

**MASS MARKING AND MARK-SELECTIVE FISHERIES  
FOR 2000 AND 2001 AND PLANNED ACTIVITIES FOR 2002**

**SFEC (03)-1**

**Report of The Regional Coordination Working Group  
of the Selective Fishery Evaluation Committee**

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# **Mass Marking and Mark-Selective Fisheries for 2000 and 2001 and Planned Activities for 2002**

## **Report of The Regional Coordination Working Group of the Selective Fishery Evaluation Committee**

### **1 Introduction**

This report provides information on mass marking, mark-selective fisheries and fishery sampling for Oregon, Washington, and British Columbia during 2000 and 2001 and planned activities for 2002. The information provided includes numbers of mass marked fish released, Double Index Tagging, a status report on electronic tag detection capabilities, and information pertaining to mark-selective fisheries (MSF). Information is included for Canadian Department of Fisheries & Oceans (CDFO), Washington Department of Fish & Wildlife (WDFW), Member Tribes of the Northwest Indian Fisheries Commission (NWIFC), U.S. Fish & Wildlife Service (USFWS) and Oregon Department of Fish & Wildlife (ODFW).

The information and data presented in this report was compiled by informal means by members of the RCWG. It is anticipated that preparation of future reports will be greatly facilitated by the implementation of the protocols and procedures for mass marking and mark-selective fisheries which were adopted by the PSC in November 2002.

### **2 Coho**

#### ***2.1 Coho Marking***

Mass marking of 1998 and 1999 brood coho from Canadian and U.S. hatcheries occurred largely as planned. The majority of coho were released from hatcheries as smolts, with relatively small numbers released as fry in 1999 and 2000. Fry releases are not mass marked, although some groups may be tagged with or without an adipose clip. Details of 1998 and 1999 brood smolt releases, by agency, are shown in Tables 1 to 10 and summarized in the following tables. Adipose mark numbers include both mass marked and adipose-clipped coded-wire tagged releases.

### 2.1.1 1998 Brood Coho Released in 2000

Area	Agency	Total Release (millions)	Total Adipose Marks	Details in Table
Straight of Georgia	CDFO	9.8	7.7	1
West Coast Vancouver Island	CDFO	1.5	1.3	1
Puget Sound	WDFW	8.5	7.9	2
	NWIFC	6.5	3.7	3
	USFWS	0.4	0.3	4
Coastal Washington	WDFW	6.0	5.2	2
	NWIFC	0.7	0.2	3
	USFWS	0.9	0.4	4
Columbia River	WDFW	15.1	14.9	2
	USFWS	3.7	2.5	4
	ODFW	8.3	5.9	5
Coastal Oregon	ODFW	1.0	0.9	5
TOTAL ALL AREAS		62.4	50.9	

### 2.1.2 1999 Brood Coho Released in 2001

Area	Agency	Total Release (millions)	Total Adipose Marks	Details in Table
Straight of Georgia	CDFO	9.9	7.6	6
West Coast Vancouver Island	CDFO	1.5	1.4	6
Puget Sound	WDFW	7.2	6.4	7
	NWIFC	5.3	3.5	8
	USFWS	0.4	0.4	9
Coastal Washington	WDFW	6.1	5.8	7
	NWIFC	1.1	0.2	8
	USFWS	0.9	0.3	9
Columbia River	WDFW	14.0	10.9	7
	USFWS	3.3	1.9	9
	ODFW	7.9	5.9	10
Coastal Oregon	ODFW	1.1	1.0	10
TOTAL ALL AREAS		58.7	45.3	

### 2.1.3 Planned Coho Releases: 2000 Brood Released in 2002, 2001 Brood Released in 2003

No significant changes in the mass marking program for coho are anticipated for the 2000 or 2001 broods.

### 2.1.4 Double Index Tagging

Representative coho stocks for double index tagging (DIT) are listed in Table 11. DIT involves CWT tagging paired groups of indicator stocks, one group with adipose fin mark

and the other without; each group has a separate CWT code. No substantial changes have been made to the list of DIT stocks since 1996 brood. DIT tag groups are intended to represent associated unmarked hatchery and wild stocks. Analysis of the differences between DIT recoveries is expected to provide a means for estimating total selective fishery mortalities.

## ***2.2 Coho Mark-Selective Fisheries***

### **2.2.1 2000 and 2001 Coho Mark-Selective Fisheries**

#### **2.2.1.1 Canada**

Barbless hooks are now required for all recreational salmon fishing. During the 2000 and 2001 fishing seasons, salmon fishing with non-retention of coho was permitted in many areas of B.C. Coho retention was permitted for some local and hatchery stocks, mainly in terminal tidal and non-tidal areas. A recreational fishery occurred in the north coast for coho from late August to the end of the fishing season, which was not mark-selective. On the west and south coast of Vancouver Island (Areas 20, 23, 24 and 27) recreational marine fisheries for coho that were not mark-selective occurred in very confined near-shore areas, primarily between September 10 and December 31. The limit was one coho per day in both the northern and southern fisheries.

In 2000 and 2001, mark-selective marine sport coho fisheries took place in Areas 13 and 14 and in terminal hatchery areas. Freshwater fisheries were targeted at stocks from major enhancement facilities on Vancouver Island; sport anglers were allowed to keep one unmarked coho per day as part of their catch. In the Lower Fraser Valley, mark-selective freshwater fisheries were conducted on major enhancement systems in both years.

There were no directed commercial coho fisheries during the 2000 or 2001 seasons. The commercial fisheries were characterized by mandatory selective fishing techniques, such as revival boxes, brailing, and sorting, with fishing permitted only when stocks of concern were not prevalent. Special Management Zones were used as a tool to manage fisheries to limit encounters of coho. These Special Management Zones were in effect at varying times in both the north and south coasts, and included such areas as the north and west side of the Queen Charlotte Islands, approach areas to the Nass and Skeena rivers, the head of Rivers Inlet, the West Coast of Vancouver Island, Johnstone Strait, the Mainland inlets, the Strait of Georgia, Southern Vancouver Island, and the Fraser River.

#### **2.2.1.2 Washington**

In 2000 and 2001, recreational MSFs for coho (1997 and 1998 broods) occurred in all four ocean areas from Cape Falcon, Oregon to the U.S./Canada border. The Columbia River (Buoy 10), Willapa Bay, and Grays Harbour estuaries also had recreational MSFs in 2000. In 2001, the Columbia River (Buoy 10) and Willapa Bay (Area 2.1) fisheries were mark-

selective for coho, while Grays Harbour (Area 2.2) allowed retention of up to one unmarked coho per day.

Recreational MSFs were also conducted on the Washington side of the Strait of Juan de Fuca into Puget Sound to Port Townsend (Areas 5 and 6) in 2000 and 2001. A MSF for coho was also conducted in the most southern portion of Puget Sound (Area 13) in both years. A MSF was opened in the San Juan islands (Area 7) from August 1 through September 30, 2001.

A coho MSF Non-Treaty Commercial Troll fishery was conducted off the Washington coast in 2000 and 2001. All ocean fisheries off the Washington coast were constrained by ceilings on landed catch.

Coho recreational MSFs have been held in the Columbia River estuary and adjacent ocean area since 1998. Coho directed recreational angling opened on the central Oregon coast for the first time since 1993, with a MSF in July 1999.

In 2001, reef net fisheries in the San Juan Islands (Areas 7 and 7A) targeting sockeye salmon between July 31 and October 4 were allowed to retain marked coho salmon. Unmarked coho were released. In Area 11, a one-day (October 12, 2001) limited entry MSF was opened to two purse seiners. WDFW observers were on board to record catch data, and each boat was required to use live boxes for resuscitating unmarked coho before release.

In 2000 and 2001, tangle nets were tested as a potential gear for commercial mark-selective fishing in Willapa Bay and on the Columbia River. Preliminary results show that the tangle net is effective at capturing coho, and that a large proportion of the fish entangled survives to be released. The effects of capture on the long-term survival are being investigated.

Details of the fisheries and sampling activities are found in the appendices

Appendix 1: Area 5 Selective Fisheries Report for 2000

Appendix 2: Area 13 Selective Fishery for 2000

Appendix 3: Summary of Monitoring Results from the 2000 Recreational Buoy 10 and Columbia River Area Ocean Selective Fisheries

Appendix 4: Summary of Monitoring Results from the 2000 Non-Treaty Troll Ocean Selective Fishery

Appendix 5: Monitoring Results from the 2000 Ocean Recreational Selective Fisheries from Leadbetter Point to the U.S. Canada Border

Appendix 6: Puget Sound Selective Fisheries Report for 2001

Appendix 7: Monitoring Results from the 2001 Ocean Recreational Selective Fisheries from Leadbetter Point to the U.S. Canada Border

Appendix 8: Summary of 2001 Observations during Limited Participation Commercial Fishery



### **2.2.1.3 Oregon**

In 2000 and 2001, mark-selective recreational coho fisheries occurred in the ocean areas from Cape Falcon to Humbug Mountain and in the Columbia River area from Leadbetter Point (WA) to Cape Falcon. Mark-selective fisheries also occurred in the Columbia River (Buoy 10) and in the freshwater fisheries in various coastal rivers, tributaries of the Columbia and Willamette Rivers and the Willamette River.

In both 2000 and 2001, a commercial troll MSF for coho occurred in ocean areas off the Oregon coast north of Cape Falcon. Reports summarizing the results from all mark-selective Oregon in 2000 and 2001 are in preparation.

### **2.2.2 Planned 2002 Coho Mark-Selective Fisheries**

This section presents expectations for coho MSFs as they were being planned for 2002. Actual fisheries will be reported in a subsequent report of the Regional Coordination Work Group.

#### **2.2.2.1 Canada**

The preliminary outlook for salmon fisheries in 2002 was very similar to the past two years. As in previous years, Fisheries and Oceans Canada was expected to follow a conservation-based, precautionary approach to all salmon fisheries.

MSFs were to be considered during the fishery management planning process. As in previous years, freshwater fisheries were expected to be restricted to terminal hatchery areas. Some marine areas in Johnstone Strait, the Strait of Georgia and the west coast of Vancouver Island were expected to have limited MSFs for coho.

Recreational anglers were expected to have increased opportunities for coho fishing in the 2002 season. MSFs were expected to be approved within the constraints of stock-specific conservation concerns.

#### **2.2.2.2 Washington**

Recreational and commercial troll MSFs for coho in 2002 were expected to be conducted in the same ocean and Puget Sound as in 2000 and 2001.

#### **2.2.2.3 Oregon**

Recreational MSF coho fisheries for 2002 were expected to be similar to those conducted in 2000 and 2001. The ocean fisheries and seasons were to be determined through the Pacific Fishery Management Council process with agreement from state and tribal co-managers for inside waters.

Oregon proposed to continue MSFs in freshwater where mass-marked hatchery coho are present. The systems where MSFs may occur include the Columbia (and some tributaries),

Nehalem, Coos Bay, Coquille, Umpqua, Clackamas (and some tributaries), Sandy, Tualatin, and the mainstem Willamette. However, these fisheries would be negotiated through PSC, PFMC, state and state-tribal forums and would be dependent upon estimated impacts to salmon stocks of concern.

Commercial troll fisheries were determined through the Pacific Fishery Management Council process, but were expected to be similar to those conducted in 2000 and 2001.

## ***2.3 Coho CWT Sampling***

### ***2.3.1 2000/2001 Coho Sampling***

#### ***2.3.1.1 Canada***

R9500 tube detectors were used to sample returns to hatcheries. Nine detectors and support systems were placed in six major south coast hatchery facilities for the recovery of coded-wire tags from coho salmon.

During 2000, both coho and chinook were sampled with wands at a number of major facilities. Technicians performing dead pitch/carcass recovery programs experienced some difficulty with the wands. Complaints included issues about sensitivity of wands in cold weather and doubts about their reliability to detect coded-wire tags.

There were no directed coho commercial salmon fisheries during the 2000 or 2001 commercial season. Wands were used to sample the few coho that were landed.

Due to continued conservation concerns, there were only limited coho opportunities for the sport-fishing sector. As a result of continued emphasis on conservation of weak Thompson and Skeena River coho stocks, encounter rate monitoring programs were conducted. All coho observed through the recreational creel survey programs were sampled with wands to determine the presence or absence of a coded-wire tag. Creel surveys and encounter rate monitoring were conducted in the Strait of Georgia, Johnstone Strait, Juan de Fuca Strait, West Coast Vancouver Island and in-river fisheries on the Capilano, Stamp, Big Qualicum and Lower Fraser tributaries. A very short opening for coho also took place in the north with a limit of one fish per day, regardless of the fin clip status after upper Skeena River stocks had passed above Terrace, B.C. There was no creel survey or electronic sampling conducted for this fishery.

#### ***2.3.1.2 Washington***

Coho recovered at hatcheries, on spawning grounds and in commercial or recreational fisheries were sampled electronically for coded-wire tags. Tube detectors were used at hatcheries and in some commercial fisheries. Wands were used in all catch sampling programs. No major problems were encountered with the electronic detection equipment,

but poor sampling technique was observed at some WDFW hatcheries. Extensive training will be provided in 2002 to ensure high recovery rates of coded-wire tags.

MSFs were monitored and sampled both onboard fishing boats and on the docks by the normal sampling crews. The information collected was used to determine catch and effort as well as the number of unmarked fish brought to the boat and released. The actual mark rate in the fishery was determined using several different methods. For Buoy 10, WDFW sent a boat into the fishing area to observe and record fish as they were being caught and released and record the mark status. Voluntary trip reports were also given to the fishing public who were asked to record the fish they hooked and the mark status. In the Area 1 and 2 sport fisheries, WDFW samplers rode along on charter trips and recorded the mark information. Voluntary trip reports were also used. In Area 3, voluntary trip reports were used. In Areas 4 and 5, voluntary trip reports were used but most of the data came from WDFW test fishing boats catching and releasing coho on sport gear. In Area 7 (2001 only) and 13, sampling effort was increased and voluntary trip reports were used.

Sampling reports are attached for Puget Sound (Appendix 1,2 & 6), Washington (Appendix 5, 7), Washington Oregon coastal troll (Appendix 4) and Buoy 10 (Appendix 3) fisheries.

In Washington, sampling goals were to obtain marked to unmarked ratios, encounter rates, and compliance rates. In both 2000 and 2001, marked to unmarked ratios for coho were very similar to pre-season estimates for southern Washington coastal waters. The ratio of marked:unmarked coho salmon was lower than pre-season projections for both central and northern Washington coastal waters and Puget Sound.

In Area 5 in 2000, a projected mark rate of 38% compared to an observed rate of 33%. In 2001, a projected mark rate of 54% compared to an observed rate of 36%. The compliance rate (retention of marked coho only and releasing unmarked coho) observed by port samplers in the MSFs ranged from 98% to over 99% in 2000, and from 97% to 99% in 2001 for Washington coastal waters and in the Strait of Juan de Fuca. Enforcement staff also estimated compliance for the four Washington coastal catch areas. Boats were boarded and searched for catch. Enforcement activities suggested nearly identical compliance rates to what was observed by samplers on the dock (Attachment 1). The pre-season model projected a rate of 2% retention of all unmarked handled coho; in-season data showed overall retention rates of 2% in 2000, and 1% in 2001 of handled unmarked coho.

In Areas 7 and 13, retention of unmarked coho was significantly higher than expected. In 2000, it was estimated that anglers retained 36% of unmarked coho encountered in Area 13. In 2001, the estimate of unmarked coho retention was 26% for Area 13 and 8.4% for Area 7 (Appendix 2).

### **2.3.1.3 Oregon**

Coho recovered at hatcheries, on spawning grounds and in commercial or recreational fisheries were sampled electronically for coded-wire tags. R9500 tube detectors were used at hatchery facilities. Wands were used in all sampling programs. Some wands exhibited

hypersensitivity resulting in unnecessary snout collection before the wands could be repaired.

Monitoring of the Oregon mark-selective fisheries was conducted both onboard fishing boats and dockside with the emphasis on estimating catch and effort, the ratio of marked to unmarked coho, the number of coho that dropped-off the hook prior to being brought to the boat, and the number of unmarked coho handled and released. These data were used to estimate unobserved fishery mortalities that could be attributed to the fish that dropped-off and unmarked fish that were released.

Oregon sampling programs also collected information to characterize the fishing gears and methods used in the fisheries, the distribution of hook wound locations and to collect coded-wire tags from retained fish. The Oregon Department of Fish and Wildlife and the Oregon State Police worked cooperatively to enforce mark-selective fishery regulations and collect unbiased data on the occurrence of illegally retained unmarked coho.

#### **2.3.1.4 Alaska**

ADFG has continued with traditional (adipose-mark) visual CWT sampling for coho salmon, with no plans to convert to electronic sampling.

### **2.3.2 Planned 2002 Coho CWT Sampling**

#### **2.3.2.1 Canada**

Directed coho fisheries were not expected for south coast commercial fishing fleets in 2002 and fisheries for other species were to be subject to strict conservation measures to protect south coast (including Thompson River) coho stocks. Any coho encountered by samplers were to be electronically sampled for tags. Numbers were anticipated to be low enough that sampling could occur with wands.

Electronic sampling with wands of both coho and chinook were expected to occur through an expanded creel survey program for recreational fisheries where mass-marked coho were likely to be present. The Voluntary Head Recovery program was expected to continue for coho and chinook in northern and southern fisheries.

R9500 tube detectors supplemented with wands were expected to continue to be used at hatchery facilities participating in mass marking of coho. Wand detectors were to be used during sampling of carcasses on the spawning grounds and at fences on both hatchery and wild indicator streams.

#### **2.3.2.2 Washington**

In 2002, Washington was expected to continue to sample coho for coded-wire tags using electronic detection and sampling and monitoring programs similar to those in 2001.

### **2.3.2.3 Oregon**

Oregon was expected to continue to sample coho for coded-wire tags using electronic detection equipment. Sampling plans for mark-selective coho fisheries in 2002 were to be similar to those used in previous years, with monitoring consisting of a combination of dockside sampling, onboard observers and Oregon State Police enforcement.

### **2.3.2.4 Alaska**

ADFG was expected to continue traditional (adipose-mark) visual CWT sampling for coho salmon with no plans to convert to electronic sampling.

## **3 Chinook**

### **3.1 *Chinook Marking***

#### **3.1.1 Mass Marked Chinook Released in 2000**

Releases of mass marked chinook increased in 2000, reflecting additional mass marking agreements between WDFW and Western Washington tribes. Approximately 10.3 million of the total 42.9 million adipose clipped chinook released were also coded-wire tagged.

**3.1.1.1 1998 Brood (Yearling)**

Area	Race/Run	Total Release (millions)	Total Adipose Marks	Details in Table
Puget Sound	Spring	0.2	0.1	12,13
	Summer	0.6	0.5	13
	Fall	2.0	1.6	12,13
	Total	<b>2.8</b>	<b>2.2</b>	
Columbia River	Spring	9.6	7.7	12,14
	Summer	1.6	1.6	12
	Fall	0.5	0.4	12
	Total	<b>11.6</b>	<b>9.8</b>	
Coastal Oregon	Spring	<b>0.3</b>	<b>0.3</b>	14
TOTAL ALL AREAS		<b>14.7</b>	<b>12.3</b>	

**3.1.1.2 1999 Brood (Subyearling)**

Area	Race/Run	Total Release (millions)	Total Adipose Marks	Details in Table
Puget Sound	Spring	4.0	0.7	12,13
	Summer	0.2	0.0	13
	Fall	40.2	23.0	12,13
	Total	<b>44.4</b>	<b>23.7</b>	
Washington Coast	Falls	<b>4.8</b>	<b>0.2</b>	12
Columbia River	Spring	1.8	1.7	12,14
	Summer	1.2	0.8	12
	Fall	68.6	36.0	12
	Total	<b>71.6</b>	<b>38.6</b>	
Coastal Oregon	Spring	<b>1.2</b>	<b>1.1</b>	14
TOTAL ALL AREAS		<b>122</b>	<b>63.6</b>	

**3.1.2 Mass Marked Chinook Released in 2001**

Releases of mass marked chinook increased again in 2001. Approximately 7.4 million of the total 48.35 million adipose clipped chinook released were also coded-wire tagged.

**3.1.2.1 1999 Brood (Yearling)**

Area	Race/Run	Total Release (millions)	Total Adipose Marks	Details in Table
Puget Sound	Spring	0.3	0.1	15,16
	Summer	0.9	0.9	15
	Fall	0.7	0.7	15,16
	Total	<b>1.9</b>	<b>1.6</b>	
Columbia River	Spring	9.5	8.5	15,17
	Summer	1.6	1.6	15
	Fall	0.3	0.3	15
	Total	<b>11.4</b>	<b>10.4</b>	
Coastal Oregon	Spring	<b>0.3</b>	<b>0.3</b>	17
<b>TOTAL ALL AREAS</b>		<b>13.6</b>	<b>12.3</b>	

**3.1.2.2 2000 Brood (Subyearling)**

Area	Race/Run	Total Release (millions)	Total Adipose Marks	Details in Table
Puget Sound	Spring	4.5	0.7	15,16
	Summer	1.4	1.0	15
	Fall	36.7	24.2	15,16
	Total	<b>42.6</b>	<b>25.9</b>	
Washington Coast	Falls	<b>8.0</b>	<b>0</b>	15
Columbia River	Spring	1.7	1.6	15,17
	Summer	1.6	1.0	15
	Fall	31.4	3.0	15
	Total	<b>34.7</b>	<b>5.7</b>	
Coastal Oregon	Spring	<b>2.5</b>	<b>2.5</b>	17
<b>TOTAL ALL AREAS</b>		<b>87.8</b>	<b>34.1</b>	

### **3.1.3 Planned 2001 Brood Chinook Mass Marking**

#### **3.1.3.1 Canada**

There is no adipose clip mass marking of chinook stocks within Canada. However, to maintain assessment capability in the event that Washington pursues chinook mark-selective fisheries in areas where Canadian stocks are present, two stocks (Shuswap and Chilliwack) will be double index tagged annually.

#### **3.1.3.2 Washington**

WDFW expects to mass mark at least as many brood year 2001 chinook salmon as were marked for the 2000 brood year. Chinook salmon are expected to be mass marked at all the same locations as in 2000, although the numbers at each facility may vary with program changes. In addition, WDFW pursued agreements to increase the number of chinook that will be mass marked. Western Washington tribal hatcheries planned on marking similar numbers of 2001 brood chinook as were marked for the 2000 brood year. No change was anticipated in Washington DIT groups (Table 18).

#### **3.1.3.3 Oregon**

Oregon planned on marking similar numbers and at the same locations of 2001 brood chinook as in the 2000 brood year, with no change in DIT (Table 18).

### **3.1.4 Double Index Tagging**

Table 18 lists the chinook indicator stocks, which are expected to be double index tagged. The stocks identified were based on previous proposals for chinook MSFs. The list should be reviewed for completeness, taking into account recent MSF proposals.

## ***3.2 Chinook Mark-Selective Fisheries***

### **3.2.1 2000 and 2001 Chinook Mark-Selective Fisheries**

#### **3.2.1.1 Washington**

There were no chinook mark-selective fisheries in 2000. Beginning on March 12, 2001, a mark-selective fishery for spring chinook was opened to recreational fishers on the lower Columbia River (upstream to Bonneville Dam).

About 20 commercial fishers participated in a test fishery using tangle nets and were permitted to retain marked spring chinook while releasing unmarked spring chinook. These tests showed that less than 5% of spring chinook were brought on board dead, and further work by the WDFW showed that the survival of spring chinook released from the tangle net



was high. (Vander Haegen, G.E., K.W.Yi, C.E.Ashbrook, E.W.White, and L. L. LeClair. 2002. Evaluate live capture selective harvest methods. WDFW Report #FPT-02-01, 35 p.)

### **3.2.1.2 Oregon**

There were no chinook mark-selective fisheries in 2000. In 2001, Oregon held recreational mark-selective fisheries for spring chinook salmon in the Columbia River and various tributaries including the Willamette River. Oregon also held an experimental commercial mark-selective fishery for spring chinook in the Columbia River using tangle-net (or tooth-net) gear.

Reports outlining the results from all mark-selective fisheries in Oregon in 2000 and 2001 are in preparation.

## **3.2.2 Planned 2002 Chinook Mark-Selective Fisheries**

### **3.2.2.1 Washington**

Columbia River: A winter season commercial fishery was expected to occur during January 7 through February 15 targeting primarily sturgeon with potential MSFs directed at spring chinook. A commercial tangle net MSF targeting spring chinook was expected to occur February 25 through March 27. All fishers participating in the fishery would be required to attend a one-day workshop involving fish handling techniques and have a recovery box on board to resuscitate stressed fish to be released.

A spring chinook sport MSF was expected to occur during January through May 15 in 2002 (in the area from the mouth upstream to the I-5 Bridge during January 1 through March 15 and from the mouth upstream to Bonneville Dam and in The Dalles and John Day Reservoirs from March 15 through May 15. The fishery was expected to be closed in the area below Bonneville Dam for 6 days from April 29 through May 4. A six-mile area in the upper Bonneville Reservoir was expected to be open effective April 6 through May 15.

Puget Sound: A summer chinook sport fishery for hatchery fish was planned for a section of the Skykomish River, near the Wallace River Hatchery, in Northern Puget Sound, with a daily limit of one adipose-clipped chinook.

### **3.2.2.2 Oregon**

MSFs for spring chinook in the Columbia River and its tributaries were expected in 2002, to be planned and implemented by state, federal and tribal agencies operating through the Columbia River Compact fishery management process. Oregon also intended to continue investigating tangle-net gear as a mark-selective commercial fishing method in the Columbia River.

MSFs were planned for freshwater recreational fisheries in the area of the Columbia River and selected tributaries including the Willamette, Sandy, Deschutes, and Hood rivers. MSFs

were also planned for several tributaries of the Willamette, including the Clackamas, Santiam, Molalla, and McKenzie.

Oregon planned to conduct MSFs for spring chinook at two terminal locations on the north coast at Tillamook Bay and the Nestucca River.

### 3.3 Chinook CWT Sampling

#### 3.3.1 2000/2001 Chinook CWT Sampling

##### 3.3.1.1 Canada

The Mark Recovery Program (MRP) has initiated electronic sampling in a variety of chinook fisheries. Electronic sampling for both coho and chinook is currently possible because of restricted fisheries. If there is an improvement in commercial fisheries (i.e. more liberal catches of either coho or chinook) the equipment and infrastructure presently in place will be inadequate to support electronic sampling. The program will require an infusion of capital to maintain electronic sampling capability. It should be noted that even with the current fisheries, the equipment support systems in the north will require enhancement, including the purchase or manufacture of support/grading tables and possibly additional sampling technicians.

The scope of electronic sampling was broadened in 2001 to include all commercial fisheries targeting chinook, including restricted offloads of chinook from fisheries directed at sockeye, pink or chum. Evidence of the impact and necessity of electronic detection is provided in the following summary of tags being recovered from Northern Troll (NTR) and West Coast Vancouver Island Troll (WCVI) in 2001 for unmarked and marked chinook:

Fishery & Period	Chinook Sampled	CWT Recoveries	Unmarked Recoveries		Marked Recoveries	
			Count	Percentage	Count	Percentage
WCVI Spring	7,780	804	119	14.8%	685	85.2%
WCVI Fall	2,722	194	38	19.6%	156	80.4%
NTR Spring	1,658	128	4	3.1%	124	96.9%
NTR Fall	2,494	244	12	5.0%	232	95.0%
TOTAL	14,654	1370	173	12.6%	1,197	87.4%

It is interesting to note the temporal pattern of increased numbers of tags originating from unmarked chinook in both fisheries. The sampling of the WCVI fisheries relied substantively on a combination of wands and the R9500 affixed to a grading table or deployed portably as a stand alone. The R9500 saw extended use handling whole fish and heads-only from freezer trollers. NTR fisheries were primarily sampled with wands, although a portable R9500 was situated in Prince Rupert for the Fall/Winter fishery.

Any chinook encountered by surveyors wading coho during recreational creel survey programs where mass-marked coho were likely to be present were wanded as part of the interview. The Voluntary Head Recovery program continued for coho and chinook in northern and southern fisheries. Visual sampling is used at hatcheries and during spawning surveys, except at Chilliwack Hatchery which uses electronic sampling to recover DIT groups.

Summary of Chinook CWT detection methods used in 2001 for B.C. fisheries.

Area	Fishery			
	Commercial	Recreational	Hatchery	Spawning Surveys
North Coast	Electronic	Visual (VHR*)	Visual	Visual
Central Coast	Electronic	Visual (VHR*)	Visual	Visual
WCVI	Electronic	Electronic	Visual	Visual
Strait of Georgia	Electronic	Electronic	Visual	Visual

\* Voluntary Head Recovery Program

In addition to the deployment of electronic equipment, Canada has completed elaborate revisions to its database enabling the recording of new information fields related to mass marking and double index tagging. Samplers are now tracking the numbers of adipose clipped and unclipped fish in the samples and matching the recovery of tags to these categories.

### 3.3.1.2 Washington

Electronic sampling began in 2000 at hatchery racks at hatcheries involved with double index tagging. In 2001, almost all chinook salmon coded-wire tag (CWT) sampling programs in Washington were converted to the use of electronic detection equipment. This includes sampling of fisheries, hatcheries and spawning grounds. The only exceptions are sampling of the in-river tribal fisheries in northern coastal rivers, as there are no mass marked or DIT groups originating from these rivers. CWT sampling remained visual in these fisheries.

Summary of Chinook CWT detection methods used in 2001 for Washington fisheries.

Area	Fishery			
	Commercial	Recreational	Hatchery	Spawning Surveys
Coastal	Electronic	Electronic	Electronic	Electronic
N. Coastal Rivers	Visual	N/A	Visual	Visual
Str. Juan de Fuca	Electronic	Electronic	Electronic	Electronic
Puget Sound	Electronic	Electronic	Electronic	Electronic

### **3.3.1.3 Oregon**

Electronic detection is utilized in Oregon in hatchery and spawning areas where mass marked spring chinook return. On some spawning surveys, snouts from all carcasses are removed for later electronic detection in the lab. Additionally, fisheries in Oregon that target mass marked spring chinook are sampled electronically. Oregon has not fully converted to electronic sampling of chinook salmon and in some areas visual sampling was the method being employed. Visual detection is still used in sampling ocean chinook-directed salmon fisheries, which are not selective for fin mark and largely occur after maturing spring chinook have entered terminal areas. The bulk of the catch is comprised of chinook stocks originating from the Oregon coast and California, which are not mass marked. This allows better utilization of available electronic detection equipment in areas where mass marked salmon are targeted and where they spawn.

Summary of Chinook CWT detection methods used in 2001 for Oregon fisheries (fall chinook returns are not always electronically sampled as they are not mass marked).

Area	Fishery			
	Commercial	Recreational	Hatchery	Spawning Surveys
Ocean	Visual	Visual	N/A	N/A
Coastal Rivers	N/A	Visual	Electronic	Visual
Columbia River	Electronic	Electronic	Electronic	Electronic

### **3.3.1.4 Alaska**

ADFG has continued with traditional (adipose-mark) visual CWT sampling for chinook salmon. There are no plans to convert to electronic sampling.

## **3.3.2 Planned 2002 Chinook Sampling**

### **3.3.2.1 Canada**

Where sampling can be accommodated during the electronic sampling of coho, chinook would also be sampled electronically. If allowable catch levels for either chinook or coho is substantially increased, the equipment and infrastructure presently in place is not believed to be inadequate to support electronic sampling.

### **3.3.2.2 Washington**

As in 2001, almost all chinook salmon coded-wire tag (CWT) sampling programs in Washington were expected to use electronic detection equipment in 2002, including those for fisheries, hatcheries and spawning grounds. Visual sampling was anticipated to be in sampling of the in river tribal fisheries situated in North Coastal rivers, where mass marked and DIT groups were not expected.

### **3.3.2.3 Oregon**

Sampling in 2002 was expected to continue as described for 2001. MSF opportunities for spring chinook were expected to expand, as the majority of the adult returns to Tillamook Bay and the Willamette and Nestucca rivers will be mass marked. Ocean fisheries were to be sampled visually. Mass marked spring chinook hatchery returns and spawning ground recoveries were to be sampled electronically.

### **3.3.2.4 Alaska**

ADFG was expected to continue traditional (adipose-mark) visual CWT sampling for chinook salmon with no plans to convert to electronic sampling.

## **4 Electronic Detection Studies**

Electronic detection capability has now been integrated into coho sampling programs from British Columbia, Washington and Oregon. Studies are now focussing on the use of electronic detection equipment to sample chinook.

### **4.1 *Wand Studies for 2000***

In 1999, Washington Department of Fish and Wildlife (WDFW) did some preliminary work to assess the utility of an alternate wandling technique whereby the wand is inserted into the fish's mouth so that tags are detected through the palate. With the standard wandling technique, the wand is passed over the outside of the snout. The goal was to reduce any fish size bias in tag recoveries and to increase the overall tag recovery rate. The results of this preliminary work showed an increase in the percentage of tags that could be detected. In 2000, WDFW and the Northwest Indian Fisheries Commission (NWIFC) conducted full-scale evaluations of both wandling methods for detecting coded-wire tags in chinook salmon. WDFW also compared these methods for detecting tags in coho salmon.

The reports of these investigations (in press) show some contrasting results (see below). For chinook, WDFW showed a significant increase of about 8% in the number of tags detected using the wandling in the mouth technique (98% detection) compared to the standard wandling technique (90% detection). The study by NWIFC showed a decrease of about 3% of tags detected by wandling in the mouth (96% detection) compared to using the standard wandling technique (99% detection). The difference is suspected to be due to variations in tag placement in the sampled groups or variations in the detection ranges of the wands, although neither study was designed to examine these potential causes. NWIFC did dissect the tags from two fish missed by wandling in the mouth and observed the tags within 1 cm of the surface of the snout. When the results of both techniques on individual fish were combined both WDFW and NWIFC had a 99% detection rate of coded-wire tags. The tube detector (model R9500) successfully detected 100% of the tags.

Results of WDFW wanding experiments comparing mouth wanding and standard wanding for chinook salmon.

Hatchery	# sampled	# with Tags	Percentage of Tags Detected			
			Standard	Mouth	Combined	Tube
Lewis R.	204	27	93.8	100	100	100
Lyons Ferry	778	763	93.8	99.6	99.9	100
Portage Bay	187	132	84.1	96.2	97.7	100
Soos Creek	1151	201	73.6	92.5	97.5	100
Wallace R.	312	166	100	100	100	100
Total	2632	1326	90.6	98.3	99.3	100

Results of NWIFC wanding experiments comparing mouth wanding and standard wanding for chinook salmon.

Hatchery	# sampled	# with Tags	Percentage of Tags Detected			
			Standard	Mouth	Combined	Tube
Clear Creek	106	89	100	97.8	100	N/A
Grovers Cr	302	233	100	96.1	100	100
Makah NFH	71	46	97.8	91.3	97.8	100
Total	479	368	99.7	95.9	99.2	100

When possible, the R9500 tube detector is recommended to be used instead of a wand detector because of the slightly higher tag recovery rate and the lack of potential bias in missed tags. When wands are used for sampling chinook salmon, it is recommended that each fish be wanded with both techniques; first by wanding in the mouth then, if no tag is detected, by using the standard wanding technique. Used together with proper techniques, about 99% of the tags are expected to be recovered. When wands are used for sampling coho salmon, the standard wanding technique is recommended. The importance of proper training and use of the electronic detection equipment is stressed. During the study, poor wanding technique was noticed at several sites, which could decrease the detection rates of tags. Therefore, to maximize the effectiveness of tag recovery programs, agencies should ensure that employees using electronic detection are properly trained.

These recommendations were presented to the PSMFC Mark Committee at the 2001 annual meeting, along with the observation that the mouth wanding technique damaged the wand casing due to the teeth scraped along the surface. The Mark Committee reached consensus on endorsing the recommendation to wand both the mouth and then the external surface of the fish. However, agencies wanted to delay its application until the abrasion problem was resolved. In fall 2001, WDFW tested several wands outfitted with titanium shields and found they satisfactorily protected the wands without compromising tag detection. Further refinement is necessary to reduce the weight of the shield before wands are converted. The manufacturer of the wand is currently seeking a source for the shield.

## 4.2 Wand Studies for 2001

In early fall 2001, Northwest Marine Technology informed WDFW and several other agencies that, due to wand design, optimal tag detection would be achieved if the long axis of the wand is oriented to the long axis of the tag (i.e. with the wand parallel to the spine of the fish), here referred to as the vertical sampling technique. However, all sampling programs trained samplers to use the wanding technique previously recommended by NMT, with the long axis of the wand perpendicular to the spine of the fish. WDFW ran a pilot study using the three techniques (wanding in mouth, standard wanding, and “vertical” wanding) to evaluate whether it would be worth retraining samplers, and at the same time, to evaluate a titanium shield for protecting the wands. A blind sampling method was used to test the techniques without titanium shields on 1024 male and female chinook salmon and with the titanium shields on 848 chinook salmon at Soos Creek Hatchery (see below). The average fork length was 76.6 cm, with a range from 43 to 111 cm.

Results of blind sampling to evaluate titanium shields and wanding methods on chinook at Soos Creek Hatchery.

Method	# Tags Detected	# Tags Missed	% Detected
Standard	458	11	97.7
Mouth	462	7	98.5
Vertical	463	6	98.7
Standard with Titanium	388	8	98.0
Mouth with Titanium	392	4	99.0
Vertical with Titanium	389	7	98.2

While the test showed that the vertical sampling technique detected more tags than the standard wanding technique, it did not outperform the mouth wanding technique. Samplers found the vertical wanding technique to be slow and awkward, and it was difficult to control the wand. This would result in poor sampling technique and likely decrease the detection rate. WDFW will not retrain samplers to use the vertical wanding technique and no further testing of this method is planned. The recommendation of the PSMFC Mark Committee, to wand chinook inside the mouth and with the standard method, will be implemented by WDFW once shields are available.

The titanium shield did not affect the tag detection rate in this sample and protected the wands very well. Samplers found the shield slightly heavy (the wands are heavier on the top end, even without the shield), and recommended that it be made thinner or slightly smaller to reduce fatigue.

## 5 Mass-Marking Machine Development

To address the logistical problem of mass marking increasing numbers of salmonids, the Bonneville Power Administration and the United States Fish and Wildlife Service funded the development of an automated mass marking machine. WDFW subcontracted with Northwest

Marine Technology (NMT) for the development of an automated marking and tagging system (MATS). The automated adipose fin marking and coded wire tagging are accomplished without the use of anaesthetics or human handling. Development and improvements to the trailer continued throughout 2001.

In 2000, automated MATS trailers adipose fin marked and/or coded wire tagged 9.5 million salmonids in Oregon and Washington. In 2001, NMT contracted to tag 11.8 million salmonids in Washington, 3.8 million in Oregon and 2.0 million in California. Each trailer currently marks and/ or tags fish at a rate of approximately 25-30,000 per 8-hour shift. The original five trailers have four lines that independently operate with Microsoft Windows software. Two new trailers will have five lines to increase capacity. Each trailer has a built-in sorter capable of sorting fish by length, with approximately 1 mm accuracy, at a rate of two fish per second.

Each line within a trailer must be set to process one of seven different size groups of fish, ranging from 62 to 142 millimetres in length. Each line contains a volitional entry system, a grasper, a video system to locate the adipose fin, a fin clipper, a CWT injector, and a quality control device to reject untagged or unmarked fish. All operations are computer controlled with colour screens allowing operations such as excision and measuring to be observed in real time.

During the fall of 2000 and 2001, WDFW and NMT conducted “side-by-side” experiments to examine the potential differences in adipose fin clip quality, coded wire tag retention, and survival between the traditional and automated marking systems. Preliminary results showed no difference in immediate survival or CWT retention. Automated adipose fin clip removal quality has sometimes been slightly less than experienced by hand clipping.

In late 2001, NMT offered to sell or lease the MATS trailers to interested agencies. In 2002, the trailers will be operated by various U.S. agencies. Because of the current production speed of the trailers, they will probably be used primarily for coded-wire tagging operations rather than adipose fin mass marking. The manual fin clipping trailers, using crews of approximately 12 people, can currently process 2-3 times as many fish in an 8 hour day.

## **6 Data Format**

The PSC Data Standards Working Group of the PSC Data Sharing Technical Committee has incorporated most data elements related to mass marking, electronic sampling, and selective fisheries into the PSC data exchange format. Sampling procedures and data forms have been modified to capture the relevant information. Two issues are still outstanding: (1) the need for a descriptive file detailing the locations and time periods where selective mark fisheries were conducted to facilitate DIT analysis; and (2) some means to formally include agency estimates of mortalities of unmarked DIT groups in regional mark recovery databases.



## 7 Recommendations/Conclusions

- The list of chinook DIT groups should be reviewed by the SFEC-AWG to ensure that all stocks likely to be encountered in potential mark-selective fisheries are adequately represented.
- The geographical range required for electronic CWT sampling for chinook needs further review to ensure that the lack of CWT-only (tagged and unmarked) recoveries in areas without ED (e.g. Alaska, coastal Oregon) will not compromise the analyses performed by the PSC technical committees.
- Based on the results of recent chinook wandling studies, the SFEC concurs with the 2001 PSMFC Mark Committee recommendation to use a dual-method wandling technique: individual adult chinook should be wanded both inside the mouth (rubbing the wand on the palate) and by the standard method (rubbing the wand across the exterior surface of the snout). To minimize damage to the ED wandling equipment the wand manufacturer has been encouraged to pursue the development of a shield as soon as possible.
- Numerous questions remain regarding the capacity of DIT and ED to maintain the viability of the CWT system. Data is now available for analysis of the performance of coho DIT groups. We recommend that SFEC work with agencies in 2003 on this analysis.

## 8 Tables

**Table 1. Releases of 1998 Brood Coho Smolts in 2000 by Canadian Hatcheries**  
(not including small scale enhancement projects operated by schools and community groups).

Area	Hatchery	Tagged		Untagged		Total
		Ad Clipped	Unclipped	Ad Clipped	Unclipped	
Strait Of Georgia	Alouette R				14,446	14,446
	Anderson Cr/GSMN				8,557	8,557
	Bedwell Bay			8,829		8,829
	Big Qualicum R*	40,836	41,657	1,283,501	5,309	1,371,303
	Capilano R			524,976		524,976
	Chapman R			70,000	17,500	87,500
	Chehalis R			1,171,672		1,171,672
	Chilliwack R*	46,322	28,060	1,914,009	138	1,988,529
	Cowichan R				31,588	31,588
	Deadman R				11,000	11,000
	Doctor Bay				13,996	13,996
	Fanny Bay/GSVI			49,775		49,775
	Goldstream R*	30,095	30,179		83,632	143,906
	Gold R			14,439		14,439
	Gwa'ni				73,794	73,794
	Horseshoe Bay			9,500		9,500
	Hoy Cr				2,000	2,000
	Hutchinson Cr				1,000	1,000
	Inch Cr*	60,309	40,098	669,481	4,499	774,387
	Kanaka Cr				14,500	14,500
	L Campbell R				29,752	29,752
	Little R/GSVI				18,000	18,000
	Malaspina College				3,938	3,938
	Mossom Cr				7,204	7,204
	Nanaimo R				161,506	161,506
	Nelson Cr/GSMN				10,000	10,000
	Noons Cr				21,234	21,234
	Oyster R	29,287		28,553		57,840
	Poco Hatchery				22,600	22,600
	Port Hardy/Quatse				108,633	108,633
	Puntledge R			645,051	158,200	803,251
	Quinsam R*	42,354	41,483	741,732	657,928	1,483,497
	Reed Pt/Ioco			9,879		9,879
Sechelt			122,189		122,189	
Seymour R	30,131		33	45,636	75,800	
Shuswap R				4,580	4,580	
Sliammon R				25,987	25,987	
Spius Cr*	36,313	74,301	6,211	22,629	139,454	

Table 1 cont'd

Area	Hatchery	Tagged		Untagged		Total
		Ad Clipped	Unclipped	Ad Clipped	Unclipped	
Strait of Georgia	Stave Val SES				21,500	21,500
	Tenderfoot Cr	66,444	74,301	6,244	120,332	267,321
	Thompson R N		29,568		32,239	61,807
	Trans Mountain Vancouver Aquarium			10,184	7,152	10,184 7,152
AREA TOTAL		382,091	359,647	7,286,258	1,761,009	9,789,005
West Coast of Vancouver Island	Conuma R			97,644		97,644
	Nitinat R	42,436		236,723	27,660	306,819
	Robertson Cr*	40,207	40,287	902,214		982,708
	Sooke R Thornton R				77,000 49,747	77,000 49,747
AREA TOTAL		82,643	40,287	1,236,581	154,407	1,513,918
TOTAL		464,734	399,934	8,522,839	1,915,416	11,302,923

\* Double Index Tag (DIT) groups

**Table 2. Releases of 1998 Brood Coho Smolts in 2000 by Washington Dept. of F&W Hatcheries.**

Area	Hatchery	Tagged		Untagged		Total
		Ad Clipped	Unclipped	Ad Clipped	Unclipped	
Puget Sound	Ballard Salmon Net Pens	0	0	36,500	0	36,500
	Blaine High School	0	0	11,758	0	11,758
	Dungeness	0	0	827,609	38,495	866,104
	Fox Island Net Pens	0	0	49,710	0	49,710
	George Adams*	42,495	41,459	410,590	7,722	502,266
	Issaquah	0	0	531,524	13,476	545,000
	Kendall Creek*	43,242	50,223	169,509	15,526	278,500
	Lake Shannon Net Pens	0	0	0	43,931	43,931
	Marblemount *	40,398	40,525	168,018	659	249,600
	Minter Creek	0	0	1,482,757	25,643	1,508,400
	Possession Point Net Pens	0	0	25,000	0	25,000
	Seattle Aquarium	0	0	24,701	0	24,701
	Soos Creek*	42,957	56,310	470,258	2,624	572,149
	South Sound Net Pens	49,858	2,920	2,095,943	121,969	2,270,690
	Voights Creek*	28,136	28,196	1,039,248	31,283	1,126,863
	Wallace River*	43,014	46,977	271,996	11,073	373,060
Whatcom Creek	0	0	5,000	0	5,000	
AREA TOTAL		290,100	266,610	7,620,121	312,401	8,489,232
Coastal	Aberdeen Net Pens	0	0	98,000	2,000	100,000
	Bingham Cr*	65,986	78,175	550,677	2,462	697,300
	Forks Creek*	0	0	487,480	648	637,300
	Humptulips	0	0	1,494,153	35,847	1,530,000
	Lake Aberdeen	0	0	33,931	500	34,341
	Naselle	0	0	952,643	34,457	987,100
	Nemah	0	0	533,158	4,842	538,000
	Ocean Shores Net Pens	0	0	98,000	2,000	100,000
	Satsop Springs	0	0	0	500,000	500,000
	Skookumchuck	102,983	622	0	0	103,605
	Solduc* (fall coho)	71,753	72,617	457,572	16,958	618,900
	Solduc (summer coho)	0	0	202,221	7,879	210,100
AREA TOTAL		314,619	226,789	4,907,835	607,593	6,056,836
Columbia River	Cowlitz Salmon	207,555	0	3,845,197	0	4,052,752
	Deep River Net Pens	55,422	0	361,539	14,182	431,143
	Elochoman	63,372	205	448,423	0	512,000
	Fallert Creek	30,074	181	494,745	0	252,000
	Grays River	28,774	0	115,274	4,515	148,563

Table 2 cont'd

Area	Hatchery	Tagged		Untagged		Total
		Ad Clipped	Unclipped	Ad Clipped	Unclipped	
	Kalama Falls	280,194	9,106	448,497	14,568	752,365
	Klickitat	44,484	44,465	1,330,881	170	1,420,000
	Lewis River*	66,447	66,425	1,969,956	23,856	2,126,684
	Lewis River*	73,830	74,530	790,614	11,652	950,666
	Malinowski Ponds	10,317	0	0	0	10,317
	North Toutle	29,649	0	774,933	17,024	821,606
	Speelyai	97,445	2,021	338,073	6,867	444,406
	Steamboat Slough NP	29,487	450	159,183	2,423	191,543
	Washougal (Klickitat Release ) Type N	29,272	49	492,405	0	521,726
	Washougal (Klickitat Release ) Type S	29,752	46	1,586,696	0	1,616,494
	Washougal (Type N)	30,665	48	502,310	0	533,023
	Washougal (Type S)	163	0	93,030	0	93,193
	AREA TOTAL	1,106,902	197,526	13,751,756	95,297	15,151,481
	TOTAL	1,711,621	690,925	26,279,712	1,015,291	29,697,549

\* Double Index Tag (DIT) groups

**Table 3. Releases of 1998 Brood Coho Smolts in 2000 by Western Washington Tribal Hatcheries.**

Area	Hatchery	Tagged		Untagged		Total
		Ad Clipped	Unclipped	Ad Clipped	Unclipped	
Puget Sound	Lower Elwha *	180,253	76,733	5,384	422,486	684,856
	Jim Creek		4,791			4,791
	Lummi Bay	46,836		900,864		947,700
	Skookum Creek	47,822		1,101,378		1,149,200
	Bernie Gobin		41,741		807,259	849,000
	Agate Pass Seapens <sup>1</sup>	20,736		252,204		272,940
	Elliott Bay Pens	46,185		409,954		456,139
	Crisp Creek	47,864		146,316		194,180
	Keta Creek				470,986	470,986
	Upper Puyallup Plants	50,497		50,903		101,400
	Clear Creek		44,070		426,300	470,370
	Kalama Creek		49,266		245,738	295,004
	Port Gamble Pens <sup>*1</sup>	49,346	49,077	291,331		389,754
	Quilcene Bay Pens <sup>*2</sup>	48,023	48,640	583	110,754	208,000
AREA TOTAL		537,562	314,318	3,158,917	2,483,523	6,494,320
Coastal	Educket Creek <sup>2</sup>			43,340		43,340
	Salmon River *	68,433	71,997	3,906	363,403	507,739
	Queets Supplementation	9,599		119,862		129,461
AREA TOTAL		78,032	71,997	167,108	363,403	680,540
TOTAL		615,594	386,315	3,326,025	2,846,926	7,174,860

<sup>1</sup> Coop with WDFW

<sup>2</sup> Coop with USFWS

\* Double Index Tag (DIT) groups

**Table 4. Releases of 1998 Brood Coho Smolts in 2000 by USFWS Hatcheries.**

Area	Hatchery	Tagged		Untagged		Total
		Ad Clipped	Unclipped	Ad Clipped	Unclipped	
Puget	Quilcene *	48,193	44,616	275,130	25,436	393,375
Sound	AREA TOTAL	48,193	44,616	275,130	25,436	393,375
Coastal	Makah *	37,852	39,068	157,470	2,408	236,798
	Quinault *	159,442	143,988	19,988	307,053	630,471
	AREA TOTAL	197,294	183,056	177,458	309,461	867,269
Columbia River	Little White Salmon	99,621	0	448,317	0	547,938
	Willard *	51,433	52,097	893,769	847	998,146
	Yakama ponds	0	975,952	0	16,627	992,579
	Winthrop	26,472	0	0	173,291	199,763
	Eagle Creek *	23,095	23,080	958,669	1,844	1,006,688
	AREA TOTAL	200,621	1,051,129	2,300,755	192,609	3,745,114
TOTAL		446,108	1,278,801	2,753,343	572,506	5,005,758

\* Double Index Tag (DIT) groups



**Table 5. Releases of 1998 Brood Coho Smolts in 2000 by Oregon Hatcheries**  
(numbers are preliminary).

Area	Hatchery	Tagged		Untagged		Total
		Ad Clipped	Unclipped	Ad Clipped	Unclipped	
Coastal	Bandon	24,844	101	28,683	204	53,832
	Butte Falls	25,103	0	36,995	526	62,624
	Cole Rivers*	26,262	26,616	119,467	1,841	174,186
	Nehalem*	51,867	51,008	103,542	3,235	209,652
	Noble Creek	28,133	0	93,799	418	122,350
	Rock Creek*	49,346	26,919	67,704	1,054	145,023
	Salmon River*	9,318	10,131	666	335	20,450
	Trask	26,550	114	167,168	2,553	196,385
AREA TOTAL		241,423	114,889	618,024	10,166	984,502
Columbia. River	Big Creek	51,117	1,166	477,952	13,226	543,459
	Blind Slough Netpens	24,624	0	168,459	2,562	195,645
	Bonneville	53,022	340	1,108,538	14,183	1,176,082
	Cascade*	131,697	51,989	1,323	2,101,363	2,286,372
	S Fk Klaskanine	25,414	100	571,160	13,984	610,658
	Sandy*	126,494	143,874	676,946	6,062	953,377
	Tongue Pt Netpens	50,809	140	689,364	13,810	754,123
	Youngs Bay Netpens*	99,071	27,287	1,671,784	21,358	1,819,500
AREA TOTAL		562,247	224,896	5,365,526	2,186,549	8,339,216
TOTAL		803,671	339,785	5,983,550	2,196,714	9,323,720

\* Double Index Tag (DIT) groups

**Table 6. Releases of 1999 Brood Coho Smolts in 2001 by Canadian Hatcheries**

Area	Hatchery	Tagged		Untagged		Total
		Ad Clipped	Unclipped	Ad Clipped	Unclipped	
Strait of Georgia	Alouette R	27,247		0	43,694	70,941
	Bedwell Bay			7,423	0	7,423
	Big Qualicum R	40,596	40,211	1,269,685	255,558	1,606,050
	Capilano R			529,554	0	529,554
	Chapman Cr				72,000	72,000
	Chehalis R			1,242,761	0	1,242,761
	Chilliwack R	42,795	42,643	1,833,852	199	1,919,489
	Cowichan R				41,599	41,599
	Deadman R				66,416	66,416
	Gold R			26,106	0	26,106
	Goldstream R*	30,004	30,213	303	51,073	111,593
	Gwa'ni				88,112	88,112
	Horseshoe Bay			17,000	0	17,000
	Inch Cr	59,960	40,090	745,125	0	845,175
	Kanaka Cr				77,300	77,300
	L Campbell R				30,000	30,000
	Mossom Cr			3,700	0	3,700
	Nanaimo R				64,319	64,319
	P Hardy/Quatse			0	109,064	109,064
	Puntledge R	38,708		584,843	186,989	810,540
	Quinsam R	42,999	43,160	634,283	437,954	1,158,396
	Reed Pt/Ioco			9,847	0	9,847
	Sechelt			102,785	0	102,785
	Serpentine Enh				23,000	23,000
	Seymour R/GSMN			68,681	0	68,681
	Shuswap R	30,049	0	151	0	30,200
	Sliammon R				24,829	24,829
Spius Cr*	113,185	68,093	2,674	85,567	269,519	
Tenderfoot Cr	39,339	0	1,784	305,471	346,594	
Terminal Cr			26,000	14,500	40,500	
Thompson R N		39,770	0	35,624	75,394	
AREA TOTAL		464,882	304,180	7,106,557	2,013,268	9,888,887
West Coast of Vancouver Island	Conuma R			83,126	0	83,126
	Nitinat R			292,139	0	292,139
	Robertson Cr	79,536		892,644	0	972,180
	Sooke R	29,700	29,900	0	14,800	74,400
	Thornton Cr				44,883	44,883
AREA TOTAL		109,236	29,900	1,267,909	59,683	1,466,728
TOTAL		574,118	334,080	8,374,466	2,072,951	11,355,615

\*Double Index Tag (DIT) groups. Goldstream and Spius are DIT groups only and are not proposed for mass marking.

**Table 7. Releases of 1999 Brood Coho Smolts in 2001 by Washington Dept. of F&W**

Area	Hatchery	Tagged		Untagged		Total
		Ad Clipped	Unclipped	Ad Clipped	Unclipped	
Puget Sound	Dungeness	0	0	548,700	0	548,700
	Elwha	0	0	0	294,400	294,400
	Fox Island Net Pens	0	1,154	59,525	296	60,975
	George Adams*	49,403	51,637	388,838	4,114	493,992
	Hurd Creek	0	8,680	0	74	8,754
	Issaquah	0	0	505,600	0	505,600
	Kendall Creek*	43,621	46,896	217,816	8,467	316,800
	Marblemount*	109,551	45,514	95,886	949	251,900
	Minter Creek	20,064	60	1,341,391	27,810	1,389,325
	Seattle Aquarium	0	0	16,979	0	16,979
	Soos Creek*	43,799	50,354	456,885	50,518	601,556
	South Sound Net Pens	46,413	1,635	1,251,478	44,047	1,343,573
	Voights Cr*	44,122	44,593	1,083,897	22,214	1,194,826
	Wallace River*	47,762	43,430	62,141	2,012	155,345
	Whatcom Creek	0	0	0	0	0
AREA TOTAL		404,735	293,953	6,029,136	454,901	7,182,725
Coastal	Aberdeen Net Pens	0	0	251,980	4,020	256,000
	Bingham Creek*	69,344	68,418	541,172	9,766	688,700
	Forks Creek*	70,596	64,021	474,843	16,040	625,500
	Humtulpis	0	0	1,622,478	33,112	1,655,590
	Lake Aberdeen	49,432	200	29,252	116	79,000
	Naselle	0	0	1,008,857	7,643	1,016,500
	Nemah	0	0	502,968	5,132	508,100
	Satsop Springs	0	0	450,000	0	450,000
	Skookumchuck	0	0	69,950	0	69,950
	Solduc* (fall coho)	71,348	66,301	455,714	14,137	607,500
	Solduc (summer coho)	0	0	186,720	5,280	192,000
AREA TOTAL		260,720	198,940	5,593,934	95,246	6,148,840
Columbia River	Cowlitz Salmon	140,136	0	4,044,789	10,833	4,195,758
	Deep River Net Pens	46,061	469	345,314	3,493	395,337
	Elochoman	85,771	1,856	804,415	17,082	909,125
	Fallert Creek	30,863	0	323,887	0	354,750
	Grays River	28,835	0	131,714	0	160,549
	Kalama Falls	30,340	399	327,761	0	358,500
	Klickitat	45,524	0	1,250,476	0	1,296,000
	Lewis River* (Type N)	73,932	89,052	634,773	70,999	868,756
	Lewis River* (Type S)	66,831	81,343	684,282	76,582	909,038
	Malinowski Ponds	14,484	0	0	0	14,484

Table 7 cont'd

Area	Hatchery	Tagged		Untagged		Total
		Ad Clipped	Unclipped	Ad Clipped	Unclipped	
	North Toutle	328,707	2,886	770,918	6,801	1,109,312
	Steamboat Slough NP	29,800	0	179,166	0	208,966
	Washougal ( Klickitat release) Type N	46,834	90	534	1,944,326	1,991,784
	Washougal ( Klickitat release) Type S	12,940	83	249	797,044	810,316
	Washougal (Type N)	29,844	240	436,704	3,521	470,309
	AREA TOTAL	1,010,903	176,418	9,934,982	2,930,681	14,052,984
	TOTAL	1,676,358	669,311	21,558,052	3,481,004	27,384,725

\* Double Index Tag (DIT) groups

**Table 8. Releases of 1999 Brood Coho Smolts in 2001 by Western Washington Tribal Hatcheries.**

Area	Hatchery	Tagged		Untagged		Total
		Ad Clipped	Unclipped	Ad Clipped	Unclipped	
Puget Sound	Lower Elwha *	150,447	63,482	22,141	258,540	494,610
	Lummi Bay	46,125	3,644	715,664	55,282	820,715
	Skookum Creek	44,224	4,628	641,957	66,566	757,375
	Bernie Gobin	47,067	403	243,591	608,939	900,000
	Agate Pass Seapens <sup>1</sup>	50,000		250,000		300,000
	Elliott Bay Pens	50,000		400,000		450,000
	Crisp Creek	45,582	1,100	143,748	4,570	195,000
	Keta Creek				559,625	559,625
	Upper Puyallup Plants	100,369		96,771		197,140
	Clear Creek					0
	Kalama Creek					0
	Port Gamble Pens* <sup>1</sup>	44,184	47,448	325,353	16,235	433,220
	Quilcene Bay Pens* <sup>2</sup>	40,000	40,000		120,000	200,000
	AREA TOTAL		617,998	160,705	2,839,225	1,689,757
Coastal	Educket Creek <sup>2</sup>			34,950		34,950
	Salmon River*	70,750	72,561	4,118	746,484	893,913
	Queets Supplementation	83,703		54,926		138,629
	AREA TOTAL		154,453	72,561	93,994	746,484
<b>TOTAL</b>		<b>772,451</b>	<b>233,266</b>	<b>2,933,219</b>	<b>2,436,241</b>	<b>6,375,177</b>

<sup>1</sup> Coop with WDFW

<sup>2</sup> Coop with USFWS

\* Double Index Tag (DIT) groups

**Table 9. Releases of 1999 Brood Coho Smolts in 2001 at USFWS Hatcheries**  
(numbers are preliminary)

Area	Hatchery	Tagged		Untagged		Total
		Ad Clipped	Unclipped	Ad Clipped	Unclipped	
Puget	Quilcene *	46,269	41,929	340,565	232	428,995
Sound	AREA TOTAL	46,269	41,929	340,565	232	428,995
Coastal	Makah *	37,966	39,227	103,251	2,051	182,495
	Quinault *	96,521	77,013	100,563	485,276	759,373
	AREA TOTAL	134,487	116,240	203,814	487,327	941,868
Columbia. River	Willard *	120,317	730,256	1,077,763	494,786	2,423,122
	Eagle Creek *	24,947	170,200	661,227	53,876	910,250
	AREA TOTAL	145,264	900,456	1,738,990	548,662	3,333,372
TOTAL		326,020	1,058,625	2,283,369	1,036,221	4,704,235

\* Double Index Tag (DIT) groups

**Table 10. Releases of 1999 Brood Coho Smolts in 2001 from Oregon Hatcheries**  
(all numbers are preliminary).

Area	Hatchery	Tagged		Untagged		Total
		Ad Clipped	Unclipped	Ad Clipped	Unclipped	
Coastal	Bandon	25,688	0	23,072	0	48,760
	Butte Falls	0	0	0	39,849	39,849
	Cole Rivers*	26,965	26,757	155,920	94	209,736
	Nehalem*	50,961	50,997	102,690	0	204,648
	Noble Creek	26,700	0	97,653	0	124,353
	Rock Creek*	24,929	26,252	25,188	482	76,851
	Salmon River*	24,146	24,030	196,429	1,012	245,617
	Trask	25,824	1,327	160,653	6,830	194,634
AREA TOTAL		205,213	129,363	761,605	48,267	1,144,448
Columbia. River	Big Creek	53,792	301	479,037	4,055	537,185
	Blind Slough Netpens	26,969	25,104	245,516	1,822	299,411
	Bonneville	50,923	436	1,185,130	13,166	1,249,655
	Cascade*	79,131	27,197	2,201	1,366,030	1,474,559
	Columbia R Estuary Netpens	26,494	98	150,801	1,794	179,187
	Eagle Cr NFH	0	0	53,720	0	53,720
	Leavenworth NFH	25,576	26,557	507	399,423	452,063
	S Fk Klaskanine	26,231	45	677,210	6,593	710,079
	Sandy*	123,553	96,226	566,339	1,225	787,343
	Tongue Pt Netpens	46,909	0	600,165	8,539	655,613
	Youngs Bay Netpens*	74,663	407	1,428,850	40,924	1,544,844
	AREA TOTAL		534,241	176,371	5,389,476	1,843,571
TOTAL		739,454	305,734	6,151,081	1,891,838	9,088,107

\* Double Index Tag (DIT) groups

**Table 11. Coho exploitation rate index stocks identified for double index tagging (DIT)**

Region	Natural/Unmarked Stock Representation	DIT Stock	Hatchery
Strait of Georgia	East Coast Vancouver Island	Big Qualicum	Big Qualicum
	Lower Fraser	Chilliwack	Chilliwack
	East Coast Vancouver Island	Goldstream River	Goldstream River
	Lower Fraser	Inch Creek	Inch Creek
	North Vancouver Island	Quinsam River	Quinsam River
Thompson River	Thompson River	Coldwater R	Spius Creek
West Coast Van. Is.	West Coast Vancouver Island	Robertson Creek	Robertson Creek
Puget Sound	Nooksack	Nooksack	WDFW Kendall Creek
	Skagit	Skagit	WDFW Marblemount
	Stillaguamish/Snohomish	Skykomish	WDFW Wallace River
	Mid Puget Sound	Green River	WDFW Soos Creek
	South Puget Sound	Puyallup	WDFW Voights Creek
	North Hood Canal	Quilcene	USFWS Quilcene Natl
	Quilcene Net Pens (Hood Canal)	Quilcene	Quilcene Net Pens
	South Hood Canal	George Adams	WDFW George Adams
	Strait of Juan de Fuca	Elwha	Lower Elwha Tribal
Washington Coast	North Coast	Solduc	WDFW Solduc
	North Central Coast	Queets	Quinault Salmon R
	Quinault	Quinault	USFWS Quinault R
	Grays Harbour	Satsop	WDFW Bingham Cr
	Willipa Bay	Forks Creek	WDFW Forks Creek
Columbia River	Lower Columbia River	Lewis River	WDFW Lewis River
	Lower Columbia River	Tanner Creek	ODFW Youngs Bay
	Lower Columbia River	Sandy	ODFW Sandy
	Umatilla River	Tanner Creek	ODFW Cascade
	Yakima River	Tanner Creek	ODFW Cascade
Oregon Coast	Oregon North Coast	Nehalem River	ODFW Nehalem
	Oregon North Central Coast	Salmon River	ODFW Salmon River
	Oregon South Central Coast	Rock Creek	ODFW Rock Creek
	Oregon South Coast	Rogue River	ODFW Cole River



**Table 12. Releases of 1998 and 1999 Brood Mass Marked Chinook in 2000 from Washington Dept. of F&W Hatcheries**

1998 Brood - Fall chinook unless otherwise noted

Area	Hatchery	Tagged		Untagged		Total
		Ad Clipped	Unclipped	Ad Clipped	Unclipped	
Puget Sound	Chambers Creek	0	0	85,810	1,121	86,201
	Fox Island NP	0	0	247,199	1,811	249,010
	Hoodsport	0	0	0	268,611	268,611
	Hupp Springs (springs)	0	88,625	0	1,950	90,575
	Icy Creek	0	0	146,610	0	146,610
	Lakewood	0	0	201,555	4,323	205,878
	Marblemount* (springs)	65,619	67,098	1,476	1,107	135,300
	McAllister Creek	0	0	292,894	23,456	316,350
	Mukilteo Net Pens	0	0	14,950	0	14,650
	Oak Harbor Net Pens	0	0	28,500	0	28,500
	Puyallup	0	0	76,500	0	76,500
	Samish	0	0	55,521	11,689	67,210
	South Sound Net Pens	0	0	157,290	3,210	160,500
	Tumwater Falls*	75,498	329	112,574	489	188,890
	Wallace River (summers)	0	0	546,011	7,989	554,000
	AREA TOTAL		141,117	156,052	1,966,160	325,756
Columbia River	Carlton Pond (summers)	202,423	136	2,710	0	205,269
	Chiwawa (springs)	70,679	892	4,335	0	75,906
	Cowlitz Salmon (springs)	110,784	200	835,469	2,534	948,987
	Dryden Pond (summers)	629,416	11,693	8,503	0	649,612
	Fallert (springs)	124,043	0	277,607	0	401,650
	Fish First (springs)	49,553	354	93,124	654	143,685
	Kalama (springs)	116,737	2,466	4,078	0	123,281
	Klickitat (springs)	87,211	0	567	473,952	561,730
	Lewis River* (springs)	144,252	147,855	592,906	16,358	752,453
	Lyons Ferry	441,721	11,987	2,693	0	456,401
	Methow (springs)	427,365	3,218	20,557	0	451,140
	Ringold Springs (springs)	113,157	382	2,086	276,191	391,816
	Similkameen (summers)	282,149	5,799	5,116	0	293,064
	Tucannon (springs)	124,118	1,098	2,723	0	127,939
	Turtle Rock (summers)	215,646	0	1,673	0	217,319
	Wells (summers)	428,720	8,515	20,535	0	457,770
AREA TOTAL		3,568,244	194,595	1,874,682	769,689	6,407,210
TOTAL		3,709,361	350,647	3,840,842	1,095,445	8,996,295

\* Double Index Tag (DIT) groups

Table 12 Continued  
 1999 Brood- Fall chinook unless otherwise noted

Area	Hatchery	Tagged		Untagged		Total
		Ad Clipped	Unclipped	Ad Clipped	Unclipped	
Puget Sound	Coulter Creek	0	0	953,940	42,330	996,270
	County Line Ponds (summers)	193,131	0	1,459	0	194,590
	DesMoines Net Pens	0	0	0	29,800	29,800
	Dungeness (springs)	195,939	596,848	5,527	702,802	1,501,116
	Elwha	0	0	0	1,803,000	1,803,000
	Fox Island Net Pens	0	0	0	17,600	17,600
	George Adams*	208,330	218,728	18,123	3,334,672	3,779,853
	Garrison	0	0	825,114	15,014	840,128
	Glenwood Springs	0	0	170,000	80,000	250,000
	Hoodsport	0	0	0	3,110,853	3,110,853
	Hupp Springs (springs)	0	240,271	0	9,751	250,022
	Issaquah	0	0	1,446,258	76,119	1,522,377
	Kendall Creek*	196,120	201,691	2,182	1,310,807	1,710,800
	Langley Net Pens	0	0	0	14,926	14,926
	Marblemount	31,604	0	81	0	31,685
	Marblemount (springs)	256,616	3,271	2,733	0	262,620
	McAllister Creek	0	0	1,044,416	52,084	1,096,500
	McKernan	0	0	75,175	0	75,175
	Minter Creek	0	0	1,889,839	76,211	1,976,050
	Samish*	178,661	183,066	2,892,197	1,446,571	4,700,495
	Soos Creek*	193,355	201,589	2,581,854	534,415	3,511,213
	Tumwater Falls	0	0	3,869,190	54,937	3,924,127
	Voights Creek	0	0	1,666,886	57,214	1,724,100
Wallace River*	0	0	0	835,000	835,000	
Whitehorse Pond (summers) **	0	172,350	0	0	172,350	
AREA TOTAL		1,453,756	1,817,814	17,454,974	13,604,106	34,330,650
Coast	Forks Creek	205,390	2,295	5,779	1,980,697	2,194,161
	Humptulips	0	0	0	385,100	385,100
	Lake Aberdeen	0	0	0	50,000	50,000
	Naselle	0	0	0	1,117,700	1,117,700
	Nemah	0	0	0	716,900	716,900
	Satsop Springs	0	0	0	290,000	290,000
AREA TOTAL		205,390	2,295	5,779	4,540,397	4,753,861

Area	Hatchery	Tagged		Untagged		Total
		Ad Clipped	Unclipped	Ad Clipped	Unclipped	
Columbia. River	Cowlitz Salmon	197,131	1,691	4,115	5,382,129	5,585,066
	Elochoman	86,833	139	5,638	1,012,390	1,105,000
	Fallert Creek	80,897	182	9,978	1,738,875	1,829,932
	Kalama Falls	91,880	0	493	1,879,727	1,972,100
	Klickitat (springs)	128,843	0	1,157	60,842	190,842
	Klickitat	597,251	3,287,701	14,978	72570	3,972,500
	Lyons Ferry	188,125	2,513	6,005	0	196,643
	North Toutle	91,189	184	736	2,252,332	2,344,441
	Priest Rapids	200,808	3,528	3,165	6,648,492	6,855,993
	Ringold Springs	410,378	12,467	6,142	3,007,910	3,436,897
	Sea Resources	0	0	0	79,167	79,167
	Turtle Rock (summers)	371,525	18,933	14,073	0	716972
	Washougal	77,822	739	13,842	3,320,861	3,413,264
	Wells* (summers)	340,755	9,606	106,609	0	456,970
AREA TOTAL		2,863,437	3,337,683	186,931	25,767,736	32,155,787
TOTAL		4,522,583	5,157,792	3,464,280	33,364,565	71,240,298

\* Double Index Tag (DIT) groups

**Table 13. Releases of 1998 and 1999 Brood Mass Marked Chinook in 2000 from Western Washington Tribal Hatcheries.**

1998 brood

Area	Hatchery	Tagged		Untagged		Total
		Ad Clipped	Unclipped	Ad Clipped	Unclipped	
Puget Sound	Bernie Gobin	39,575		4,106	2,099	45,780
	White River (springs)		19,646		1,343	20,989
	Gorst Creek <sup>1</sup>			96,009		96,009
AREA TOTAL		39,575	19,646	110,115	3,442	162,778

1999 brood

Area	Hatchery	Tagged		Untagged		Total
		Ad Clipped	Unclipped	Ad Clipped	Unclipped	
Puget Sound	Lummi Bay			1,200,000		1,200,000
	Bernie Gobin	200,358		16,070	1,908,772	2,125,200
	Diru Creek	176,202		105,497		281,699
	Gorst Creek <sup>1</sup>			2,156,395		2,156,395
	Grovers Creek *	181,132	180,536	71,957	642,858	1,076,483
	Keta Creek (outplants)			313,354		313,354
	White River (springs)		269,400		12,399	281,799
	Clear Creek *	199,030	194,985	2,353,902	28,632	2,776,549
	Kalama Creek	88,949		1,000,432		1,089,381
AREA TOTAL		845,671	644,921	5,061,212	4,749,056	11,300,860

\* Double Index Tag (DIT) groups

**Table 14. Releases of 1998 and 1999 Brood Mass Marked Chinook in 2000 from Oregon Dept. of Fish and Wildlife Hatcheries**  
(all numbers are preliminary)

1998 Brood

Area	Hatchery	Tagged		Untagged		Total
		Ad Clipped	Unclipped	Ad Clipped	Unclipped	
Coastal	Rock Creek	26,819	53	223,729	681	251,282
	AREA TOTAL	26,819	53	223,729	681	251,282
Columbia River	Blind Slough Netpens	76,495	47	3,089	116,770	196,401
	Clackamas	73,888	50,382	731,724	37,400	893,394
	Clackamette Cove	74,810	3,818	2,456	265	81,349
	Marion Forks	30,402	1,711	592,794	41,337	666,244
	McKenzie	345,190	50,168	588,126	12,571	996,055
	South Santiam	54,356	1,698	635,630	29,317	721,001
	Tongue Point Netpens	52,543	0	612	196,854	250,009
	Willamette	84,417	1,650	1,091,145	0	1,177,212
	Youngs Bay Netpens	78,804	230	369	385,248	464,651
	AREA TOTAL	870,905	109,704	3,645,945	819,762	5,446,316
<b>TOTAL</b>		<b>897,724</b>	<b>109,757</b>	<b>3,869,674</b>	<b>820,443</b>	<b>5,697,598</b>

1999 Brood

Area	Hatchery	Tagged		Untagged		Total
		Ad Clipped	Unclipped	Ad Clipped	Unclipped	
Coastal	Cedar Creek	25,533	786	87,033	49	113,401
	Cole Rivers	122,039	59,834	352,786	10,245	544,904
	Hughey Creek	0	0	25,725	0	25,725
	Rock Creek	24,537	1,435	120,434	552	146,958
	Trask	26,280	436	115,391	2,692	144,799
	Tuffy Creek	23,797	2,774	72,581	2,632	101,784
	Whiskey Creek	0	0	48,824	0	48,824
	Winchester Bay (Step)	0	0	42,799	1,198	43,997
	AREA TOTAL	222,186	65,265	865,573	17,368	1,170,392
Columbia River	Clackamas	60,815	56	503,299	9,369	573,539
	McKenzie	129,665	7,549	242,438	18,649	398,301
	OMSI Net Pens	0	0	35,833	0	35,833
	South Santiam	52,509	0	234,099	5,539	292,147
	Willamette	46,869	1,154	257,271	12,145	317,439
	AREA TOTAL	289,858	8,759	1,272,940	45,702	1,617,259
<b>TOTAL</b>		<b>512,044</b>	<b>74,024</b>	<b>2,138,513</b>	<b>63,070</b>	<b>2,787,651</b>

\* Double Index Tag (DIT) groups

**Table 15. Releases of 1999 and 2000 Brood Mass Marked Chinook in 2001 from Washington Department of Fish and Wildlife Hatcheries**

Subyearling: 2000 Brood – Fall chinook unless otherwise noted

Area	Hatchery	Tagged		Untagged		Total
		Ad Clipped	Unclipped	Ad Clipped	Unclipped	
Puget Sound	Coulter Creek	0	0	1,088,728	14,272	1,103,000
	Dungeness (springs)	94,431	706,201	177,869	1,106,279	2,084,780
	Elwha	0	0	0	2,583,000	2,583,000
	George Adams*	223,009	227,460	487	3,384,664	3,835,620
	Garrison Springs	0	0	619,236	27,149	646,385
	Glenwood Springs	0	0	250,000	0	250,000
	Hoodsport	0	0	0	3,059,892	3,059,892
	Hupp Springs (springs)	0	238,765	0	3,562	242,327
	Issaquah	0	0	2,053,605	141,168	2,194,773
	Kendall Creek*	197,364	199,511	1,636	1,248,789	1,647,300
	Marblemount	366,150	736	1,471	0	368,357
	Marblemount (springs)	268,460	541	1,078	0	270,079
	McAllister	0	0	841,476	31,424	872,900
	Minter Creek	0	0	1,789,587	55,063	1,844,650
	Percival Cove Net Pens	0	0	591,127	22,673	613,800
	Samish*	146,129	151,312	3,225,739	219,097	3,742,277
	Soos Creek*	194,248	205,861	2,945,147	50,409	3,395,665
	Tumwater Falls	109,140	11,110	2,992,044	96,906	3,199,200
	Voights Creek	0	0	1,571,505	39,935	1,611,440
	Wallace River*	205,008	215,556	776,559	26,071	1,223,194
Whitehorse (summers) **	0	192,789	0	0	192,789	
AREA TOTAL		1,803,939	2,139,842	18,927,294	12,110,353	34,981,428
Coast	Forks Creek	0	0	0	1,903,600	1,903,600
	Humptulips	0	0	0	259,425	259,425
	Lake Aberdeen	0	0	0	50,000	50,000
	Naselle	0	0	0	4,338,700	4,338,700
	Nemah	0	0	0	1,305,600	1,305,600
	Satsop Springs	0	0	0	175,000	175,000
	AREA TOTAL	0	0	0	8,032,325	8,032,325
Columbia River	Cowlitz Salmon	196,248	3,921	2,383	5,773,259	5,975,811
	Elochoman	92,714	0	2,086	1,897,200	1,992,000
	Fallert Creek	94,418	949	1,472	2,448,421	2,545,260
	Kalama Falls	1,267,847	126	126	1,340,819	2,608,918
	Klickitat	410,227	1,593,735	2,573	1,843,765	3,850,300

Table 15 cont'd

Area	Hatchery	Tagged		Untagged		Total
		Ad Clipped	Unclipped	Ad Clipped	Unclipped	
	Lyons Ferry	188,164	10,357	1,455	3,994	203,970
	North Toutle	73,646	0	15,904	605,893	695,443
	Priest Rapids	199,969	810	1,429	6,660,352	6,862,560
	Ringold Springs	399,244	0	0	2,575,661	2,974,905
	Turtle Rock (summers)	406,022	11,061	9,692	627,466	1,054,221
	Washougal	92,796	478	761	3,623,839	3,717,874
	Wells (summers)	490,873	7,627	89,470	0	587,970
	AREA TOTAL	3,912,148	1,629,064	127,351	27,400,669	33,069,232
	TOTAL	5,716,087	3,768,906	19,054,645	47,543,347	76,082,985

\* Double Index Tag (DIT) groups

**Table 15 continued.**

Yearling: 1999 Brood – Fall chinook unless otherwise noted

Area	Hatchery	Tagged		Untagged		Total
		Ad Clipped	Unclipped	Ad Clipped	Unclipped	
Puget Sound	Chambers Creek	0	0	80,289	8,722	89,011
	Fox Island Net Pens	0	0	196,367	14,783	211,150
	Hoodsport	0	0	0	247,931	247,931
	Hupp Springs (springs)	0	83,742	0	6,595	90,337
	Icy Creek	0	0	241,300	0	241,300
	Lakewood	0	0	172,122	14,234	186,356
	Marblemount *	71,246	74,251	865	1,031	147,393
	McAllister Creek	0	0	122,005	7995	130,000
	Mukilteo Net Pens	0	0	1,900	0	19,000
	Samish	0	0	78,235	5,448	83,683
	Tumwater Falls	67,926	1,965	107,034	3,075	180,000
	Wallace River (summers)	0	0	500,000	0	500,000
	Whatcom Creek	0	0	120,980	0	120,980
	AREA TOTAL		139,172	159,958	1,638,197	309,814
Columbia River	Carlton Pond (summers)	412,237	10,236	1,890	0	424,363
	Cowlitz Salmon (springs)	109,473	0	789,179	0	898,652
	Deep River Pens (springs)	48,876	1,109	106,856	2,724	159,565
	Dryden Pond (summers)	945,089	43,239	17,226	0	1,005,554
	Fallert Creek (springs)	123,643	125	252,118	0	375,886
	Kalama Falls (springs)	106,885	0	18,115	0	125,000
	Klickitat (springs)	86,703	95	10,682	517,520	615,000
	Lewis River* (springs)	132,130	150,154	477,775	25,298	785,357
	Lyons Ferry	326,380	10,468	1,609	0	338,757
	Methow (springs)	240,854	5,437	1,809	0	248,100
	North Toutle (springs)	86,601	0	0	0	86,601
	Similkameen (springs)	583,317	27,551	19,595	0	630,463
	Tucannon (springs)	97,600	0	0	0	97,600
	Turtle Rock (summers)	275,767	4,916	5,024	0	285,707
	Wells (summers)	304,511	1,436	6,151	0	312,098
AREA TOTAL		3,880,366	254,766	1,708,029	545,542	6,388,703
TOTAL		4,019,538	414,724	3,346,226	855,356	8,635,844

\* Double Index Tag (DIT) groups



**Table 16. Releases of 1999 and 2000 Brood Mass Marked Chinook in 2001 from Western Washington Tribal Hatcheries**  
(numbers are preliminary)

Yearling: 1999 Brood – Fall chinook unless otherwise noted

Area	Hatchery	Tagged		Untagged		Total
		Ad Clipped	Unclipped	Ad Clipped	Unclipped	
Puget Sound	Bernie Gobin	37,861	282	494	143	38,780
	White River (springs)		82,204		7,735	89,939
	Gorst Creek <sup>1</sup>			110,052		110,052
AREA TOTAL		37,861	82,486	110,546	7,878	238,771

Subyearling: 2000 Brood– Fall chinook unless otherwise noted

Area	Hatchery	Tagged		Untagged		Total
		Ad Clipped	Unclipped	Ad Clipped	Unclipped	
Puget Sound	Lummi Bay	167,171	4,003	801,414 <sup>1</sup>	18,663	991,251
	Bernie Gobin	162,137	3,141	24,863	1,229,859	1,420,000
	Diru Creek	233,487	3,767	4,144	2,755	244,153
	Gorst Creek <sup>1</sup>			1,275,443	13,404	1,288,847
	Grovers Creek *	203,754	206,563	25,211	229,427	664,955
	Keta Creek (outplants)			587,392		587,392
	White River (springs)		253,592		26,121	279,713
	Clear Creek *	169,143	176,207	2,068,077	294,881	2,708,308
	Kalama Creek	83,178	3,655	471,237	9,529	567,599
AREA TOTAL		1,018,870	650,928	5,257,781	1,824,639	8,752,218

<sup>1</sup> Includes 300,000 releases from Whatcom Creek Hatchery

\* Double Index Tag (DIT) groups

**Table 17. Releases of 1999 and 2000 Brood Mass Marked Chinook in 2001 from Oregon Hatcheries**

(numbers are preliminary).

Yearling: 1999 Brood– Fall chinook unless otherwise noted

Area	Hatchery	Tagged		Untagged		Total
		Ad Clipped	Unclipped	Ad Clipped	Unclipped	
Coastal	Rock Creek	24,100	2,545	248,083	2,812	277,540
AREA TOTAL		24,100	2,545	248,083	2,812	277,540
Columbia. River	Blind Slough Netpens	99,443	2,708	143,691	4,554	250,396
	Clackamas	76,586	51,208	713,374	16,687	857,855
	Marion Forks	30,900	1,085	615,784	16,431	664,200
	McKenzie	431,319	53,017	570,191	20,606	1,075,133
	South Santiam	93,262	908	621,601	0	715,771
	Willamette	82,035	783	1,172,235	97,729	1,352,782
	Young Bay Netpens	139,784	2,772	387,349	7,993	537,898
AREA TOTAL		953,329	112,481	4,224,225	164,000	5,454,035
TOTAL		977,429	115,026	4,472,308	166,812	5,731,575

Subyearling: 2000 Brood– Fall chinook unless otherwise noted

Area	Hatchery	Tagged		Untagged		Total
		Ad Clipped	Unclipped	Ad Clipped	Unclipped	
Coastal	Cedar Creek	26,878	0	80,758	0	107,636
	Trask	24,534	2,509	120,812	0	147,855
	Tuffy Creek	24,798	1,768	80,896	98	107,560
	Whiskey Cr (STEP)	0	0	115,658	0	115,658
	Rock Creek	25,886	86	118,910	0	144,882
	Cole Rivers	137,802	56,257	1,701,682	2,599	1,898,340
AREA TOTAL		239,898	60,620	2,218,716	2,697	2,521,931
Columbia. River	Clackamas	81,448	0	504,044	4,503	589,995
	South Santiam	55,453	0	246,300	0	301,753
	McKenzie	25,240	96	382,755	6,654	414,745
	Willamette	59,918	0	286,257	0	346,175
AREA TOTAL		222,059	96	1,419,356	11,157	1,652,668
TOTAL		461,957	60,716	3,628,072	13,854	4,174,599

**Table 18. Chinook exploitation rate index stocks identified for double index tagging (DIT)**

Region	Natural/Unmarked Stock Representation	DIT Stock	Hatchery
Southern B.C.	Lower Fraser	Chilliwack	Chilliwack
	Interior Fraser	Lower Shuswap	Shuswap
Puget Sound	Nooksack River spring	Nooksack spring Fingerlings	WDFW Kendall Creek
	Skagit River springs	Skagit spring yearlings	WDFW Marblemount
	White River springs	(none)	
	North Puget Sound summer/fall	Skykomish summer Fingerlings	WDFW Wallace River
	North Puget Sound fall	Samish fall fingerlings	WDFW Samish
	Mid Puget Sound fall	Green R. & Grovers Cr. fall fingerlings	WDFW Soos Cr. & Suquamish Grovers Cr.
	South Puget Sound fall	Nisqually fall fingerlings	Nisqually Hatchery at Clear Creek
	Hood Canal fall	George Adams fall fingerlings	WDFW George Adams
	Strait of Juan de Fuca	(none)	
Washington Coast		(none)	
Columbia River	Lower Columbia spring	Lewis R. spring yearlings	WDFW Lewis River
	Willamette River spring	Clackamas spring yearlings	ODFW Clackamas River
	Willamette River spring	McKenzie spring yearlings	ODFW McKenzie River
	<u>Upper Columbia spring/summer</u>	(none)	
	<u>Snake River spring/summer</u>	(none)	
Oregon Coast		(none)	

- 1998 brood only

## 9 Appendices

Formats have been changed from the original for inclusion in this report.

## **Appendix 1: WDFW Area 5 Selective Fisheries Report for 2000**

In 2000 a selective coho fishery occurred in catch record card area 5 from August 1 until September 30.

This fishery was sampled at a 21% sample rate by WDFW to obtain catch and effort statistics. Additional sampling resources were used to collect coho mark ratios, chinook encounters, coho age information, and drop-off rates.

The following methods were used to estimate above parameters:

### **Boat Study:**

WDFW technicians fished Area 5 five days per week from a WDFW boat August 1-September 24. The boat moved through the fishing fleet and fished in the same area as the majority of the anglers. For each hook-up, the time, species, landed versus drop-off, fork length of coho in centimetres, and coho mark status was documented.

### **Voluntary Trip Reports (VTR):**

Anglers participating in the fishery volunteered to record salmon encounters by species, coho and chinook mark status, number of drop-offs, and method of disposition (kept, released).

### **Charter Trip Reports:**

One volunteer charter boat skipper recorded fishing statistics from all fishing customers over the course of the season. He recorded salmon encounters by species, coho and chinook mark status, number of drop-offs, and method of disposition (kept, released).

### **Dockside Interviews (Creel):**

WDFW technicians interviewed anglers at completion of a fishing trip. Anglers reported catch as well as number, species, and mark status of fish released.

The WDFW study (see table 1) is used as the benchmark for mark rates, because trained observers collected the data. WDFW sampled 725 coho of which 315 were marked for a mark rate of 43.4%. Mark rates from voluntary trip reports and charter observations were only slightly lower at 40.9% and 42.9% respectively.

As in 1999 the mark rate from dockside interviews (33%) was significantly lower than the mark rate collected by trained observers (43%). Noviello noted in 1999 that, "The lower mark rate in coho reported in dockside interviews may be an artifact of recall error combined with difficulty in detecting marks on small coho. It is possible that anglers on the water were releasing coho without accurately determining the presence of a mark. If you did not see a mark the natural inclination would be to report it as unmarked. This might be more prevalent on small fish that would be released with or without a mark with only minimal observation by the angler."

Table 2 compares the Area 5 catch estimate with modelled statistics from FRAM 0024. Landed coho catch was estimated as 29,386 and modelled as 27,029. The predicted retention of unmarked coho was at 3.2% nine times higher than the observed rate of .37%. Anglers were estimated to have released 74,734 coho during the course of the fishery, whereas the model predicted 42,455 releases.

Table 1. Estimates of August - September 2000 coho mark rates in CRC Area 5

Study	Landed			Released			Mark Rate	% Released	%Marked Released	Sample Size *
	M	UM	UK	M	UM	UK				
WDFW Study	na	na	na	315	410	0	0.434	na	na	725
VTR	58	0	0	9	97	0	0.409	0.65	0.085	164
Charter	213	0	7	152	486	26	0.429	0.75	0.229	884
Creel Census	6194	23	0	1049	14431	1207	0.334	0.73	0.063	22904

\* Coho sample size excludes drop-offs

Table 2. Area 5 Catch Estimate versus Modelled Catch

Method	Landed			Released			Mark Rate	% Released	%Marked Released
	M	UM	UK	M	UM	UK			
Catch Estimate(from creel)	29277	109	0	4698	64630	5406	0.334	0.73	0.063
Modelled Catch *	26175	854	0	0	42455	0	0.377	0.61	0.000

\* Catch was modelled for Areas 5 and 6 combined. Area 6 catch is modelled as 30% of Area 5 catch.

Subtracted Area 6 catch (at 30% of Area 5) from total to arrive at Area 5 modelled catch.

M: Marked

UM: Unmarked

UK: Unknown Mark Status

#### Area 5 Sport Fishery, 2000

#### Age Profile of Coho Retained and Encountered

#### Age of Coho Retained

Month	Age 2	Age 3	% Age 2
August	19	297	6.0%
September	7	421	1.6%
Total	26	718	3.5%

Age of Coho Encountered

Month	Age 2	Age 3	% Age 2
August	89	185	32.5%
September	101	333	23.3%
Total	190	518	26.8%

Age of Un-Marked Coho Encountered

Month	Age 2	Age 3	Age 4	% Age 2
August	37	111	0	25.0%
September	53	193	1	21.5%
Total	90	304	1	22.8%

Age of Marked Coho Encountered

Month	Age 2	Age 3	% Age 2
August	52	74	41.3%
September	48	140	25.5%
Total	100	214	31.8%

Mark Rate of Coho by Size

Size	Mark Rate
>40 CM	0.37
<40 CM	0.54

Week	No. Marked *	No. Unmarked *	% Marked
32	16	15	52%
33	19	28	40%
34	35	39	47%
35	35	49	42%
36	72	86	46%
37	58	69	46%
38	43	51	46%
39	37	73	34%
August	105	131	44%
September	210	279	43%
Total	315	410	43%

\* data excludes drop offs

Boat Study: Chinook and Coho Encountered in Area 5, 2000

	Chinook *	Coho *
Numbers	71	725
Percent	8.92%	91.08%

\* data excludes drop offs

Boat Study: Drop Off Rate in Area 5, 2000

	Handled	DO
Numbers	796	179
Percent	81.64%	18.36%

Boat Study: Coho Mark Ratio by Size

Size	No. Marked	No. Unmarked	% Marked
<40 cm	143	121	0.542
>=40cm	171	288	0.373



**Appendix 2: WDFW Area 13 Selective Fishery for 2000**

In 2000 a selective coho fishery occurred in catch record card area 13 from July 1 until October 31. This fishery was sampled intensively by WDFW to obtain catch per unit of effort and species composition statistics and to recover coded-wire tags. WDFW relied on Voluntary Trip Reports (VTR) and dockside interviews to obtain the coho mark rate and salmon encounter rate information.

**Voluntary Trip Reports**

Some anglers participating in the fishery volunteered to record salmon encounters by species, coho and chinook mark status, number of drop-offs, and method of disposition (kept, released).

**Dockside Interviews:**

WDFW technicians interviewed anglers at completion of a fishing trip. Anglers reported catch as well as number, species, and mark status of fish released.

Table 1. Estimate of Coho Mark Rate in CRC Area 13

Study	Landed Marked	Landed Unmarked	Released Marked	Released Unmarked	Released Unknown	Mark Rate	% Released	% Marked Released	Sample Size
VTR	31	0	44	3	9	.962	.644	.936	87
Creel	272	25	46	33	74	.846	.340	.582	450

% Marked Released:  $\text{Marked Released} / (\text{Marked Released} + \text{Unmarked Released})$

Unmark Retention Error:  $\text{Unmarked Retained} / \text{Unmarked Encountered}$   
 $25 / (25 + 33 + [74 * \{25 + 33\} / \{25 + 33 + 272 + 46\}])$   
 URE = 36%

### **Appendix 3: Summary of Monitoring Results from the 2000 Recreational Buoy 10 and Columbia River Area Ocean Selective Fisheries**

Oregon Department of Fish and Wildlife  
Washington Department of Fish and Wildlife

March, 2001

#### Introduction

The Pacific Fishery Management Council (PFMC) adopted selective recreational fisheries for coho in the ocean catch areas from Cape Falcon, Oregon to the U.S./Canada border as well as the Buoy 10 fishery in the Columbia River estuary. This summary is the result of joint monitoring efforts by Oregon Department of Fish and Wildlife (ODFW) and Washington Department of Fish and Wildlife (WDFW) for the 2000 recreational selective coho salmon fisheries in the Columbia River estuary (Buoy 10) and in the adjacent ocean area from Cape Falcon, Oregon to Leadbetter Point, Washington.

When the Council set the 2000 selective fisheries, assumptions were made about coho and chinook abundance, distribution of stocks, coho mark rates, compliance with the new regulations, and incidental mortality. For the second consecutive year, a monitoring plan was implemented to test some of these assumptions through dockside catch and effort sampling along with direct on-water observations of the fisheries in progress.

#### Fishery Descriptions

The Columbia River area recreational ocean fishery from Cape Falcon, Oregon to Leadbetter Point, Washington opened on July 10<sup>th</sup> and remained open through August 13<sup>th</sup>, when the coho quota was projected to have been attained. The fishery was open Sundays through Thursdays, for a total of 25 fishing days. The original coho quota of 37,500 was increased to 40,900 in-season following a trade between recreational and commercial troll fisheries. The harvest guideline for chinook was 3,300. The bag limit was two salmon per day, only one of which could be chinook, with minimum size limits of 24" for chinook and 16" for coho. The Columbia Control Zone was closed, and beginning August 1, coho retention was prohibited in that portion of Area 1 between Tillamook Head and Cape Falcon, Oregon. Selective fishery regulations required all retained coho to have a healed adipose finclip.

The estuary fishery (Buoy 10) in the Columbia River from the mouth upriver to the Tongue Point-Rocky Point line opened August 1<sup>st</sup> through December 31<sup>st</sup>. The bag limit was two salmon per day, only one of which could be chinook, with minimum size limits of 24" for chinook and 16" for coho. The Buoy 10 fishery was not quota managed but was expected to catch 54,900 fin clipped coho. The Buoy 10 fishery was closed to chinook retention between August 28<sup>th</sup> and August 30<sup>th</sup> to reduce overall impacts and preserve Columbia River chinook sharing agreements.

## Methods

The ODFW and WDFW hired full-time observers for at-sea observation of the ocean and Buoy 10 salmon fisheries. Charter operators from the ports of Ilwaco, Astoria, Warrenton, Hammond, and Garibaldi volunteered space on their vessels to accommodate ODFW and WDFW observers. Additionally, WDFW observed private fishing boats from an adjacent vessel during the Buoy 10 fishery.

Observers aboard charter boats collected information about fish encounters, areas fished and types of gear used. Data recorded included species hooked, presence or absence of the adipose fin, size (legal or sublegal), and result of fish contacting the gear (fish retained, released, or dropped off) for every hook-up the observer witnessed. Hook wound location was recorded whenever possible.

Observers aboard the adjacent vessel witnessed hook-ups by the private boat fleet. The observer vessel was positioned near a concentration of private fishing boats. When a hook-up was observed on a private boat, the observer vessel provided a vantage point to record as much of the above information as could be witnessed.

Dockside port samplers collected catch information through interviews and catch inspections as fishing boats returned to the docks. Data collected per boat included catch by species, presence or absence of adipose fins on all retained salmon, number of anglers, and total number of salmon released by species. Landed salmon were sampled for species, fork length, scale collection, fin mark, and coded-wire tag. Due to the mass marking of hatchery coho, electronic detection equipment was used to indicate the presence or absence of coded-wire tags in all coho.

Total effort data was collected through either exit or entrance counts of vessels passing through the entrance of the ports. Dockside sampling data was then expanded to the observed effort profile to estimate total retained and released catch.

## Catch and Effort

Retained salmon catch and angler effort in the Columbia River area ocean selective fishery are shown in Table 1. Anglers retained 39,575 coho and 2,312 chinook on 24,200 angler trips. Catch rates in the ocean fishery were approximately 1.7 salmon per angler trip, and the 40,900 coho quota was nearly attained in five weeks of fishing.

Retained salmon catch and angler effort in the Buoy 10 selective fishery are shown in Table 2. Anglers retained 21,475 coho and 6,085 chinook on 75,512 angler trips. Catch rates in the Buoy 10 fishery were approximately 0.4 salmon per angler trip.

### Coho Handled

The WDFW and ODFW staff observed salmon encounters onboard charter boats throughout the ocean selective fishery season. They observed 1,082 marked coho and 185 unmarked coho for an overall mark rate of 85% (Table 3), compared to 78% in 1999.

Observation of the Buoy 10 selective fishery was conducted primarily by WDFW and was concentrated in the August and September timeframe when angler effort and coho catch are the greatest. Observers documented 135 marked coho and 26 unmarked coho for an overall mark rate of 84% (Table 4), compared to 79% in 1999.

### Preseason vs. Postseason Estimates of Coho Mark Rates

Table 5 compares preseason and postseason estimates of mark rate for the Buoy 10 and ocean selective fisheries. Preseason projections of 2000 coho mark rates were estimated using the coho Fishery Regulation and Assessment Model (FRAM). Postseason estimates were calculated from coho encounter data collected during onboard observations. Postseason estimates of mark rates in both fisheries were slightly lower than preseason estimates.

### Dockside vs. Observer Data in Selective Fisheries

Observation data on the 2000 selective coho fisheries were collected in part to investigate potential bias in estimates of coho mark rates based on angler recollection of released coho. Mark rates calculated from data collected at the dock were generally lower than those calculated from observer data (Tables 6 and 7)<sup>1</sup>.

The dockside sampling of the ocean area selective fishery showed an angler-report based coho mark rate of 75% throughout the season, compared with 85% estimated from observation data. Dockside sampling of the Buoy 10 selective fishery showed a similarly lower angler-report based coho mark rate of 77% compared to the 84% estimated from observation data.

### Compliance

Using combined dockside sampling information, estimates of compliance with selective regulations were assessed as a percentage of the retained coho catch with a healed adipose fin clip (Tables 6 and 7). Compliance rates in these two selective fisheries were above the 97.5% rate assumed preseason.

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<sup>1</sup> Catch and effort numbers reflect actual geographic catch area rather than PFMC quota area; numbers may differ slightly from quota area data.

Dockside sampling indicated that compliance with the selective fishery regulations in the ocean area averaged 99%. Enforcement personnel found similar compliance rates.

Compliance with the selective fishery regulation in the Buoy 10 fishery was also high. Dockside sampling personnel saw compliance rates of 98% through the season, similar to observations by WDFW enforcement officers.

### Estimated Mortality

A comparison of preseason and postseason estimates of total coho mortality in the Columbia River area ocean and Buoy 10 fisheries is shown in Tables 8 and 9. Table 8 summarizes total coho mortality predicted preseason using the FRAM model and projected coho mark rates. Table 9 shows total coho mortality estimated postseason using FRAM methodology and observed catch and coho mark rates.

This analysis uses observed coho mark rates from ODFW and WDFW at-sea sampling data to estimate total coho release. Estimates of incidental mortality are calculated using rates adopted by the PFMC for 2000 recreational fisheries (5% drop off mortality and 14% hooking mortality).

Incidental coho mortality in the Columbia River ocean area is estimated at 4,330. When combined with the 39,975 retained coho, estimated total coho mortality in this area is 44,305, compared with 40,630 projected preseason. An in-season trade between recreational and commercial troll fisheries resulted in greater mortalities to marked and unmarked coho than modelled preseason.

Incidental mortality in the Buoy 10 fishery is estimated at 2,091 coho. When combined with the 21,475 retained coho, estimated coho mortality totals 23,566, compared to 59,404 projected preseason.

### Drop Off Rates

Observers from ODFW and WDFW recorded information on fish that were hooked but lost before being brought to the boat, commonly referred to as drop offs. Current PFMC methodology for estimating mortality due to drop off uses a rate of 5% of the total number of fish handled (retention plus release). Estimates of drop off mortality rates from observation data collected during the ocean selective fisheries are displayed in Table 9. Rates for both chinook and coho were never estimated to be greater than 3%. Based on this analysis, the methodology for assessing drop off mortality adopted by the PFMC is conservatively high.

### Conclusion

Preliminary postseason results from the 2000 monitoring of the Buoy 10 and ocean selective fisheries indicate that preseason assumptions concerning compliance and drop off used in the modelling of these fisheries are adequately conservative when assessing these fisheries. The observed mark rate for these areas was slightly lower than what was projected. This

difference in observed and expected mark rates would result in higher than projected incidental mortality for unmarked coho for a given level of harvest.

### Acknowledgements

The selective fishery monitoring of these fisheries is a joint effort of WDFW and ODFW and their respective enforcement divisions. The ODFW and WDFW would like to thank the charter operators who voluntarily provided space on their boats for observers. Special recognition is due all samplers and observers who spent a great deal of time collecting the data presented in this summary.

**Table 1: Salmon retention and angler effort in the 2000 Columbia River area ocean selective fishery.**

	Month	CHARTER			PRIVATE			BANK			TOTAL		
		Angler Trips	Coho	Chinook	Angler Trips	Coho	Chinook	Angler Trips	Coho	Chinook	Angler Trips	Coho	Chinook
<b>Washington</b>	July	1,977	3,594	283	4,643	7,861	465	222	0	0	6,842	11,455	748
	August	2,121	4,003	200	6,496	10,391	600	298	0	0	8,915	14,394	800
	<b>TOTAL</b>	<b>4,098</b>	<b>7,597</b>	<b>483</b>	<b>11,139</b>	<b>18,252</b>	<b>1,065</b>	<b>520</b>	<b>0</b>	<b>0</b>	<b>15,757</b>	<b>25,849</b>	<b>1,548</b>
<b>Oregon</b>	July	620	1,113	73	3,374	5,638	362	0	0	0	3,994	6,751	435
	August	591	1,090	50	3,858	5,885	279	0	0	0	4,449	6,975	329
	<b>TOTAL</b>	<b>1,211</b>	<b>2,203</b>	<b>123</b>	<b>7,232</b>	<b>11,523</b>	<b>641</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8,443</b>	<b>13,726</b>	<b>764</b>
<b>Subtotals</b>	July	2,597	4,707	356	8,017	13,499	827	222	0	0	10,836	18,206	1,183
	August	2,712	5,093	250	10,354	16,276	879	298	0	0	13,364	21,369	1,129
<b>Grand Total</b>		<b>5,309</b>	<b>9,800</b>	<b>606</b>	<b>18,371</b>	<b>29,775</b>	<b>1,706</b>	<b>520</b>	<b>0</b>	<b>0</b>	<b>24,200</b>	<b>39,575</b>	<b>2,312</b>

**Table 2: Salmon retention and angler effort in the 2000 Buoy 10 selective fishery.**

	Month	CHARTER			PRIVATE			BANK			TOTAL		
		Angler Trips	Coho	Chinook	Angler Trips	Coho	Chinook	Angler Trips	Coho	Chinook	Angler Trips	Coho	Chinook
<b>Washington</b>	August	2,124	1,088	263	27,306	7,460	2,516	952	42	60	30,382	8,590	2,839
	September	1,561	1,035	23	8,962	3,573	110	1,156	165	0	11,679	4,773	133
	<b>TOTAL</b>	<b>3,685</b>	<b>2,123</b>	<b>286</b>	<b>36,268</b>	<b>11,033</b>	<b>2,626</b>	<b>2,108</b>	<b>207</b>	<b>60</b>	<b>42,061</b>	<b>13,363</b>	<b>2,972</b>
<b>Oregon</b>	August	509	164	26	20,356	4,696	2,994	707	17	0	21,572	4,877	3,020
	September	280	130	0	7,136	2,827	89	1,463	278	4	8,879	3,235	93
	<b>TOTAL</b>	<b>789</b>	<b>294</b>	<b>26</b>	<b>27,492</b>	<b>7,523</b>	<b>3,083</b>	<b>2,170</b>	<b>295</b>	<b>4</b>	<b>30,451</b>	<b>8,112</b>	<b>3,113</b>
<b>Subtotals</b>	August	2,633	1,252	289	47,662	12,156	5,510	1,659	59	60	51,954	13,467	5,859
	September	1,841	1,165	23	16,098	6,400	199	2,619	443	4	20,558	8,008	226
<b>Grand Total</b>		<b>4,474</b>	<b>2,417</b>	<b>312</b>	<b>63,760</b>	<b>18,556</b>	<b>5,709</b>	<b>4,278</b>	<b>502</b>	<b>64</b>	<b>72,512</b>	<b>21,475</b>	<b>6,085</b>

**Table 3: On-water observation data from the 2000 Columbia River area ocean selective fishery.**

<b>COHO</b>				
	Unmarked Handled	Marked Handled	Total Handled	Mark Rate
<b>Washington</b>				
July	62	374	436	86%
August	5	54	59	92%
<b>Oregon</b>				
July	66	394	460	86%
August	52	260	312	83%
<b>Subtotals</b>				
July	128	768	896	86%
August	57	314	371	85%
<b>TOTAL</b>	185	1082	1267	85%

**Table 4: On-water observation data from the 2000 Buoy 10 selective fishery.**

<b>COHO</b>				
	Unmarked Handled	Marked Handled	Total Handled	Mark Rate
<b>Washington</b>				
August	17	73	90	81%
September	9	62	71	87%
<b>Oregon</b>				
August	0	0	0	N/A
September	0	0	0	N/A
<b>Subtotals</b>				
August	17	73	90	81%
September	9	62	71	87%
<b>TOTAL</b>	26	135	161	84%



**Table 5: Projected and observed coho mark rates in the 2000 Buoy 10 and Columbia River area ocean fisheries.**

Catch Area	Marked Handled	Total Handled	Observed Mark Rate	FRAM Projected Mark Rate
<b>Columbia River Ocean Area</b>				
July	768	896	86%	
August	314	371	85%	
<b>TOTAL</b>	<b>1,082</b>	<b>1,267</b>	<b>85%</b>	<b>87%</b>
<b>Buoy 10</b>				
August	73	90	81%	
September	62	71	87%	
<b>TOTAL</b>	<b>135</b>	<b>161</b>	<b>84%</b>	<b>87%</b>

**Table 6: Expanded dockside sampling data from the 2000 Columbia River area ocean selective fishery. a/**

	<b>COHO</b>				
	Legal-Sized Unmarked Releases	Legal-Sized Marked Retention	Legal-Sized Unmarked Retention	Mark Rate	Compliance Rate b/
<b>Washington</b>					
July	3,432	11,389	66	77%	99.4%
August	4,945	14,665	139	74%	99.1%
<b>Oregon</b>					
July	2,112	6,736	5	76%	99.9%
August	2,463	6,953	22	74%	99.7%
<b>Subtotals</b>					
July	5,544	18,125	71	76%	99.6%
August	7,408	21,618	161	74%	99.3%
<b>TOTAL</b>	<b>12,952</b>	<b>39,743</b>	<b>232</b>	<b>75%</b>	<b>99.4%</b>

*a/ Catch numbers reflect actual catch area and may differ from quota area catch.*

*b/ Compliance rates based on dockside sampling by WDFW and ODFW.*

**Table 7: Expanded dockside sampling data from the 2000 Buoy 10 selective fishery.**

	<b>COHO</b>				
	Legal-Sized Unmarked Releases	Legal-Sized Marked Retention	Legal-Sized Unmarked Retention	Mark Rate	Compliance Rate a/
<b>Washington</b>					
August	2,467	8,433	157	76%	98.2%
September	1,529	4,720	53	75%	98.9%
<b>Oregon</b>					
August	1,218			0%	
September	664			0%	
<b>Subtotals</b>					
August	3,685	8,433	157	69%	98.2%
September	2,193	4,720	53	68%	98.9%
<b>TOTAL</b>	<b>5,878</b>	<b>13,153</b>	<b>210</b>	<b>68%</b>	<b>98.4%</b>

*a/ Compliance rates based on WDFW dockside sampling and Oregon State Police.*

**Table 8: Preseason FRAM (model run 0024) projected coho mortality in the 2000 Buoy 10 and Columbia River ocean area recreational fisheries.**

		Total Retention	Marked Retention	Unmarked Retention	Unmarked Released	Total Handled a/	Predicted Mark Rate	Drop Off Mortality b/	Release Mortality c/	Incidental Mortality d/	Total Mortality e/
<b>Ocean</b>	July	15,000	14,956	44	303	18,121	88%	245	437	682	15,437
	August	22,500	22,422	78	534	27,744	86%	1,388	734	2,122	24,622
	<b>Total</b>	<b>37,500</b>	<b>37,378</b>	<b>122</b>	<b>837</b>	<b>45,865</b>		<b>1,633</b>	<b>1,171</b>	<b>2,804</b>	<b>40,304</b>
<b>Buoy 10</b>	August	32,500	32,300	100	784	39,362	87%	1,968	1,114	3,082	33,514
	September	22,500	22,430	70	550	27,369	87%	1,368	779	2,167	23,279
	<b>Total</b>	<b>55,000</b>	<b>54,730</b>	<b>170</b>	<b>1,334</b>	<b>66,731</b>		<b>3,336</b>	<b>1,893</b>	<b>5,249</b>	<b>56,893</b>

a/ Marked handled + Unmarked handled.

b/ 5% of total handled.

c/ 14% of unmarked released.

d/ Drop off + Release mortality

e/ Total retention + Incidental mortality.

**Table 9: Estimated actual coho mortality in the 2000 Buoy 10 and Columbia River ocean area recreational fisheries.**

		Total Retention	Marked Retention	Unmarked Retention	Unmarked Released	Total Handled a/	Observed Mark Rate	Drop Off Mortality b/	Release Mortality c/	Incidental Mortality d/	Total Mortality e/
<b>Ocean</b>	July	18,196	18,125	71	5,544	21,146	85.7%	1,057	776	1,833	20,029
	August	21,779	21,618	161	7,408	29,187	84.6%	1,459	1,037	2,496	24,275
	<b>Total</b>	<b>39,975</b>	<b>39,743</b>	<b>232</b>	<b>12,952</b>	<b>50,333</b>	<b>85.4%</b>	<b>2,517</b>	<b>1,813</b>	<b>4,330</b>	<b>44,305</b>
<b>Buoy 10</b>	August	13,467	8,433	5,034	3,685		81.1%	0	516	516	13,983
	September	8,008	4,720	3,288	2,193		87.3%	0	307	307	8,315
	<b>Total</b>	<b>21,475</b>	<b>13,153</b>	<b>8,322</b>	<b>5,878</b>	<b>0</b>	<b>83.9%</b>	<b>0</b>	<b>823</b>	<b>823</b>	<b>22,298</b>

a/ Marked retention/Observed mark rate.

b/ 5% of total handled.

c/ 14% of unmarked released.

d/ Drop off + Release mortality.

e/ Total retention + Incidental mortality

## Appendix 4: Summary of Monitoring Results from the 2000 Non-Treaty Troll Ocean Selective Fishery



March, 2001

### Introduction

The Pacific Fishery Management Council (PFMC) adopted a selective non-Treaty troll fishery for coho in the area from Cape Falcon, Oregon to the Queets River, Washington. When the fishery was assessed, assumptions were made about coho and chinook abundance, distribution of stocks, coho mark rates, and incidental mortality. A monitoring plan was implemented to test some of these assumptions through dockside catch and effort sampling along with direct on-water observations of the fishery in progress. This summary is the result of joint monitoring efforts by Oregon Department of Fish and Wildlife (ODFW) and Washington Department of Fish and Wildlife (WDFW) for the 2000 non-Treaty troll selective coho salmon fishery.

### Fishery Description

The area from Cape Falcon, Oregon to the Queets River, Washington was open from August 4 through the earlier of September 30 or attainment of the revised coho quota of 21,000<sup>2</sup> or the overall chinook quota. All salmon could be retained. Selective fishery regulations required all retained coho to have a healed adipose fin clip. The fishery operated on a cycle of 4 days open/3 days closed. Minimum size limits were 28 inches and 20 inches, respectively, for chinook and coho. Single point, single shank barbless hooks were required. The fishery was open August 4-7, August 11-14, August 18-21, August 25-28, and September 1-5, for a total of 21 days.

### Methods

The ODFW and WDFW hired observers for at-sea observation of the non-Treaty troll fishery. Troll vessel operators voluntarily accommodated ODFW and WDFW observers. Additionally, trollers without observers aboard were asked to complete logbooks during each fishing day.

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<sup>2</sup> The original quota of 25,000 coho was reduced to 21,000 in-season following a trade between the commercial troll and recreational fisheries.

Observers aboard troll vessels collected information about fish encounters and areas fished. Data recorded included species hooked, presence or absence of the adipose fin, size (legal or sublegal), and result of fish contacting the gear (fish retained, released, or dropped off) for every hookup the observer witnessed. Hook wound location was recorded whenever possible.

Voluntary logbook data included the area fished and numbers of retained fish by species, released legal and sublegal chinook, released legal sized unmarked and marked coho, and released sublegal coho for each day fished.

Dockside port samplers collected catch information through interviews and catch inspections as fishing boats returned to the docks to sell. Data collected per boat included number of days and area fished, catch by species, presence or absence of adipose fins and coded-wire tags, and scale collection. Due to the mass marking of hatchery coho, electronic detection equipment was used to indicate the presence or absence of coded-wire tags in all coho.

### Catch and Effort

Salmon catch and fishing effort in the non-Treaty troll selective fishery are shown in Table 1. A total of 14,826 coho and 2,534 chinook were landed from the Columbia River ocean area (Cape Falcon, OR to Leadbetter Point, WA) for 319 days fished. A total of 2,468 coho and 755 chinook were landed from Washington catch area 2 (Leadbetter Point to the Queets River) for 74 days fished. The overall coho harvest during this fishery totalled 17,294 on a quota of 21,000; chinook harvest totalled 3,289 on a quota of 4,500.

### Coho Handled

The WDFW and ODFW staff observed salmon encounters onboard troll vessels throughout August during the non-Treaty troll selective fishery. Observers documented encounters of 326 marked coho and 119 unmarked coho for an overall mark rate of 73% in the Columbia River ocean area. In Washington catch area 2, observers documented encounters of 114 marked coho and 98 unmarked coho for an overall mark rate of 54%.

Voluntary logbook data maintained by troll vessel skippers in the Columbia River ocean area documented 1,971 coho encounters. Of these, 492 unmarked coho were handled for an overall mark rate of 75%. Table 2 shows mark rates by catch area and data type.

### Preseason vs. Postseason Estimates of Coho Mark Rates

Table 3 compares preseason and postseason estimates of mark rate for the 2000 non-Treaty troll selective fishery. Preseason projections of coho mark rates were estimated using the coho Fishery Regulation and Assessment Model (FRAM). Postseason estimates were calculated from coho encounter data collected during onboard observations and from logbooks. Postseason estimates of mark rates in both areas were lower than preseason estimates.

## Compliance

Table 4 shows estimates of compliance with selective regulations based on data collected during dockside sampling. Rates were assessed as a percentage of the retained coho catch with a healed adipose fin clip. Approximately 51% of the coho landed from the Columbia River ocean area were sampled dockside in Oregon and Washington; 40% of the coho landed from Washington Area 2 were sampled. A compliance rate of 99% was observed in both catch areas.

Estimates of compliance from work by Washington enforcement personnel were similar to those observed dockside (personal communication, Sergeant Mike Cenci, WDFW). Oregon State Police reported a total of 78 troll vessel contacts and 18 charges of possessing/taking unmarked coho.

## Estimated Mortality

A comparison of preseason and postseason estimates of total coho mortality in the non-Treaty troll selective fishery is shown in Tables 5 and 6. Table 5 summarizes total coho mortality predicted preseason using the FRAM model and projected coho mark rates. Table 6 shows total coho mortality estimated postseason using FRAM methodology and observed catch and coho mark rates.

This analysis uses observed coho mark rates from ODFW and WDFW at-sea sampling and voluntary logbook data to estimate total coho release. Estimates of incidental mortality are calculated using rates adopted by the PFMC for 2000 troll fisheries (5% drop off mortality and 26% hooking mortality).

Incidental coho mortality in the Columbia River area is estimated at 2,273. When combined with the 14,826 retained coho, estimated total coho mortality in this area is 17,099.

Incidental mortality in Washington Area 2 is estimated at 768 coho. When combined with the 2,468 retained coho, estimated coho mortality totals 3,236.

Total coho mortality for the 2000 Cape Falcon to Queets River non-Treaty troll selective fishery is estimated at 20,335 coho. This compares to a preseason total mortality projection of 28,234 coho.

## Drop Off Rates

Observers from ODFW and WDFW recorded information on fish that were hooked but lost before being brought to the boat, commonly referred to as drop offs. Current PFMC methodology for estimating mortality due to drop off uses a rate of 5% of the total number of fish handled (retention plus release). Estimates of drop off mortality rates from observation data collected during the non-Treaty troll selective fisheries are displayed in Table 7. Coho

drop-off rates were estimated to be less than 2%. Based on this analysis, the methodology for assessing drop off mortality adopted by the PFMC is conservatively high.

### Conclusion

Preliminary postseason results from the 2000 monitoring of the non-Treaty troll selective fisheries indicate that preseason assumptions concerning compliance and drop off used in the modelling of these fisheries appeared adequately conservative when assessing these fisheries. The observed mark rate was approximately 10% below what was expected. This difference in observed and expected mark rates would result in higher than projected incidental mortality for unmarked coho for a given level of harvest.

### Acknowledgements

The selective fishery monitoring of these fisheries is a joint effort of WDFW and ODFW and their respective enforcement divisions. The ODFW and WDFW would like to thank the troll vessel skippers who voluntarily provided space on their boats for observers, and the skippers who kept voluntary logbook data, providing valuable information to this project. Special recognition is due all samplers and observers who spent a great deal of time collecting the data presented in this summary.

Table 1: Salmon catch and effort by area and month in the 2000 non-treaty troll fisheries.

Month	Columbia River Ocean Area			WA Area 2			TOTAL		
	Days Fished	Coho	Chinook	Days Fished	Coho	Chinook	Days Fished	Coho	Chinook
August	272	13,130	2,374	71	2,419	752	343	15,729	3,126
September	47	1,516	160	3	49	3	50	1,565	163
TOTAL	319	14,826	2,534	74	2,468	755	393	17,294	3,289

Table 2: 2000 mark rate of legal-sized coho encountered in the 2000 non-treaty troll fisheries.

	Observer Data				Voluntary Logbooks			
	Unmarked Handled	Marked Handled	Total Handled	Coho Mark Rate	Unmarked Handled	Marked Handled	Total Handled	Coho Mark Rate
Columbia River Area	119	326	445	73%	492	1,479	1,971	75%
WA Area 2	98	114	212	54%	N/A	N/A	N/A	N/A

Table 3: Mark rate of legal-sized coho encountered from on-board observation and logbook data in the 2000 non-treaty troll fisheries compared with the FRAM preseason projected mark rates.

	Total Legal Sized Coho Encountered	Observed Coho Mark Rate	Projected Coho Mark Rate
Columbia River Area	2,416	75%	84%
WA Area 2	212	54%	67%



Table 4: Compliance with selective coho fishery regulations observed through dockside port sampling.

		Total Sampled	Marked Coho Sampled	Unmarked Coho Sampled	% of Sampled Coho Marked
Columbia River River Area	Washington	1,301	1,300	1	99.9%
	Oregon	6,311	6,283	28	99.6%
	Total	7,612	7,583	29	99.6%
WA Area 2		979	966	13	98.7%

Table 5: Preseason FRAM (model run 0024) projected coho mortality in the 2000 non-treaty troll selective fisheries.

	Retention			Unmarked Released	Total Handled a/	Predicted Mark Rate	Mortality			
	Total	Marked	Unmarked				Drop Off b/	Release c/	Incidental d/	Total e/
Columbia River Area	8,250	8,216	34	1,673	10,477	84%	522	435	957	9,207
WA Area 2	16,750	16,580	170	8,350	26,158	72%	1,830	2,606	4,436	29,436
TOTAL	25,000	24,796	204	10,023	36,605	72%	1,830	2,606	4,436	29,436

a/ Marked handled + Unmarked handled

b/ 5% of total handled

c/ 26% of unmarked released

d/Drop off + release mortality

e/ Total retention + Incidental mortality

Table 6: Estimated actual coho mortality in the 2000 non-treaty troll selective fisheries.

	Total Retention	Marked Retention	Unmarked Retention	Unmarked Released	Total Handled a/	Predicted Mark Rate	Drop Off Mortality b/	Release Mortality c/	Incidental Mortality d/	Total Mortality e/
Columbia River Area	14,826	14,767	59	4,941	19,765	75%	988	1,285	2,273	17,099
WA Area 2	2,468	2,436	32	2,084	4,530	54%	226	546	768	3,236
TOTAL	17,294	24,796	91	7,025	24,295	71%	1,215	1,827	3,041	20,335

a/ Marked handled + Unmarked handled

b/ 5% of total handled

c/ 26% of unmarked released

d/Drop off + release mortality

e/ Total retention + Incidental mortality

Table 7: Estimated drop off mortality rates in the 2000 non-treaty troll fisheries using on-water observation data.

	Total Salmon Handled	Observed Drop Offs	Estimated Observed Drop Off Mortality a/	FRAM total Drop Off Mortality b/	Observed Drop Off Mortality Rate c/
Columbia River Area	445	23	7	22	1.6%
WA Area2	212	8	2	11	1.2%
TOTAL	657	31	10	33	1.5%

a/ Assumes 31% hooking mortality rate on observed drop offs.

b/ Total drop off mortality calculated using FRAM methodology (5% of handled fish).

c/ Estimated drop off mortality/Total salmon handled; 5% used by FRAM pre-season.

## **Appendix 5: Monitoring results from the 2000 Ocean Recreational Selective Fisheries from Leadbetter Point to the U.S. Canada Border**

Washington Department of Fish and Wildlife

March, 2001

### Introduction

The Pacific Fishery Management Council (PFMC) adopted selective recreational fisheries for coho in all four ocean areas from Cape Falcon, Oregon to the U.S./Canada border as well as the Buoy 10 fishery in the Columbia River estuary. This paper is a report on the three areas north of Leadbetter Point (Catch Record Card Areas 2, 3 and 4).

When the Council set the 2000 selective fisheries, assumptions were made about coho and chinook abundance, distribution of stocks, coho mark rates, compliance with the new regulations, and incidental mortality. For the second consecutive year, a monitoring plan was implemented to test some of these assumptions through dockside catch and effort sampling along with direct on-water observations of the fisheries in progress.

### Fishery Descriptions

**AREA 2:** The ocean recreational fishery from Leadbetter Point, Washington to the Queets river (Area 2) was open Sunday through Thursday, July 3 through August 10, and on August 13 in that portion of Area 2 inside a line from the lighthouse 1 mile south of the south jetty to Buoy 2 to Buoy 3 to the Grays Harbour north jetty and through Buoy 13, for a total of 30 fishing days. That portion of Area 2 defined above was closed through August 10. A two salmon daily bag limit, one of which may be chinook, was in effect; all retained coho were required to have a healed adipose fin clip.

**AREA 3:** The ocean recreational fishery from the Queets River to Cape Alava (Area 3) was open seven days per week July 3 through August 12, for a total of 41 fishing days. A two salmon daily bag limit, one of which may be chinook, was in effect; retained coho were required to have a healed adipose fin clip.

**AREA 4:** The ocean recreational fishery from Cape Alava to the U.S./Canada border (Area 4) was open seven days per week July 3 through August 17, for a total of 46 fishing days. A two salmon daily bag limit, one of which may be chinook, was in effect; retained coho were required to have a healed adipose fin clip. The state waters Area 4B add-on fishery was open seven days per week August 18 through September 30, for a total of 44 fishing days. The daily bag limit was two salmon with no chinook retention, and retained coho were required to have a healed adipose fin clip.

## Methods

**AREA 2:** WDFW stationed four dockside samplers and two on-water observers in Westport to monitor the Area 2 selective fishery. The on-water observers concentrated their efforts on the charter fleet operating from Westport. Charter operators volunteered space on their vessels to accommodate the WDFW observers. The observers on charter boats collected information about that specific boat's encounters for the day. Data recorded included species hooked, presence or absence of the adipose fin, size (legal or sublegal), and result of the hookup (fish retained, released, or dropped off) for each hookup that occurred on that vessel.

Dockside port samplers collected catch information through interviews and catch inspections as fishing boats returned to port. Data collected per boat included catch by species, presence or absence of adipose fins on all retained salmon, number of anglers, total number of salmon released by species, and number of adipose-clipped coho released. Landed salmon were sampled for species, fin mark, and coded-wire tag and scale collection. Due to the mass marking of hatchery coho, electronic detection equipment was used to indicate the presence or absence of coded-wire tags in all coho.

Total effort data was collected through counts of vessels leaving the port on their way to the fishing grounds each day. Dockside sampling data was then expanded according to the observed effort profile to estimate total effort and retained and released catch.

**AREA 3:** WDFW stationed one employee in La Push to monitor the selective recreational ocean fishery in Area 3. Because there is little to no charter boat activity in La Push, and because the private sport activity is relatively low and scattered, on-water observation from La Push was not feasible. However, charter boats from Neah Bay fished in Area 3 on many occasions, and observers from Neah Bay were able to collect data aboard those trips.

Dockside, the port sampler collected catch information through interviews and catch inspections as described above. Total effort data was collected through a count of vessels returning to the port. Dockside sampling data was then expanded according to the observed effort profile to estimate total effort and retained and released catch.

**AREA 4:** WDFW stationed four people dockside and two on-water observers in Neah Bay to monitor the Area 4 selective fishery. The on-water observers worked mainly from a WDFW vessel, observing hookups by the private boat fleet. The observer vessel positioned itself each day near concentrations of private fishing boats. When a hookup occurred, the WDFW vessel moved as close as feasible, and observers recorded species hooked, presence or absence of the adipose fin, size (legal or sublegal), and result of the hookup (fish retained, released, or dropped off) as possible.

In addition, WDFW personnel fished aboard a privately owned boat whenever possible and recorded the above information about each encounter. This method was implemented when it became apparent that due to conditions such as fog, low effort, and the fact that fishers didn't

tend to group in one area like in other areas along the coast, it was possible to witness more encounters this way.

On-water observers also rode along on charter boats whenever possible. Charter operators in Neah Bay volunteered space on their vessels to accommodate the WDFW observers. The observers on charter boats collected information identical to that collected in Westport.

Dockside, the port samplers collected catch information through interviews and catch inspections as described above. Total effort data was collected through counts of vessels leaving the port on their way to the fishing grounds each day. Dockside sampling data was then expanded according to the observed effort profile to estimate total effort and retained and released catch.

#### Catch and Effort

In Area 2, 19,834 anglers harvested a total of 28,794 coho or 98 percent of the 29,500 coho quota and 6,336 chinook or 86 percent of the 7,400 chinook guideline.

In Area 3, 1,975 anglers harvested a total of 176 chinook or 59 percent of the 300 chinook guideline, and 1,926 coho or 99 percent of the 1,950 coho quota.

In the Area 4 ocean fishery, 7,934 anglers harvested a total of 410 chinook or 82 percent of the chinook guideline of 500, and 7,220 coho or 9 percent over the 6,650 coho quota. In the Area 4B state-waters fishery, 3,419 anglers harvested a total of 4,410 coho or 74 percent of the 6,000 coho quota

Table 1 shows estimated total effort and landed salmon catch by month for the catch areas north of Leadbetter Point.

#### Selective Fishery Observation

**AREA 2.** WDFW staff observed anglers on board charter boats for each week the fishery was open in Area 2. Data collected include observations of 1,204 legal-sized coho encountered aboard chartered fishing vessels. Of these encounters, 568 coho were retained, which is 2% of the 28,794 coho retained in the ocean fishery. The mark rate (adipose fin clipped) of the legal-sized coho encountered through the season was 70%. The mark rate by month was 71% and 69% in July and August respectively (Table 2). Four percent of the 1,737 salmon observed hooked in Area 2 dropped off prior to being landed.

**AREA 3.** WDFW staff were able to observe anglers on board charter boats for the July portion of the Area 3 fishery. Data collected include observations of 103 legal-sized coho encountered aboard chartered fishing vessels. Of these encounters, 49 coho were retained, which is 2% of the 1,926 coho retained in the fishery. The mark rate (adipose fin clipped) of the legal-sized coho encountered was 51%. Data showed that of the 143 salmon hooked, 14 salmon (10%) dropped off prior to being landed.

**AREA 4.** WDFW staff observed catch in the Area 4 and Area 4B fisheries from an on-water remote platform, through fishing from a privately owned boat, and from a few charter ride alongs. A total of 270 legal-sized coho were observed as they were brought to the boat. Of these encounters, 47 coho were retained, which is 0.4% of the 11,630 coho retained in the two fisheries. The mark rate (adipose fin clipped) of the legal-sized coho encountered through the season was 34%. The mark rate by month was 40%, 36%, and 30% for July, August and September respectively (Table 2). Of the 378 salmon observed hooked, 71 salmon (19%) dropped off prior to being landed.

#### Comparison of Pre-season vs. Post-season Estimates of Coho Mark Rates

Pre-season projections of 2000 coho mark rates were estimated using the coho Fishery Regulation Assessment Model (FRAM). The coho FRAM uses inputs of pre-season run size projections and historic coded wire tag recovery data to predict the resulting impacts from a proposed fishery. Fram model run 0024 was the final pre-season assessment of the PFMC's adopted fishery package for the 2000 ocean fisheries. Table 3 compares the coho mark rates projected by the FRAM model with those observed through on-water monitoring in Areas 2, 3, and 4 in 2000.

Observation data showed actual coho mark rates consistently lower than pre-season projections in Area 2. The total observed coho mark rate for the season in the ocean Area 2 selective fishery was 70% compared to 77% projected pre-season. The observed mark rates in Areas 3 and 4 were lower than projected pre-season. In ocean Area 3, the observed coho mark rate was 51%, compared to the pre-season projection of 75%. The observed coho mark rate in the ocean Area 4 selective fishery 34%, compared to 48% projected pre-season.

#### Comparison of Dockside and Observer Data in Selective Fisheries

Observation data on 2000 selective coho fisheries were collected in part to investigate potential bias in estimates of coho mark rates based on angler recollection of released coho. Table 4 compares coho release rates collected through on-water observation and through dockside interviews. Relative to estimates of released salmon from fishery observation data, information collected at the dock in 2000 showed a bias towards higher numbers of salmon released in Areas 2 and 3. In Area 4, dockside-reported release rates were lower than those observed on-water, but a comparison of the two rates is invalid since much of the on-water data was collected through a catch-and-release program conducted by WDFW staff.

The dockside sampling of the ocean Area 2 selective fishery showed a coho release rate of 44%, compared to a rate of 31% observed on the water. In Area 3, dockside sampling data showed a coho release rate of 58%, compared to a rate of 52% observed on the water.

#### Compliance

Information on compliance with selective regulations was collected through both dockside sampling by the WDFW sampling program and enforcement activities conducted by WDFW Enforcement staff.

Compliance with the selective fishery regulation in the ocean area fishery was high for both private and charter vessels. In Area 2, 45% of the total estimated coho landed were sampled dockside by the ocean sampling program. In Area 3, 94% of the total estimated coho landed were sampled, and in Area 4, 42% were sampled dockside. Dockside sampling showed compliance rates for the season of 99.6%, 98.9%, and 98.2% for Area 2, Area 3, and Area 4 respectively (Table 5). These rates are nearly identical to the compliance rates observed in 1999.

Boat patrols, dockside enforcement, and investigative work conducted by WDFW Enforcement confirmed the selective fishery compliance rates observed by the WDFW sampling program. In Area 2, the compliance rate was estimated at 98.1%; a 99.0% compliance rate was estimated in Area 3, and a compliance rate of 98.9% was estimated for Area 4 (Attachment 1).

### Drop Off Rates

On-water observers in all areas recorded information on fish that were hooked but lost before being brought to the boat, commonly referred to as drop offs. For this study, the definition of drop off was that the fish was actually hooked but became free before it could be landed. This definition calls for some judgement on the part of the observers or anglers recording the data, resulting in potential bias.

Current Council methodology for estimating mortality due to drop off uses a rate of 5% of the total number of fish handled (retention plus release). Mortality rates for the season estimated from on-water observation data ranged from less than 1% in Areas 2 and 3 to 1.5% in Area 4. Estimates of drop off mortality rates from on-water observation data collected during the ocean selective fisheries are compared with FRAM projections in Table 6.

### Estimated Mortality

Table 7 shows the FRAM pre-season projections of total coho mortality. Estimates of actual coho mortality in the ocean selective fisheries are shown in Table 8. This analysis uses estimates of coho mark rates from on-water sampling to estimate total coho release. Estimates of incidental mortality are calculated using rates adopted by the Council for recreational fisheries (5% drop off mortality and 14% hooking mortality).

Incidental coho mortality in Area 2 is estimated at 3,730 which, when combined with a total coho retention of 28,794, puts the estimate of total coho mortality in the Area 2 selective fishery at 32,524. This compares to a pre-season projected total mortality of 31,078 coho.

In Area 3, incidental mortality is estimated at 438 which, when combined with a total coho retention of 1,926, puts the estimate of total coho mortality in the ocean selective fishery at 2,364. This compares to a pre-season projected total mortality of 1,832 coho.

Incidental coho mortality in Area 4 is estimated at 4,798 which, when combined with a total coho retention of 11,630, puts the estimate of total coho mortality in the ocean selective fishery at 16,428. This compares to a pre-season projected total mortality of 14,560 coho.

### Conclusion

The observed coho mark rate in Areas 2, 3, and 4 was consistently lower in all months than pre-season projections. One possible explanation for this discrepancy is that wild fish may have survived at a higher rate or been more prevalent in these areas than expected.

The release data collected through dockside interviews was generally higher than what was observed during on-water observations. Many other studies conducted by WDFW have shown that anglers tend to over-estimate rather than under-estimate the number of released fish. The on-water release rates in Area 4/4B must be ignored because of the catch-and-release method of on-water observation used in that area.

The selective fishing compliance rate ranged between 98% and 99% on the coast. Enforcement activities suggested similar compliance rates to what was observed by samplers on the dock. The pre-season model projected a rate of 5% retention of all unmarked handled coho; in-season data showed a retention rate of 1% of handled unmarked coho in all three areas.

Total estimated mortality in all three areas was higher than projected by the FRAM model pre-season. This was due mainly to the fact that the observed mark rate was lower in each area than predicted.

### Acknowledgements

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Table 1: Salmon catch and effort by area and month in the 2000 ocean recreational fisheries

MONTH	Area 2			Area 3			Area 4/4B		
	Angler trips	Coho	Chinook	Angler trips	Coho	Chinook	Angler trips	Coho	Chinook
July	12,343	18,554	4,153	1,233	965	106	4,980	3,603	313
August	7,491	10,240	2,183	742	961	70	4,727	5,960	105
Sept	0	0	0	0	0	0	1,646	2,067	0
<b>TOTAL</b>	<b>19,834</b>	<b>28,794</b>	<b>6,336</b>	<b>1,975</b>	<b>1,926</b>	<b>176</b>	<b>11,353</b>	<b>11,630</b>	<b>418</b>

Table 2: 2000 mark rate of legal-sized coho encountered during on-board observation in the ocean recreational fisheries.

		Total Encountered	Marked Encountered	Unmarked Encountered	Unknown Encountered	Coho Mark Rate
<b>AREA 2</b>	July	816	577	235	4	71%
	August	388	266	122	0	69%
	<b>Total</b>	<b>1,204</b>	<b>843</b>	<b>357</b>	<b>4</b>	<b>70%</b>
<b>AREA 3</b>	July	103	52	50	1	51%
	August	0	0	0	0	N/A
	<b>Total</b>	<b>103</b>	<b>52</b>	<b>50</b>	<b>1</b>	<b>51%</b>
<b>AREA 4/4B</b>	July	83	33	49	1	40%
	August	62	22	40	0	35%
	Sept	125	37	88	0	30%
	<b>Total</b>	<b>270</b>	<b>92</b>	<b>177</b>	<b>1</b>	<b>34%</b>

Table 3: 2000 mark rate of legal-sized coho encountered during on-board observation in the ocean recreational fisheries compared with the FRAM preseason projected mark rates.

		Total Legal Sized Coho Encountered	Observed Coho Mark Rate	Projected Coho Mark Rate
<b>AREA 2</b>	July	816	71%	79%
	August	388	69%	75%
	<b>Total</b>	<b>1,204</b>	<b>70%</b>	<b>77%</b>
<b>AREA 3</b>	July	103	51%	76%
	August	0	N/A	59%
	<b>Total</b>	<b>103</b>	<b>51%</b>	<b>75%</b>
<b>AREA 4/4B</b>	July	83	40%	56%
	August	62	35%	45%
	Sept	125	30%	45%
	<b>Total</b>	<b>270</b>	<b>34%</b>	<b>48%</b>

Table 4: Comparison of coho release rates observed on-water and reported through dockside interviews in the 2000 ocean recreational fisheries.

		ON-WATER OBSERVATIONS			DOCKSIDE REPORTS		
		Coho Retained	Coho Released	Release Rate	Coho Retained	Coho Released	Release Rate
<b>AREA 2</b>	July	568	248	30%	7,900	5,499	41%
	August	263	125	32%	4,986	4,406	47%
	<b>Total</b>	<b>831</b>	<b>373</b>	<b>31%</b>	<b>12,886</b>	<b>9,905</b>	<b>43%</b>
<b>AREA 3</b>	July	49	53	52%	911	1,201	57%
	August	N/A	N/A	N/A	890	1,264	59%
	<b>Total</b>	<b>49</b>	<b>53</b>	<b>52%</b>	<b>1,801</b>	<b>2,465</b>	<b>58%</b>
<b>AREA 4/4B</b>	July	28	55	66%	1,420	2,658	65%
	August	18	44	71%	2,376	5,100	68%
	Sept	1	124	99%	1,112	4,028	78%
	<b>Total</b>	<b>47</b>	<b>223</b>	<b>83%</b>	<b>4,908</b>	<b>11,786</b>	<b>71%</b>

Table 5: Compliance with selective fishery regulations observed through dockside port sampling.

		Total Coho Sampled	Marked Coho Sampled	Unmarked Coho Sampled	% Sampled Coho Marked
<b>AREA 2</b>	July	8,227	8,195	32	99.6%
	August	4,659	4,638	21	99.5%
	<b>Total</b>	<b>12,886</b>	<b>12,833</b>	<b>53</b>	<b>99.6%</b>
<b>AREA 3</b>	July	916	902	14	98.5%
	August	885	879	6	99.3%
	<b>Total</b>	<b>1,801</b>	<b>1,781</b>	<b>20</b>	<b>98.9%</b>
<b>AREA 4/4B</b>	July	1,446	1,418	28	98.1%
	August	2,494	2,449	45	98.2%
	Sept	968	952	16	98.3%
	<b>Total</b>	<b>4,908</b>	<b>4,819</b>	<b>89</b>	<b>98.2%</b>

Table 6: Estimated drop off mortality in the 2000 ocean recreational fisheries using on-water observation data.

		Total Salmon Handled	Observed Drop Offs	Estimated Observed Drop Off Mortality a/	FRAM total Drop Off Mortality b/	Observed Drop Off Mortality Rate c/
<b>AREA 2</b>	July	1,190	57	5	60	0.4%
	August	547	16	1	27	0.2%
	<b>Total</b>	<b>1,737</b>	<b>73</b>	<b>6</b>	<b>87</b>	<b>0.3%</b>
<b>AREA 3</b>	July	143	14	1	7	0.8%
	August	N/A	N/A	N/A	N/A	N/A
	<b>Total</b>	<b>143</b>	<b>14</b>	<b>1</b>	<b>7</b>	<b>0.8%</b>
<b>AREA 4/4B</b>	July	139	45	4	7	2.6%
	August	101	13	1	5	1.0%
	Sept	138	13	1	7	0.8%
	<b>Total</b>	<b>378</b>	<b>71</b>	<b>6</b>	<b>19</b>	<b>1.5%</b>

*a/ Assumes 8% hooking mortality rate on observed drop offs.*

*b/ Total drop off mortality calculated using FRAM methodology (5% of handled fish).*

*c/ Estimated drop off mortality/Total salmon handled; 5% used by FRAM pre-season.*

Table 7: Preseason FRAM (model run 0024) projected coho mortality in the 2000 ocean recreational fisheries.

		Total Retention	Marked Retention	Unmarked Retention	Unmarked Released	Total Handled a/	Predicted Mark Rate	Drop Off Mortality b/	Release Mortality c/	Incidental Mortality d/	Total Mortality e/
<b>AREA 2</b>	July	12,000	11,931	69	3,393	16,154	79%	808	475	1,283	13,283
	August/Sept f/	16,900	16,781	119	5,817	23,788	75%	1,189	814	2,004	18,904
	<b>Total</b>	<b>28,900</b>	<b>28,712</b>	<b>188</b>	<b>9,210</b>	<b>39,942</b>	<b>77%</b>	<b>1,997</b>	<b>1,289</b>	<b>3,287</b>	<b>32,187</b>
<b>AREA 3</b>	July	1,600	1,589	11	529	2,231	76%	112	74	186	1,786
	August/Sept	100	99	1	71	171	59%	9	10	18	118
	<b>Total</b>	<b>1,700</b>	<b>1,688</b>	<b>12</b>	<b>600</b>	<b>2,402</b>	<b>75%</b>	<b>120</b>	<b>84</b>	<b>204</b>	<b>1,904</b>
<b>AREA 4/4B</b>	July	4,800	4,721	79	3,877	8,978	56%	449	543	992	5,792
	August/Sept	8,100	7,893	207	10,127	18,731	45%	937	1,418	2,354	10,454
	<b>Total</b>	<b>12,900</b>	<b>12,614</b>	<b>286</b>	<b>14,004</b>	<b>27,709</b>	<b>48%</b>	<b>1,385</b>	<b>1,961</b>	<b>3,346</b>	<b>16,246</b>

a/ Marked handled + Unmarked handled.

b/ 5% of total handled.

c/ 14% of unmarked released.

d/ Drop off + Release mortality.

e/ Total retention + Incidental mortality.

f/ August and September are modelled as one unit.

Table 8: Estimated actual coho mortality in the 2000 ocean recreational fisheries.

		Total Retention	Marked Retention	Unmarked Retention	Unmarked Released	Total Handled a/	Observed Mark Rate	Drop Off Mortality b/	Release Mortality c/	Incidental Mortality d/	Total Mortality e/
<b>AREA 2</b>	July	18,554	18,473	81	7,443	25,997	71%	1,300	1,042	2,342	20,896
	Aug/Sept	10,240	10,183	57	4,613	14,853	69%	743	646	1,389	11,629
	<b>Total</b>	<b>28,794</b>	<b>28,656</b>	<b>138</b>	<b>12,056</b>	<b>40,850</b>	<b>70%</b>	<b>2,043</b>	<b>1,688</b>	<b>3,730</b>	<b>32,524</b>
<b>AREA 3</b>	July	965	946	19	891	1,856	51%	93	125	217	1,182
	Aug/Sept	961	954	7	910	1,871	51%	94	127	221	1,182
	<b>Total</b>	<b>1,926</b>	<b>1,900</b>	<b>26</b>	<b>1,800</b>	<b>3,726</b>	<b>51%</b>	<b>186</b>	<b>252</b>	<b>438</b>	<b>2,364</b>
<b>AREA 4/4B</b>	July	3,603	3,540	63	5,193	8,796	40%	440	727	1,167	4,770
	Aug/Sept	8,027	7,895	132	16,996	25,023	32%	1,251	2,379	3,631	11,658
	<b>Total</b>	<b>11,630</b>	<b>11,435</b>	<b>195</b>	<b>22,189</b>	<b>33,819</b>	<b>34%</b>	<b>1,691</b>	<b>3,107</b>	<b>4,798</b>	<b>16,428</b>

a/ Marked retention/Observed mark rate.

b/ 5% of total handled.

c/ 14% of unmarked released.

d/ Drop off + Release mortality.

e/ Total retention + Incidental mortality.

## **Appendix 6: Puget Sound Selective Fisheries Report for 2001**

### Introduction

In 2001 selective coho fisheries occurred in catch record card (CRC) Area 5 from July 1 until August 31, in CRC Area 6 and 7 from August 1 until September 30, and in CRC Area 13 from July 1 until October 31.

In order to test inputs used to model these selective fisheries and to conduct a post-season assessment of the fisheries, a monitoring program was implemented. The objectives of the monitoring program were to collect adipose mark rate information and species encounter data.

### Methods

Sampling effort was increased in all selective fishery areas to obtain high sampling rates and to collect selective fisheries specific information.

The Area 5 fishery was sampled at a 22% rate by WDFW to obtain catch and effort statistics. For the duration of the selective fishery two additional samplers were hired to conduct a hook and line test fishery in Area 5. They collected information about coho mark rates, species encountered, coho age, and drop-off rates. When Area 5 opened non-selectively in September these samplers were moved to Area 6.

An additional sampler was hired in Areas 7 and 13 to increase sampling levels and to promote, distribute, and collect voluntary trip report forms. The sampling supervisor responsible for Area 7 was also working with key recreational fishing groups to promote and obtain voluntary trip report information.

The following methods were used to estimate coho mark rates, drop-off rates, and encounter rates by species:

#### Hook-and-Line Test Fishery - Areas 5 and 6:

WDFW technicians fished in Area 5 from a WDFW boat July 1- August 31 and Area 6 in September. The boat moved through the fishing fleet and fished in the same area as the majority of the anglers. For each hook-up, the time, species, landed versus drop-off, fork length of coho in centimetres, and coho mark status were documented. Samplers also obtained a scale sample to age each coho encountered.

#### Voluntary Trip Reports (VTR) - all selective Areas:

Anglers participating in the fishery volunteered to record salmon encounters by species, coho and chinook mark status, number of drop-offs, and method of disposition (kept, released).

#### Dockside Interviews (Creel) - all selective Areas:

WDFW technicians interviewed anglers at completion of a fishing trip. Anglers reported catch as well as number, species, and mark status of fish released.



## Results

### Adipose Mark Rates

Knowledge of the adipose mark rates in a selective fishery is crucial to evaluating model assumptions, hooking impacts on the unmarked population, as well as angler satisfaction.

For results of mark rate assessments, please see table 1.

The WDFW test fishery is used as the benchmark for mark rates when available, because trained observers speciate catch and determine mark status. In absence of a test fishery, the voluntary trip reports are considered more reliable than angler interviews. Anglers filling out voluntary trip reports have been educated about the selective fishery and the need to observe mark rates. These anglers have been instructed to record hook-ups immediately after they occur, thus eliminating the possibility of recall error. Angler interviews might be preferable to voluntary trip reports if the number of observations from trip reports is very low and is greatly exceeded by the number of observations from angler interviews.

In Area 5 WDFW sampled 579 coho during its test fishery, of which 206 were marked, for a mark rate of 35.6%. Mark rates from voluntary trip reports and angler interviews were lower at 27% and 23% respectively.

Likewise, the Area 6 mark rate from the test fishery was at 39% also higher than the mark rate of 29% from voluntary trip reports, and 22 % from angler interviews.

Test fisheries were not conducted in Areas 7 and 13, because of the low catch per unit of effort in these areas and the high costs associated with obtaining a meaningful sample size. In Area 7 the mark rate from angler interviews was 31% and the mark rate from voluntary trip reports was 42%.

In Area 13 the mark rates from angler interviews and voluntary trip reports were 87% and 79% respectively.

This is the third year of comparing mark rates from angler interviews and voluntary trip reports with mark rates collected during a test fishery. All three years mark rates from the test fishery exceeded mark rates from voluntary trip reports, which in turn exceeded mark rates from angler interviews. There is strong evidence that the low mark rates reported by anglers in Areas 5 and 6 during dock-side interviews and voluntary trip reports were caused by anglers misidentifying pink salmon as coho. Since pink salmon are not adipose marked, anglers mistaking them for coho salmon would have released them, assuming that they had hooked an un-marked coho. Samplers reported that anglers often were not aware of the presence of pink salmon during the fishery, even though they were quite abundant during July and August. According to angler interviews 77% of salmon encountered in Area 5 during July and August were coho, whereas 58% of salmon encountered during the test fishers were coho (table 2).

Another reasons for the depressed mark rates reported by anglers were noted by Noviello in 1999. "The lower mark rate in coho reported in dockside interviews may be an artifact of

recall error combined with difficulty in detecting marks on small coho. It is possible that anglers on the water were releasing coho without accurately determining the presence of a mark. If you did not see a mark the natural inclination would be to report it as unmarked. This might be more prevalent on small fish that would be released with or without a mark with only minimal observation by the angler.”

### Species Encountered

Table 2 lists the number of chinook, coho, and pink encountered by area and month for angler interviews, voluntary trip reports, and the test fishery. The objective of the test fishery was to catch as many coho as possible, to get an adequate sample size for mark rate assessments. Thus WDFW technicians may not have fished in the same manner and with the same gear as the general angling population. The number of voluntary trip reports returned in Area 6 may not have been adequate for analysis of species encountered.

### Compliance

Table 3 summarizes the number of unmarked coho retained during mark selective fisheries by Area and month. Unmarked Retention Error, the number of marked fish retained over the number of marked fish encountered was 1.08% in Area 5, 1.58% in Area 6, 8.44% in Area 7, and 25.6% in Area 13.

### Age Composition

Only .3% of the coho retained by anglers were 2-year-old salmon, whereas 9.3% of the coho encountered were 2-year-olds (see table 4). This supports the assumption that anglers select for larger coho.

Almost all 2-year-old coho were released by anglers regardless of mark status.

In July the test fishery encountered 248 3-year-old coho and zero 2-year-olds. Possible reasons for the absence of 2-year-olds in the catch could be that this age group was not present in July and/or that these fish were too small to swallow the bait.

The mark rate of 2-year-old coho was at 64% almost double the mark rate of 33% of the 3-year-old population.

### Comparison of Modelled versus Observed Fisheries Data

Table 5 compares the Area 5 catch estimate for July and August with modelled statistics from FRAM. Landed coho catch was estimated as 22,537 and modelled as 22,028. The predicted retention of unmarked coho was at 2 % almost double the observed rate of 1.08%. Anglers were estimated to have released 62,603 coho. The modelled non-retention mortality was 5,725, whereas the estimated non-retention mortality was 8,639.

**Table 1 Adipose Mark Rates in Selective Fisheries**

Method	Area 5	Area 6	Area 7	Area 13
Interviews	0.23	0.22	0.31	0.87
VTR	0.27	0.29	0.42	0.79
Test	0.36	0.39	NA	NA

Interviews: Data from angler interviews  
VTR: Voluntary Trip Reports  
Test: On-The-Water Hook and Line Test Fishery

**Angler Interviews**

Area	Month	Marked Retained	Un-mark Retained	Marked Released	Un-marked Released	Unknown Released	Mark Rate
Area 5	July	2161	117	208	7521	158	0.24
	August	2534	72	143	9425	147	0.22
	<b>Total</b>	<b>4695</b>	<b>189</b>	<b>351</b>	<b>16946</b>	<b>305</b>	<b>0.23</b>
Area 6	August	580	40	64	2537	153	0.20
	September	599	38	67	2109	81	0.24
	<b>Total</b>	<b>1179</b>	<b>78</b>	<b>131</b>	<b>4646</b>	<b>234</b>	<b>0.22</b>
Area 7	August	158	26	11	213	46	0.41
	September	159	50	20	484	87	0.25
	<b>Total</b>	<b>317</b>	<b>76</b>	<b>31</b>	<b>697</b>	<b>133</b>	<b>0.31</b>
Area 13	July	6	0	3	1	10	0.90
	August	5	2	14	2	16	0.83
	September	82	8	9	7	45	0.86
	October	49	4	15	4	12	0.89
	<b>Total</b>	<b>142</b>	<b>14</b>	<b>41</b>	<b>14</b>	<b>83</b>	<b>0.87</b>

**Voluntary Trip Reports**

Area	Month	Marked	Un-marked	Unknown	Mark Rate
Area 5	July	26	58	2	0.310
	August	9	38	0	0.191
	September	11	17	0	0.393
	<b>Total</b>	<b>46</b>	<b>113</b>	<b>2</b>	<b>0.289</b>
Area 6	August	5	9	0	0.357
	September	9	25	0	0.265
Area 7	<b>Total</b>	<b>14</b>	<b>34</b>	<b>0</b>	<b>0.292</b>
	August	10	13	3	0.435
	September	17	24	2	0.415
	<b>Total</b>	<b>27</b>	<b>37</b>	<b>5</b>	<b>0.422</b>

Table 1 Con't

<b>Area 13</b>	July	3	0	3	1.000
	August	2	2	0	0.500
	September	24	6	5	0.800
	October	5	1	2	0.833
	<b>Total</b>	<b>34</b>	<b>9</b>	<b>10</b>	<b>0.791</b>

**Test Fishery**

<b>Area 5</b>	<b>Month</b>	<b>Marked</b>	<b>Un-marked</b>	<b>Mark Rate</b>
	July	73	163	0.309
	August	133	210	0.388
	<b>Total</b>	<b>206</b>	<b>373</b>	<b>0.356</b>
<b>Area 6</b>	September	22	34	0.393
	<b>Total</b>	<b>22</b>	<b>34</b>	<b>0.393</b>

**Table 2: Species Encountered by Method, Area, and Month, 2001**

**Area 5**

<b>Month</b>	<b>Method</b>	<b>Chinook</b>		<b>Pink</b>		<b>Coho</b>	
July	Interviews	1341	10.6%	802	6.3%	10540	83.1%
	VTR	2	2.2%	0	0.0%	87	97.8%
	Test	50	8.6%	163	28.1%	367	63.3%
August	Interviews	565	3.4%	3878	23.7%	11945	72.9%
	VTR	4	7.0%	4	7.0%	49	86.0%
	Test	61	9.7%	235	37.4%	332	52.9%
September	Interviews	1399	5.9%	1732	7.3%	20642	86.8%
	VTR	2	6.1%	3	9.1%	28	84.8%

**Area 6**

<b>Month</b>	<b>Method</b>	<b>Chinook</b>		<b>Pink</b>		<b>Coho</b>	
August	Interviews	251	3.8%	3434	52.3%	2882	43.9%
	VTR	0	0.0%	12	46.2%	14	53.8%
September	Interviews	74	1.8%	694	16.7%	3386	81.5%
	VTR	0	0.0%	2	5.6%	34	94.4%
	Test	14	17.5%	3	3.8%	63	78.8%

**Table 2 con't: Species Encountered by Method, Area, and Month, 2001**  
**Area 7**

Month	Method	Chinook		Pink		Coho	
August	Interviews	408	24.8%	911	55.5%	323	19.7%
	VTR	16	18.0%	45	50.6%	28	31.5%
September	Interviews	221	13.3%	507	30.6%	931	56.1%
	VTR	13	11.5%	55	48.7%	45	39.8%

**Area 13**

Month	Method	Chinook		Pink		Coho	
July	Interviews	26	46.4%	0	0.0%	30	53.6%
	VTR	12	63.2%	0	0.0%	7	36.8%
August	Interviews	192	86.5%	2	0.9%	28	12.6%
	VTR	61	88.4%	1	1.4%	7	10.1%
September	Interviews	73	32.0%	3	1.3%	152	66.7%
	VTR	13	25.5%	0	0.0%	38	74.5%
October	Interviews	25	22.9%	0	0.0%	84	77.1%
	VTR	1	8.3%	0	0.0%	11	91.7%

2001 Information from Dock-Side Angler Interviews

**Table 3: Retention of Unmarked Coho in the Selective Fishery**

Area 5	Month	Marked Retained	Un-marked Retained	Unmarked Encountered *	Unmark Retention Error
	July	2161	117	7792	1.50%
August	2534	72	9642	0.75%	
<b>Total</b>	<b>4695</b>	<b>189</b>	<b>17434</b>	<b>1.08%</b>	
Area 6	August	580	40	2726	1.47%
	September	599	38	2226	1.71%
	<b>Total</b>	<b>1179</b>	<b>78</b>	<b>4952</b>	<b>1.58%</b>
Area 7	August	158	26	283	9.20%
	September	159	50	618	8.10%
	<b>Total</b>	<b>317</b>	<b>76</b>	<b>900</b>	<b>8.44%</b>

**Table 3 con't: Retention of Unmarked Coho in the Selective Fishery**

<b>Area 13</b>	July	6	0	3.5	0.00%
	August	5	2	6.0	33.33%
	September	82	8	34.7	23.06%
	October	49	4	10.5	38.00%
	<b>Total</b>	<b>142</b>	<b>14</b>	<b>55</b>	<b>25.59%</b>

Unmarked Encountered:

Unmarked Retained + Unmarked Released + (Unknown Released \*Unmarked Released/(Marked Released + Unmarked Released))

Unmark Retention Error:

Unmarked Retained
Unmarked Encountered

**Table 4: Area 5 Recreational Fishery, 2001**

Age Profile of Coho Retained and Encountered

**Age of Coho Encountered**

Month	Age 2	Age 3	% Age 2
July		248	0.000%
August	56	295	15.954%
Total	56	543	9.349%

**Age of Coho Retained**

Month	Age 2	Age 3	% Age 2
July	1	550	0.181%
August	3	790	0.378%
Total	4	1340	0.298%

**Age of Un-Marked Coho Encountered**

Month	Age 2	Age 3	% Age 2
July	0	159	0.000%
August	20	190	9.524%
Total	20	349	5.420%

**Table 4 con't: Area 5 Recreational Fishery, 2001**

**Age of Marked Coho Encountered**

Month	Age 2	Age 3	% Age 2
July	0	73	0.000%
August	35	96	26.718%
Total	35	169	17.157%

**Mark Rate of Coho by Size**

Size	Mark Rate
<= 40	45%
> 40 cm	34%

**Mark Rate of Coho by Age**

Age	AD	UM	% Marked
2	35	20	63.6%
3	169	349	32.6%

**Table 5: Comparison of Modelled versus Observed Fisheries Statistics**

	Anticipated Mark Rate a/	Observed Mark Rate	Expected Catch c/	Landed Coho Catch					Estimated Non Retention Mortality b/
				Anticipated Non Retention Mortality	Total	Marked	Unmarked	Unmarked Coho Released	
Area 5 (Jul/Aug)	0.54	0.36	22,028	5,725	22,537	21,887	650	62,603	8,639

## **Appendix 7: Monitoring Results from the 2001 Ocean Recreational Selective Fisheries from Leadbetter Point to the U.S. Canada Border**

Washington Department of Fish and Wildlife

February, 2002

### Introduction

The Pacific Fishery Management Council (PFMC) adopted selective recreational fisheries for coho in all four ocean areas from Cape Falcon, Oregon to the U.S./Canada border as well as the Buoy 10 fishery in the Columbia River estuary. This paper is a report on the three areas north of Leadbetter Point (Catch Record Card Areas 2, 3 and 4).

When the Council set the 2001 selective fisheries, assumptions were made about coho and chinook abundance, distribution of stocks, coho mark rates, compliance with the new regulations, and incidental mortality. For the third consecutive year, a monitoring plan was implemented to test some of these assumptions through dockside catch and effort sampling along with direct on-water observations of the fisheries in progress.

### Fishery Descriptions

**AREA 2:** The ocean recreational fishery from Leadbetter Point, Washington to the Queets river (Area 2) was open Sunday through Thursday, July 1 through September 6, and seven days per week September 7 through September 30, for a total of 74 fishing days. A two salmon daily bag limit, only one of which may be chinook, was in effect; all retained coho were required to have a healed adipose fin clip.

**AREA 3:** The ocean recreational fishery from the Queets River to Cape Alava (Area 3) was open seven days per week July 1 through September 23. From September 24 through October 21, salmon fishing was restricted to that portion of Area 3 defined by a line from Teawhit Head northwest to "Q" Buoy, to Cake Rock, then true east to the shoreline, seven days per week. A total of 113 fishing days were available in Area 3. A two salmon daily bag limit, only one of which may be chinook, was in effect; retained coho were required to have a healed adipose fin clip.

**AREA 4:** The ocean recreational fishery from Cape Alava to the U.S./Canada border (Area 4) was open seven days per week July 1 through September 30, for a total of 92 fishing days. A two salmon daily bag limit, only one of which may be chinook, was in effect; retained coho were required to have a healed adipose fin clip.

### Methods

**AREA 2:** WDFW stationed five dockside samplers and one on-water observer in Westport to monitor the Area 2 selective fishery. The on-water observer concentrated his efforts on the charter fleet operating from Westport. Charter operators volunteered space on their vessels to



accommodate the WDFW observer, who collected information about that specific boat's encounters for the day. Data recorded included species hooked, presence or absence of the adipose fin, size (legal or sublegal), and result of the hookup (fish retained, released, or dropped off) for each hookup that occurred on that vessel.

Dockside port samplers collected catch information through interviews and catch inspections as fishing boats returned to port. Data collected per boat included catch by species, presence or absence of adipose fins on all retained salmon, number of anglers, total number of salmon released by species, and number of adipose-clipped coho released. Landed salmon were sampled for species, fin mark, and coded-wire tag and scale collection. Due to the mass marking of hatchery chinook and coho, electronic detection equipment was used to indicate the presence or absence of coded-wire tags in those salmon species.

Total effort data was collected through counts of vessels leaving the port on their way to the fishing grounds each day. Dockside sampling data was then expanded according to the observed effort profile to estimate total effort and retained and released catch.

**AREA 3:** WDFW stationed one employee in La Push to monitor the selective recreational ocean fishery in Area 3. Because there is very little charter boat activity in La Push, and because the private sport activity is relatively low and scattered, on-water observation from La Push was not feasible.

Dockside, the port sampler collected catch information through interviews and catch inspections as described above. Total effort data was collected through a count of vessels returning to the port. Dockside sampling data was then expanded according to the observed effort profile to estimate total effort and retained and released catch.

**AREA 4:** WDFW stationed four dockside employees and two on-water observers in Neah Bay to monitor the Area 4 selective fishery. The on-water observers worked mainly from a WDFW vessel, fishing for salmon and recording species hooked, presence or absence of the adipose fin, size (legal or sublegal), and result of the hookup (fish retained, released, or dropped off). All fish hooked were released.

On-water observers also rode along on charter boats whenever possible. Charter operators in Neah Bay volunteered space on their vessels to accommodate the WDFW observers. The observers on charter boats collected information identical to that collected in Westport.

Dockside, the port samplers collected catch information through interviews and catch inspections as described above. Total effort data was collected through counts of vessels leaving the port on their way to the fishing grounds each day. Dockside sampling data was then expanded according to the observed effort profile to estimate total effort and retained and released catch.

**ALL AREAS:** Logbooks were made available to WDFW personnel to collect data from their private fishing trips. Data recorded included Catch Record Card Area fished, target species, and for each hookup, the species hooked, presence or absence of the adipose fin, size

(legal or sublegal), and result of the hookup (fish retained, released, or dropped off). Logbooks were collected from trips in Areas 2 and 4, and were included with on-water observer data.

### Catch and Effort

In Area 2, 49,682 anglers harvested a total of 69,396 coho or 83 percent of the 83,250 coho quota and 15,745 chinook or 81 percent of the 19,450 chinook guideline. A total of 918 pink were also harvested.

In Area 3, 3,387 anglers harvested a total of 3,310 coho or 57 percent of the 5,850 coho quota and 584 chinook or 53 percent of the 1,100 chinook guideline. A total of 161 pink were also harvested.

In Area 4, 17,947 anglers harvested a total of 17,877 coho or 76 percent of the 23,400 coho quota and 1,523 chinook or 90 percent of the 1,700 chinook guideline. A total of 2,799 pink were also harvested.

Table 1 shows estimated total effort and landed chinook and coho catch by month for the catch areas north of Leadbetter Point.

### Selective Fishery Observation

**AREA 2.** WDFW staff observed anglers on board charter boats for each week the fishery was open in Area 2. Data collected include observations of 1,142 legal-sized coho encountered aboard chartered fishing vessels. Of these encounters, 633 coho were retained, which is 1% of the 69,396 coho retained in the ocean fishery. The mark rate (adipose fin clipped) of the legal-sized coho encountered through the season was 58%. The mark rate by month was 57% in July, 60% in August, and 51% in September (Table 2). Fourteen percent of the 1,859 salmon observed hooked in Area 2 dropped off prior to being landed.

**AREA 3.** No on-water observation data were collected from Area 3 in 2001.

**AREA 4.** WDFW staff observed catch in Area 4 for each week the fishery was open. A total of 584 legal-sized coho were observed as they were brought to the boat. The mark rate (adipose fin clipped) of the legal-sized coho encountered through the season was 39%. The mark rate by month was 44% in July, 40% in August, and 24% in September (Table 2). Seventeen percent of the 766 salmon observed hooked in Area 4 dropped off prior to being landed.

### Comparison of Pre-season vs. Post-season Estimates of Coho Mark Rates

Pre-season projections of 2001 coho mark rates were estimated using the coho Fishery Regulation Assessment Model (FRAM). The coho FRAM uses inputs of pre-season run size projections and historic coded wire tag recovery data to predict the resulting impacts from a proposed fishery. FRAM model run 0119 was the final pre-season assessment of the PFMC's

adopted fishery package for the 2000 ocean fisheries. Table 3 compares the coho mark rates projected by the FRAM model with those observed through on-water monitoring in Areas 2, 3, and 4 in 2001.

Observation data showed actual coho mark rates consistently lower than pre-season projections. The total observed coho mark rate for the season in the ocean Area 2 selective fishery was 58% compared to 80% projected pre-season. In ocean Area 3, the coho mark rate calculated from dockside interviews was 32%, compared to the pre-season projection of 73%. The observed coho mark rate in the ocean Area 4 selective fishery 39%, compared to 58% projected pre-season.

#### Comparison of Dockside and Observer Data in Selective Fisheries

Observation data on 2001 selective coho fisheries were collected in part to investigate potential bias in estimates of coho mark rates based on angler recollection of released coho. Table 4 compares coho release rates in Area 2 collected through on-water observation and through dockside interviews. Area 3 on-water observation data is not available for comparison, and in Area 4, comparison of the two rates is invalid since most of the on-water data was collected through a catch-and-release program conducted by WDFW staff.

Relative to estimates of released salmon from fishery observation data, information collected at the dock in 2001 showed a very small bias towards lower numbers of salmon released. The dockside sampling of the ocean Area 2 selective fishery showed a coho release rate of 43%, compared to a rate of 45% observed on the water.

#### Compliance

Information on compliance with selective regulations was collected through both dockside sampling by the WDFW sampling program and enforcement activities conducted by WDFW Enforcement staff.

Compliance with the selective fishery regulation in the ocean area fishery was high for both private and charter vessels. In Area 2, 34% of the total estimated coho landed were sampled dockside by the ocean sampling program. In Area 3, 70% of the total estimated coho landed were sampled, and in Area 4, 43% were sampled dockside. Dockside sampling showed compliance rates for the season of 99.1%, 98.9%, and 97.4% for Area 2, Area 3, and Area 4 respectively (Table 5). These rates are nearly identical to the compliance rates observed in 2000.

Boat patrols, dockside enforcement, and investigative work conducted by WDFW Enforcement found selective fishery compliance rates similar to those observed by the WDFW sampling program. In Area 2, the compliance rate was estimated at 98.4%; a 100.0% compliance rate was estimated in Area 3, and a compliance rate of 96.1% was estimated for Area 4 (Attachment 1).

## Drop Off Rates

On-water observers in all areas recorded information on fish that were hooked but lost before being brought to the boat, commonly referred to as drop offs. For this study, the definition of drop off was that the fish was actually hooked but became free before it could be landed. This definition calls for some judgement on the part of the observers or anglers recording the data, resulting in potential bias.

Current Council methodology for estimating mortality due to drop off uses a rate of 5% of the total number of fish handled (retention plus release). Mortality rates for the season estimated from on-water observation data were 1% in both Area 2 and Area 4. Estimates of drop off mortality rates from on-water observation data collected during the ocean selective fisheries are compared with FRAM projections in Table 6.

## Estimated Mortality

Table 7 shows the FRAM pre-season projections of total coho mortality. Estimates of actual coho mortality in the ocean selective fisheries are shown in Table 8. This analysis uses estimates of coho mark rates from on-water sampling in Areas 2 and 4 and from dockside interviews in Area 3 to estimate total coho release. Estimates of incidental mortality are calculated using rates adopted by the Council for recreational fisheries (5% drop off mortality and 14% hooking mortality).

Incidental coho mortality in Area 2 is estimated at 13,086 which, when combined with a total coho retention of 69,396, puts the estimate of total coho mortality in the Area 2 selective fishery at 82,482. This compares to a pre-season projected total mortality of 91,753 coho.

In Area 3, incidental mortality is estimated at 1,460 which, when combined with a total coho retention of 3,310, puts the estimate of total coho mortality in the ocean selective fishery at 4,770. This compares to a pre-season projected total mortality of 6,665 coho.

Incidental coho mortality in Area 4 is estimated at 5,875 which, when combined with a total coho retention of 17,877, puts the estimate of total coho mortality in the ocean selective fishery at 23,752. This compares to a pre-season projected total mortality of 28,581 coho.

## Conclusion

The observed coho mark rate in Areas 2, 3, and 4 was consistently lower in all months than pre-season projections. One possible explanation for this discrepancy is that wild fish may have survived at a higher rate or been more prevalent in these areas than expected.

The release data collected through dockside interviews was just slightly lower than what was observed during on-water observations where comparison was possible. Previous years' data as well as many other studies conducted by WDFW have shown that anglers tend to over-estimate rather than under-estimate the number of released fish.

The selective fishing compliance rate ranged between 97% and 99% on the coast. Enforcement activities suggested similar compliance rates to what was observed by samplers on the dock. The pre-season model projected a rate of 5% retention of all unmarked handled coho; in-season data showed a retention rate of 1% of handled unmarked coho in all three areas.

Total estimated mortality in all three areas was lower than projected by the FRAM model pre-season. Incidental mortality was higher than predicted in all areas due to the lower than predicted mark rates, but total mortality was tempered by the fact that coho quotas were not met in 2001.

### Acknowledgements

The Ocean Sampling Program staff would like to thank all of the samplers and observers whose data collection made these analyses possible, and Sergeant Mike Cenci and the officers of the Ocean Enforcement Division who supplied their compliance information. Additionally, a special thanks to Mark Cedergreen and Butch Smith as well as the Westport Charter Boat Association and the Ilwaco Charter Boat Association and the individual charter boat operators who voluntarily gave us access to ride along with the fleet as they fished.

**TABLE 1:** Salmon catch and effort by area and month in the 2000 ocean recreational fisheries.

MONTH	Area 2			Area 3			Area 4/4B		
	Angler trips	Coho	Chinook	Angler trips	Coho	Chinook	Angler trips	Coho	Chinook
July	12,343	18,554	4,153	1,233	965	106	4,980	3,603	313
August	7,491	10,240	2,183	742	961	70	4,727	5,960	105
Sept	0	0	0	0	0	0	1,646	2,067	0
<b>TOTAL</b>	<b>19,834</b>	<b>28,794</b>	<b>6,336</b>	<b>1,975</b>	<b>1,926</b>	<b>176</b>	<b>11,353</b>	<b>11,630</b>	<b>418</b>

**TABLE 2:** 2000 mark rate of legal-sized coho encountered during on-board observation in the ocean recreational fisheries.

		Total Encountered	Marked Encountered	Unmarked Encountered	Unknown Encountered	Coho Mark Rate
<b>AREA 2</b>	July	816	577	235	4	71%
	August	388	266	122	0	69%
	<b>Total</b>	<b>1,204</b>	<b>843</b>	<b>357</b>	<b>4</b>	<b>70%</b>
<b>AREA 3</b>	July	103	52	50	1	51%
	August	0	0	0	0	N/A
	<b>Total</b>	<b>103</b>	<b>52</b>	<b>50</b>	<b>1</b>	<b>51%</b>
<b>AREA 4/4B</b>	July	83	33	49	1	40%
	August	62	22	40	0	35%
	Sept	125	37	88	0	30%
	<b>Total</b>	<b>270</b>	<b>92</b>	<b>177</b>	<b>1</b>	<b>34%</b>

**TABLE 3:** 2000 mark rate of legal-sized coho encountered during on-board observation in the ocean recreational fisheries compared with the FRAM preseason projected mark rates.

		Total Legal Sized Coho Encountered	Observed Coho Mark Rate	Projected Coho Mark Rate
<b>AREA 2</b>	July	816	71%	79%
	August	388	69%	75%
	<b>Total</b>	<b>1,204</b>	<b>70%</b>	<b>77%</b>
<b>AREA 3</b>	July	103	51%	76%
	August	0	N/A	59%
	<b>Total</b>	<b>103</b>	<b>51%</b>	<b>75%</b>
<b>AREA 4/4B</b>	July	83	40%	56%
	August	62	35%	45%
	Sept	125	30%	45%
	<b>Total</b>	<b>270</b>	<b>34%</b>	<b>48%</b>

**TABLE 4:** Comparison of coho release rates observed on-water and reported through dockside interviews in the 2000 ocean recreational fisheries.

		ON-WATER OBSERVATIONS			DOCKSIDE REPORTS		
		Coho Retained	Coho Released	Release Rate	Coho Retained	Coho Released	Release Rate
<b>AREA 2</b>	July	568	248	30%	7,900	5,499	41%
	August	263	125	32%	4,986	4,406	47%
	<b>Total</b>	<b>831</b>	<b>373</b>	<b>31%</b>	<b>12,886</b>	<b>9,905</b>	<b>43%</b>
<b>AREA 3</b>	July	49	53	52%	911	1,201	57%
	August	N/A	N/A	N/A	890	1,264	59%
	<b>Total</b>	<b>49</b>	<b>53</b>	<b>52%</b>	<b>1,801</b>	<b>2,465</b>	<b>58%</b>
<b>AREA 4/4B</b>	July	28	55	66%	1,420	2,658	65%
	August	18	44	71%	2,376	5,100	68%
	Sept	1	124	99%	1,112	4,028	78%
	<b>Total</b>	<b>47</b>	<b>223</b>	<b>83%</b>	<b>4,908</b>	<b>11,786</b>	<b>71%</b>

**TABLE 5:** Compliance with selective fishery regulations observed through dockside port sampling.

		Total Coho Sampled	Marked Coho Sampled	Unmarked Coho Sampled	% Sampled Coho Marked
<b>AREA 2</b>	July	8,227	8,195	32	99.6%
	August	4,659	4,638	21	99.5%
	<b>Total</b>	<b>12,886</b>	<b>12,833</b>	<b>53</b>	<b>99.6%</b>
<b>AREA 3</b>	July	916	902	14	98.5%
	August	885	879	6	99.3%
	<b>Total</b>	<b>1,801</b>	<b>1,781</b>	<b>20</b>	<b>98.9%</b>
<b>AREA 4/4B</b>	July	1,446	1,418	28	98.1%
	August	2,494	2,449	45	98.2%
	Sept	968	952	16	98.3%
	<b>Total</b>	<b>4,908</b>	<b>4,819</b>	<b>89</b>	<b>98.2%</b>

**TABLE 6:** Estimated drop off mortality in the 2000 ocean recreational fisheries using on-water observation data.

		Total Salmon Handled	Observed Drop Offs	Estimated Drop Off Mortality a/	FRAM total Drop Off Mortality b/	Observed Drop Off Mortality Rate c/
<b>AREA 2</b>	July	1,190	57	5	60	0.4%
	August	547	16	1	27	0.2%
	<b>Total</b>	<b>1,737</b>	<b>73</b>	<b>6</b>	<b>87</b>	<b>0.3%</b>
<b>AREA 3</b>	July	143	14	1	7	0.8%
	August	N/A	N/A	N/A	N/A	N/A
	<b>Total</b>	<b>143</b>	<b>14</b>	<b>1</b>	<b>7</b>	<b>0.8%</b>
<b>AREA 4/4B</b>	July	139	45	4	7	2.6%
	August	101	13	1	5	1.0%
	Sept	138	13	1	7	0.8%
	<b>Total</b>	<b>378</b>	<b>71</b>	<b>6</b>	<b>19</b>	<b>1.5%</b>

a/ Assumes 8% hooking mortality rate on observed drop offs.

b/ Total drop off mortality calculated using FRAM methodology (5% of handled fish).

c/ Estimated drop off mortality/Total salmon handled; 5% used by FRAM pre-season.



**TABLE 7:** Preseason FRAM (model run 0024) projected coho mortality in the 2000 ocean recreational fisheries.

		Total Retention	Marked Retention	Unmarked Retention	Unmarked Released	Total Handled a/	Predicted Mark Rate	Drop Off Mortality b/	Release Mortality c/	Incidental Mortality d/	Total Mortality e/
<b>AREA 2</b>	July	12,000	11,931	69	3,393	16,154	79%	808	475	1,283	13,283
	August/Sept f/	16,900	16,781	119	5,817	23,788	75%	1,189	814	2,004	18,904
	<b>Total</b>	<b>28,900</b>	<b>28,712</b>	<b>188</b>	<b>9,210</b>	<b>39,942</b>	<b>77%</b>	<b>1,997</b>	<b>1,289</b>	<b>3,287</b>	<b>32,187</b>
<b>AREA 3</b>	July	1,600	1,589	11	529	2,231	76%	112	74	186	1,786
	August/Sept	100	99	1	71	171	59%	9	10	18	118
	<b>Total</b>	<b>1,700</b>	<b>1,688</b>	<b>12</b>	<b>600</b>	<b>2,402</b>	<b>75%</b>	<b>120</b>	<b>84</b>	<b>204</b>	<b>1,904</b>
<b>AREA 4/4B</b>	July	4,800	4,721	79	3,877	8,978	56%	449	543	992	5,792
	August/Sept	8,100	7,893	207	10,127	18,731	45%	937	1,418	2,354	10,454
	<b>Total</b>	<b>12,900</b>	<b>12,614</b>	<b>286</b>	<b>14,004</b>	<b>27,709</b>	<b>48%</b>	<b>1,385</b>	<b>1,961</b>	<b>3,346</b>	<b>16,246</b>

a/ Marked handled + Unmarked handled.

b/ 5% of total handled.

c/ 14% of unmarked released.

d/ Drop off + Release mortality.

e/ Total retention + Incidental mortality.

f/ August and September are modelled as one unit.

**TABLE 8:** Estimated actual coho mortality in the 2000 ocean recreational fisheries.

		Total Retention	Marked Retention	Unmarked Retention	Unmarked Released	Total Handled a/	Observed Mark Rate	Drop Off Mortality b/	Release Mortality c/	Incidental Mortality d/	Total Mortality e/
<b>AREA 2</b>	July	18,554	18,473	81	7,443	25,997	71%	1,300	1,042	2,342	20,896
	August/Sept	10,240	10,183	57	4,613	14,853	69%	743	646	1,389	11,629
	<b>Total</b>	<b>28,794</b>	<b>28,656</b>	<b>138</b>	<b>12,056</b>	<b>40,850</b>	<b>70%</b>	<b>2,043</b>	<b>1,688</b>	<b>3,730</b>	<b>32,524</b>
<b>AREA 3</b>	July	965	946	19	891	1,856	51%	93	125	217	1,182
	August/Sept	961	954	7	910	1,871	51%	94	127	221	1,182
	<b>Total</b>	<b>1,926</b>	<b>1,900</b>	<b>26</b>	<b>1,800</b>	<b>3,726</b>	<b>51%</b>	<b>186</b>	<b>252</b>	<b>438</b>	<b>2,364</b>
<b>AREA 4/4B</b>	July	3,603	3,540	63	5,193	8,796	40%	440	727	1,167	4,770
	August/Sept	8,027	7,895	132	16,996	25,023	32%	1,251	2,379	3,631	11,658
	<b>Total</b>	<b>11,630</b>	<b>11,435</b>	<b>195</b>	<b>22,189</b>	<b>33,819</b>	<b>34%</b>	<b>1,691</b>	<b>3,107</b>	<b>4,798</b>	<b>16,428</b>

*a/ Marked retention/Observed mark rate.*

*b/ 5% of total handled.*

*c/ 14% of unmarked released.*

*d/ Drop off + Release mortality.*

*e/ Total retention + Incidental mortality.*

## **Appendix 8: Summary of 2001 Observations During Limited Participation Commercial Fishery in Puget Sound**



STATE OF WASHINGTON

**DEPARTMENT OF FISH AND WILDLIFE**

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November 20, 2001

**TO: Dick Geist**

**FROM: Tim Flint, Region 6 Fish Program Manager**

**SUBJECT: Summary of Observations during Limited Participation Fishery**

On October 11, 2001 Pat Pattillo and I were observers on board the two boats participating in the Limited Participation Fishery in Puget Sound Commercial Area 11. My data summary and observations are included here.

Vessel - New Oregon (block type purse seiner)

Skipper - Andy Blair

number of additional crew - four

Weather - clear and calm

Tides at Gig Harbour - 0635 hrs 0.2ft, 1413 hrs 11.6ft, 2006 hrs 6.5ft

We made a total of four sets in the Gig Harbour/Colvos Passage area. Prior to fishing, I instructed the skipper that our objective was primarily to observe the handling and release of coho by using a recovery tank and that as much as possible we would like to target coho. He and I both acknowledged that we would likely catch significantly more chum than coho at this time of year in the area to be fished.

Since we were not expecting a large number of coho, I asked that all (marked and unmarked coho) be placed in the recovery tank. The marked and unmarked coho were removed from

the recovery tank at the same time but the hatchery fish were then retained as it was legal to do.

The recovery tank was a 'half-tote' with a hose attached to a surface aerator made of PVC pipe with holes drilled in it. The temperature was approximately 50 degrees Fahrenheit. I did not directly measure the flow into the tank but it was more than adequate for the size of the tank and number of fish to be held.

### **Set 1**

Area: approximately 0.5 mile north of the entrance to Gig Harbour (west side of Colvos Passage)

Set time: 0730 (skiff off) to 0830 (rings up) - 1 hour

Catch: 0 chum, 1 coho (marked), 4 chinook (2 marked, 1 unmarked, 1 unknown)

#### Comments:

Since there were very few fish, the bag was brought on board and the fish were quickly removed and placed in the recovery tank. There were a fair number of jellyfish also in the bag when the fish were brought on board.

The two smallest chinook (est. 2-3 lb blackmouth) were both gilled in the 5 inch mesh of the seine and were recognized and removed by the crew prior to going through the block. One of these escaped overboard and the other was placed in the recovery tank. The other two chinook (blackmouth) were placed in the tank along with the single coho.

#### Condition at release:

We used the same condition index as is being used in the tangle net test fisheries as follows:

- Condition 1 = Vigorous, not bleeding
- Condition 2 = Vigorous, bleeding from gills
- Condition 3 = Lethargic, not bleeding
- Condition 4 = Lethargic, bleeding
- Condition 5 = No movement or ventilation (dead)

The following 3 fish were held for approximately 23 minutes.

Condition 1 - 2 chinook (approx. 3 and 8 pounds) with minimal scale loss

Condition 1 - 1 coho

The small, gilled chinook was held for 1 hour.

Condition 3 - 1 chinook but had significant gill damage and not likely to survive.

### **Set 2**

Area: Olalla Point (just north of Olalla Creek) on west side of Colvos Passage

Set time: 0947 (skiff off) to 1022 (rings up) - 35 minutes

Catch: 198 chum, 15 coho (8 unmarked, 7 marked), 1 dogfish

Comments:

The net was brought up to the side of the vessel at 1041. Three brails of approximately 50 fish each were brought onto the deck, then the rest of the seine was brought aboard with approximately 30-40 fish. Some coho were removed directly from the bagged net by the skiff man and handed to another crew member who placed them in the recovery tank. In a couple of cases, vigorous fish were dropped on the deck and in one case a fish jumped out of the recovery tank onto the deck. The latter fish would have likely been a mortality if the observer had not alerted a crew member that the fish had jumped out of the tank. All the fish were on board by 1047. Two to three crew members were looking for and sorting coho, got to them quickly and did not miss any of the coho.

One coho and approximately 15 chum were gilled in the 5 inch mesh. All of the coho were placed in the recovery tank.

Condition at release:

14 coho were held in the recovery tank from 21 to 29 minutes.

Condition 1 - 14 coho - some of these fish were very vigorous when placed in the tank and others were on their side initially but became upright and were vigorous upon release.

1 coho was held for approximately 1 hour

Condition 3 - 1 coho - this fish was the one that was gilled in the 5 inch mesh and had some gill damage and not likely to survive.

**Set 3**

Area: approx. 1/4 mile north of Olalla Point (just north of Olalla Creek and slightly further north than set #2) on west side of Colvos Passage

Set time: 1120 (skiff off) to 1154 (rings up) - 34 minutes

Catch: 2,537 chum, 36 coho (23 unmarked, 13 marked)

Comments:

The net was brought up to the side of the vessel at 1215. It was obvious that this was a large set and fish were brailed onto the deck with the hold closed. There were approximately 50 fish per brail. All the fish were on board at 1405, approximately 2 hours after the net was brought alongside the vessel.

The procedure used by the skipper and crew was to put 3 to 4 brails full of fish onto the deck, while generally one crew member looked for the coho and placed them in the recovery tank. In between brails, the same crew member also put chum into the small opening into the hold

but could only get a portion of those fish off the deck before the hold had to be closed and another brail full of fish was released onto the deck. Generally, this individual did a very good job of identifying and getting coho into the tank in a timely manner. However, as the second, third and fourth brails came onto the deck it became more difficult to sort out the coho and get them into the recovery tank. Some coho were on the deck for a longer period of time and in one or two instances, coho would most likely have died if not pointed out by me to the crew. In one case a different crew member grabbed a larger coho around the operculum and placed it in the tank. Some initial bleeding was observed from the gill area and this fish never fully recovered, being released at Condition 3 after 2 hours.

The last of the fish were brought onto the vessel in the bag of the net. This amounted to about 350 fish. The majority of the coho mortality from this set was likely a result of bringing too many fish on board at once.

There were a significant number of chum gilled in the 5 inch mesh. I estimated approximately 10% of the chum (approximately 250 fish) were gilled in the net which took a considerable amount of time to remove, many after the entire catch was onboard.

At times, the hose supplying the recovery tank was removed and used to wash down the deck. On at least one occasion, coho in the recovery tank were stressed from this action but no mortality occurred.

#### Condition at release:

At 1315, approximately 1 hour after bringing the net alongside the vessel, I had the crew stop brailing temporarily while we removed coho from the recovery tank.

A total of 21 coho were in the recovery tank at this time. These fish were held for varying lengths of time up to 1 hour.

Condition 1 - 20 coho

Condition 3 - 1 coho - this fish was held for another hour. I believe this was the fish that was roughly handled by the gill plates when placed in the tank.

At 1440, the rest of the coho were removed from the tank. There were 15 coho in the tank at this time. These fish had been held in the recovery tank for varying lengths of time up to 75 minutes.

Condition 1 - 4 coho

Condition 5 (dead) - 11 coho

It appeared that nearly all the observed mortalities were essentially from the group of 350 fish brought onboard in the bag and were dead or nearly so when placed in the recovery tank.

In summary for the entire set the condition at release was:

Condition 1 - 24

Condition 3 - 1  
Condition 5 - 11  
total 36

#### **Set 4**

Area: Point Richmond on west side of Colvos Passage

Set time: 1503 (skiff off) to 1538 (rings up) - 35 minutes

Catch: 205 chum, 10 coho (6 unmarked, 4 marked)

#### Comments:

On this set I required the crew to brail fish and only put one brail full of fish (less than 50) on the deck at a time. Coho were placed in the recovery tank and then all the chum were placed into the hold before the next brail of fish was brought onboard. Three brails of 40 to 60 fish each and then the bag with approximately 60 fish were brought onboard. Five of the ten coho were gilled in the 5 inch mesh. There was some difficulty getting two of the gilled coho out of the net and one of these was thrown onto the deck and then into the recovery tank. There were some small flatfish, crab, sculpins and starfish captured during this set. The net was brought alongside the vessel at 1555 and all the fish were on board by 1617.

#### Condition at release:

All coho were placed in the recovery tank. The fish were removed from the recovery tank by approximately 1640 (precise time not recorded). Fish were held in the recovery tank for up to 40 minutes.

Condition 1 - 5 coho - One of these was taken directly from the net alongside the boat and directly released. In addition one of these fish jumped directly out of the tank and over the side.

Condition 3 - 4 coho

Condition 5 (dead) - 1 coho

The one dead fish (Condition 5) was one of the gilled fish and was placed in the tank in very poor condition and never really revived.

Placing only one brail of fish on the deck at a time worked much better. Several rather than a single crew member were looking for the coho and getting them into the recovery tank and the likelihood of missing a coho was much less. The chum were then quickly put into the hold, again with several crew members. It appeared that the time spent in putting only one brail of fish on the deck and sorting and clearing fish from the deck was about the same as putting several brails of fish on the deck at a time.

## **Daily Summary for the 4 Sets:**

### **Total catch:**

chum 2,940  
coho 62  
chinook 4

### **Condition of coho upon removal from recovery tank:**

Condition 1 44 (71%) - Vigorous, not bleeding  
Condition 3 6 (10%) - Lethargic, not bleeding  
Condition 5 12 (19%) - No movement or ventilation

### **Recommendations:**

This was just a general look at the use of the recovery tank to revive and release non target salmon from purse seines. Based on my observations, it appears that the use of recovery tanks and specific restrictions on handling fish may be a viable option in releasing the non target salmon in this type of fishery. With other species and higher proportions of non target salmon, adjustments would likely have to be made. For example, if the catch was primarily coho with a requirement to release wild coho, it would be much more difficult to sort out the wild fish and get them in the recovery tank in a timely manner. In this case, it may be necessary to require that fewer fish are put on the deck at a time.

In implementation of this type of selective purse seine fishery, there are obviously a number of issues that need to be considered including the expected encounter rate of the non-target salmon, expected multiple recaptures in an intensive seine fishery, etc.

Based on my observations, my ideas about requirements that would be necessary to effectively minimize mortality of non-target salmon in this type of purse seine fishery are as follows:

Require brailing if there are more than 50 to 60 salmon in the set

Require only a single brail full of fish consisting of no more than 50 to 60 fish on the deck at any time.

Each brail of fish must be sorted immediately and the deck cleared of fish prior to the next brail of fish being brought onboard.

The bag of the net may not be brought onboard with more than 50 to 60 fish in it.

Condition 1 fish may be either placed in the recovery tank or returned to the water immediately

Condition 2 through 5 fish must be placed in the recovery tank immediately

Fish must be held in the recovery tank until they are Condition 1 or for a minimum of 30? minutes.

A standard design for a recovery tank should be established with a minimum flow required to the tank at all times when fish are being held.



WDFW observers should be required on all vessels to ensure compliance.

Pat Pattillo will be providing his information from the other vessel separately, but in our discussions, his observations were be similar to those provided above.

Cc: Andy Blair, Skipper FV New Oregon  
Pat Pattillo, Steve Boessow, Chuck Phillips