Problems and Strategies

Eighteen major and, to various degrees, interrelated problems were identified as needing to be resolved to reach the seven management objectives. This list of problems is not intended to be all inclusive. Many of the problems detailed in Oregon's Strategic Plan for Fisheries apply to various degrees to coho salmon production and management. Many of the problems and recommended actions will require the development of specific detailed management and/or research plans. The problems are listed as follows:

1. Production of jacks and adults has shown an apparent leveling off (1965-76) and recent reduction (1977-81) in spite of increased hatchery smolt releases in the OPI area.

2. Fisheries exploiting mixed stocks of salmon often overharvest wild stocks and underharvest hatchery stocks.

3. Spawning stocks of wild coho salmon in coastal watersheds are below optimum escapement levels for maximum production.

4. Stock size predictor needs improvement.

5. Data on the distribution and contribution of stocks in offshore fisheries are inadequate for efficient, effective management of wild and hatchery fish.


7. Losses of coho occur when they are caught or hooked but not retained (noncatch fishing mortality).

8. Hatchery coho can adversely impact wild coho and consequently total production.

9. Harvest estimates and the data gathering systems often are inadequate for effective fishery management.

10. Losses from predation reduce the abundance of coho salmon at successive stages in the life cycle.

11. The measurement of coho spawning populations needs improvement.

12. More adult coho salmon return to some hatcheries than are needed to provide eggs for reproduction.

13. Coho produced in Oregon and caught outside of state jurisdiction confound attempts to manage Oregon stocks for the optimum benefit of Oregon's citizens.

14. Wild coho salmon stocks in coastal streams need to be rehabilitated while maintaining genetic integrity and adequate escapement levels.
15. Underharvest of early returning hatchery coho stocks in the Columbia River is occurring.

16. Natural production of coho in tributaries of the Columbia, Snake, and Willamette rivers needs to be supplemented.

17. The number of commercial fishing vessels used to harvest the salmon resource exceeds the number needed to most efficiently harvest the resource.

18. The characteristics and spawning distribution of Oregon's coho stocks need to be described to establish appropriate stock unit boundaries.

These problems are discussed in detail as follows describing the current actions taken and recommended actions that are necessary to solve the problems.

Problem 1

Production of jacks and adults has shown an apparent leveling off (1965-76) and recent reduction (1977-81) in spite of increased hatchery smolt releases in the OPI area.

Actions Taken:

a. The total release of hatchery smolts has increased from 8.5 million in 1960 to about 64 million in 1981.

b. Alternative hypotheses were examined to explain the declining trend in adult coho production (see Appendix 3).

c. Density-dependent mortality among smolts, poor upwelling, or some combination were identified as the most probable reasons for declining survival of smolts. Reduced natural production, stock changes, and other hatchery-related problems also contributed to the decline in adult production.

Recommended Actions:

a. Stimulate and participate in the development of plans for the production and release of coho smolts.

b. Investigate methods of increasing survival of hatchery-reared smolts. Test alternate release times and sites and stocks of hatchery fish.

c. Broaden the production base by restoring wild coho stocks in coastal streams, diversifying hatchery stocks, and increasing natural production in specific areas through supplemental stocking of streams with appropriate hatchery fish.

d. Support research on the early life-history of coho salmon in the ocean to isolate mechanism(s), critical time intervals, and primary localities influencing survival of smolts.
e. Continue to monitor trends in the spawning escapement of wild and hatchery jacks and adults.

f. Continue to monitor trends in the production of jacks and adults in the OPI.

g. Continue to analyze the relationships of adult production in the OPI and coastal upwelling intensities.

h. Continue to monitor the proportion of wild and hatchery fish caught in the ocean.

Problem 2

Fisheries exploiting mixed stocks of salmon often overharvest wild stocks and underharvest hatchery stocks.

Hatchery production has increased the fishing effort and exploitation rate on mixed stocks of hatchery and wild coho salmon. Hatchery stocks generally can withstand higher exploitation rates than wild stocks because better survival from eggs to smolts in the hatchery requires fewer returning adults to perpetuate the hatchery stocks. Higher exploitation rates needed to harvest hatchery stocks result in suboptimal production or extinction of wild stocks and possible reduction in total yield. Refer to the Stock Recruitment Concept in Part I of the Anadromous Fish Management Plan for a more detailed explanation of the problem and possible consequences of mixed stock fisheries.

Actions Taken:

a. A Wild Fish Management Policy has been adopted that states that the protection and enhancement of wild stocks will be given first and highest consideration when developing management plans.

b. The PFMC, Columbia River Compact, and the Commission have adopted regulations to reduce exploitation rates on mixed stocks in the ocean and Columbia River.

c. Limited number of stocks have been coded-wire tagged to determine distribution and contribution.

d. Popular articles have been published in Oregon Wildlife informing the public about the problems of mixed stock fisheries and values of wild stocks.

e. Studies have been conducted to geographically define and characterize coho salmon stocks as well as determine the significance of differences between wild and hatchery stocks.

Recommended Actions:

a. Increase efforts to protect wild coastal stocks.
b. Investigate techniques to isolate or differentiate hatchery stocks from wild stocks to maximize harvest of hatchery fish such as allowing terminal fisheries or known stock fisheries off of or in the mouths of rivers.

c. Identify wild stocks that cannot withstand an average exploitation rate of 69% and devise ways to artificially supplement them or improve survival in freshwater through habitat improvement.

d. Improve the design of coded-wire tagging programs to determine distribution and contribution of wild and hatchery stocks and continue to support studies to identify and characterize stocks (see Problem 18).

e. Avoid any actions that seriously jeopardize the choice of management options in the future.

Problem 3

Spawning stocks of wild coho salmon in coastal watersheds are below optimum escapement levels for maximum production.

About 4,800 miles of stream exist capable of producing at least 775,000 coho (730,000 adults) under existing habitat conditions. The most plausible explanations for the current depressed condition of the wild stocks are: (1) earlier degradation of freshwater habitat, (2) too few adults reaching spawning areas as a result of harvest rates being too high, (3) reduced productivity of stocks resulting from indiscriminate mixing of stocks, and (4) increased mortality in ocean nursery areas that appears to be related to upwelling in some way.

Actions Taken:

a. Spawning fish surveys have been conducted in standard index streams for 30 years.

b. The PFMC and ODFW have developed management plans to reduce exploitation rates in ocean fisheries, thereby increasing the spawning escapement.

c. Tagging studies are used to determine ocean contribution and relative survival rates.

d. Biologists of various resource agencies devote considerable time to restoring freshwater habitat and reviewing activities that potentially impact spawning and rearing areas. Minimum permissible streamflows have been established in some basins to protect rearing habitat for juvenile salmon.

e. Preliminary research has been conducted on determining and measuring optimum escapement levels and factors influencing smolt production in freshwater.
Recommended Actions:

a. Accelerate and expand efforts to rehabilitate wild runs (see Problem 14).

b. Maintain habitat protection and improvement efforts to increase natural production.

c. Support PFMC regulations to reduce exploitation rates in ocean fisheries and adopt state regulations consistent with the plan for increasing the spawning escapement of wild coastal stocks to optimum densities.

d. Continue to monitor trends in the spawning escapement of wild coastal stocks. Support research efforts to refine escapement estimates.

e. Achieve optimum spawning escapements of 200,000 wild adults in coastal watersheds by 1987 (see Objective 3).

f. Refine inventory of available spawning habitat and escapement needs by drainage.

Problem 4

Stock size predictor needs improvement.

The return of jacks (2-year-old fish) to hatcheries provides a reliable prediction of adult hatchery fish (3-year-old fish) in the OPI area the following year. However, a good predictor is not available for the wild stock component of the OPI.

Actions Taken:

a. Spawning fish surveys are made to provide a relative indicator of wild stock strength.

b. Dam counts are used where available as an indicator of stock strength.

c. Scale patterns are analyzed to separate the hatchery and wild components of the ocean catches.

d. A predictor of stock size in the OPI area has been developed.

Recommended Actions:

a. Continue with ongoing activities.

b. Develop a more reliable measure of spawning escapement for wild stocks in coastal watersheds.

c. Maintain and improve current forecast techniques of total stock abundance in the OPI area.

d. Support research to develop better prediction of stock size utilizing such techniques as wild smolt indices to relate to expected stock size.
e. Improve in-season capability to adjust stock size predictions.

f. Improve the design of coded-wire tagging programs to determine distribution and contribution of wild and hatchery stocks.

Problem 5

Data on the distribution and contribution of stocks in offshore fisheries are inadequate for efficient, effective management of wild and hatchery fish.

The distribution and contribution of coho stocks offshore are vital concerns in regulating fishing zones, gear, and seasons. The data are also useful in calculating interceptions by neighboring states and Canada and analyzing the performance of individual stocks in Oregon's ocean fisheries. Tagged fish recoveries indicate the extent of differential movements and contributions of specific stocks along the Pacific coast and increase the options for managing select stocks for regional or localized fisheries.

Actions Taken:

a. ODFW has finmarked some stocks in past years and has recently switched to the more effective practice of tagging smolts with coded wire. During 1979-80 approximately 960,000 smolts from 13 stocks were scheduled to be tagged. Additional smolts from various local and imported stocks were tagged by private hatchery operations.

b. Other fishery management agencies on the Pacific coast have tagged stocks in their respective jurisdictions that have been recovered in Oregon fisheries.

c. Theoretical studies were published defining the number of tagged fish and repetitions needed to attain desirable levels of precision for fish contribution studies.

d. Scientific studies have been designed to adequately determine the distribution of catch for major hatchery stocks propagated in Oregon.

e. Tagging procedures were improved by purchasing two self-contained tagging vans capable of handling on-site marking programs.

f. Tag sampling operations in sport and commercial landings were improved by extending the breadth and depth of coverage at Oregon ports.

g. Tag recovery operations were improved to process samples, decode tags, and disseminate information within and between agencies.

Recommended Actions:

a. Develop a comprehensive marking program to precisely determine the catch distribution and contribution of Oregon's major coho salmon stocks.

b. Increase the emphasis on tagging major wild stocks in coastal rivers.

II.I-6
c. Continue to improve data processing and reporting within and between management agencies to reduce lag time in published results.

d. Whenever feasible, increase the scope of experimental designs to obtain important ancillary data on survival, exploitation rates, between and within brood variations, catch-to-escapement ratios, instantaneous natural mortality rates at successive life stages, etc., to increase perceptions of salmon population dynamics.

e. Support research designed to determine the offshore distribution of stocks during the first year at sea.

f. Inaugurate procedures or develop techniques to estimate landing and mark information by area of catch, rather than port of landing.

g. Encourage NMFS to finance coast-wide sampling programs for catch and mark recoveries.

h. Explore the need for and feasibility of externally tagging adult coho at sea to provide additional information on the origin of fish along Oregon's coast in the spring.

Problem 6

Survival of hatchery smolts needs improvement.

In spite of long-term efforts by ODFW to produce quality coho smolts, several problems in the current program that could affect survival need to be addressed. Diseases continue to be a problem and agents to prevent or treat diseased fish are being increasingly restricted in use. Fish health may have declined due to the poorer quality of the Oregon Moist Pellet diet as a result of reduced quality of fish meal ingredients. Genetic changes and general hatchery practices, such as pond carrying capacities, dissolved gases, and fish space requirements may have adversely affected survival.

Actions Taken:

a. Hatchery managers attempt to use the best available technology and research findings in the coho production program.

b. Since 1949 Oregon has conducted an active research program in disease, nutrition, and hatchery practices for the purpose of improving quality of hatchery fish.

c. The Oregon Moist Pellet diet was developed and feeding regimes adopted which prescribed the desired smolt size at a certain time.

d. Time of release of hatchery smolts has been adjusted in attempts to enhance survival.
Recommended Actions:

a. Increase research efforts in fish pathology. Life-histories (e.g., Ceratomyxa) need to be better determined, the distribution of certain diseases (e.g., viruses) needs to be investigated, and more preventative and treatment measures need to be developed.

b. Continue and strengthen nutrition research in the overall effort to provide fish with better quality protein. Investigation of essential nutritional requirements needs to be continued.

c. Increase research on rearing and smolt release strategies for improving survival.

d. Identify the benefits and determine the costs to diversify hatchery brood stocks.

e. Improve liaison among administration, research, management, and hatchery personnel.

Problem 7

Losses of coho occur when they are caught or hooked but not retained (noncatch fishing mortality).

This problem is especially prevalent in the ocean fisheries where "shakers" are released because of management restrictions or users' preference.

Actions Taken:

a. The ocean sport and troll size limits on coho salmon have been reduced to 16 inches to protect immature fish.

b. Chinook-only seasons have been restricted to times of low coho abundance.

c. Selective fishing gear and barbless hooks have been required when coho are present in chinook-only seasons.

d. Fishermen have been encouraged to exercise care in releasing unretainable fish.

e. Hooking losses in the ocean troll fishery have been estimated.

Recommended Actions:

a. Encourage the adoption of all-species seasons.

b. Continue researching the use of selective fishing gear during chinook-only seasons.

c. Work with Marine Advisory Program to develop a more effective education program for fishermen.

d. Conduct studies to determine hooking mortality in recreational fisheries and fish loss in gill-net fisheries.

II.I-8
Problem 8

Hatchery coho can adversely impact wild coho and consequently total production.

Juvenile coho released in large numbers from hatcheries prior to smolting will compete with wild coho and other species for food and rearing space unless the stream is grossly underseeded. The presence of excessive numbers leads to (1) less than optimal growth that can later affect marine survival, (2) the immediate displacement and eventual death of less competitive individuals, and/or (3) death of individuals directly or indirectly from stress-related factors. Hatchery presmolts can have a distinct size advantage over wild juveniles because hatchery fish tend to spawn earlier and generally grow faster while in the hatchery (these are not necessarily desirable characteristics for survival in the wild). Density-dependent mortality (reduced survival) can occur not only in freshwater but could occur in the ocean nursery area for coho as a result of increased releases of hatchery smolts. This mortality would affect wild and hatchery smolts alike. The survival potential of wild stocks can also be adversely affected if interbreeding occurs with hatchery fish. The magnitude of the impact depends on the number of hatchery and wild fish involved and the degree to which hatchery fish differ from the wild stock in important traits. Generally, hatchery fish are less fit for survival in the stream than wild fish because of different selective pressures that occur in the hatchery.

Actions Taken:

a. Until recently, hatchery coho were confined to certain streams to reduce the potential for impacting wild stocks.

b. Hatchery fish were released only where wild populations were believed to be grossly underescaped or absent.

c. Until recently, releases have concentrated on adults and smolts to reduce potential for competition in the freshwater habitat and to begin the natural selection process with the spawning of adult fish.

d. Presmolt releases were recently increased to about 6 million annually in coastal streams as a result of legislative action.

Recommended Actions:

a. Develop new or modify existing hatchery stocks for rehabilitation and supplementation programs to provide a fish better adapted for survival in the stream.

b. Release presmolts from the appropriate stock only where biological and physical stream inventories indicate a need.

c. Substitute releases of adults, smolts, or fry from streamside incubator boxes wherever possible for presmolts when using hatchery stocks for rehabilitation or supplemental programs.
Problem 9

Harvest estimates and the data gathering systems often are inadequate for effective fishery management.

Catch statistics from important ocean and in-river fisheries may not be available for a year or more after data are collected. Such delays mean that important management decisions may be made with inadequate information. Public confidence in ODFW suffers when decisions are made from inadequate data and when information requested cannot be provided within a reasonable time.

Actions Taken:

a. Statistically designed sampling programs are in use to estimate catch and effort by ocean fisheries.

b. An in-season data system was developed for the ocean fisheries to increase timeliness of catch and effort statistics. This system was integrated with similar systems in Washington and California to provide a coast-wide data system for ocean salmon statistics.

c. Sampling procedures in ocean recreational and commercial fisheries were improved by increasing the extent of coverage at Oregon ports.

d. Sampling programs are in effect on the Columbia River to measure landings by major fisheries including the commercial gill-net, Indian, and recreational fisheries.

e. Annual estimates of in-river recreational salmon catches are made with the salmon-steelhead tag. The tag was revised in 1978 to provide more refined catch estimates.

Recommended Actions:

a. Continue with ongoing programs to develop catch and effort data.

b. Determine the kinds, timeliness, and precision of harvest data needed to make sound management decisions. Develop organizational procedures to assure efficient collection and utilization of data.

c. Design and implement sampling programs to get improved estimates of total catch and effort by major fisheries.

d. Improve data system for the ocean salmon troll fishery to provide catch and effort data by area of catch rather than port of landing.

e. Improve salmon-steelhead tag information system or develop alternate system to provide timely estimate of in-river recreational catch by species including jacks.

f. Encourage NMFS to finance coast-wide sampling program for catch.

g. Provide information to the user public to improve understanding of existing data programs.

h. Encourage public assistance in improving data gathering systems.

II.I-10
Problem 10

Losses from predation reduce the abundance of coho salmon at successive stages in the life cycle.

Actions taken:

a. Undesirable predators and competitors have been removed or controlled in some areas.

b. Research on seal predation has been conducted by Oregon State University (OSU) and NMFS cooperators in estuaries. Studies are under way to determine trends in population size and migration of marine mammals.

c. ODFW has cooperated with OSU and NMFS scientists to develop plans for studying salmon smolt survival in the ocean.

d. ODFW has submitted a resolution to congress to modify the Marine Mammal Protection Act.

Recommended Actions:

a. Continue chemical rehabilitation projects where justified.

b. Support research to develop selective piscicides or biological controls of undesirable species.

c. Fund research projects to fully analyze predation by other fish populations on salmon, particularly in reservoirs and tailwaters below dams and in coastal lakes. For instance, predation and competition from recently established warmwater fish populations are believed to be largely responsible for the severe decline in coho salmon formerly rearing in Tenmile Lakes system.

d. Support research to define the role of predation governing mortality of smolts in the ocean.

e. Develop methods of controlling the distribution of undesirable fish such as installing lowhead barrier dams.

f. Obtain congressional support to modify the Marine Mammal Protection Act of 1972 to allow implementation of management plans by the state.

Problem 11

The measurement of coho spawning populations needs improvement.

Although trends in spawning escapement have been monitored, population estimates are needed for coastal streams. Complete counts of adults and jacks returning to hatcheries are needed.
Actions Taken:

a. ODFW has conducted spawning ground surveys on coastal index streams since 1950, establishing a reliable history of trends in coho populations.

b. Counts have been made at some fishways.

c. Adults and jacks entering hatcheries have been counted.

d. Spawning surveys on some nonindex streams have been made.

e. Programs have been initiated for defining and measuring optimal escapement.

Recommended Actions:

a. Continue coastal index surveys, expanding coverage where needed.

b. Continue monitoring runs at all counting stations.

c. Install counting facilities at all feasible locations.

d. Develop a reliable measure of spawning escapement for wild stocks in coastal river systems.

e. Count all adults and jacks returning to hatcheries.

f. Develop techniques to assess returns from off-station releases of hatchery fish.

g. Determine the amount (and distance) of straying of hatchery fish.

Problem 12

More adult coho salmon return to some hatcheries than are needed to provide eggs for reproduction.

Surplus coho occur at hatcheries because of harvest constraints necessary to protect other stocks of salmon mixed with coho, males not needed for fertilizing eggs, and a better survival rate from egg to smolt for hatchery than for wild fish.

Actions Taken:

a. Adults are transported to streams with underutilized spawning potential.

b. Adults have been transported downstream to below known sport fishing areas.

c. Smolts are released off-station and eggs and presmolts are used in rehabilitation and supplementation programs.
d. Carcasses are sold to the highest bidder and the proceeds used for hatchery programs, if authorized, or enter the State General Fund.

e. Special terminal fisheries have been authorized to selectively harvest hatchery fish (Youngs Bay gill-net fishery).

Recommended Actions:

a. Maintain ongoing efforts.

b. Devise innovative methods of harvesting hatchery coho in terminal or known stock fisheries.

c. Improve information on distribution and timing of migrations of wild and hatchery fish.

d. Increase efforts to inform public about program and problems of using and reducing surplus hatchery fish.

e. Seek ways to obtain fair market prices for carcasses that are sold.

Problem 13

Coho produced in Oregon and caught outside of state jurisdiction confound attempts to manage Oregon stocks for the optimum benefit of Oregon's citizens.

Actions Taken:

a. Oregon coho have been coded-wire tagged to determine their distribution and contribution.

b. ODFW has actively participated in developing treaties, agreements, and regulations where federal or multiagency jurisdiction prevails.

c. ODFW has analyzed data and prepared reports that point out the need for improved production and harvest management coordination.

Recommended Actions:

a. Continue to participate in developing data and recommendations for regulations necessary under federal or multiagency jurisdiction.

b. Increase efforts to coordinate multiagency production and enhancement programs.

c. Expand coded-wire tag efforts to improve data on distribution and contribution of Oregon stocks.

d. Emphasize stocks and release strategies that maximize returns to Oregon fisheries.

II.I-13
Wild coho salmon stocks in coastal streams need to be rehabilitated while maintaining genetic integrity and adequate escapement levels.

Wild coho stocks represent an important renewable natural resource and are important for aesthetic, cultural, biological, and economic reasons. The basic management techniques for rehabilitating wild stocks are: (1) regulations to reduce harvest rate to desirable levels, (2) habitat protection and improvement, (3) artificial propagation in some form to increase survival from egg to smolt, and (4) release of suitable hatchery donor stocks where wild fish no longer exist in useful numbers.

Actions Taken:

a. Ocean harvest rates, beginning in 1979, have been reduced to increase escapements into coastal streams.

b. Habitat protection and assistance to land-use planners have continued or been increased.

c. Surplus adult coho of hatchery origin have been transferred to presumably underutilized streams for natural spawning since the mid-1960's.

d. Beginning in 1977 about 45% of the hatchery smolts have been released away from the hatchery (off-station) so that returning adults would have an opportunity to spawn naturally.

e. Presmolts are being released off-station to seed supposedly underused rearing areas.

f. The transfer of hatchery stocks among watersheds has been reduced, and more locally adapted stocks are being developed (e.g., Rogue, Umpqua [Smith River], Salmon, Coquille, and Nehalem rivers and Tenmile Lakes system).

g. Studies have been initiated to better define and measure optimal escapement.

h. Studies have been conducted to better define limitations to stock transfers.

i. Studies have been initiated to determine the effectiveness of using hatchery stocks to establish or rehabilitate natural spawning populations.

Recommended Actions:

a. Continue with ongoing efforts.

b. Implement streamside incubator program through STEP as needed to enhance survival from egg to emergent fry but minimize genetic changes that result from long-term intensive culture programs.

II.I-14
c. Develop new brood stocks where needed to accelerate rehabilitation stocking program.

d. Modify existing hatchery brood stocks to improve survival in wild where hatchery fish (adults, smolts, or presmolts) are to be used in rehabilitation or supplemental programs.

e. Identify those streams where continued supplemental stocking will be required.

f. Increase efforts to improve habitat through STEP and cooperative programs with other land management agencies and private landowners.

g. Prepare a "state of the art" report for habitat improvement and restoration techniques for western Oregon streams. Such a manual is the first step in identifying and planning habitat projects.

h. Develop detailed rehabilitation plan for coastal streams by July 1, 1983.

i. Evaluate off-station smolt releases to determine mortality rate and tendency to stray rather than return to release sites.

Problem 15

Underharvest of early returning hatchery coho stocks in the Columbia River is occurring.

The majority of the early hatchery coho return to the Columbia River between mid-August and mid-September. During the last few years little commercial harvest has been allowed during this time because of: (1) the need to provide fall chinook to Treaty Indians, (2) the need to protect spawning escapements of other intermingled stocks, and (3) the statute (ORS 509.031) that requires minimizing the handling of steelhead in the non-Indian commercial fishery.

Actions Taken:

a. Management techniques such as time and area regulations have been employed.

b. Surplus fish returning to Bonneville Hatchery have been sold to the highest bidder.

c. Surplus fish returning to Bonneville have been offered to Indian Treaty tribes.

d. Presmolts releases in tributaries below Bonneville Dam have been initiated.

Recommended Actions:

a. Release a portion of the early stock coho at Bonneville Hatchery into Youngs Bay where terminal fishing capabilities exist.
b. Investigate the possibility of changing the timing of the early stock so that it enters the Columbia after mid-September.

c. Accelerate rehabilitation of depleted upriver stock of chinook salmon currently needing protection.

d. Develop gear that would allow selective harvest of early coho.

e. Develop and evaluate a later returning stock of coho from remnant runs found in the Sandy and Clackamas rivers and/or a foreign stock.

Problem 16

Natural production of coho in tributaries of the Columbia, Snake, and Willamette rivers needs to be supplemented.

Coho in the Columbia River system will be managed primarily for hatchery production because hatchery fish comprise over 90% of the returning runs. This, along with excessive mortality of naturally produced stocks above Bonneville Dam, results in underused natural production areas. Some of these areas should be supplemented with surplus hatchery fish to increase and diversify the total production capabilities.

Actions Taken:

a. Presmolt and adults are being released off-station, in lower Columbia River and lower Willamette River tributaries, to seed underused rearing areas.

b. The results of earlier releases of surplus hatchery fish into Willamette River tributaries above the falls at Oregon City are being analyzed. The analysis will be used to define the coho program above the falls.

c. Habitat protection efforts and assistance to land-use planners has continued or increased.

Recommended Actions:

a. Continue with ongoing efforts. The supplemental stocking of lower Columbia River tributaries with early (Toutle) stock should continue and be expanded where appropriate until a better stock is available. Any supplemental stocking of coho in Snake River tributaries should await the rehabilitation of the Grande Ronde stock.

b. Identify those streams currently being stocked, where continued or expanded supplementation appears to be worthwhile.

c. Complete the analysis of Willamette River data and implement stocking programs where potentially serious interactions between coho and other salmonids will not be a problem. Modify Willamette Plan accordingly.
d. Evaluate opportunities to increase natural coho production above Bonneville Dam (mid-Columbia tributaries) using surplus fish (early stock) from lower Columbia River hatcheries. The prestocking evaluation should include not only production potentials but interactions with other salmonids, potential harvest management problems, and the development of recapture facilities and target fisheries.

e. Increase efforts to improve habitat through STEP and cooperative programs with other land management agencies and private landowners.

f. Develop new hatchery brood stocks from existing native late run stocks (e.g., Clackamas, Sandy, and Grande Ronde rivers) and evaluate potential of introducing one or more foreign stocks to meet management objectives.

Problem 17

The number of commercial fishing vessels used to harvest the salmon resource exceeds the number needed to most efficiently harvest the resource.

There is an excessive commitment of capital and labor in the commercial salmon fishery. This excess has resulted from the historically open access or common property nature of the salmon resource. As a result, salmon are not harvested commercially at a minimum cost to society. The share of revenues is divided into smaller and smaller pieces as more vessels enter the fishery.

Actions Taken:

a. The 1979 Oregon Legislature enacted moratorium legislation to put a ceiling on the number of vessels which may participate in the commercial salmon fisheries.

b. A vessel moratorium permit system has been integrated into the Department's commercial fisheries licensing system.

c. Other states have effort moratoria or reduction programs in effect.

Recommended Actions:

a. Support the continuation of the moratorium legislation enacted by the 1979 Oregon Legislature.

b. Recommend minor changes in the legislation to minimize costs of administration of the moratorium permit system.

c. Encourage the development of efficient and equitable effort control programs.
Problem 18

The characteristics and spawning distribution of Oregon's coho stocks need to be described to establish appropriate stock unit boundaries.

The stock concept suggests that populations of coho in each coastal basin comprise a stock, each of which should have separate management criteria. Stock units or groups of closely related stocks may be established for the purpose of assessing abundance and escapement, or for setting production/catch goals, or for establishing stock transfer guidelines. These management stock units might be determined on the basis of observed spawning distribution, which demonstrates genetic interchange. Another approach is to assess the important characteristics of various stocks to show similarities in adaptive traits and manage similar stocks such that efficiency is achieved without jeopardizing the adaptive characteristics of the various stocks.

Actions Taken:

a. Preliminary assessments of stock units for coho salmon have been made by the OSU Cooperative Fishery Research Unit.

b. ODFW is presently characterizing the ocean distribution and catch of various hatchery and wild stocks of coho salmon.

c. Preliminary studies have been made of spawning distribution of hatchery and wild coho salmon in the Yaquina Basin.

d. Conservative stock transfer guidelines have been proposed on the basis of existing understanding and judgment of stock characteristics.

Recommended Actions:

a. Conduct research to determine the importance of various stock characteristics to survival and production, as well as to long-term viability.

b. Once the most important traits have been determined, characterize the various hatchery and wild coho stocks for patterns of similarity in these characteristics.

c. Determine the level of genetic interchange between various hatchery and wild stocks within a basin and between basins.

d. On the basis of the above information, revise stock unit designations and revise the stock transfer guidelines to achieve wild and hatchery production goals without jeopardizing the production capacity of various stocks.