing habitat in Oregon's coastal watersheds.

3. To develop and conduct future fisheries that do not interfere with the restoration of wild coho salmon stocks.

4. Minimize hook and release fishery impacts in ocean and terminal area salmon fisheries related to total fishery impacts that include those from "non-landed" catch.

5. Improve the technical capability, accuracy, and precision of pre-season coho salmon stock predictors (wild and hatchery) and their assessment in pre-season models to evaluate proposed harvest strategies and impacts on wild coho stocks.

Illegal Salmon Catch

1. Adequately assess rates of illegal harvest for the purpose of attaining more complete information on overall harvest-related impact and exploitation of OCN coho salmon.

2. Ensure that illegal recreational and commercial harvests do not have unacceptable adverse impacts on coho restoration.

Salmon Bycatch

1. To fully implement sampling programs that adequately observe and sample bycatch in non-salmonid fisheries at the necessary levels to ensure statistical reliability.

Ocean Productivity

1. Manage coho harvest in response to ocean survival conditions

2. Increase our ability to measure and respond to changes in ocean conditions

Loss of genetic adaptation of wild populations from interbreeding with genetically dissimilar, less fit hatchery fish

1. Reduce the genetic risk to wild populations by reducing the percentage of hatchery fish to less than 10% of the total population spawning in the wild.

2. To clearly describe the purpose and conduct of all coastal coho hatchery programs.

3. To facilitate differentiation of hatchery fish from wild fish on spawning grounds.

Competition with hatchery reared fish

1. Reduce the potential for competition between juvenile hatchery and wild coho by decreasing the number of hatchery fish released.

Low density reproductive failure of wild populations

1. Evaluate the potential and effectiveness of using hatchery production to rebuild or restore critically depressed wild populations of coastal coho salmon.

Reduced nutrients (carcass nutrient cycle) from depressed runs

1. Increase the growth and survival of juvenile coho salmon in a set of streams where spawner abundance is depressed by increasing the abundance of adult salmon carcasses in spawning areas during and shortly after the spawning season.

Predation by Pinnipeds and Sea Birds

1. To determine and evaluate the impacts of predation by pinnipeds and sea birds on coho salmon.

2. Propose management actions as needed to respond to local predation problems, relative to the significance of the observed predation.

Interactions with Exotic Fishes

1. Determine and evaluate the potential for negative effects to restoration of depressed coho stocks from predation and competition by locally abundant exotic fishes.

2. Take management actions based on evaluation of costs, benefits, and expectation of success.

Oregon Watershed Enhancement Board: Oregon Plan Monitoring Support

Contacts: Geoff Huntington, Director, OWEB (503) 9860180
Ken Bierly, Deputy Director, OWEB (503) 986-0182

OWEB supports numerous local monitoring efforts that include water quality assessments, stream habitat evaluation, restoration effectiveness monitoring, flow restoration monitoring, and salmon population assessments for abundance and distribution. Support is provided through the grant review process and funding process administered by OWEB, supported by local review teams, with technical review provided by the Monitoring Team, and as approved by the OWEB Board. See attached table and OWEB web page for description http://www.oweb.state.or.us/ .

OWEB Supports and maintains a database of restoration projects conducted in support of the Oregon Plan. Contact Bobbi Riggers (541) 757-4263 x233 for additional information, for assistance in querying the database for specialized reports, and for copies of their Annual Reports. The Annual Report of Restoration Projects is also available on their web site.

OWEB has begun a process to work with the IMST, OSU, the Oregon Plan Monitoring Team, and other interests to develop a prioritized list of research, information, and monitoring needs. This list will become the basis for soliciting proposals to OWEB and other sources to fund Research Investments for the Oregon Plan.

OWEB has adopted "A Strategy for Achieving Healthy Watersheds in Oregon" which describes their strategy for planning, implementing, and monitoring the recovery of watersheds and native fish populations in Oregon. Monitoring is a key component of the Strategy.

With the conclusion of the 2001 Oregon Legislative Session, and passage of Senate Bills 945 and 946, OWEB has be given increased responsibility for implementing the Oregon Plan, will become the lead state agency, and will continue to work with the Governor's Office, Legislative leadership, and Federal Agencies to help coordinate salmon recovery and watershed health in Oregon and as part of other Regional processes. OWEB has received increased budget support to assist in this process. Details of the OWEB budget and plans to assume leadership of Oregon Plan Monitoring efforts will be provided to IMST as they become available.