SEQUENCE OF EVENTS AND STATUS OF FISHERIES

Situation: A summary of the management events for the 2000 salmon season (updated through October 15) is contained in Supplemental Attachment 1. There have been no inseason management conferences or actions since the last reported conference (number 13) on September 5, 2000, and no additional conferences are expected during the remainder of the season. The only ocean salmon fishing seasons remaining are the all-salmon-except-coho seasons for the recreational fishery south of Horse Mountain, California (closes in November), the recreational and commercial fisheries off central Oregon which close October 31, and the limited area state water fisheries off Oregon.

Mr. Doug Milward, Chair of the Salmon Technical Team (STT), will provide detailed effort and harvest data for the 2000 salmon season in his report to the Council.

Council Action: None. Information only.

Reference Materials:

1. Sequence of Events in Ocean Salmon Fishery Management, January through October 15, 2000 (Exhibit B.1, Supplemental Attachment 1).
2. Status Report of the 2000 Ocean Salmon Fisheries off Washington, Oregon, and California (Exhibit B.1, Supplemental STT Report).

PFMC
10/13/00

Sequence of events in ocean salmon fishery management, January through October 25, 2000.[1/] (page 1 of 5)

GENERAL MANAGEMENT ACTIONS AND INSEASON CONFERENCES

Feb. 8 — National Marine Fisheries Service (NMFS) inseason conference number one results in delayed openings of the recreational fisheries south of Pt. Arena, California, to help reduce impacts on endangered Sacramento River winter and threatened Central Valley spring chinook. Between Pt. Arena and Pigeon Pt., the season opening is delayed from Apr. 1 to Apr. 15. South of Pigeon Pt., the season opens Apr. 1 rather than Mar. 18.

Mar. 7 — NMFS provides the Council with a letter outlining the 2000 management guidance for stocks listed under the Endangered Species Act (ESA).

Council adopts three troll and three recreational ocean salmon fishery management options for public review.

NMFS inseason conference number two (at the Council meeting) results in two Council recommendations which are implemented by NMFS (1) open the commercial and recreational fisheries off Oregon from Cape Falcon to Humbug Mt. on April 1 for all salmon except coho and (2) do not open commercial test fisheries off California in Apr. south of Pillar Pt. due to concern for impacts on ESA listed salmon stocks.

Mar. 15-16 — North of Cape Falcon Salmon Forum meets in Portland, Oregon to initiate consideration of recommendations for treaty Indian and non-Indian salmon management options.

Mar. 27-28 — Council holds public hearings on proposed 2000 management options in five locations within the three Pacific Coast states. In addition, the state of California holds an additional hearing in Moss Landing.

Mar. 28-30 — North of Cape Falcon Salmon Forum meets in Tukwila, Washington to further consider recommendations for treaty Indian and non-Indian salmon management options.

Apr. 6 — Council adopts final ocean salmon fishery management recommendations for approval and implementation by the U.S. Secretary of Commerce. The proposed measures include selective fisheries and comply with the salmon fishery management plan (FMP) and the current biological opinions for listed species. An emergency rule is not required for implementation.

May 1 — Ocean salmon seasons implemented as recommended by the Council and published in the *Federal Register* on May 5 (65 FR 26138).

Jun. 6 — NMFS inseason conference number three results in a proposed closure of the May/June, non-Indian troll fishery north of Cape Falcon on June 9 as the fishery is projected to achieve its 11,000 chinook guideline at that time.

Jun. 9 — NMFS inseason conference number four rescinds the June 9 closure of the May/June, non-Indian troll fishery north of Cape Falcon and, with ample guideline remaining, allows the fishery to continue to the scheduled June 15 closure.

Jun. 12 — Council submits *Amendment 14 to the Pacific Coast Salmon Plan* to NMFS for implementation. The amendment includes implementation of the 1996 Sustainable Fisheries Act, significant editorial changes, provides a specific allocation for the La Push port area, and establishes management criteria for selective fisheries targeting on marked hatchery coho.

July 24 — NMFS inseason conference number five closes the central Oregon (Cape Falcon to Humbug Mt.), recreational fishery that is selective for marked hatchery coho. The closure, effective July 25, is necessary to avoid exceeding the 20,000 marked coho quota and precedes the season cutoff date of July 31. The recreational fishery in this area remains open for all-salmon-except-coho.

July 31 — NMFS inseason conference number six adjusts landing limits and quotas for the Queets River to Cape Falcon, non-Indian, commercial troll fishery (opening Aug. 4) as follows: (1) landing limit of 300 coho for the first four-day open period; (2) no chinook landing limits as the quota exceeds 2,500 chinook; and (3) the adjusted chinook quota for the fishery is 2,750 chinook.

GENERAL MANAGEMENT ACTIONS AND INSEASON CONFERENCES (continued)

Aug. 4 — NMFS inseason conference number seven considers the projected achievement of the coho quota for the Cape Alava to Queets River (La Push) sport fishery and transfers 250 coho from the Neah Bay quota to La Push to extend the fishery into the following week. A conference is scheduled for Aug. 7 to review the landings and determine the closing date for the La Push sport fishery.

Aug. 7 — NMFS inseason conference number eight considers the projected achievement of the coho quota for the Cape Alava to Queets River (La Push) sport fishery and delays any action until an additional conference on Aug. 9

Aug. 9 — NMFS inseason conference number nine considers four issues: (1) closure of the troll fishery off Oregon between Sisters Rocks and Mack Arch under a 1,300 chinook quota; (2) adjustments to the non-Indian troll fishery between the Queets River and Cape Falcon; (3) adjustments to the recreational fisheries in the Columbia River and Westport subareas; and (4) closures for the sport fisheries north of Cape Falcon.

NMFS closes the Sisters Rock to Mack Arch troll fishery on Aug. 11 as the quota is projected to be met at that time. To allow achievement of the quotas for the commercial and sport fisheries north of Cape Falcon, NMFS transfers 1,000 chinook to the troll fishery (Queets River to Cape Falcon) in exchange for 3,400 coho to the Columbia River subarea and 600 coho to the Westport subarea. The trade makes it possible to avoid any changes in the landing restrictions for the Aug. 11-14 opening of the troll fishery. NMFS transfers 60 coho from Neah Bay to the La Push sport fishery and sets the La Push closure for Aug. 12. Any remaining coho in the La Push quota will be transferred back to Neah Bay. The Columbia River subarea sport fishery will close Aug. 13. For the Westport subarea, all but the area at the mouth of the harbor defined by the Westport lighthouse and buoys 2 and 3 will be closed on Aug. 10 and the remaining area closed on Aug. 13. These closures are necessary to assure the coho quotas are not exceeded.

Aug. 16 — NMFS inseason conference number ten results in: (1) removing the 300 coho landing limit from the third open period of the Queets River to Cape Falcon non-Indian troll fishery and (2) closing the Neah Bay (U.S.-Canada border to Cape Alava) sport fishery on Aug. 17 to avoid exceeding the coho quota.

Aug. 23 — NMFS inseason conference number 11 considers landings in the Queets River to Cape Falcon, non-Indian troll fishery and recommends the fourth open period proceed with no change in regulations.

Aug. 30 — NMFS inseason conference number 12 considers landings in the Queets River to Cape Falcon, non-Indian troll fishery and takes action to increase the fifth opening to five days with the expectation that it will be the final opening.

Sept. 5 — NMFS inseason conference number 13 considers landings in the House Rock to Humboldt south jetty, troll fishery and closes the fishery north of the Oregon-California border on Sept. 5 as the 1,000 chinook guideline for landings in that area has already been reached.

NON-INDIAN COMMERCIAL TROLL SEASONS

Apr. 1 — Cape Falcon to Humbug Mt., Oregon, all-salmon-except-coho fishery opens through July 22. The fishery will reopen Aug. 1 through Aug. 29 and Sept. 1 through Oct. 31.

May 1 — U.S.-Canada border to Cape Falcon, all-salmon-except-coho fishery opens through the earlier of June 15 or an 11,000 chinook guideline.

Humbug Mt. to Oregon-California border, all-salmon-except-coho fishery opens through May 31.

Pt. San Pedro to U.S.-Mexico border, all-salmon-except-coho fishery opens through Aug. 27.

May 29 — Pt. Reyes to Pt. San Pedro, all-salmon-except-coho fishery opens through Sept. 30.

May 31 — Humbug Mt. to Oregon-California border all-salmon-except-coho fishery closes.

NON-INDIAN COMMERCIAL TROLL SEASONS (continued)

Jun. 15	U.S.-Canada border to Cape Falcon, all-salmon-except-coho fishery closes as scheduled.
July 1	Fort Ross to Pt. Reyes, all-salmon-except-coho test fishery within 6 nm opens through the earlier of July 15 or a 4,500 chinook quota.
July 15	Scheduled closure of the Fort Ross to Pt. Reyes, all-salmon-except-coho test fishery within 6 nm.
July 18	Pt. Arena to Pt. Reyes, general area all-salmon-except-coho fishery opens through Sept. 30.
July 22	Cape Falcon to Humbug Mt., all-salmon-except-coho fishery closes. The fishery will reopen Aug. 1.
Aug. 1	Cape Falcon to Humbug Mt., all-salmon-except-coho fishery reopens. The fishery will close Aug. 29 and reopen Sept. 1 through Oct. 31.
	Sisters Rocks to Mack Arch, all-salmon-except-coho fishery opens within 4 nm of shore under a 1,500 chinook quota and a landing limit of 30 chinook per day. The fishery is scheduled to run continuously until the earlier of Aug. 31 or the quota.
Aug. 4-7	Queets River to Cape Falcon, all-salmon fishery opens under a quota of 2,750 chinook (1,500 in the preseason guideline plus 1,250 transferred from the May/June season) and 25,000 coho with healed adipose fin clips (selective fishery). The fishery proceeds on a cycle of 4 days open and 3 days closed with a landing limit of 300 coho for the open period.
Aug. 11	Sisters Rocks to Mack Arch, all-salmon-except-coho fishery closes as the 1,300 chinook quota is projected to be met.
Aug. 11-14	Queets River to Cape Falcon, all-salmon fishery opens for the second 4-day period under the same regulations as the initial opening, but with a trade of 4,000 coho to the sport fishery for 1,000 chinook added to the troll quota (i.e., overall commercial quotas of 3,750 chinook and 21,000 marked coho).
Aug. 18-21	Queets River to Cape Falcon, all-salmon fishery reopens for the third 4-day period with no coho landing limit.
Aug. 25-28	Queets River to Cape Falcon, all-salmon fishery reopens for the fourth 4-day period with no coho landing limit.
Aug. 27	South of Pt. San Pedro, all-salmon-except-coho fishery closes.
Aug. 29	Cape Falcon to Humbug Mt., all-salmon-except-coho fishery closes for 2 days.
Aug. 31	Scheduled closure of the Sisters Rocks to Mack Arch, all-salmon-except-coho fishery within 4 nm of shore.
Sept. 1-5	Queets River to Cape Falcon, all-salmon fishery reopens for a final 5-day period with no coho landing limit.
Sept. 1	Cape Falcon to Humbug Mt., all-salmon-except-coho fishery reopens through Oct. 31.
	House Rock to Humboldt south jetty, all-salmon-except-coho fishery opens under a quota of 7,000 chinook of which no more than 1,000 chinook may be landed in Brookings.
	Horse Mt. to Pt. Arena, all-salmon-except-coho fishery opens through Sept. 30.
Sept. 5	Queets River to Cape Falcon, all-salmon fishery closes for the season.

NON-INDIAN COMMERCIAL TROLL SEASONS (continued)

	House Rock to Oregon-California border, all-salmon-except-coho fishery closes upon meeting the 1,000 chinook landing guideline for Brookings.
Sept. 30	Oregon-California border to Humboldt south jetty and Horse Mt. to Pt. San Pedro, all-salmon-except-coho fisheries close for the season.
Oct. 16	Goat Island to 42°01'20" N latitude (Chetco River area), chinook only fishery inside Oregon territorial waters opens through the earlier of achieving a 1,000 chinook quota or Oct. 31.
Oct. 31	Cape Falcon to Humbug Mt., all-salmon-except-coho fishery closes for the season.
Oct. 31	Goat Island to 42°01'20" N latitude (Chetco River area), chinook only fishery inside Oregon territorial waters closes as scheduled.
Nov. 1	Oregon State territorial waters, chinook only fisheries open from (1) Twin Rocks to Pyramid Rock (Tillamook Bay mouth) and (2) Cape Blanco to Humbug Mt. (Elk River area). All landings in the Elk River fishery must be landed in Port Orford.
Nov. 15	Twin Rocks to Pyramid Rock (Tillamook Bay mouth), chinook only fishery inside Oregon territorial waters closes for the season.
Dec. 15	Cape Blanco to Humbug Mt. (Elk River area), chinook only fishery inside Oregon territorial waters closes for the season.

TREATY INDIAN COMMERCIAL TROLL SEASONS

May 1	All-salmon-except-coho fisheries open through the earlier of June 30 or an overall 20,000 chinook quota for the May-June season (any remainder of the quota is not transferable to the Aug.-Sept. season).
June 30	Scheduled closure of the all-salmon-except-coho fisheries.
Aug. 1	All-salmon fisheries open.
Sept. 15	Scheduled closure of the all-salmon fisheries.

RECREATIONAL SEASONS

Feb. 12	Horse Mt. to Pt. Arena, all-salmon-except-coho fishery opens. The fishery closes July 6 and reopens July 22 through Nov. 12.
Apr. 1	Pigeon Pt. to the U.S.-Mexico border, all-salmon-except-coho fishery opens through Oct. 1. The opening was delayed from March 18 (see inseason conference number 1 on Feb. 8).
Apr. 1	Cape Falcon to Humbug Mt., all-salmon-except-coho fishery opens. The fishery becomes selective for marked hatchery coho beginning July 1.
Apr. 15	Pt. Arena to Pigeon Pt., all-salmon-except-coho fishery opens through Nov. 5. The opening was delayed from Apr. 1 (see inseason conference number 1 on Feb. 8).
May 27	Humbug Mt. to Horse Mt., all-salmon-except-coho fishery opens through July 6 with a daily-bag-limit of one fish. The fishery reopens July 29 through Sept. 10 with a two fish daily bag limit.
July 1	Cape Falcon to Humbug Mountain, all-salmon selective coho fishery opens under a quota of 20,000 adipose fin clipped coho. Only coho with a healed adipose fin clip may be retained. During the selective fishery, the season is only open Saturday through Sunday and Tuesday

NON-INDIAN COMMERCIAL TROLL SEASONS (continued)

	through Thursday of each week through the earlier of the 20,000 marked coho quota or July 30. There are no special gear restrictions other than the requirement to use barbless hooks.
July 3	Fisheries north of Leadbetter Pt. open for all salmon with a daily bag limit of two fish, but only one chinook. All fisheries are selective for marked hatchery coho (adipose fin clip). North of Queets River (La Push and Neah Bay), the fishery opens 7 days per week. From Queets River to Leadbetter Pt. (Westport subarea), the fishery is only open Sun. through Thurs. The fisheries will close the earliest of Sept. 30, achievement of the coho subarea quotas, or achievement of the overall chinook quota.
July 6	Humbug Mt. to Horse Mt., all-salmon-except-coho fishery closes. The fishery will reopen July 29 and continue through Sept. 10 with a two fish bag limit.
	Horse Mt. to Pt. Arena, all-salmon-except-coho fishery closes. The fishery will reopen July 22 and continue through Nov. 12.
July 10	Leadbetter Pt. to Cape Falcon (Columbia River subarea), all-salmon fishery opens with a daily bag limit of two fish, but only one chinook. The fishery is selective for marked hatchery coho (adipose fin clip), open only Sun. through Thurs. of each week and will close the earliest of Sept. 30, achievement of the coho subarea quota, or achievement of the overall chinook quota north of Cape Falcon.
July 22	Horse Mt. to Pt. Arena, all-salmon-except-coho fishery reopens through Nov. 12.
July 25	Cape Falcon to Humbug Mt., all-salmon selective fishery for marked hatchery coho closes as the 20,000 marked coho quota is projected to have been met.
July 29	Humbug Mt. to Horse Mt., all-salmon-except-coho fishery reopens through Sept. 10 under a two fish bag limit.
Aug. 10	Except for the area at the mouth of the harbor defined by the Westport lighthouse and buoys #2 and #3, the Queets River to Leadbetter Pt. (Westport subarea), all-salmon fishery closes to assure the coho quota is not exceeded.
Aug. 12	Cape Alava to Queets River (La Push), all-salmon fishery closes to avoid exceeding the coho quota.
Aug. 13	Leadbetter Pt. to Cape Falcon (Columbia River subarea) and state water area at the mouth of Grays Harbor (Westport bubble), all salmon fisheries close to assure the coho quota is not exceeded.
Aug. 17	U.S.-Canada Border to Cape Alava (Neah Bay), all-salmon fishery closes to avoid exceeding the overall coho quota.
Sept. 10	Humbug Mt. to Horse Mt., all-salmon-except-coho fishery closes for the season.
Oct. 1	Pigeon Pt. to U.S.-Mexico border, all-salmon-except-coho fishery closes for the season.
Oct. 7	Goat Island to 42°01'20" N latitude (Chetco River area), chinook only fishery inside Oregon territorial waters opens under a one chinook bag limit.
Oct. 15	Goat Island to 42°01'20" N latitude (Chetco River area), chinook only fishery inside Oregon territorial waters closes for the season.
Oct. 31	Cape Falcon to Humbug Mt., all-salmon-except-coho fishery closes for the season.
Nov. 1	Twin Rocks to Pyramid Rock (Tillamook Bay mouth) and Cape Blanco to Humbug Mt. (Elk River area), chinook only fisheries inside Oregon territorial waters open.

Sequence of events in ocean salmon fishery management, January through October 25, 2000.[a/] (page 6 of 5)

NON-INDIAN COMMERCIAL TROLL SEASONS (continued)

Nov. 5	Pt. Arena to Pigeon Pt., all-salmon-except-coho fishery closes for the season.
Nov. 12	Horse Mt. to Pt. Arena, all-salmon-except-coho fishery closes for the season.
Nov. 15	Twin Rocks to Pyramid Rock (Tillamook Bay mouth), chinook only fishery inside Oregon territorial waters closes for the season.
Dec. 15	Cape Blanco to Humbug Mt. (Elk River area), chinook only fishery inside Oregon territorial waters closes for the season.

i/ Unless stated otherwise, season openings or modifications of restrictions are effective at 0001 hours of the listed date. Closures are effective at midnight. Some events occurring after October 25 are subject to change, depending on achievement of quotas or other inseason management actions.

STATUS REPORT OF THE 2000 OCEAN SALMON FISHERIES OFF WASHINGTON, OREGON, and CALIFORNIA.
Preliminary Data Through September, 2000, unless otherwise noted.

Exhibit B.1
Supplemental STT Report
October 2000

	Fishery and Area	Season Dates	Effort (Days Fished) a/	CHINOOK Catch	CHINOOK Quota	CHINOOK Percent	COHO Catch	COHO Quota	COHO Percent
TROLL									
b/	Treaty Indian	*5/1-6/30*	172	5,911	20,000	30%	Non-Retention		
		8/1-9/15	58	1,647	5,500	30%	22,057	20,000	110%
c/	Non-Treaty N Falcon	*5/1-6/15*	107	8,652	11,000	79%	Non-Retention		
e/	Queets R - Cape Falcon	*8/4-9/30*	439	3,185	3,750	85%	17,278	21,000	82%
	Cape Falcon-Humbug Mtn	*4/1-7/22*	2,936	37,899	None	NA	Non-Retention		
		8/1-8/29	1,857	47,236	None	NA	Non-Retention		
		9/1-10/31	1,000	25,500	None	NA	Non-Retention		
	Humbug Mtn-OR/CA Border	*5/1-5/31*	4	21	None	NA	Non-Retention		
	Sisters Rocks-OR/CA Border	*8/1-8/31*	85	1,392	1,300	107%	Non-Retention		
	House Rock-Humbolt S Jetty	*9/1-9/30*	177	3,091	7,000	44%	Non-Retention		
	Horse Mtn-Pt. Arena	*9/1-9/30*	392	21,320	None	NA	Non-Retention		
	Pt. Arena-Pt. Reyes	*7/18-9/30*	4,160	47,344	None	NA	Non-Retention		
	Ft. Ross-Pt. Reyes	*7/1-7/15*	252	1,894	4,500	42%	Non-Retention		
	Pt. Reyes to Pt. San Pedro	*5/29-9/30*	4,912	234,052	None	NA	Non-Retention		
	Pt. San Pedro-US/Mexico border	*5/1-8/27*	9,432	281,364	None	NA	Non-Retention		

	RECREATIONAL		Effort (Angler Days)	Catch	Guideline d/	Percent	Catch	Quota	Percent
e/	US/Canada Border-Cape Alava	*7/3-9/30*	8,115	467	500	NA	7,265	6,650	109%
e/	Cape Alava-Queets River	*7/3-9/30*	1,989	182	300	NA	1,932	1,950	99%
e/	Queets River-Leadbetter Pt.	*7/3-9/30*	19,825	6,349	7,400	NA	28,841	29,500	98%
e/	Leadbetter Pt.-Cape Falcon	*7/10-9/30*	24,251	2,315	4,300	NA	39,668	40,900	97%
	Cape Falcon-Humbug Mtn	*4/1-10/31*	18,345	6,507	None	NA	Non-Retention		
	---selective fishery	*7/1-7/31*	26,211	5,862	None	NA	19,509	20,000	98%
	Humbug Mtn-Horse Mtn	*5/27-7/6*	13,005	5,275	None	NA	Non-Retention		
		7/29-9/10	25,989	18,966	None	NA	Non-Retention		
	Horse Mtn-Pt. Arena	*2/12-7/6*	11,413	9,881	None	NA	Non-Retention		
		7/22-11/12	13,050	15,432	None	NA	Non-Retention		
	Pt. Arena-Pigeon Pt.	*4/15-11/5*	77,268	57,277	None	NA	Non-Retention		
	Pigeon Pt.-US/Mexico Border	*4/1-10/31*	81,862	78,662	None	NA	Non-Retention		

a/ Treaty troll effort reported as landings
b/ Treaty troll landings through season
c/ Numbers shown as chinook quotas for Non-treaty troll and sport fisheries North of Falcon are guidelines rather than quotas.
d/ Only the overall chinook harvest guideline for all recreational fisheries north of Cape Falcon is a quota.
e/ Mark Selective fishery

TOTALS TO DATE

	Effort			Chinook Catch			Coho Catch		
	2000	1999	1998	2000	1999	1998	2000	1999	1998
TROLL									
Treaty Indian	230	283	113	7,558	23,730	13,200	22,057	13,214	3,810
Washington Non-Treaty	300	611	100	9,651	15,296	5,929	5,216	4,472	0
Oregon	6,173	4,300	6,900	115,483	58,000	120,200	12,062	0	0
California	19,280	14,000	12,800	587,816	264,500	226,900	0	0	0
Total Troll	25,983	19,194	19,913	720,508	361,526	366,229	39,335	17,686	3,810
RECREATIONAL									
Washington	45,740	44,800	20,100	8,549	9,100	1,900	63,980	38,200	21,300
Oregon	71,966	43,000	21,200	24,175	6,800	3,300	33,235	13,600	2,300
California	203,617	148,000	151,800	174,451	87,600	122,000	0	0	0
Total Recreational	321,323	235,800	193,100	207,175	103,500	127,200	97,215	51,800	23,600
PFMC Total				927,683	465,026	493,429	136,550	69,486	27,410

STATE OF WASHINGTON
DEPARTMENT OF FISH AND WILDLIFE
ENFORCEMENT PROGRAM

2000 WASHINGTON COASTAL SELECTIVE SALMON FISHERY

The following report is a synopsis of enforcement activities by Washington Department of Fish and Wildlife Officers, for the coastal selective salmon fishery. Enforcement presence in the four salmon management areas was accomplished by vessel, dock patrols, special investigations, and joint operations with Oregon State Police, National Marine Fisheries Service, the U.S. Coast Guard and Canada Oceans and Fisheries.

Developing compliance rate estimations for fish and wildlife violations are difficult. When compliance is estimated by comparing the number of contacts to violations discovered by WDFW officers, the data can be confounded by having a uniformed officer present. Users who are violating fish and wildlife laws change their behavior when an officer is present. Often the contact- to -violation percentage is a reflection of the effectiveness of the officer at discovering a violation.

Efforts to apprehend intentional violators resulted in some notable cases and severe penalties. For example, three individuals each faced $1,596 in criminal fines after they were cited for fishing violations. An at-sea boarding revealed the possession of 11 unmarked coho salmon, one undersized chinook and evidence that barbed hooks were being used. The suspect vessel was seized and eventually released after the operator paid $2,500 in separate civil penalties. In other instances, people were caught attempting to sneak over limits of salmon out of town. Close inspections of catches this season also revealed that some anglers had mutilated coho salmon in an effort to pass them off as marked fish .

The WDFW Enforcement Program elevated the coastal salmon season to a priority issue. Officers worked in concert with other enforcement entities and assigned WDFW officers from other areas of the state to achieve a visible presence throughout the peak of the season. WDFW Officers enjoy an excellent working relationship with fish management personnel and again relied heavily on their input this year in order to be in the right place at the right time. The results are summarized by catch area on the following pages.

Area One (Ilwaco, WA):

Enforcement Hours:

Docks -	133
Vessel -	114
Investigative -	3
Interagency -	1
Total -	251 hours

Contacts: 1,077 total

Violations:

License (no license / fail to record salmon catch) - 36 warnings; 19 citations.
Gear (more than one line / barbed hook) - 8 warnings; 4 citations.
Unmarked coho possession - 1 warning; 12 citations.
Overlimit salmon - 1 warning; 2 citations.
Season / area (conservation zone closure / closed day / closed season) - 31 warnings; 23 citations.
Boater safety (gear / registrations) - 2 citations; 37 vessel safety inspections.
No limited entry charter license - 2 citations.
Other offenses (shellfish/ bottom fish limits / warrants/ narcotics) - 3 warning; 15 citations.

Total Warnings: 80
Total Citations: 79

Estimated compliance with salmon rules was 87.3 %.*
The estimated compliance for possessing unmarked coho was approximately 98.8% .**
Season/ area violations, primarily vessels fishing in the control zone, accounted for 39 % of the total salmon rule violations compared to 81.5% in 1999***

1999 / 2000 comparison of unmarked coho release compliance: down by .5%.

Area Two (Westport, WA):

Enforcement hours:

Docks -	80
Vessel -	159
Investigative -	06
Total -	245

Contacts: 560 total

Violations:

License (no license / fail to record salmon catch) - 19 warnings; 6 citations.
Gear (more than one line / barbed hook/ fail to submit gear for inspect.) - 4 warnings, 2 citations.
Unmarked coho retention - 11 citations.
Season / area (conservation zone closure / closed day / closed season) - 4 warnings; 1 citation.
Overlimit salmon- 4 citations.
Boater safety (gear / registrations) - 0.
Other offenses (shellfish/ warrants/ narcotics) - 4 citations.

Total Warnings: 27
Total Citations: 28

The estimated compliance rate with salmon rules was 91 %*.
The estimated compliance rate for possessing unmarked coho was approximately 98.1%.**

1999 / 2000 comparison of unmarked coho release compliance: down by 1.4%.

Area Three (LaPush, WA):

Enforcement Hours:

Docks -	53
Vessel -	12
Interagency -	0
Investigative -	03
Total -	68

Contacts: 364 total

Violations:

License (no license / fail to record salmon catch) - 3 warnings; 2 citations.
Gear (more than one line / barbed hook/ fail to submit gear for inspect.) - 0.
Unmarked coho retention - 4 citations.
Retention of chinook - 1 citation.
Season / area (conservation zone closure / closed day / closed season) - 0.
Charter license violation - 1 warning.
General groundfish violations - 7 warnings; 2 citations.
Halibut closed season - 5 warnings.
Boater safety (gear / registrations) - 1 warning.
Other offenses (shellfish/ bottom fish limits / warrants/ narcotics) - 2 citations.

Total Warnings: 17
Total Citations: 11

The estimated compliance with salmon rules was 97 %.*
The compliance rate for possessing unmarked coho was approximately 99%.**

1999 / 2000 comparison of unmarked coho release compliance: down by .9%.

Area Four (Neah Bay, WA):

Enforcement Hours:

Docks -	161
Vessel -	341
Investigative -	10
Total -	512

Contacts: 866 total

Violations:

License (no license / fail to record salmon catch) - 19 warnings; 19 citations.
Gear (more than one line / barbed hook/ fail to submit gear for inspect.) - 19 warnings; 8 citations.
Wild coho retention - 2 warnings; 8 citations.
Possession of Canada caught salmon in violation of Port rules - 5 citations.
Season / area (conservation zone closure / closed day / closed season) - 2 warnings.
Boater safety (gear / registrations) - 10 warnings; 1 citation.
General groundfish - 12 citations.
Other offenses - 1 citation.

Total Warnings: 52
Total Citations: 54

The estimated compliance with salmon rules was 90.6%.*
The estimated compliance for possessing unmarked coho was 98.9%.**

1999 / 2000 comparison of unmarked coho release compliance: up by 3.5%.

* % compliance with salmon regulations = total salmon rule violations (license, gear, possession, season and area) / total contacts

** % compliance for possession of unmarked coho = total unmarked fish violations / total contacts

*** % of salmon violations in Control Zone = area, season violations / total salmon rule violations

RESULTS OF SCIENTIFIC AND STATISTICAL COMMITTEE METHODOLOGY REVIEW

Situation: Each year, the Scientific and Statistical Committee (SSC) completes a methodology review to help assure new or significantly modified methodologies employed to estimate impacts of the Council's salmon management use the best available science. This review is preparatory to the Council's adoption, at the November meeting, of all anticipated methodology changes to be implemented in the coming season, or, in certain limited cases, of providing directions for handling any unresolved methodology problems prior to the formulation of salmon management options in March. Because there is insufficient time to review new or modified methods at the March meeting, the Council may reject their use if they have not been approved the preceding November.

The methodologies the SSC is expected to report on at this time are:

- cohort analysis with regard to revision of the Klamath Ocean Harvest Model (KOHM)
- modification of the methodology for estimating Central Valley Index (CVI) chinook abundance
- coho cohort analysis project

The Council staff assessment of the status of the methodology reviews at the time of briefing book preparation is as follows. The revision of the KOHM is not complete at this time and is not expected to be utilized in place of the current model for the 2001 salmon season. It is unclear as to whether or not the coho cohort analysis is sufficiently developed and documented to be utilized in 2001. Modification of the CVI chinook abundance estimate involves forcing the regression through zero. This is a relatively common procedure, and presumably the SSC will be able to provide guidance to the Council on this issue. However, no documentation of any of the methodology changes was received by the SSC review deadline of September 1, 2000.

Council Action:

1. **Approve methodology changes as appropriate for implementation in the 2001 salmon season.**
2. Provide guidance as needed for any unresolved methodology issues.

Reference Materials:

1. Exhibit B.2.b, Supplemental SSC Report.

PFMC
10/17/00

RESULTS OF SCIENTIFIC AND STATISTICAL COMMITTEE METHODOLOGY REVIEW

The Salmon Advisory Subpanel commends the hard work and progress made by those working on the Klamath Ocean Harvest Model. We urge those involved to carry on this work for implementation in the 2002 fishing season.

PFMC
10/31/00

RESULTS OF SCIENTIFIC AND STATISTICAL COMMITTEE METHODOLOGY REVIEW

The Scientific and Statistical Committee (SSC) reviewed two methodologies that are under development: the revised Klamath Ocean Harvest Model (KOHM) and the Coho Cohort Reconstruction project. Progress is good on both projects, but neither will have a product ready for use in the 2001 season setting process.

Mr. Allen Grover (CDFG), Dr. Lloyd Goldwasser (NMFS), and Mr. Michael Mohr (NMFS) briefed the SSC salmon subcommittee on the progress of the Klamath Ocean Harvest Model (KOHM) revision. This team has undertaken a thorough reworking of the input data sets and many of the supporting analyses, as well as the KOHM itself. The ocean coded-wire tag (CWT) database, which is one of the foundations of the model, was checked for accuracy and consistency. A new, corrected data base was created. The SSC recommends the corrected data base be made available through the Pacific States Marine Fisheries Commission (PSMFC). In addition, several freshwater CWT data sets that the KOHM team has assembled should be considered for inclusion on the PSMFC system. Using the revised data sets, along with an age composition analysis (marine and in-river) and a size-at-age analysis, the KOHM team produced a new cohort analysis. Remaining work includes a catch-effort analysis, inclusion of Central Valley and Rogue River stocks in the ocean populations, and creation of the harvest model itself. This project appears to be well conceived, carefully executed, and well documented. Progress is slower than expected due, in part, to the large number of interdependent elements in the analysis and the overall scope of the project. The final products, which will include revised Klamath fall chinook data sets and a new harvest model, should be completed in time for review prior to the 2002 management season.

Mr. Jim Packer of Washington Department of Fish and Wildlife presented a progress report on the coho cohort analysis and coho FRAM development. This project was initiated in 1994 with the goal to revise the base period used in the coho FRAM model to improve the harvest estimates in mixed stock fisheries. Progress to date includes production of historical exploitation rates and contribution rates for stocks and fisheries from 1986 to 1991. Work to be done includes incorporation of the new data set in the structure of FRAM. There are several challenges that remain. Six years of data need to be condensed into a single base period. The new data set has many more stocks and fisheries than the existing model. Stock size predictions are needed for each included stock. The increased resolution of the new model must be reconciled with the capability of tribes and agencies to predict stock size. The new data set has four time periods (January through June, July, August, September through December) compared with 13 for the existing model. The current system of Terminal Area Management Modules will not work with the new data set. This will necessitate development of new techniques for modeling late-season and terminal area fisheries. The new model structure will permit a functional internet interface, simplifying model distribution and coordination of preseason negotiations. Mr. Packer indicated the final model should be ready for review in the summer of 2001 and for the use in fishery management in 2002. In order to conduct that review the SSC will need thorough documentation of the model and the methods used to develop the new data base.

PFMC
10/31/00

FINAL REPORT OF THE OREGON COASTAL NATURAL COHO WORK GROUP

Situation: Under Amendment 13 to the *Pacific Coast Salmon Plan* and by the terms of the *Oregon Salmon Plan*, the management of Oregon coastal natural (OCN) coho salmon is subject to a comprehensive, adaptive review this year. The purpose of the review is to assure the management measures adopted in Amendment 13 in 1997 still reflect the best science and approach to rebuilding the OCN coho stock.

In November 1999, the Council approved an Amendment 13 review process and work group to be headed by Oregon Department of Fish and Wildlife (ODFW). Mr. Sam Sharr heads the work group and provided the Council with the group's preliminary report at the September 2000 meeting. The final draft report has now been completed and is provided for your review in Exhibit B.3.b (OCN Work Group Report).

The final work group report provides several recommendations for technical changes to the management matrix which guides harvest rates for OCN coho in the Council's salmon fishery management plan (FMP). The Oregon Fish and Wildlife Commission has briefly reviewed the report and believes it provides important concepts which should be considered further by the Council. If it so chooses, the Council could implement the work group's recommendations in at least three different ways.

1. In the short-term, the Council could simply utilize the recommendations as expert biological opinion to help guide establishment of the final harvest rate in 2001 and possibly even 2002 under the current FMP. The current FMP will require a harvest impact of no more than 15% in 2001 based on known very low parent stock size and projected marine survival of medium or better (also no more than 15% in 2002). Under very low parent stock abundance and projected medium marine survival, the Council balanced biological and socio-economic concerns by adopting an impact of 8.2% for 2000. Under the proposed alternative of the work group, the 2000 and 2001 fisheries would be limited to a maximum impact of 8% while the 2002 fishery could range from 8% to 25%, depending on marine survival (Table 6, page 30).

2. If the Scientific and Statistical Committee, Salmon Technical Team, and Council agree upon the need for specific technical changes proposed in the report which do not raise significant allocation issues, it may be possible to incorporate them into the current FMP without plan amendment prior to the 2001 salmon season (section 3.1.2 of Amendment 14).

3. The Council could propose the changes as a formal FMP amendment and begin that process (which could not be completed in time for the 2001 salmon season).

Council Action:

1. Consider the recommendations of the OCN Coho Work Group for changes to the current management measures in the salmon FMP.
2. Determine which recommendations to implement and the timing and procedures for doing so.

Reference Materials:

1. The 2000 Review of Amendment 13 to the Pacific Coast Salmon Plan (Exhibit B.3.b, OCN Work Group Report).

PFMC
10/17/00

FINAL DRAFT

Exhibit B.3.b
OCN Work Group Report
November 2000

2000 REVIEW OF AMENDMENT 13 TO THE PACIFIC COAST SALMON PLAN

OCN WORK GROUP
Sam Sharr, ODFW
Curt Melcher, ODFW
Tom Nickelson, ODFW
Dr. Pete Lawson, NMFS
Dr. Robert Kope, NMFS
Dr. John Coon, PFMC

October 12, 2000

FINAL DRAFT

TABLE OF CONTENTS

FINAL DRAFT

LIST OF TABLES

FINAL DRAFT

LIST OF FIGURES

FINAL DRAFT

LIST OF APPENDICES

FINAL DRAFT

EXECUTIVE SUMMARY

Amendment 13 to the Pacific Fishery Management Council (PFMC) Fishery Management Plan (FMP) was designed to insure that fishery related impacts do not act as a significant impediment to the recovery of depressed Oregon Coastal Natural (OCN) coho stocks. When the PFMC adopted the amendment in November 1997, they stipulated that it should be reviewed and updated on a periodic basis. With respect to the review, they specifically referenced technical concerns raised by the Scientific and Statistical Committee (SSC) and the Salmon Technical Team (STT) regarding parameters in the management matrix that trigger allowable fishery impacts. In their November 1999 meeting, the PFMC approved an Oregon Department of Fish and Wildlife (ODFW) proposal to form an ad hoc OCN work group composed of representatives from ODFW, PFMC, and National Marine Fisheries Service to complete the stipulated 2000 review.

In the last decade OCN coho spawner abundance has been low, the progeny from those spawners have experienced extremely low marine survival, and the last three brood cycles have failed to replace themselves. Because similar spawner abundance and marine survival conditions were expected to continue in the near future, the OCN work group focused the majority of their attention on management trigger points for conditions of low spawner abundance and marine survival. The group has met five times since their inception and, at the September 11-16, 2000 meeting of the PFMC, they presented a draft report of their findings to the SSC and the Council.

The draft report of the OCN work group contains an expanded management matrix that includes two new parental spawner categories and one new marine survival category. Hence, what was formerly a 3x3 matrix is now a 4x5 matrix. The new parental spawner categories occur in the low end of the spawner abundance range and are designated as "Very Low" and "Critical". The new marine survival category, designated as "Extremely Low", is also in the low end of the range and corresponds to levels observed from 1992 through 1998. In addition to the inclusion of new marine survival categories, there has also been a shift in the boundary between the "Low" and "Medium" categories.

The sensitivity of OCN coho productivity was examined for conditions of variable spawner abundance and protracted "Extremely Low" marine survival. Model results predict that **any** impacts that result in reductions in OCN spawner densities below a "Critical" level of four fish-per-mile significantly increase risk of extinction for the population. They also indicate that when the marine survival index is "Extremely Low" (hatchery jack to smolt ratio ≤ 0.0008), fishery related impacts in excess of 8% are likely to significantly impede recovery of the population

Fishery impact rates less than 8% are lower than any previously set by the PFMC in the preseason process. Reducing fishery impacts to this low level would require additional constraints on chinook directed and coho selective fisheries and would likely also require extensive PFMC negotiations with respect to the allocation of available fisheries resources among user groups.

FINAL DRAFT

INTRODUCTION

Oregon Coastal Natural (OCN) coho are an aggregate of naturally produced coho stocks from Oregon coastal streams (Figure 1). Historically this aggregate was the largest contributor of naturally produced coho caught in ocean fisheries off Oregon and California. OCN coho are also part of an even larger aggregate of natural and hatchery production south of Leadbetter Point, Washington known as the Oregon Production Index (OPI). Because of their relative importance, OCN coho abundance has a significant role in setting allowable harvest levels in fisheries in the OPI area, particularly in fisheries south of Cape Falcon, Oregon.

OCN coho spawning escapements were severely depressed in the late 1970's and a schedule to rebuild OCN coho stocks by 1987 was part of the original Pacific Fishery Management Council (PFMC) Fishery Management Plan (FMP) and the subsequent 1984 Framework Amendment. The rebuilding program for OCN coho was predicated upon managing fisheries for a long-term average Maximum Sustainable Yield (MSY) escapement goal of 200,000 spawners. Under this regime the total harvest of OCN coho in all fisheries was determined as the pre-season abundance forecast minus the desired MSY escapement of 200,000. Management success was contingent upon the correct assessment of MSY escapement and the accuracy of the pre-season forecast.

In 1986, a pre-season forecasting model based upon jack abundance in the previous year for OPI coho predicted a very large return. Unfortunately, managers in the PFMC were skeptical of the forecast, and opted to constrain fisheries based upon an another less optimistic prediction. Consistent with the initial forecast and contrary to the expectation of the PFMC, the return of the Columbia River hatchery component of the OPI was one of the largest ever recorded. Because the PFMC was poorly equipped to respond rapidly to forecast error, ocean fisheries never had an opportunity to access the large surplus of fish. More than 1.5 million coho escaped the ocean fisheries in 1986 and entered the Columbia River. This economic loss prompted the ocean salmon fishing industry to petition the Council for a modification of the fixed MSY escapement goal policy. The concern was that management in the wake of some future forecasts similar to such as occurred in 1986 might preclude or severely restrict fisheries again in the future even though hatchery stocks might be present in sufficient numbers to support a harvest. In response to this concern, the Council adopted Amendment 7 to the FMP in 1987.

Amendment 7 allowed for a deviation from the fixed goal of 200,000 spawners at forecasted OCN abundance levels below 400,000. The Council's analysis of management under Amendment 7 indicated that the strategy of reducing escapement goals in response to low abundance would result in increased economic benefits. It also projected that despite reductions in harvest constraints, spawning escapement shortfalls would be infrequent and would have a low likelihood of jeopardizing continued productivity of the OCN stock aggregate. The Council's analysis was predicated upon the assumption that

large deviations from average productivity of the OCN stock such as occurred in 1983 are infrequent. However, under Amendment 7, OCN productivity continued to decline, the escapement goal was set below the 200,000 MSY goal in five of the nine years from 1985 through 1993 and the MSY goals were never met.

Based upon the persistent declining trend in OCN abundance and productivity, the PFMC took emergency action to reduce the harvest rates on OCN coho in 1991, 1992, and 1993. The Council also completed a stock status review of OCN coho in 1992. The review concluded that the decline of OCN coho could be attributed to widespread degradation and under-seeding of freshwater habitat, a long-term trend of poor ocean rearing conditions, and excessive harvest associated with over-estimation of OCN stock abundance.

By 1993 it was clear that management provisions in Amendment 7 frequently resulted in spawning escapement goals below those required for MSY, and consequently resulted in repeated failure to achieve MSY escapement. To address these failures the Council considered other management alternatives and in late 1993 adopted Amendment 11 to the FMP. Amendment 11 re-instituted a fixed MSY escapement goal for OCN coho, it restated the goal as 42 fish per mile, and it stipulated that when the pre-fishery population size dropped below 250,000, impacts from fisheries should not exceed 20% of the pre-fishery population. It further stipulated that, if the spawner densities dropped below 28 adults per mile, incidental fishery impacts would be allowed up to 20% only if they caused no irreparable harm to the OCN stock.

Despite the fixed MSY escapement goal and harvest constraints imposed by Amendment 11, OCN stocks failed to exhibit signs of recovery. By 1993 the National Marine Fisheries Service (NMFS) had already begun to receive petitions to list Oregon coastal coho populations as threatened under the Federal Endangered Species Act (ESA). In 1995 NMFS proposed coho populations in both the Oregon Coastal and Southern Oregon/ Northern California evolutionarily significant units (ESU's) for listing. In an attempt to restore OCN coho and avert the proposed ESA listings the state of Oregon initiated the Governor's Coastal Salmon Restoration Initiative (Oregon Plan). Concurrently the PFMC began to consider another amendment to their FMP that would insure that fishery related impacts would not act as a significant impediment to the recovery of depressed OCN coho stocks. The harvest management portion of the Oregon Plan formed the basis for changes in Council management of ocean fisheries and became the template for Amendment 13.

Unlike Amendment 11, Amendment 13 proposed managing fisheries based upon exploitation rates, not spawner escapement objectives. These exploitation rates are based upon estimates of habitat production potential that incorporate effects of both freshwater and marine environments and are derived from habitat-based assessment and modeling of OCN coho production. Amendment 13 also divides the coastwide aggregate of OCN coho stocks into smaller sub-aggregates based upon geographic proximity and genetic similarities among contributing populations (Figure 1). This approach addresses differences in production potential between populations in different basins. Furthermore, whereas management actions in Amendment 11 relied upon pre-season projections of

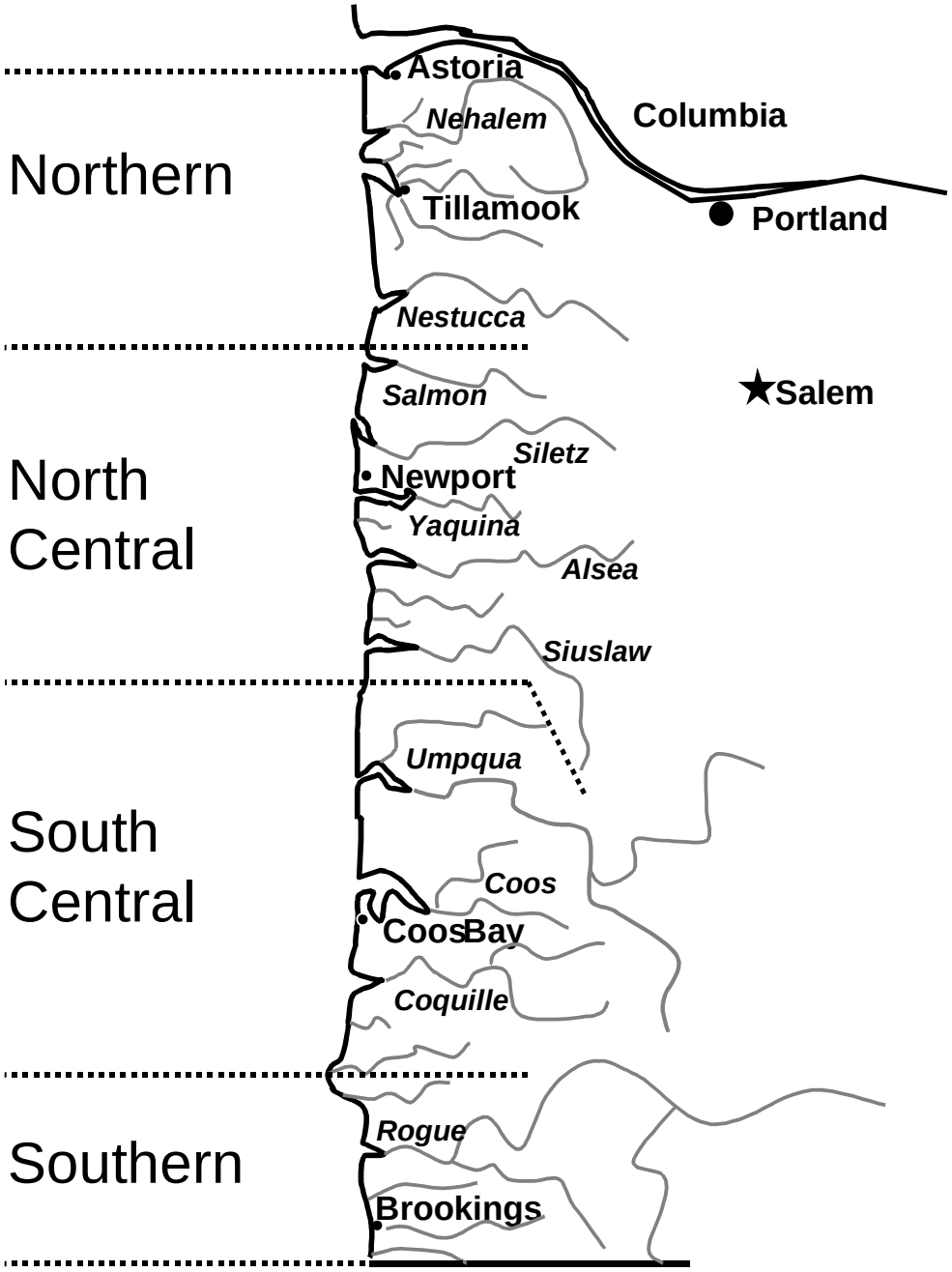

Figure 1. Map of the Oregon Coast showing major river basins that produce OCN coho and the sub-aggregate grouping of those basins.

abundance from inaccurate forecasting models, management actions in Amendment 13 are triggered by actual brood year specific parental spawner abundance and juvenile survival observations (Table 1). The Pacific Fishery Management Council approved Amendment 13 to the FMP in November 1997 (PFMC 1999).

Large-scale habitat and fisheries monitoring programs are principal components of the Oregon Plan. Results of these programs improve the accuracy and precision of data and assumptions used in habitat based production models. The PFMC recognized this dynamic nature of population projections based upon habitat based production models. They stipulated that Plan Amendment 13 should be reviewed and updated on a periodic basis to incorporate new information and that the first review will be completed in the year 2000.

The first reference to a review occurs in the overview section of the Council adopted management alternative (Section 2.2.1). It stipulates that the review must be comprehensive and adaptive. The reference in this section also contains a provision for Council approved changes to methods used to estimate technical parameters in the alternative without plan amendment provided that the proposed changes are reviewed and recommended by the Scientific and Statistical Committee. The purpose of this provision was to facilitate the timely incorporation of the best available science into the management process.

The second reference to a review in Council adopted management alternative occurs in Section 2.2.3 (Monitoring and Evaluation). It stipulates that a comprehensive evaluation mechanism will be implemented on a pre-determined schedule in the year 2000. It further stipulates that the review will be completed as a cooperative effort among co-managers in the PFMC process and that all features of the management alternative are subject to change upon completion of the scheduled review. Finally, it stipulates that the review will include but not be limited to evaluations of: 1) the relationship of parents to adult recruits at various life stages; 2) results of juvenile monitoring such as estimates of egg to fingerling to smolt survival, summer and winter carrying capacities, and stock specific parents to smolt relationships; 3) the relationship of fishery impacts on stock sustainability at various freshwater and marine survival rates; 4) stratified estimates of fishery related mortality; 5) parental spawner and marine survival levels that define decision points in the management matrix; 6) updated run reconstructions based on new Stratified Random Survey (SRS) methods for assessing spawners abundance and assessments of fisheries impacts based on post-season runs of the Fisheries Regulatory Assessment Model (FRAM); and 7) SRS related assumptions about viable spawning habitat.

The third reference to a performance review of Plan Amendment 13 occurs in Section 4.3 (Council Response to Technical Concerns). Council language in this section acknowledges that the new management approach in the Amendment must be adaptive and that a full review of the approach must occur in 2000. Technical concerns raised by the SSC and STT regarding parameters in the management matrix that trigger allowable fishery impacts were specifically emphasized. In that regard, the Council specifically

Table 1. Current Amendment 13 harvest management matrix with parental spawner and marine survival categories and associated fishery harvest impact rates for OCN coho.

PARENT SPAWNER STATUS [b/]	SMOLT TO ADULT MARINE SURVIVAL [a/]		
	Low	**Medium**	**High**
	ALLOWABLE TOTAL FISHERY IMPACT		
High Parent Spawners achieved Level #2 rebuilding criteria *and* grandparent spawners achieved Level #1 rebuilding criteria	**≤15%**	**≤30%**	**≤35%**
Medium Parent spawners achieved Level #1 or greater rebuilding criteria	**≤15%**	**≤20%**	**≤25%**
Low Parent spawners less than Level #1 rebuilding criteria	**≤15%** **≤10-13%** [c/]	**≤15%**	**≤15%**

Stock Component Rebuilding Criteria:	**Level #1** (50%)	**Level #2** (75%)
Northern	10,900	16,400
North - Central	27,500	41,300
South - Central	25,000	37,500
Southern	2,700	4,100
Total	66,100	99,300

a/ Smolt to adult marine survival is projected from smolt to jack marine survival for representive OPI hatchery stocks from the appropriate brood year. Low medium and high marine survival categores are defined as less than 0.09%, from 0.09% to 0.34% and greater than = 0.34% respectively.

b/ In the event that a spawner criteria is achieved, but a *major* basin within the stock component is *less than ten percent of the full seeding level* , the next tier of additional harvest would not be allowed in mixed stock fisheries for that component, nor additional impacts within that particular basin. (see Table A-3 in Appendix A of Amendment 13 to the FMP for a listing of major basins within stock components and Table A-2 in Appendix A of Amendment 13 for spawners needed for full seeding at 3% marine survival.

c/ This exploitation rate criteria applies when parent spawners are less than 38% of the Level #1 rebuilding criteria, or *when marine survival conditions are extremely low as in 1994-98 (i.e. < 0.06% hatchery smolt to jack survival)*

recommended that the review include special emphasis on the assessment of (1) how well the amendment provides for significant rebuilding towards full seeding and (2) a detailed review of the selection of parental spawner and marine survival criteria that trigger allowable impact rates in fisheries.

In the November 1999 meeting of the PFMC, the Oregon Department of Fish and Wildlife (ODFW) proposed the formation of an ad hoc OCN work group to complete the stipulated 2000 review. The proposed group would included representatives from ODFW, the PFMC staff, the Scientific and Statistical Committee (SSC), the Salmon Technical Team (STT) and an ODFW or WDFW representative on the Oregon Production Index Technical Team (OPITT) with ODFW as the lead agency. In recognition of their scientific expertise and oversight role with respect to the Oregon Plan, ODFW recommended that representatives from Oregon's Governor appointed Independent Multidisciplinary Science Team (IMST) be asked to attend all meetings of the OCN work group in an advisory capacity. ODFW also proposed a meeting and work schedule for the group that culminates with a final report for SSC and full Council review in November of 2000 (Appendix 1).

The Council approved the ODFW proposal in the November 1999 meeting and directed Dr. J. Coon of PFMC, Dr. R. Kope of NMFS, and Dr. P. Lawson of NMFS to be the representatives from the PFMC staff, the STT and the SSC respectively. ODFW subsequently appointed their Ocean Salmon Manager, S. Sharr, as their staff representative, C. Melcher, as their representative from OPITT (and the STT), and T. Nickelson (co-author of Amendment 13 and the subsequent risk assessment). ODFW also proposed a meeting and work schedule for the team that culminated in a final report for SSC and full Council review in November of 2000. The ad hoc review team has had five meetings since their inception in November 1999. Dates and attendance lists for the meetings are shown in Appendix 2.

GOALS AND OBJECTIVES

Two technical concerns that the SSC and STT explicitly identified as review items in Section 4.3 were: (1) how well the amendment provides for significant rebuilding towards full seeding and (2) a detailed review of the selection of parental spawner and marine survival criteria that trigger allowable impact rates in fisheries. Similarly, the IMST (1999) has identified the need for (1) explicit recovery criteria and (2) explicit links between biologically based production models for OCN coho and the parental spawner and marine survival criteria used as trigger points in the harvest management matrix of Plan Amendment 13. In addition during the early stages of their deliberations, the OCN Work Group recognized the need for more specific exploitation rate guidelines that minimize fishery impacts on OCN coho when stock size is extremely low and marine survival is very poor. The National Marine Fisheries Service (NMFS) has subsequently expressed similar interest in more specific guidelines for the "most adverse stock condition" (June 9, 2000 letter from William Stelle, Jr., Regional Administrator, NMFS

to Jim Lone, Chair, PFMC). These Council, SSC, STT, IMST, OCN Work Group, and NMFS concerns have provided the focus for our initial discussions and analyses.

METHODS

Based upon recommendations from the Council, SSC, STT and the IMST, the OCN work group identified a need to focus immediate attention on the following: 1) review the current status of OCN coho based upon current adult return and recruitment data; 2) define a new "Critical" parental spawner trigger point for OCN coho that is the minimum spawner density required to avoid the significantly increased risk of extinction associated with depensatory demographic effects; 3) identify a new "Extremely Low" marine survival category point that recognizes the very poor marine survival experienced by OCN coho in recent years; 4) construct an expanded version of the Plan Amendment 13 harvest management matrix that incorporates these two new trigger points; and 5) define the new parental spawner and marine survival trigger points based upon results of the habitat based production model.

Analysis of Current Status of OCN Coho

Re-calibrated fishery impacts, spawner abundance, and total pre-fishery population data for OCN coho were used to examine population trends. Trends in pre-fishery ocean population size were examined for the entire OCN aggregate. Trends in spawner abundance and recruitment were examined by sub-aggregate.

Population Production Models

A habitat based production model constructed by Nickelson and Lawson (1998) that incorporates environmental, demographic, and genetic stochasticity was used to examine changes in extinction rates with decreasing parental spawner abundance. This analytical approach takes advantage of an established and peer reviewed production model that was used during the risk assessment analysis for Plan Amendment 13 (ODFW and NMFS 1998). It also addresses the need identified by the SSC, STT, and IMST for an explicit link between management trigger points and a biologically based population production model for OCN coho. Hereafter, this analytical tool will be referred to as the Nickelson and Lawson Model.

A simpler deterministic version of the Nickelson and Lawson Model was used to assess population responses to parental spawner and marine survival trigger points. This deterministic model was also used to establish exploitation rates that would not hinder recovery of OCN coho under varying conditions of marine survival and parental spawner abundance. The model employed the density dependent freshwater survival equation from Nickelson and Lawson (1998) to predict changes in population abundance in the

best habitat that might occur at different combinations of spawner abundance and harvest impact. The equation is as follows:

$$S_{t+3} = S_t Efm(1-h) \qquad [1]$$

where:
S = the OCN coho spawning population,
t = the year,
E = 1,250 eggs per spawner, assuming an average fecundity of 2,500 eggs per female and a 1:1 sex ratio,
f = a density dependent freshwater survival function $0.338(0.079\ P^{-0.669})$ where P is the percent of full seeding of the best habitat,
m = marine survival rate for wild fish in a given category, and
h = harvest impact.

Equation [1] was used to determine the spawner escapement that would result from a specific harvest impact. It was also used to estimate the range of spawner populations anticipated to occur in each cell of the matrix. By rearranging Equation [1], the harvest impact that would result in a predetermined spawner escapement was determined:

$$h = 1 - \left[S_{t+3} \Big/ S_t Efm \right]. \qquad [2]$$

With the exception of the case of estimating the upper range of expected spawner population, the value of m used in all calculations was the minimum observed survival rate for a given marine survival category (except for an outlier in the medium category that was excluded from the analysis because it resulted from an El Nino event). Use of the minimum observed survival rate resulted in the development of allowable harvest impacts based on conservative estimates of population productivity.

Analysis of Parental Spawner Categories

"Critical" Category

When a stock is at low abundance a primary management objective is to avoid reducing spawner escapements to a level that increases the risk of extinction. Identifying this point is a difficult task due, in part, to our lack of information about the behavior of populations at low abundance. Genetic analyses conclude that several hundred active spawners are needed in a population for preserving genetic diversity (Lynch 1990, Waples 1990). Ecological studies suggest that one or two hundred spawners per mile are needed for a fully functioning ecosystem (Bilby et. al. 1998), and that lower spawner densities lead to smaller juvenile salmon with potentially lower survival rates (Cederholm, et al. 2000). In addition to genetic and ecological effects there is thought to be decreased reproductive success at low population sizes due to random effects. This phenomenon is termed

"depensation." McElhaney, et al. (2000) provide a more thorough discussion of risks to salmon populations at low abundances.

The technique we used to identify risk of extinction as a function of population size focused on the depensatory influence of random events on spawning success at low densities. These effects include skewed sex ratios, asynchronous escapement timing, redd scouring, and other factors that can prevent spawners from finding mates, or from reproducing successfully if they do mate. Our analysis used the Nickelson and Lawson Model.

In this analysis we ran the model starting from actual 1994 population sizes. We simulated four broods with 10% marine survival to fill each basin with fish, then simulated 16 generations with 1% marine survival to observe population decline including a large number of extinction events. Fishery exploitation rates of 0.00 and 0.08 were modeled. All coastal basins were modeled, and 1,000 iterations of the model were run for each level of fishing impacts.

To assess risk of extinction as a function of population size, we first converted spawner abundance to fish per mile (fpm) by dividing total spawners by the number of miles in each basin. We then looked at the population density in each of the first twelve low-survival generations and looked ahead four generations for extinction events. For this analysis extinction was defined as <0.05 fish per mile. Starting populations were sorted into bins of 0.1-1, 1.1-2, ... 9.1-10, 10.1-20, and >20 fpm, with a probability of extinction tabulated for each bin.

"Very Low", "Low", "Medium", and "High" Parental Spawner Categories

The Habitat Based Production Model suggests that productivity of the population at spawner densities above the critically low level are much more sensitive to variations in marine survival than to spawner abundance. Consequently, for parental spawner density levels above the critically low level we have opted to retain the categories in the existing matrix. Typically, so long as spawner abundance is out of the critically low category it is not the most significant determinant of recovery but is an important measure of recovery success. Spawner abundance categories in the current matrix for other than critically low spawner densities are adequate for rapid recovery of the population when marine survivals are at levels adequate for recruits per spawner of greater than one.

Analysis of Marine Survival Categories

The ratio of jacks per smolt at Columbia River and Oregon Coastal hatcheries has been retained as the best pre-season indicator of marine survivals for adult OCN returns expected in the current year. The fit of jacks per smolt on adults per smolt for each brood year of hatchery production from 1967 through 1996 is good (Figure 2).

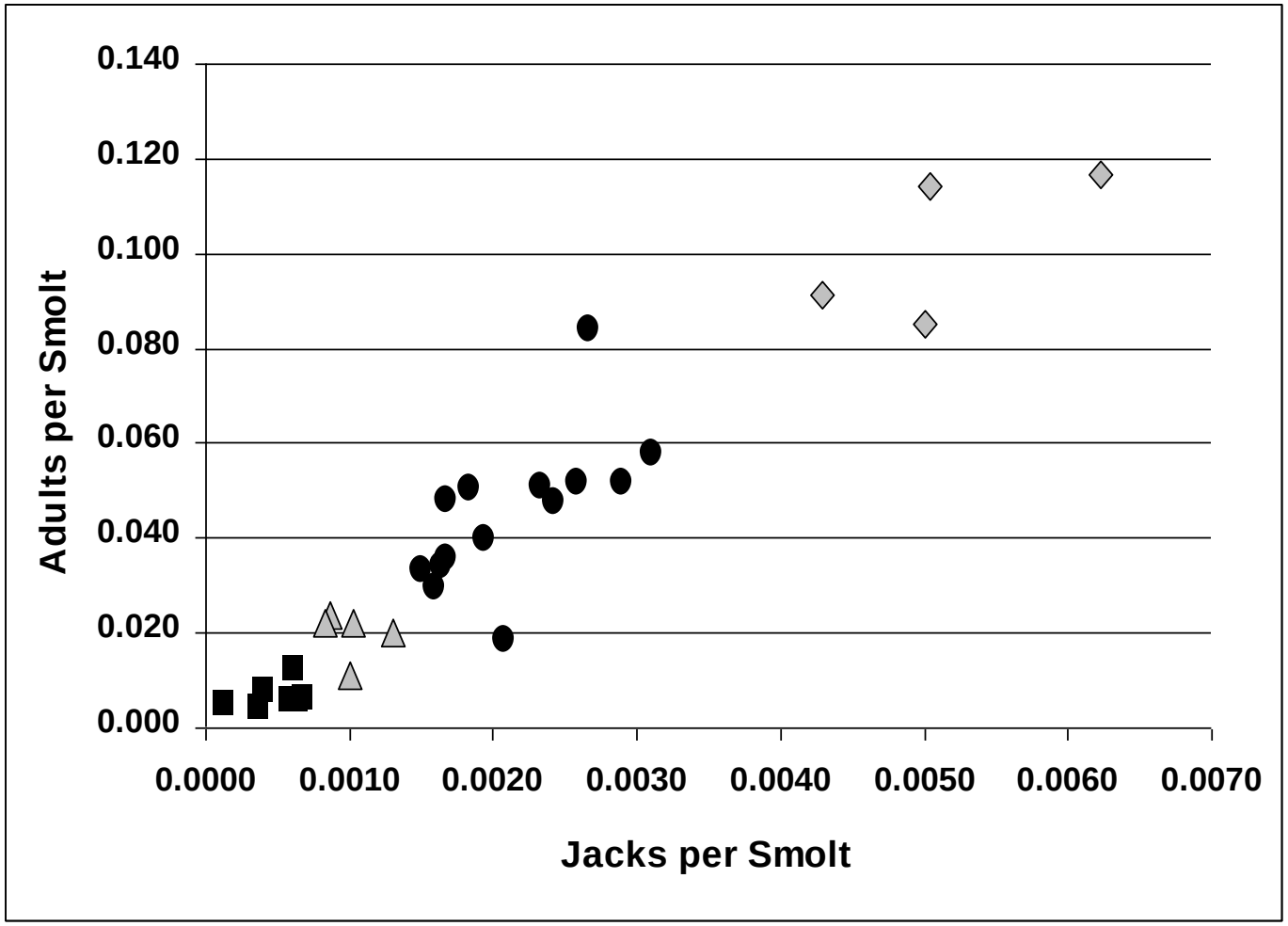

Figure 2. Relationship of jack:smolt versus adult:smolt ratios for OPI hatchery coho (the four different shaded symbols represent the four new marine survival categories in the revised harvest management matrix).

Groupings in these empirical data were useful for identifying preliminary boundaries of four marine survival categories. The Deterministic Model was subsequently used to define the population production potential for each of these categories. The categories are defined as follows:

"Extremely Low" -At the upper bound of this category marine survival would be expected to be at a level such that populations would fail to replace themselves even in the absence of harvest.

"Low" - Average marine survival in this category should result in populations at 50-100% of full seeding in the absence of harvest, depending upon beginning population size.

"Medium" - When marine survivals are in this category the population, on average, experiences recruitment >1.5 across the entire spectrum of parental spawner abundance. By this definition the "Medium" category would functionally encompass all marine survivals greater than those observed in the "Low" category. However, groupings of the empirical data in the relationship between jacks per smolt and adults per smolt (Fig. 1) clearly point to a fourth category of higher marine survival and were useful for identifying an upper boundary for the "Medium" category.

"High" - This category remained the same as originally designed in Amendment 13. Empirical data in the relationship between jacks per smolt and adults per smolt (Fig. 1) were useful for identifying a group of marine survival values in the upper end of the range that correspond to this category.

RESULTS

Current Status of OCN Populations and Progress Towards Rebuilding

Ocean coho populations began to decline in the mid-1970's (Figure 3). Although Council action has resulted in major reductions in fisheries related impacts on these populations in the last decade the decline has continued. Based upon criteria in the current harvest management matrix of Plan Amendment 13, one or more of OCN coho stock components (sub-aggregates) have been in the "Low" parental spawner category every year in the last decade (Table 2, Figure 4). Except for 1999, all those same years also had at least one sub-aggregate in the <19% of full seeding category and at least one major basin with spawner abundance less than 10% of full seeding. Moreover, an average of more than 20% of all major basins had escapements less than 10% of full seeding, 40% were at less than 38% of Level 1 (19% of full seeding), and two thirds were below Level 1 (50% of full seeding)(Figure 5). Most recently, more than 40% of all major basins in 1997 and 1998 had spawner densities at critical levels of less than 10% of full seeding. In those

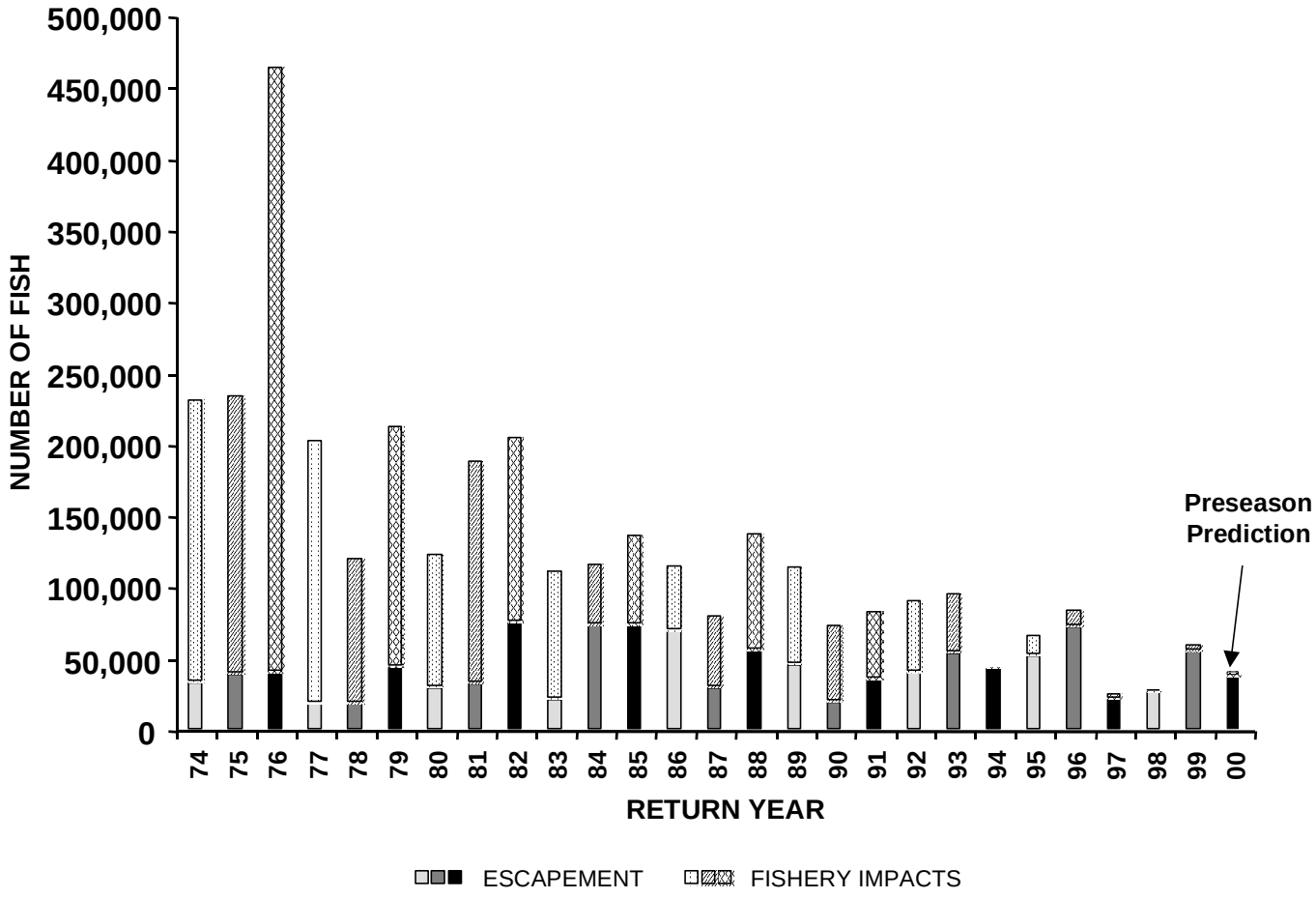

Figure 3. Total annual pre-fishery ocean population size of adult OCN coho. The population for each return year is shown as stacked bars with hatched portions depicting fishery-related impacts and solid portions depicting spawning escapement. The cohorts originating from the 1971, 72, and 73 brood cycles are depicted by light gray, gray, and black, respectively.

Basin	Full Seeding	Annual SRS Spawning Escapement Estimate in Numbers of Fish and as Precent of Full Seeding																			
		1990		1991		1992		1993		1994		1995		1996		1997		1998		1999	
		No.	%	No.	%	No.	% Full Seeding	No.	% Full Seeding	No.	% Full Seeding	No.	% Full Seeding	No.	% Full Seeding	No.	% Full Seeding	No.	% Full Seeding	No.	% Full Seeding
Nehalem	17,500	1,552	8.9%	3,975	22.7%	1,268	7.2%	2,265	12.9%	2,007	11.5%	1,463	8.4%	1,057	6.0%	1,173	6.7%	1,190	6.8%	3,410	19.5%
Tillamook	2,000	265	13.3%	3,000	150.0%	261	13.1%	860	43.0%	652	32.6%	289	14.5%	661	33.1%	388	19.4%	271	13.6%	2,119	106.0%
Nestucca	1,800	189	10.5%	728	40.4%	684	38.0%	401	22.3%	313	17.4%	1,811	100.6%	519	28.8%	271	15.1%	169	9.4%	2,117	117.6%
Direct Ocean Tribs	400	191	47.8%	1,579	394.8%	209	52.3%	983	245.8%	485	121.3%	319	79.8%	1,043	260.8%	314	78.5%	946	236.5%	698	174.5%
Northern	21,700	2,197	10.1%	9,282	42.8%	2,422	11.2%	4,509	20.8%	3,457	15.9%	3,882	17.9%	3,280	15.1%	2,146	9.9%	2,576	11.9%	8,344	38.5%
Siletz	4,300	441	10.3%	984	22.9%	2,447	56.9%	400	9.3%	1,200	27.9%	607	14.1%	763	17.7%	336	7.8%	394	9.2%	1,203	28.0%
Yaquina	7,100	381	5.4%	380	5.4%	633	8.9%	549	7.7%	2,448	34.5%	5,668	79.8%	5,127	72.2%	384	5.4%	365	5.1%	2,248	31.7%
Alsea	15,100	1,189	7.9%	1,561	10.3%	7,029	46.5%	1,071	7.1%	1,279	8.5%	681	4.5%	1,637	10.8%	680	4.5%	213	1.4%	1,923	12.7%
Siuslaw	22,800	2,685	11.8%	3,740	16.4%	3,440	15.1%	4,428	19.4%	3,205	14.1%	6,089	26.7%	7,625	33.4%	668	2.9%	1,089	4.8%	2,617	11.5%
Direct Ocean Tribs	5,700	895	15.7%	67	1.2%	1,821	31.9%	1,331	23.4%	1,743	30.6%	573	10.1%	2,975	52.2%	774	13.6%	1,222	21.4%	3,379	59.3%
North -Central	55,000	5,591	10.2%	6,732	12.2%	15,370	27.9%	7,779	14.1%	9,875	18.0%	13,618	24.8%	18,127	33.0%	2,842	5.2%	3,283	6.0%	11,370	20.7%
Umpqua	29,400	3,737	12.7%	3,600	12.2%	2,152	7.3%	9,311	31.7%	1,185	4.0%	11,349	38.6%	9,749	33.2%	2,233	7.6%	8,426	28.7%	6,471	22.0%
Coos	7,200	2,273	31.6%	3,813	53.0%	16,545	229.8%	15,284	212.3%	14,685	204.0%	10,351	143.8%	12,128	168.4%	1,127	15.7%	3,167	44.0%	4,676	64.9%
Coquille	5,400	2,712	50.2%	5,651	104.6%	2,115	39.2%	7,384	136.7%	5,035	93.2%	2,116	39.2%	16,169	299.4%	5,720	105.9%	2,466	45.7%	3,044	56.4%
Coastal Lakes	8,000	4,393	54.9%	7,251	90.6%	1,986	24.8%	10,145	126.8%	5,841	73.0%	11,216	140.2%	13,493	168.7%	8,603	107.5%	11,107	138.8%	19,499	243.7%
South Central	50,000	13,115	26.2%	20,315	40.6%	22,798	45.6%	42,124	84.2%	26,746	53.5%	35,032	70.1%	51,539	103.1%	17,683	35.4%	25,166	50.3%	33,690	67.4%
Rogue	5,400	2,796	51.8%	765	14.2%	1,935	35.8%	174	3.2%	5,303	98.2%	4,221	78.2%	5,386	99.7%	8,300	153.7%	3,300	61.1%	2,000	37.0%
Southern	5,400	2,796	51.8%	765	14.2%	1,935	35.8%	174	3.2%	5,303	98.2%	4,221	78.2%	5,386	99.7%	8,300	153.7%	3,300	61.1%	2,000	37.0%
Total	132,100	23,699	17.9%	37,094	28.1%	42,525	32.2%	54,586	41.3%	45,381	34.4%	56,753	43.0%	78,332	59.3%	30,971	23.4%	34,325	26.0%	55,404	41.9%

Table 2. Estimated number of OCN coho required to fully seed optimum spawning habitat in stock sub-aggregates and their constituent major basins. The annual SRS estimates of OCN coho spawning escapement in each of those basins expressed as numbers of spawners and as a percent of full seeding. Shaded cells in the sub-aggregate subtotals indicate instances when spawner abundance is in the "Critical" (< 4 fish per mile) status. Shaded totals indicate that the status of the aggregate as a whole would be "Critical" under proposed new criteria.

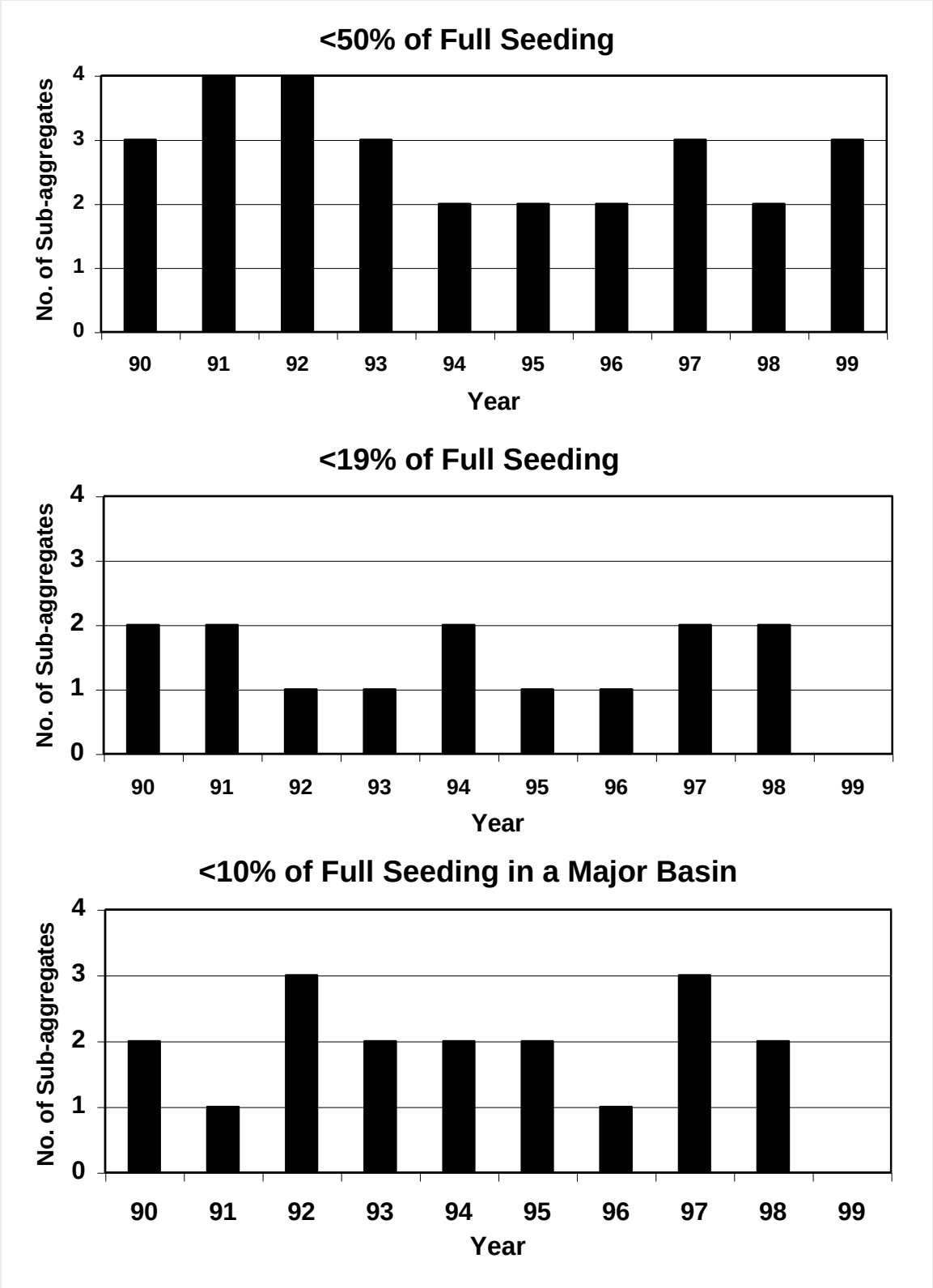

Figure 4. Annual number of sub-aggregates with spawner abundance <50% of full seeding, < 19% of full seeding, or with at least on major basin with <10% of full seeding, 1990-1999.

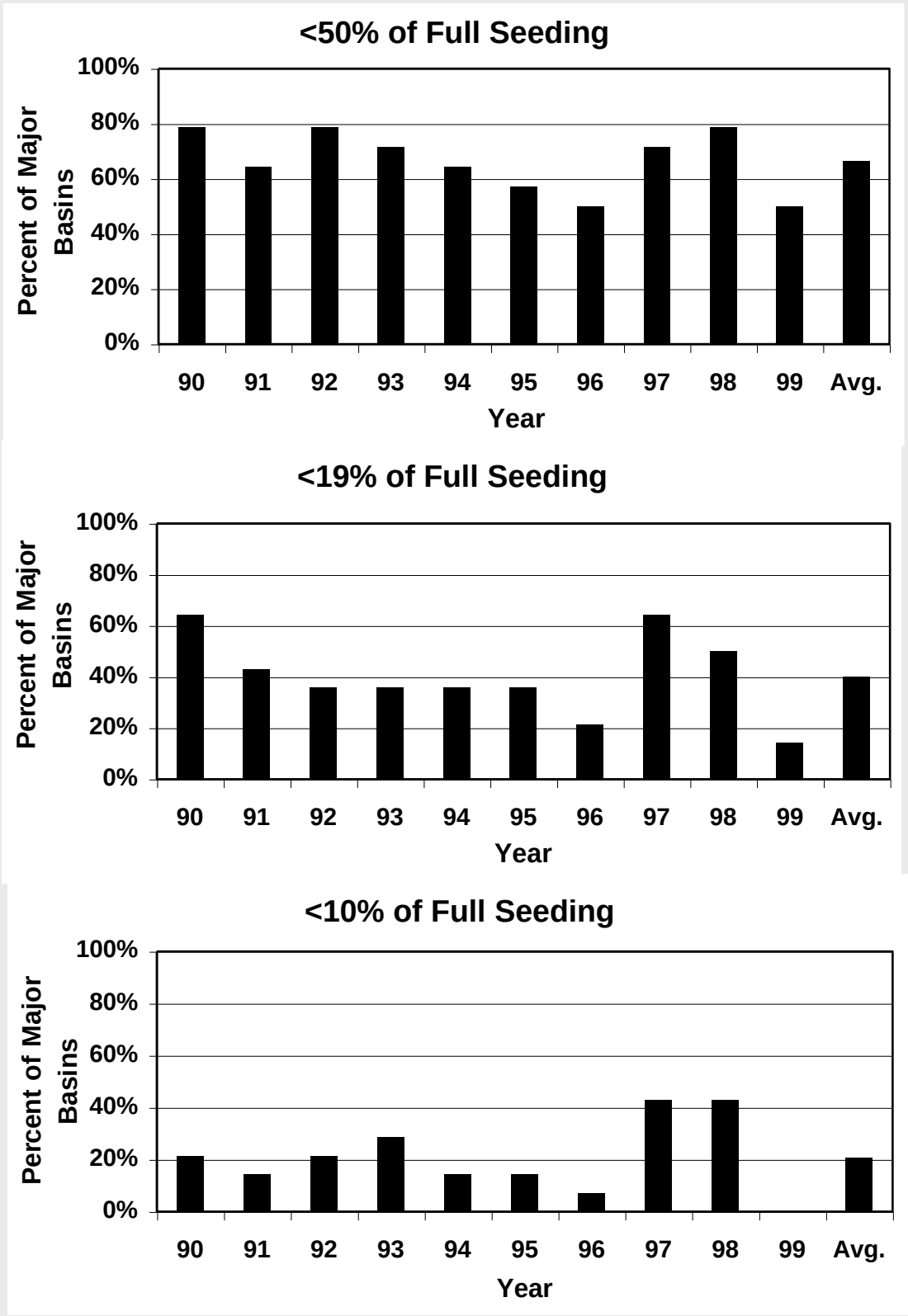

Figure 5. Annual and average percentage of major coastal basins with spawner abundance <50%, 19%, and 10% of full seeding in the last decade (1990-1999).

years spawner abundance in more than half the basins were in the "Extremely Low" (38% of Level 1) category. The situation was more hopeful in 1999 when no major basin had less than 10% of full seeding and only 14% were less than 38% of Level 1. However, in 1999 more than half of all basins had seeding levels at less than Level 1.

Marine survivals as represented by jacks:smolts ratios for OPI hatchery stocks declined from "High" levels in the early 1970's to "Medium" and "Low" levels by the early 1980's (Figure 6). Survivals remained fairly constant thereafter for the next decade. However, by the early 1990's, they began to decline again and survivals experienced by the 1991-93 brood cycles (1994-96 adult returns) were "Extremely Low". Marine survival remained "Extremely Low" for fish produced from the 1994 and 1995 brood cycles but improved to the lower end of the Amendment 13 "Medium" category for the 1996 and 1997 brood cycles. As might be expected, recruitment in the face of such low marine survival has been very poor and the 1994-96 broods failed to replace themselves (Figure 7). Poor spawner to recruitment ratios are evident among all sub-aggregates (Figure 8). Modest improvements in marine survival and OCN productivity have occurred in the last two years but evidence for a long term increasing trend is lacking.

Definitions of Marine Survival Categories

Given the proposed breakdown of marine survival categories the jacks:smolts ratio has predicted the category accurately in 27 out of 30 years. Twice, survival was under-predicted (1986 and1992 adult returns) and only once survival was over predicted. This latter case was the 1983 El Niño year during which, as predicted by some, additional adult mortality occurred after the jacks returned. This phenomenon is now widely recognized and should be anticipated in the future. The mean values of all four survival categories are highly significantly different from each other ($p < 0.01$).

"Extremely Low" Marine Survival

This category corresponds to the very poor survival experienced by adults returning in 1992-98 and is predicted by jacks:smolts ratios of <0.0008 (Table 3). Under the criteria of this category, it is expected that marine survival of hatchery fish will be less than 1%, as has been the case for six of the seven years in the empirical data. Adult marine survival observed in the "Extremely Low" category ranges from 0.5% to 1.3% and averages 0.7%. For modeling purposes, it was assumed that marine survival of wild fish in this category would be twice that of hatchery fish (Nickelson 1986, Seiler 1989).

"Low" Marine Survival

The new "Low" marine survival category encompasses values from the low end of the original "Medium" category, which was extremely wide, ranging from less than 2% marine survival to over 8%. The new "Low" adult marine survival category is predicted

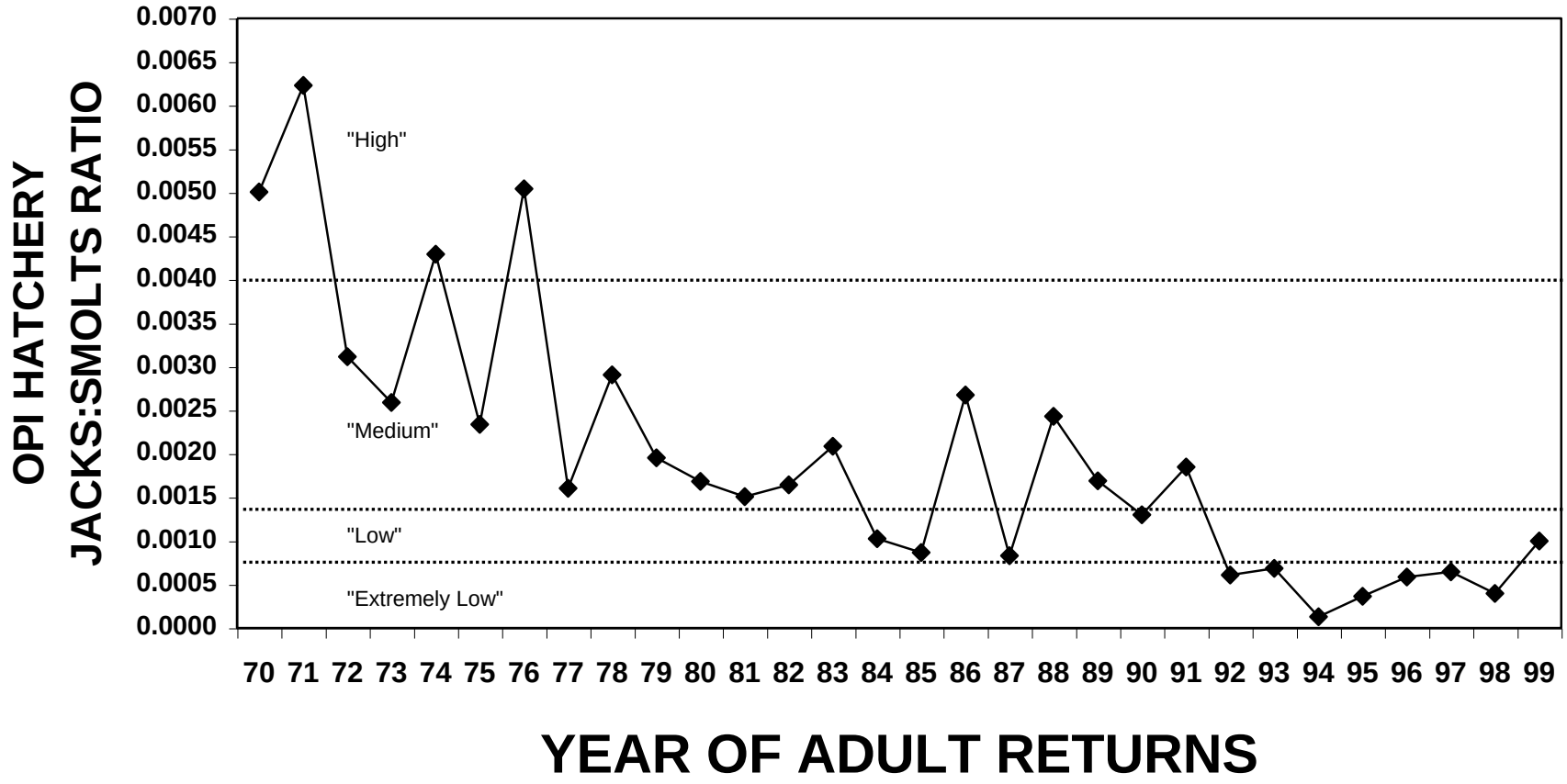

Figure 6. Ratios of jacks to smolts for OPI hatchery coho for adult return years 1970-1999. The ratios are used in the Amendment 13 matrix as a surrogate for adult marine survivals experienced by OCN coho. The proposed new "Extremely Low", "Low", "Medium", and "High" categories are labeled and delineated by dotted lines across the chart.

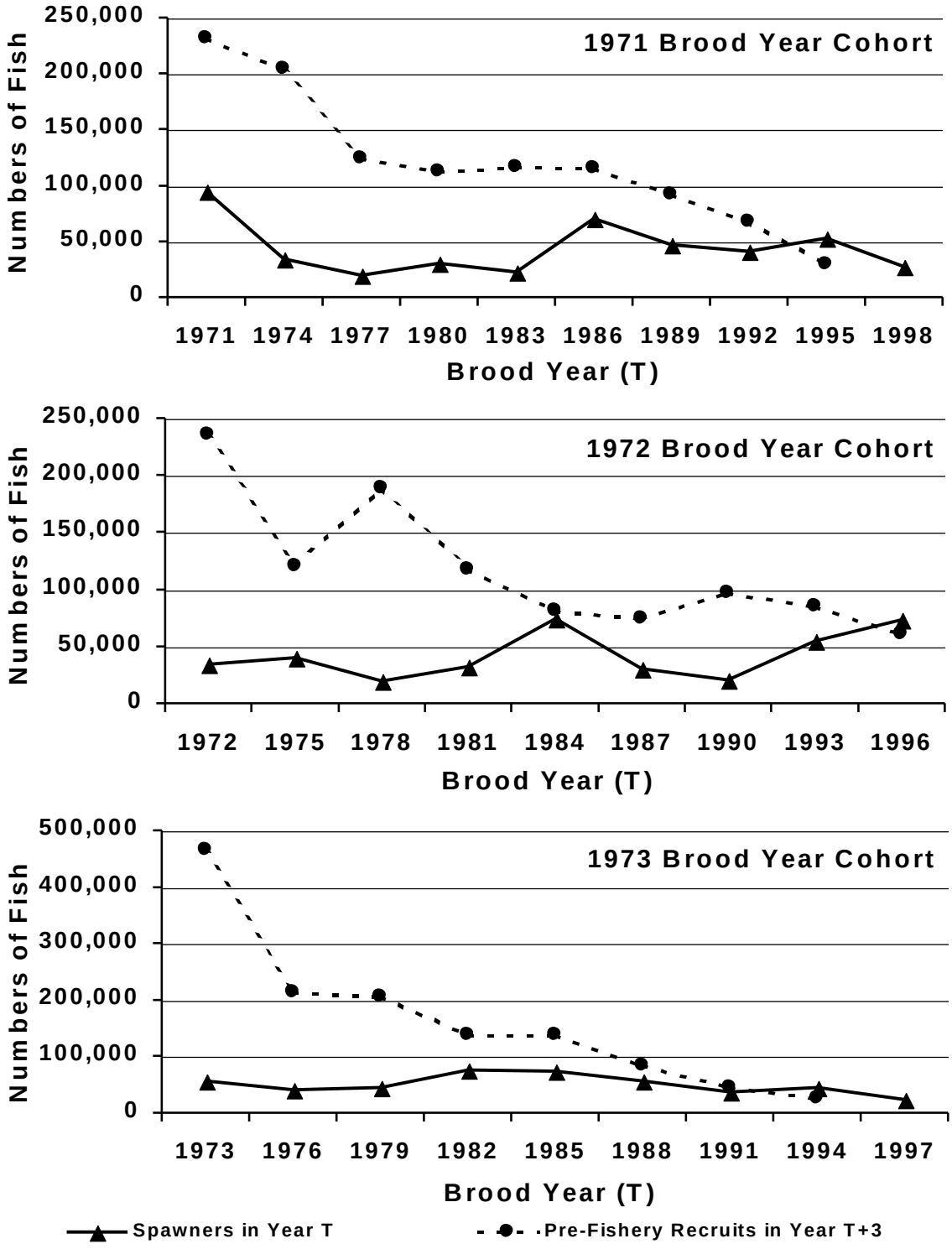

Figure 7. Annual parental spawners and resulting pre-fishery recruits for the cohorts originating from the 1971, 72, and 73 brood cycles.

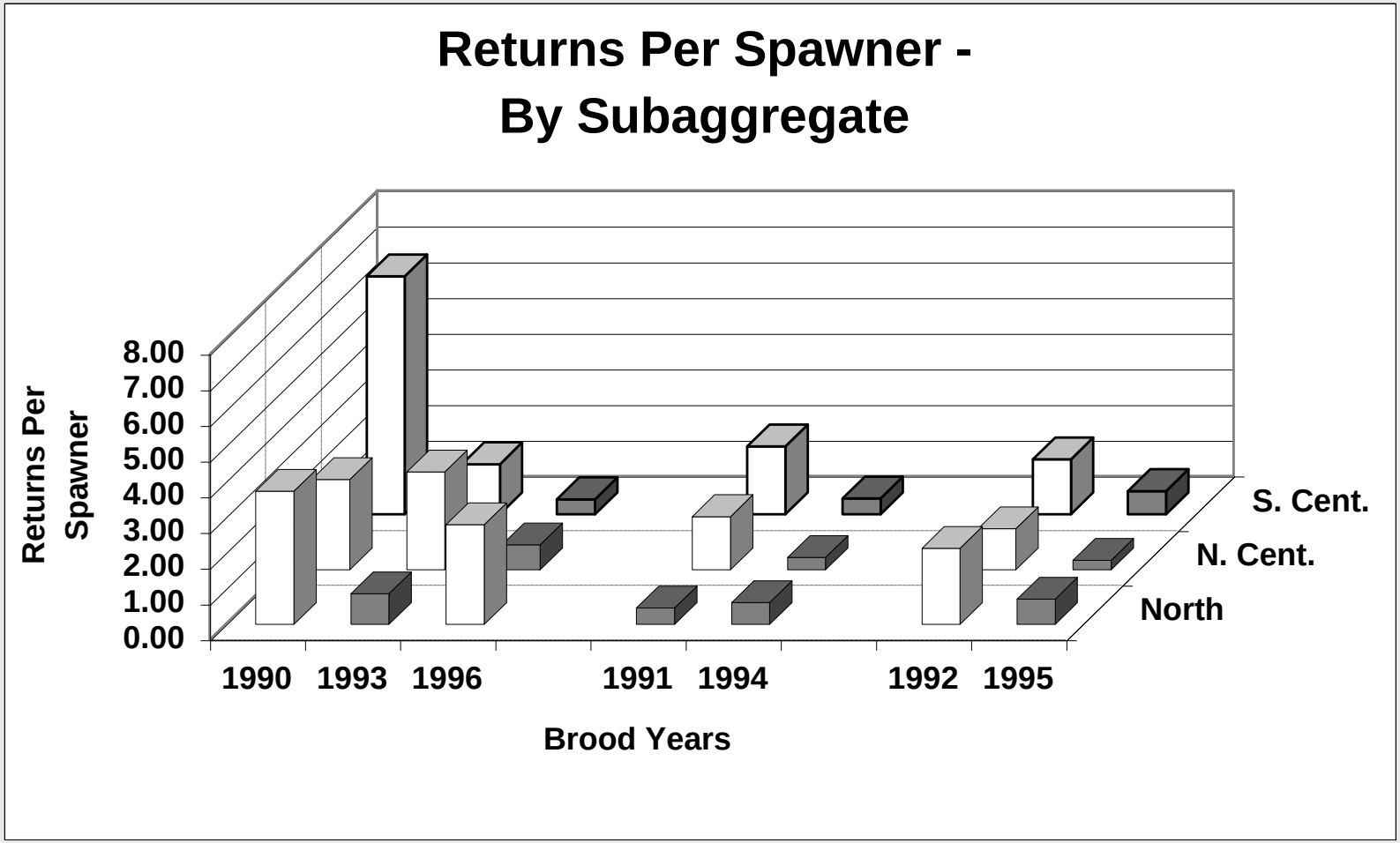

Figure 8. Returns per spawner for OCN coho sub-aggregates for the 1990, 91, and 92 brood cycles. Darkly shaded bars indicate returns per spawner of less than one (failure to replace).

Table 3. Prediction of marine survival categories from OPI hatchery smolt-to-jack survival rates(1970-1999). Adult numbers have been updated using re-scaled SRS-based estimates. Numbers for smolts are in millions, jacks and adults in thousands. The former "Medium" category encompassed the "Medium" category shown in this table plus the shaded rows in "Low" category. The former "Low" category included the unshaded "Low" year in this table plus all years in the new "Extremely Low" category.

Year (t)	Smolts (t-1)	Jacks (t-1)	Jacks/Smolt	Adults (t)	Adults/Smolt		Adults/Smolt
		HIGH ADULT MARINE SURVIVAL					
		(Predicted by Jacks:Smolts Ratios ≥0.0040)					
1971	**28.8**	**179.4**	**0.0062**	**3365.0**	**11.7%**		
1976	**34.0**	**171.5**	**0.0050**	**3885.3**	**11.4%**	**Average**	**10.2%**
1970	**32.4**	**162.2**	**0.0050**	**2765.1**	**8.5%**	**Maximum**	**11.7%**
1974	**33.6**	**144.2**	**0.0043**	**3071.1**	**9.1%**	**Minimum**	**8.5%**
		MEDIUM ADULT MARINE SURVIVAL					
		(Predicted by Jacks:Smolts Ratios of >0.0014 - 0.0040)					
1972	**33.3**	**103.7**	**0.0031**	**1924.8**	**5.8%**		
1978	**35.5**	**103.2**	**0.0029**	**1824.1**	**5.1%**		
1986	**29.0**	**77.6**	**0.0027**	**2435.8**	**8.4%**		
1973	**35.3**	**91.4**	**0.0026**	**1817.0**	**5.1%**		
1988	**35.0**	**85.1**	**0.0024**	**1666.1**	**4.8%**		
1975	**32.6**	**76.2**	**0.0023**	**1652.8**	**5.1%**		
1983	**32.7**	**68.2**	**0.0021**	**595.7**	**1.8%**	**El Nino**	
1979	**37.1**	**72.5**	**0.0020**	**1476.7**	**4.0%**		
1991	**37.2**	**68.7**	**0.0018**	**1874.8**	**5.0%**		
1989	**36.0**	**60.8**	**0.0017**	**1721.4**	**4.8%**		
1980	**34.2**	**57.6**	**0.0017**	**1224.0**	**3.6%**		
1982	**37.3**	**61.3**	**0.0016**	**1266.8**	**3.4%**	**Average**	**4.5%**
1977	**33.5**	**53.7**	**0.0016**	**987.5**	**2.9%**	**Maximum**	**8.4%**
1981	**32.3**	**48.7**	**0.0015**	**1064.5**	**3.3%**	**Minimum**	**2.9%**
		LOW ADULT MARINE SURVIVAL					
		(Predicted by Jack:Smolts Ratios of 0.0008 - 0.0014)					
1990	**35.9**	**46.7**	**0.0013**	**718.4**	**2.0%**		
1984	**30.9**	**31.7**	**0.0010**	**689.4**	**2.2%**		
1999	**29.1**	**29.1**	**0.0010**	**322.4**	**1.1%**	**Average**	**2.0%**
1985	**30.0**	**26.0**	**0.0009**	**717.5**	**2.4%**	**Maximum**	**2.4%**
1987	**39.5**	**32.8**	**0.0008**	**880.1**	**2.2%**	**Minimum**	**1.1%**
		EXTREMELY LOW ADULT MARINE SURVIVAL					
		(Predicted by Jacks:Smolts Ratios < 0.0008)					
1993	**39.7**	**27.2**	**0.0007**	**261.7**	**0.7%**		
1997	**31.6**	**20.4**	**0.0006**	**197.2**	**0.6%**		
1992	**42.1**	**25.6**	**0.0006**	**540.8**	**1.3%**		
1996	**29.5**	**17.3**	**0.0006**	**184.9**	**0.6%**		
1998	**24.6**	**9.8**	**0.0004**	**202.6**	**0.8%**	**Average**	**0.7%**
1995	**32.3**	**11.8**	**0.0004**	**147.1**	**0.5%**	**Maximum**	**1.3%**
1994	**39.5**	**5.1**	**0.0001**	**202.4**	**0.5%**	**Minimum**	**0.5%**

by jacks:smolts ratios of 0.0008-0.0014. Under the conditions of this category, it is expected that marine survival of hatchery fish will range from 1% to possibly 3%. Marine survival observed in the Low category ranges from 1.1% to 2.4% and averages 2.0%. The 1987 data point is also in this category. It was originally grouped with what is now the Extremely Low group, but was almost double any other adult survival value in the group.

For modeling purposes, it was assumed that marine survival of wild fish in this category would be 1.5 times that of hatchery fish.

"Medium" Marine Survival

Marine survival observed in the new "Medium" survival category ranges from 2.9% to 8.4%, except in an El Niño year (1983), and averages 4.5%. Under the conditions of this category, it is expected that marine survival of hatchery fish will range from slightly less than 3% to a high of 6-8%. This category is predicted by jack:smolt ratios of >0.0014-0.0040. For modeling purposes, it was assumed that marine survival of wild fish would be 1.5 times that of hatchery fish at the low end of this category and equal to that of hatchery fish at the high end of this category.

"High" Marine Survival

The difference between High and Medium survival is by far the most obvious and discernable. The cluster of empirical data points in this category is easily recognized in the plotted relationship between jacks per smolt and adults per smolt (Figure 2). Adult marine survival observed in the High category ranges from 8.6% to 11.7% and averages 10.2%. Under the conditions of this category, it is expected that marine survival of hatchery fish will be greater than 8%. This category is predicted by jack:smolt ratios >0.0040. For modeling purposes, it was assumed that marine survival of wild fish in this category would be the same as that of hatchery fish (Nickelson 1986).

Definitions of Parental Spawner Categories

"Critical" Parental Spawner Density

The pattern in probability of extinction in four generations as a function of parental spawner densities was consistent across basins. Larger basins, and basins with higher quality habitat, showed overall lower extinction probabilities, as expected. But all basins showed an increase in extinction probability with declining spawner densities. The probabilities in all but the Rogue River trended higher below densities of 3 to 5 fpm. Because the response of most basins was so similar, we combined the results across all basins to arrive at a single curve for each fishery exploitation rate. Each expresses the probability of extinction in four generations as a function of spawner density (Figure 9). The Rogue River is one notable exception to the general trend for the

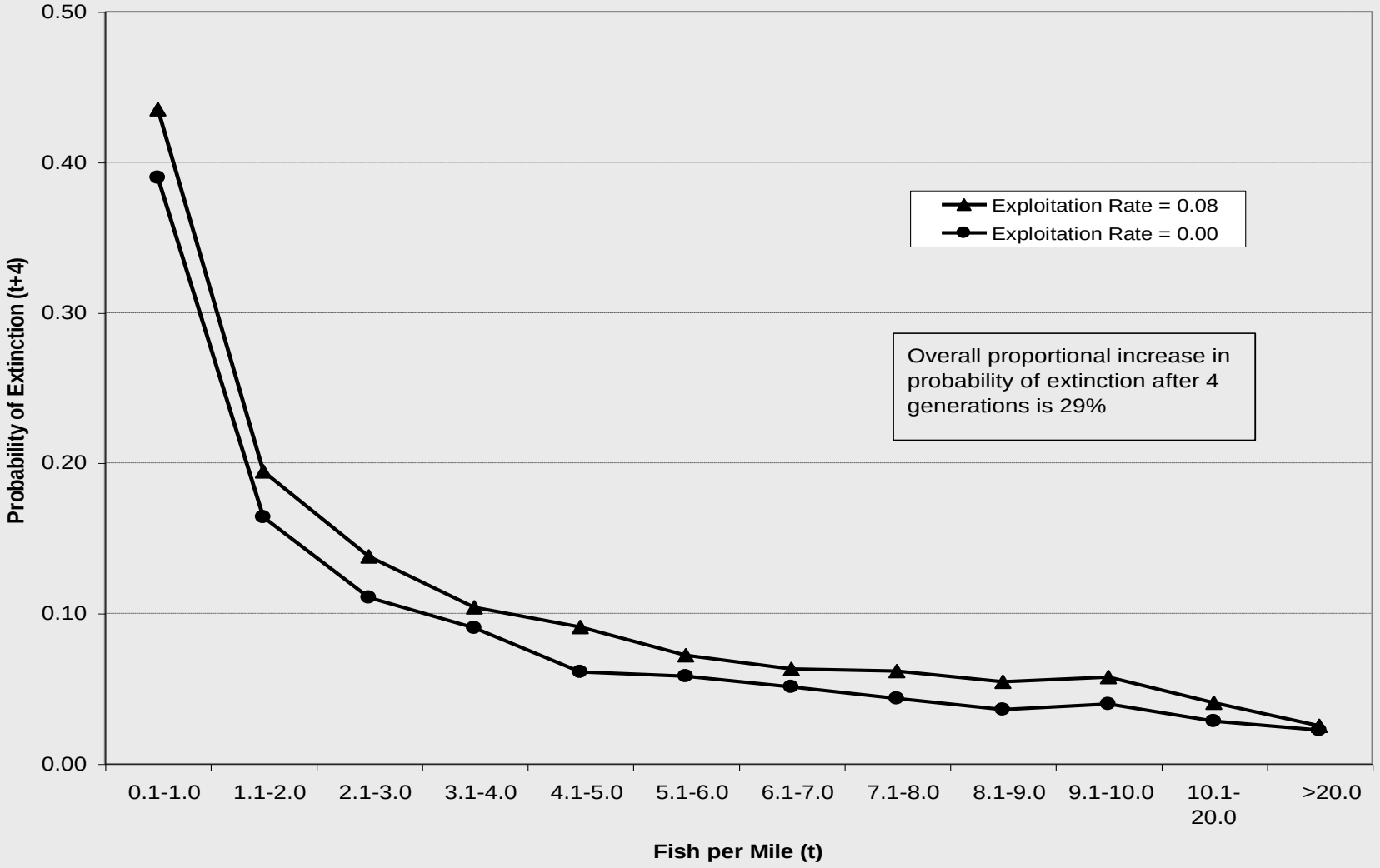

Figure 9. Probability of basin-level extinction in 4 generations as a function of spawner density for exploitation rates of 0.00 and 0.08. All Oregon coastal basins are combined.

22

large major coastal basins to resemble the OCN stocks in aggregate with respect to extinction probability versus spawner density. The ratio of high quality habitat to total habitat in the Rogue Basin is lower than in other coastal basins. Spawner densities in the Rogue must be well below the four fish per mile level before extinction probabilities increase significantly. For this reason, we have opted to treat the Rogue Basin (hence the Southern Sub-aggregate) differently than all others and express "Critical" spawner status as 12% of full seeding rather than in density of spawners. The value of 12% is consistent with the average percent of full seeding in other basins when four fish per mile is achieved.

As with all model results, these curves must be interpreted carefully. The absolute extinction probabilities are not very meaningful, as they are sensitive to the marine survival rate chosen and many of the modeling parameters. What is informative and important is the shape of the curve: as populations drop below about five fish per mile the risk of extinction starts to rise rapidly. A fishery exploitation rate of 0.08 increased the probabilities by only a few percentage points. However, the absolute extinction probabilities are less meaningful than the difference between the two runs. Overall extinction probabilities of basins in four generations were 0.13 without fishery impacts and 0.17 with an exploitation rate of 0.08, an increase of 29%.

"Very Low", "Low", "Medium", and "High" Parental Spawner Categories

The "Very Low" Parental Spawner category in the new matrix ranges from 12% to 19% of full seeding which corresponds with the lowest parental spawner category in the existing matrix that is defined as < 19% of full seeding. The "Low", "Medium", and "High" Parental Spawner Categories are identical to those in the existing matrix and are as follows: 19%-50% of full seeding; 50%-75% of full seeding; and 75% - 100% of full seeding for parental spawners and 50%-75% of full seeding for grandparental spawners.

Fishery Impact Rates

The evolution of the newly proposed harvest management matrix from the matrix that is currently in Amendment 13 is shown in Table 4. Table 5 is the final version of the proposed new matrix showing new spawner abundance and marine survival criteria and new impact rates. Appendix 3 shows the same matrix with ranges of spawner escapement projections for each cell. Fishery impact rates appropriate for observed conditions of marine survival and parental spawner abundance appear in cells of the matrix that are delineated by the intersections of vertical boundary lines for marine survival categories and horizontal boundary lines for parental spawner categories. With respect to parental spawner categories, decisions within the matrix are dictated by the performance of the weakest sub-aggregate. Hence, if the weakest sub-aggregate is categorized as "Critical" with respect to parental spawner abundance, managers will be confined to the "Critical" row of the matrix.

Table 4. Evolution of revisions to the Plan Amendment 13 harvest management matrix shown in increments from the existing matrix (A) to the final proposed matrix (D). The creation of the new "Very Low" spawner abundance category from criteria used to define the <10-13% impact rate cell in the existing matrix is shown in B. The inclusion of the new "Critical" parental spawner and "Extremely Low" marine survival categories are shown in C. Unshaded cells correspond to cells in the existing matrix, the lightly shaded cells correspond to cells in the existing matrix that have been extended, darkly shaded cells represent the new cells, and stippling indicates harvest rates that have been changed.

A. Existing Plan Amendment 13 harvest management matrix.

PARENT SPAWNER STATUS [b/]	SMOLT TO ADULT MARINE SURVIVAL		
	Low	**Medium**	**High**
	ALLOWABLE TOTAL FISHERY IMPACT		
High Parent Spawners ≥75 % of full seeding *and* grandparent spawners ≥50% of full seeding	**≤15%**	**≤30%**	**≤35%**
Medium Parent spawners ≥50% of full seeding	**≤15%**	**≤20%**	**≤25%**
Low Parent spawners <50% of full seeding	**≤15%**	**≤15%**	**≤15%**
Parental Spawners <19% of full seeding	**≤10-13%**		

B. Extension of very low parental spawner status (10-13% impact rate cell) across matrix.

PARENT SPAWNER STATUS [b/]	SMOLT TO ADULT MARINE SURVIVAL		
	Low	**Medium**	**High**
	ALLOWABLE TOTAL FISHERY IMPACT		
High Parent Spawners ≥75 % of full seeding *and* grandparent spawners ≥50% of full seeding	**≤15%**	**≤30%**	**≤35%**
Medium Parent spawners ≥50% of full seeding	**≤15%**	**≤20%**	**≤25%**
Low Parent spawners <50% of full seeding	**≤15%**	**≤15%**	**≤15%**
Very Low Parental Spawners <19% of full seeding	**≤10-13%**	**≤10-13%**	**≤10-13%**

C. Addition of new "Critical" parental spawner and "Extremely Low" marine survival categories.

PARENT SPAWNER STATUS [b/]	SMOLT TO ADULT MARINE SURVIVAL			
	Extremely Low	**Low**	**Medium**	**High**
	ALLOWABLE TOTAL FISHERY IMPACT			
High Parent Spawners ≥75 % of full seeding	**≤8%**	**≤15%**	**≤30%**	**≤35%**
Medium Parent spawners ≥50% and <75% of full seeding	**≤8%**	**≤15%**	**≤20%**	**≤25%**
Low Parent spawners ≥19% and <50% of full seeding	**≤8%**	**≤15%**	**≤15%**	**≤15%**
Very Low Parent spawners > 4 fish per mile and < 19% of full seeding	**≤8%**	**≤10-13%**	**≤10-13%**	**≤10-13%**
Critical Parental Spawners ≤ 4 fish per mile	**0-8%**	**0-8%**	**0-8%**	**0-8%**

D. Final revised matrix

PARENT SPAWNER STATUS [b/]	SMOLT TO ADULT MARINE SURVIVAL			
	Extremely Low	**Low**	**Medium**	**High**
	ALLOWABLE TOTAL FISHERY IMPACT			
High Parent Spawners ≥75 % of full seeding	**≤8%**	**≤15%**	**≤30%**	**≤45%**
Medium Parent spawners ≥50% and <75% of full seeding	**≤8%**	**≤15%**	**≤20%**	**≤38%**
Low Parent spawners ≥19% and <50% of full seeding	**≤8%**	**≤15%**	**≤15%**	**≤25%**
Very Low Parent spawners > 4 fish per mile and < 19% of full seeding	**≤8%**	**≤11%**	**≤11%**	**≤11%**
Critical Parent spawners ≤ 4 fish per mile	**0-8%**	**0-8%**	**0-8%**	**0-8%**

Table 5. Proposed revisions to the harvest management matrix in Plan Amendment 13 showing allowable fishery impacts and ranges of resulting recruitment for each combination of parental spawner abundance and marine survival.

Parent Spawner Status [1/]	Marine Survival Index (based on return of jacks per hatchery smolt)			
	Extremely Low (<0.0008)	**Low** (0.0008 to 0.0014)	**Medium** (>0.0014 to 0.0040)	**High** (>0.0040)
High Parent Spawners > 75% of full seeding	**E** ≤ 8%	**J** ≤ 15%	**O** ≤ 30%	**J** ≤ 45%
Medium Parent Spawners > 50% & ≤ 75% of full seeding	**D** ≤ 8%	**I** ≤ 15%	**N** ≤ 20%	**I** ≤ 38%
Low Parent Spawners > 19% & ≤ 50% of full seeding	**C** ≤ 8%	**H** ≤ 15%	**M** ≤ 15%	**H** ≤ 25%
Very Low Parent Spawners > 4 fish per mile & ≤ 19% of full seeding	**B** ≤ 8%	**G** ≤ 11%	**L** ≤ 11%	**Q** ≤ 11%
Critical [2/] Parental Spawners ≤ 4 fish per mile	**A** 0 - 8%	**F** 0 - 8%	**K** 0 - 8%	**P** 0 - 8%

Sub-aggregate and Basin Specific Spawner Criteria Data

Sub-aggregate	Miles of Available Spawning Habitat	100% of Full Seeding	"Critical"		Very Low, Low, Medium & High		
			4 Fish per Mile	12% of Full Seeding	19% of Full Seeding	50% of Full Seeding	75% of full Seeding
Northern	899	21,700	3,596	NA	4,123	10,850	16,275
North - Central	1,163	55,000	4,652	NA	10,450	27,500	41,250
South - Central	1,685	50,000	6,740	NA	9,500	25,000	37,500
Southern	450	5,400	NA	648	1,026	2,700	4,050
Coastwide Total	4,197	132,100	15,636		25,099	66,050	99,075

1/ Parental spawner abundance status for the OCN aggergate assumes the status of the weakest sub-aggregate.

2/ "Critical" parental spawner status is defined as 4 fish per mile for the Northern, North-Central, and South-Central subaggergates. Because the ratio of high quality spawning habitat to total spawning habitat in the Rogue River Basin differs significantly from the rest of the basins on the coast, the spawner density of 4 fish per mile does not represent "Critical" status for that basin. Instead. "Critical" status for the Rogue Basin (Southern Sub-aggergate) is estimated as 12% of full seeding of high quality habitat.

"Critical" Parental Spawner Density Status (Cells A, F, K, and P)

The productivity of a population with parental spawner abundance in this category can be highly variable. Risk of extinction for a population in the "Critical" category increases rapidly as spawner densities decline because of demographic effects such as two spawners not being able to find each other. Under these conditions, any impacts other than natural mortality will increase the risk to long term viability of the population and should be avoided. Incidental fishery related impacts that occur when spawner abundance for the aggregate or any sub-aggregate falls within this category will increase the risk of extinction for the population and are not biologically justifiable. Hence, the range of suggested allowable harvest related impacts in management matrix cells in this category includes zero as an option.

"Extremely Low" Marine Survival (Cells B-E)

The population should not be expected to replace itself when in this survival category except when parent spawner status is "Very Low" or "Critical". In those latter circumstances, poor recruitment as a result of low spawner abundance may be offset by survival gains from compensatory effects associated with reduced juvenile densities in freshwater rearing areas. Therefore, since populations in this category cannot recover, even at optimal spawner densities, we should be in a conservation mode and attempt to minimize harvest impacts. The Council has previously recognized the need for conservation when these marine survival conditions existed in 1997 and 1998 and adopted pre-season impact rates below guidelines shown in the existing harvest management matrix.

When marine survivals persist in the "Extremely Low" category the population can sustain itself but only at levels that can dangerously approach the "Critical" level. Density dependent compensatory effects in the freshwater environment reduce the risk to the population from minor impacts other than natural mortality but caution is very important when populations are experiencing these conditions. The harvest impact of 8% for cells within this marine survival category is the lowest estimated OCN impact rate achieved to-date in coastwide salmon fisheries in the last decade. It is lower than the lowest <10-13% impact limit currently imposed by the matrix but is an attempt to reduce impacts from fisheries to the lowest level possible without precluding fisheries that have only incidental impacts on OCN coho. Model results verify that fishery impacts of 8% or less will likely not reduce the ability of the population to sustain at replacement levels or increase slightly as abundance approaches the "Critical" level.

Very Low Parent Spawner Status (Cells G, L, and Q)

The original impact rate of $\leq$10-13% has now been set at $\leq$11%. The 11% value is based on the average impact rate that has been achieved by the Council since the severely restrictive non-retention fisheries were implemented for coho in 1994. On average under conditions defined by these cells, parental spawners will not decline to the "Critical" level if harvest impacts are held to less than 11%. Originally, the reduced harvest impact of $\leq$10-13% was only required when parental spawner status is "Very Low" and marine

survival status is "Low". The modification proposes to expand the application of "Very Low " parental spawner abundance across the higher marine survival categories as conservation and rebuilding measure.

Low Marine Survival (Cells H-J)

These cells were in the original matrix with the allowable harvest impact set at ≤15%. We do not propose any changes in these cells. When survival is at the low end of the "Low" marine survival category, the median population in the "Low" parent spawner status category should nearly replace itself at this harvest impact. Median spawner populations in the "Medium" and "High" categories should drop into the "Low" category at this harvest impact because these population levels are not able to replace themselves at the low-end marine survival.

Medium Marine Survival (Cells M-O*)*

We propose to leave the allowable harvest impact values of these cells the same as in the original matrix. The harvest impact of 15% in cell M should result in the median population in the "Low" parent spawner status category to increase to about the median population of the "High" category. The 20% and 30% harvest impacts of cells N and O, respectively should allow the median populations of these two parent spawner categories to increase to approximately full seeding of the best habitat.

High Marine Survival (Cells R-T)

We propose to increase the harvest impacts that are allowable when marine survival is in the high category. Marine survival in this range results in an extremely productive population. We propose maximum harvest impacts of 25%, 38%, and 45% when parent spawners are in the Low, Medium, High categories, respectively. These harvest impacts are based on the goal of achieving 150% of full seeding of the best habitat following harvest.

DISCUSSION

Parental spawner and marine survival data provide no evidence that recovery or rebuilding of OCN coho populations is imminent. The data strongly suggest that those populations may presently be particularly vulnerable to all fishing and non-fishing related impacts. In fact, under the new criteria described in this paper, OCN parental spawner status ranks as "Critical' in seven out of the last ten years (Figure 10). Near term Council management of ocean fisheries will likely continue to be constrained to areas of the management matrix defined by "Critical" or "Very Low" parental spawner abundance and "Low" marine survival. The SSC and the IMST have expressed

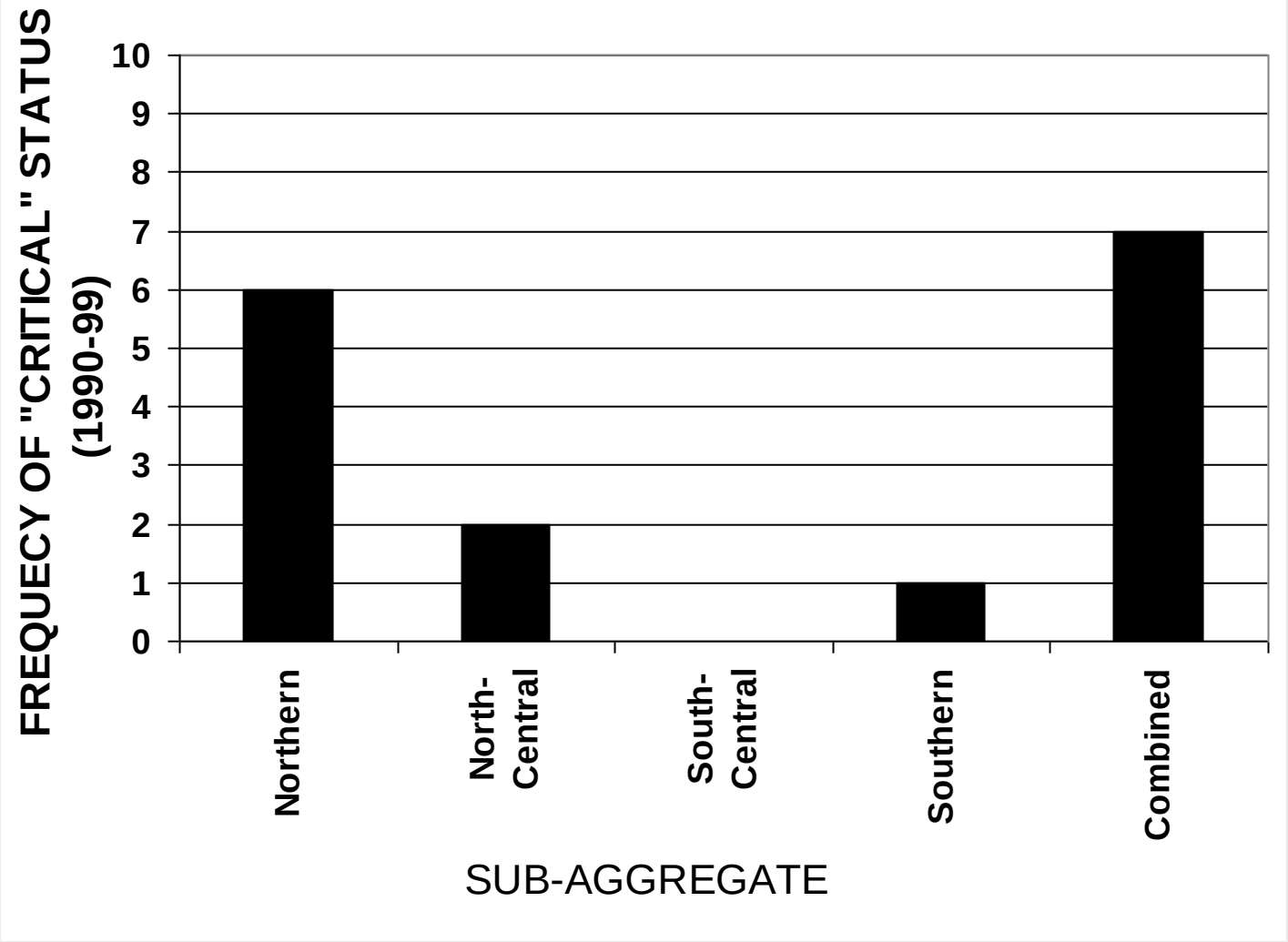

Figure 10. Frequency of occurrence of annual spawner abundance in the "Critical" category for individual OCN coho sub-aggregates and sub-aggregates combined in the last decade (1990-1999). "Critical" is defined as < four fish per mile for the Northern, North-Central, and South-Central sub-aggregates and <12% of full seeding for the Southern sub-aggregate. The OCN aggregate as a whole (Combined) assumes the status of the weakest sub-aggregate.

28

particularly strong concerns about the scientific justification for decision criteria and allowable impact rates when parental spawner abundance and marine survival are low. Under those conditions measurement imprecision for modeling parameters exacerbates uncertainties about predicted population responses.

Plan Amendment 13 represents a very conservative and precautionary approach to managing OCN coho that differs significantly from management under previous amendments to the FMP. The management matrix in Amendment 13 is designed to achieve impact rates, not escapement goals. Trigger points in the matrix are based upon observed parental spawner performance and indicators of marine survival rather than on inaccurate and imprecise preseason forecasts. Management is also based upon the parental spawner status of sub-aggregates hence provides protection for the weakest stocks in the overall OCN aggregate

While the STT, SSC, and IMST have acknowledged the obvious precautionary measures that have been incorporated into the management matrix in Amendment 13, they have still expressed concerns about the effectiveness of the matrix in managing OCN populations when either spawner abundance or marine survival are very low. However, there is no explicit link between either the allowable impacts in the matrix or the more conservative Council approved impact rates and population production models for OCN populations that have been experiencing both poor marine survival and "Very Low" or "Critical" spawner abundance. The PFMC has partially addressed these concerns by using discretionary authority to the keep fishery related impacts on OCN coho to levels well below the maximum allowable under the existing matrix. In fact, since 1998 when Amendment 13 went into effect, fishery impacts on OCN that were approved have been lower than required by the Amendment 13 and in 1999 and 2000 very nearly met requirements for "Critical" spawner status in the proposed new matrix (Table 6).

Allowing fishery impacts on OCN coho when a sub-aggregate of populations is in the "Critical" state of spawner abundance increases the risk of extinction. Model results indicate that any loss of spawning potential for OCN coho at this low level results in increased risk of extinction as a result of density dependent demographic effects. We have defined the parental spawner status of a sub-aggregate as "Critical" if the weighted average of spawner densities among basins in the sub-aggregate is less than or equal to four fish per mile. The only exception to this definition is in the Southern Sub-aggregate in which the Rogue River is the only major basin. Because of the disproportionately low level of high quality habitat to total habitat in that basin we have opted to define "Critical" spawner status as 12% of full seeding.

Production from spawners when abundance is in the "Critical" category is apt to be highly variable. At "Low" marine survival there is a fair certainty of low recruitment. At "Medium" or "High" marine survival the risk of very low recruitment continues but there is also a potential for recruitment to near full seeding levels. In the latter case, post-season estimated returns would be large but managers would make a pre-season determination to constrain the fisheries based upon parental spawner abundance being in the "Critical" category. Hindsight, in this instance, might indicate that fisheries could have been less constrained without detriment to the population. Nevertheless, fishery

Return Year	Management Matrix	Parent Spawner Level	Marine Survival	Maximum Allowable Impacts	Fishery Impacts	
					Preseason Modeling	Postseason Estimate
1998	Original	Very Low	Low	10-13 %	11.9%	7.8%
	Proposed	***Very Low***	***Extremely Low***	***8%***		
1999	Original	Very Low	Medium	15%	8.7%	7.6%
	Proposed	***Critical***	***Low***	***0-8%***		
2000	Original	Very Low	Medium	15%	8.2%	NA
	Proposed	***Critical***	***Low***	***0-8%***		
2001	Original	Very Low	Low to High	10-13% - 15%	NA	NA
	Proposed	***Critical***	***Low to High***	***0-8%***		
2002	Original	Low	Low to High	15%	NA	NA
	Proposed	***Low***	***Extremely Low to High***	***8-25%***		

Table 6. Comparison of current management matrix in Amendment 13 to the proposed new matrix with respect to how parental spawner and marine survivals are categorized and fishery impacts allowed. Comparisons are for return years 1998 through 2002 and include available pre-season modeled and post-season estimated impacts for 1998-2000years.

constraints that managers would implement based upon a pre-season assessment of "Critical' parental spawner status would be appropriate and justified based upon the probable risk to the population if greater fishery impacts were permitted.

In the existing management matrix, if a major basin in a sub-aggregate fails to achieve 10% of full seeding, advancement to a higher harvest level is not permitted, even if the parental spawner criteria for the next tier are met for the sub-aggregate as a whole. This particular safeguard has not been included in the proposed new matrix. The reasons for this change are threefold. First, SRS estimates of spawner abundance lack the precision required at the basin level to make a determination that spawner abundance in the basin is "Critical". Second, application of extremely conservative management measures for a coastwide fishery based upon imprecise estimates of performance of a population in one basin may have little effect upon recovery of a sub-aggregate of stocks or on OCN as a whole. Performance within one basin can result from very localized events such as flooding that may not accurately reflect the performance of the entire sub-aggregate. Third, the application of extremely conservative harvest rates to both the "Critical" and "Very Low" spawner abundance categories regardless of marine survival provides adequate protection for sub-aggregates and eliminates some of the necessity for the major basin criteria in the existing matrix.

The second state describes a population that is stable but not in recovery and fishery impacts when the population is in this state should be minimized at a very low level. In the previous matrix the Council was given the discretion of maintaining fishery impacts at some level less than 10-13% when the population was in this state. The new matrix limits fishery impacts in this category to 8% regardless of spawner abundance. Modeling results indicate that at an 8% impact rate the population can at least replace itself when marine survival is "Extremely Low" and parental spawners are "Very Low". Limiting fishery impacts to 8% when marine survival is "Extremely Low" but parental spawner abundance is greater than "Very Low" does not result in increased recruitment because of density dependent effects during freshwater rearing but is warranted as a precautionary measure.

Although boundaries for "Low" and "Medium" marine survival categories have changed slightly in the new matrix, harvest rates for those categories when parental spawners are in the "Low" and "Medium" categories are the same as the corresponding cells in the existing matrix. Modeling the "Low", "Medium", and "High" marine survival categories in the new matrix allows for slightly higher fishery impact rates at "High" parental spawner abundance and show the benefits of maintaining adequate spawning populations and the potential productivity of OCN coho when marine survival is high. However, it should be noted that years in the "High" marine survival category are a rare event. Most years will probably fall in the "Low" and "Medium" categories.

In conclusion, the proposed new matrix implements more conservative allowable fishery impacts rates at very low levels of spawner abundance and marine survival and slightly higher rates when conditions of spawner abundance and marine survival are favorable. All of the results are based upon output from the Nickelson and Lawson habitat based production model. One of the key assumptions of the model is that the status of

freshwater spawning and rearing habitat is stable. Hence modeling results and the predicted probabilities for recovery of OCN coho are explicitly linked to the maintenance or increased availability of high quality freshwater habitat. If the quantity or quality of available freshwater habitat decreases further it is unlikely that any harvest management at low level of spawner abundance will result in stable or increasing OCN abundance.

RECOMMENDATIONS

Based upon the results of our analyses the consensus of the OCN Work Group is that the following changes to the management matrix in Amendment 13 will reduce the risk of extinction and improve the likelihood of recovery for OCN coho:

- Add "Critical" and "Very Low" parental spawner categories to the matrix. "Critical" is defined as spawner densities less than four fish per mile in the Northern, North-Central, and South Central sub-aggregates, and as less than 12% of full seeding in the Southern sub-aggregate. "Very Low" is defined for each sub-aggregate as greater than "Critical' but less than 19% of full seeding.
- Retain the "Low", "Medium" and "High" parental spawner categories as defined in the existing matrix (i.e. >19% and $\leq$50% of full seeding, >50% and $\leq$75% of full seeding, and >75% of full seeding, respectively).
- Eliminate the provision that prevents moving to a higher harvest rate based upon one major basin having less than 10% of full seeding.
- Define the spawner abundance status of OCN coho based upon the status of the weakest sub-aggregate as determine by the aforementioned criteria.
- Add a new "Extremely Low" marine survival category that has an OPI hatchery jacks:smolts ratio of less than 0.0008.
- Re-define the "Low" and "Medium" survival categories. OPI hatchery jacks:smolts ranges that define the two categories should be 0.0008 to 0.0014 and greater than 0.0014 to 0.0040 respectively.
- Retain the existing "High" marine survival definition as an OPI hatchery jacks:smolts ratio greater than 0.0040.
- Adjust allowable fishery impact rates in the matrix consistent with results of the Nickelson/Lawson habitat based production model.

REFERENCES

Bilby, R.E., B.R. Fransen, P.A.Bisson, J.K. Walter. 1998. Response of juvenile coho salmon (*Oncorhynchus kisutch*) and steelhead (*Oncorhynchus mykiss*) to the addition of salmon carcasses to two streams in southwestern Washington. Can. J. Fish. Aquat. Sci. 55:1908-1918.

Cederholm, C.J., D.H. Johnson, R.E. Bilby, L.G. Dominguez, A.M. Garrett, W.H. Graeber, E.L. Greda, M.D. Kunze, B.G. Marcot, J.F. Palmisano, R.W. Plotnikoff, W.G. Pearcy, C.A. Simenstad, and P.C. Trotter. 2000. Pacific Salmon and Wildlife-Ecological Contexts, Relationships, and Implications for Management. Special Edition Technical Report, Prepared for D.H. Johnson and T.A. O'Neil (Manag. Dirs.), Wildlife-Habitat Relationships in Oregon and Washington. Washington Department of Fish and Wildlife, Olympia.

IMST. 1999. Defining and evaluating recovery of OCN coho salmon stocks: Implications for rebuilding stocks under the Oregon Plan. Technical Report 1999-2, a report of the Independent Multidisciplinary Science Team, Oregon Plan for Salmon and Watersheds. Salem, Oregon.

Lynch, M. 1990. Mutation load and the survival of small populations. Evolution **44**:1725-1737.

McElhaney, P., M.H. Ruckelshaus, M.J. Ford, T.C. Wainwright, and E.P. Bjorkstedt. 2000. Viable salmonid populations and the recovery of evolutionarily significant units. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-42, 156 p.

Nickelson, T.E. 1986. Influences of upwelling, ocean temperature, and smolt abundance on marine survival of coho salmon (*Oncorhynchus kisutch*) in the Oregon production Area. Can. J. Fish. Aquat. Sci. **43**: 527-535.

Nickelson, T.E. and P. Lawson. 1998. Population viability of coho salmon *Ocorhynchus kisutch*, in Oregon coastal basins: Application of a habitat-based life-cycle model. Can. J. Fish. Aquat. Sci. **55**: 2383-2392.

ODFW and NMFS. 1998. Final assessment of risk associated with the harvest management regime of the Thirteenth Amendment to the Pacific Coast Salmon Plan. Pacific Fishery Management Council. Portland, Oregon.

PFMC. 1999. Final Amendment 13 to the Pacific Coast Salmon Plan. Fishery management regime to ensure protection and rebuilding of Oregon coastal natural coho. Pacific Fishery Management Council. Portland, Oregon.

Seiler, D. 1989. Differential survival of Grays Harbor basin anadromous salmonids: water quality implications. *In* Proceedings of the National Workshop of Effects

of Habitat Alteration on Salmonid Stocks. *Edited by* C.D. Levings, L.B. Holtby, and M.A. Henderson. Can. Spec. Publ. Fish. Aquat. Sci. No. **105**: 123-135.

Waples, R.S. 1990. Conservation genetics of Pacific salmon. II. Effective population size and rate of loss of genetic variability. J. Heredity **81**:267-276.

Appendix 1. A timeline for meetings, work assignments, progress reports, and a final report for the OCN work group that is completing a year 2000 review of Amendment 13 to the Pacific Fishery Management Council Salmon Management Plan.

Nov. 1999	PFMC appoints OCN work group.
Dec. 1999:	Initial meeting of work group. - Identify key issues. - Biological (e.g. spawning escapement requirements). - Methodological (e.g. review of habitat production model). - Procedural (e.g. practical implementation of Plan Amendment 13). - Incorporate results of Aug. 1999 IMST workshop on definition of recovery and criteria for assessing recovery of OCN coho. - Initial work assignments.
Dec. 1999 – Feb. 2000:	Data compilation and model review.
Mar. 2000:	Progress report to SSC, PFMC, and IMST.
Mar. – Jun. 2000:	Continuation of data analysis.
Jun. 2000:	Progress report to SSC and IMST.
Jun. – Sep. 2000:	Data analysis and report writing.
Sep. 2000:	Preliminary report to SSC, PMFC, and IMST.
Sep. – Nov. 2000:	Revisions and final edits to report.
Nov. 2000:	Final report to SSC, PFMC, and IMST.

Appendix 2. List of meeting dates and attendees for the ad hoc OCN work group that was approved by the PFMC in November 1999.

Designated Work Group Attendees					
	Meeting Dates and Attendance Lists				
Affiliation	Dec. 17, 1999	Apr. 28, 2000	Jun. 13, 2000	Aug. 1, 2000	Oct. 3, 2000
PFMC Staff	Dr. J Coon	Dr. J. Coon	Dr. J. Coon	Dr. J. Coon	Dr. J. Coon
NMFS / SSC	Dr. P. Lawson	Dr. P. Lawson	Dr. P. Lawson	Dr. P. Lawson	Dr. P. Lawson
NMFS / STT	(remote)		Dr. R. Kope	Dr. R. Kope	Dr. R. Kope
ODFW / OPITT	C. Melcher	C. Melcher	C. Melcher	C. Melcher	C. Melcher
ODFW Staff	S. Sharr	S. Sharr	S. Sharr	S. Sharr	S. Sharr
ODFW Staff	T. Nickelson	T. Nickelson	T. Nickelson	T. Nickelson	T. Nickelson
	Advisory Attendees				
IMST	Dr. B. Pearcy	Dr. B Pearcy	Dr. S. Gregory		Dr. S. Gregory
IMST	Dr. S. Gregory				
NMFS Staff		Dr. T. Wainwright			
ODFW Staff		Dr. B. Mcintosh	M. Chilcote		M. Burner

Appendix 3. Proposed harvest management matrix for Plan Amendment 13 showing allowable fishery impacts and range of expected resulting spawner populations.

Parent Spawner Status [1/]			Marine Survival Index (based on return of jacks per hatchery smolt)							
Category	Seeding Levels		Extremely Low (<0.0008)		Low (0.0008 to <0.0015)		Medium (0.0015 to <0.0040)		High (≥0.0040)	
	Low End	High End								
High	> 75% of Full Seeding		E ≤ 8%		J ≤ 15%		O ≤ 30%		T ≤ 45%	
	99,075	132,100	33,000	107,000	58,000	135,000	123,000	259,000	187,000	284,000
Medium	>50% & ≤75% of Full Seeding		D ≤ 8%		I ≤ 15%		N ≤ 20%		S ≤ 38%	
	66,050	99,075	29,000	96,000	51,000	123,000	123,000	268,000	185,000	291,000
Low	>19% & ≤50% of Full Seeding		C ≤ 8%		H ≤ 15%		M ≤ 15%		H ≤ 25%	
	25,099	66,050	21,000	84,000	37,000	107,000	95,000	250,000	162,000	308,000
Very Low	> 4 Fish per Mile & ≤19% of Full Seeding		B ≤ 8%		G ≤ 11%		L ≤ 11%		Q ≤ 11%	
	15,852	25,099	18,000	61,000	33,000	82,000	88,000	190,000	165,000	265,000
Critical [2/]	≤ 4 Fish per Mile		A (0-8%)		F (0-8%)		K (0-8%)		P (0-8%)	
	99,075	132,100	Unknown		Unknown		Unknown		Unknown	
Survival Rates			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Observed Hatchery			0.46%	1.28%	1.11%	2.39%	2.95%	8.40%	8.53%	11.68%
Estimated Wild			0.90%	2.60%	1.70%	3.60%	4.40%	8.40%	8.53%	11.68%
Estimation Factor			2.0	2.0	1.5	1.5	1.5	1.0	1.0	1.0

Sub-aggregate and Basin Specific Spawner Criteria Data

Sub-aggregate	Miles of Available Spawning Habitat	100% of Full Seeding	"Critical"		Very Low, Low, Medium & High		
			4 Fish per Mile	12% of Full Seeding	19% of Full Seeding	50% of Full Seeding	75% of full Seeding
Northern							
Nehalem	NA	17,500	NA	NA	3,325	8,750	13,125
Tillamook	NA	2,000	NA	NA	380	1,000	1,500
Nestucca	NA	1,800	NA	NA	342	900	1,350
Ocean Tributaries	NA	400	NA	NA	76	200	300
Total	899	21,700	3,596	NA	4,123	10,850	16,275
North - Central							
Siletz	NA	4,300	NA	NA	817	2,150	3,225
Yaquina	NA	7,100	NA	NA	1,349	3,550	5,325
Alsea	NA	15,100	NA	NA	2,869	7,550	11,325
Siuslaw	NA	22,800	NA	NA	4,332	11,400	17,100
Ocean Tributaries	NA	5,700	NA	NA	1,083	2,850	4,275
Total	1,163	55,000	4,652	NA	10,450	27,500	41,250
South - Central							
Umpqua		29,400	NA	NA	5,586	14,700	22,050
Coos		7,200	NA	NA	1,368	3,600	5,400
Coquille		5,400	NA	NA	1,026	2,700	4,050
Coastal Lakes		8,000	NA	NA	1,520	4,000	6,000
Total	1,685	50,000	6,740	NA	9,500	25,000	37,500
Southern							
Rogue River	450	5,400	NA	648	1,026	2,700	4,050
Total	450	5,400	NA	648	1,026	2,700	4,050
Coastwide Total	4,197	132,100	15,636		25,099	66,050	99,075

1/ Parental spawner abundance status for the OCN aggergate assumes the status of the weakest sub-aggregate.

2/ "Critical" parental spawner status is defined as 4 fish per mile for the Northern, North-Central, and South-Central subaggergates. Because the ratio of high quality spawning habitat to total spawning habitat in the Rogue River Basin differs significantly from the rest of the basins on the coast, the spawner density of 4 fish per mile does not represent "Critical" status for that basin. Instead. "Critical" status for the Rogue Basin (Southern Sub-aggergate) is estimated as 12% of full seeding of high quality habitat.

FINAL REPORT OF THE OREGON COASTAL NATURAL COHO WORK GROUP

The Salmon Advisory Subpanel reviewed the final draft of the *2000 Review of Amendment 13 to the Pacific Coast Salmon Plan*.

The recommendations presented on page 32, and in Table 6 on page 30, have substantial allocation implications. Other than the last paragraph of the Executive Summary on page V, there is no discussion regarding the allocation of proposed reductions under "Critical Parent Spawner Levels" and low levels of marine survival. However, we generally support the direction of the report.

Our recommendation would be to at least adopt the report as an advisory document.

PFMC
10/31/00

SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON FINAL REPORT OF THE OREGON COASTAL NATURAL COHO WORK GROUP

Mr. Sam Sharr, Oregon Department of Fish and Wildlife (ODFW), reviewed the final draft report "2000 Review of Amendment 13 to the Pacific Coast Salmon Plan" for the salmon subcommittee of the Scientific and Statistical Committee (SSC). This report thoroughly addresses two items previously identified by the SSC and Salmon Technical Team as critical to the review:

- An assessment of the current status of the Oregon Coastal Natural (OCN) stock towards rebuilding to full seeding of the spawning grounds, and

- A review of the marine survival and parental spawner trigger points in the harvest management matrix.

The SSC encourages the proposed changes to the harvest management matrix, because they are based on a peer-reviewed model, reflect conditions that have been experienced in the 1990s, and provide additional protection to OCN stocks when they are at low levels of abundance. Given the continuing depressed status of OCN stocks, the recommendations to expand the harvest management matrix defined in Amendment 13 to include two new parental spawner categories ("Very Low" and "Critical") and one new marine survival category ("Extremely Low") are warranted. The recommended allowable fishery impacts in the new harvest management matrix are consistent with the historical performance of the fishery and provide escapement levels that are consistent with the goal of full seeding of the spawning grounds. The results from the model are difficult to interpret when parental spawner levels are in the "Critical" category. The SSC stresses that when stocks are in the "Critical" parental spawner category there is no biological justification for allowing harvest.

It is important to note that the risks of extinction used in the 2000 review report do not supercede the previous risk assessment developed for Amendment 13 (Appendix C). Although the extinction risks in the 2000 review were developed with the same model used for the original risk assessment in Amendment 13, they were used only to address issues pertinent to the 2000 review. The assessment developed for Amendment 13 remains the best assessment of the risk of extinction for OCN populations.

Finally, the SSC supports research that focuses on the underlying assumptions of the model, such as ODFW's life-cycle monitoring project. This research, in addition to analyses currently under way, will provide new information that can be incorporated into future reviews of Amendment 13 and the harvest management matrix. We recommend another review be conducted in 2003.

PFMC
10/31/00

FINAL REPORT OF THE OREGON COASTAL NATURAL COHO WORK GROUP

The Salmon Technical Team (STT) appreciates the work that went into the report of the Amendment 13 Review Committee.

Clarification of the technical basis for the Committee's recommendations: The report presents results from the Nickelson-Lawson Model and a simplified deterministic version of that model as the basis for proposing a new decision matrix containing limitations on allowable exploitation rates. The report is not clear as to the details underlying the various technical analyses presented. The STT, therefore, recommends a technical appendix describing the detail underlying the derivation of the proposed decision matrix be produced. The appendix should provide an explanation of modeling decision points and modeling details that support the proposed new decision matrix can be understood and followed. Additionally, the appendix should include derivation of the model parameters for the original decision matrix established by Amendment 13, as requested by the STT and Scientific and Statistical Committee (SSC) (Amendment 13 should be attached for reference since it is referenced extensively by the Committee's Report).

Potential confusion and misinterpretation of "extinction risk": There is some potential for confusion and misinterpretation regarding the "extinction risk" presented in the report. An extinction risk analysis was completed prior to Council adoption of Amendment 13. The "extinction risk" presented in this review should not be interpreted as a substitute for or an update of that analysis. The extinction probabilities shown in Figure 9 were contrived in an attempt to generate relationships between model-estimated spawners per mile and the risk of extinction four generations later. The relationship represents model results under the assumption of prolonged periods of constant, low marine survival rates; additionally, the definition of "extinction" differs significantly in the two analyses (.05 spawners per mile over four generations in the committee's review versus 50 spawners per basin over 100 years in the Amendment 13 Risk Assessment). The relationships depicted in figure 9 should not be interpreted as true risks of extinction under actual conditions. The original risk analysis examined the risk of extinction at 0% harvest rate and the harvest rates prescribed by the matrix in Amendment 13 with a minimum harvest rate of 13%. The committee did not complete an "extinction risk" analyses comparable to that provided for Amendment 13; however, the 8% maximum exploitation rate proposed by the Committee at critical parental escapements should produce extinction risks within the bounds depicted in the Amendment 13 assessment of extinction risk.

Modified decision matrix: The STT supports the addition of the critical parental spawner status and extremely low projected marine survival rates to provide additional guidance in responding to conservation concerns. However, the STT notes that the 8% exploitation rate limit allowed under critical parental stock status is somewhat arbitrary. This rate represents the lowest preseason rate anticipated by the regulations adopted by the Council in recent years; no significant modeling or biological thresholds can be attached to this rate. The STT is concerned that application of the 8% exploitation rate limit uniformly across all expectations of marine survival may not be appropriate or consistent with the objective of achieving full seeding of high quality habitat (defined at an assumed marine survival rate of 3%). Of particular concern is the application of the limit at medium and high marine survival rates. While there is increased uncertainty regarding depensatory effects at low spawning densities and some uncertainty regarding production response at critical parental escapement and medium to high marine survival levels, the STT notes that such events have occurred historically. The STT recommends that the committee reconstruct historical production to provide an indication of what production response might be expected under such conditions. The STT also wishes to note that a limitation of exploitation rates at 8% at medium and high survival rates will increase the contentiousness of allocation issues that come before the Council. At critically low parental escapement levels and low projected marine survivals, the STT concurs that an 8% exploitation rate would likely delay the attainment of the full seeding objective. At very low projections of marine survivals and critical parental spawning escapements, the STT concurs that there is no biological justification for harvest of the OCN stock.

Modeling capacities: The STT notes that application of the deterministic Nickelson-Lawson model to individual sub-aggregates produces inconsistent results. This simplified model overpredicts spawning escapement in the north and north-central sub-aggregates while underpredicting production in the south-central and southern sub-aggregates. This could be due to a variety of factors, including differences in marine survival rates or fishery impacts, two critical elements that are assumed invariant under Amendment 13. Currently, the STT does not have the capability to evaluate differences in fishery impacts between the sub-aggregates if they exist; marine survival differences between sub-aggregates would require revision of Amendment 13.

PFMC
10/31/00

Exhibit B.3.d
Supplemental Public Comment
November 2000

Don McIsaac
PFMC
2130 SW Fifth Ave., Suite 224
Portland, OR 97201

Date: October 12, 2000

Subject: Comments concerning PFMC's Amendment 13

Attn: SSC, STT, and Oregon Coastal Natural (OCN) coho Work Group

I would like to take this opportunity to submit comments concerning the PFMC directed Amendment 13 comprehensive adaptive analysis to be completed in 2000.

When one reviews the amendment it becomes clear that there are two separate components that should be included in any comprehensive adaptive analysis. First, the estimated production parameters for freshwater habitat derived from the Habitat-Based Life Cycle Model developed by Nickleson and Lawson (1996), and a second component, the fishery impact limit and spawning rebuilding criteria used in the amendment.

While I agree with the Goals and Objectives identified by the OCN Work Group I am concerned that there are a number of other issues and analysis that are necessary if a full comprehensive adaptive review is to be completed for the Council and NMFS. The two technical concerns that the Council's Scientific and Statistical Committee and the Salmon Technical Team explicitly identified as review items in Section 4.3 are; (1) how well the amendment provides for significant rebuilding towards full seeding and (2) a detailed review of the selection of parental spawner and marine survival criteria that trigger allowable impact rates in fisheries. While these are critical issues for review I would like to the STT, SSC and the Work Group to consider the following,

- The document needs to clearly define what is 'full seeding' and how that total spawning abundance target relates to the estimated basin-wide anadromous miles of habitat. It is my understanding that when Amendment 13 discusses ‘full seeding’ it actually is referring to only about 25% of the anadromous habitat in our OCN rivers and lakes – 'the high quality habitat.'

- We do not support the direction in the Final Draft, which indicates that ODFW would like to aggregate spawning abundance estimates at the subunit scale to establish whether or not coho populations are at the 'Critical' Category. This direction will once again move the management regime back to aggregating abundance estimates to a larger scale as opposed to moving us closer to managing the "unit of conservation' which is the deme. If we are to succeed at our salmon recovery efforts we truly acknowledge and protect the genetic diversity and metapopulation structure.

- In the recent past the agencies have over-predicted OCN coho abundance 13 out of 14 years. Shouldn’t this issue be reviewed if we expect to improve abundance estimates especially when populations are so critically low in many basins? We are not achieving stock replacement at the population scale, the sub-unit scale, nor at the deme scale, the true unit of conservation. In 1997 and 1998 the spawner densities were at fish densities critical threshold levels throughout the whole coast averaging about 4 fpm. This is an 'endangered' status!

The document acknowledges the importance of the need to protect the genetic integrity of our OCN coho, and the risk of decreased reproductive success at low abundance as well as the difficulty of identifying the "Critical" Category with regards to low spawner abundance estimates. But I am very concerned that the document direction for using 4 /fish per mile (fpm) as the critical trigger to be too low to protect the populations at the demic scale. When one divides total spawners by the number of miles in each basin the risk of estimating a fpm density that does not truly reflect the low spawner densities throughout the whole basin is real. Please review OCN coho Stratified Random Sampling data for examples. The majority of the surveys are <4 fpm but when averaged together with the few surveys that had fish densities in the mid-teens the average is over 4 fpm. So, averaging fish densities per mile does not reflect what is really happening at the basin scale.

- Fragmented populations is a significant issue that must be addressed as NMFS and the Council attempts to understand recovery of the numerous ESA listed populations. If one reviews adult spawner count estimates by basin, and spawner distribution patterns it becomes clear that there are a few demes that are holding up the total spawning abundance estimate for a basin.

- Marginal habitats are also not taken into account. Again when Amendment 13 discusses 'full seeding' it actually is referring to only about 25% of the anadromous habitat in our OCN rivers and lakes – the good quality habitat. What is the scientific rational to increase fishing pressure when populations are at 50% seeding of the good quality habitat thereby postponing the recovery in to the future. Failing to acknowledge marginal habitats and small populations as well as ignoring the fact that high quality low gradient habitat that must be seeded with fry is unacceptable?

- How exactly is the amendment going to utilize the ODFW life history monitoring data – smolt production from each site to verify model abundance estimates and ocean conditions? Are the various monitoring sites a real representation of existing aquatic habitat conditions throughout the Coast Range? How is the ODFW monitoring program going to be linked to fishing rate triggers established in Amendment 13?

- The habitat model uses an egg deposition to summer parr as a constant 7% for all stream reaches when at full seeding. How was this data point derived and does this truly reflect the condition of Oregon coastal streams? What are the implications of over predicting survival at this stage of the model?

- The model looks at habitat carrying capacity by basin and sets abundance criteria for full seeding but fails to discuss stream productivity in relation to nutrient recycling. Bilby, Cedarholm, and Brickell have all documented the fact that spawned out carcasses are a vital source of nutrient enrichment which stimulates primary production in streams. This research must not be ignored when developing basin specific spawning escapement targets and triggers.

- The old spawning abundance goal was 200,000 naturally spawning OCN coho or 42 fish per mile. Now this new method has a full seeding escapement target of 132,100 coho but his includes the Rogue as well as the Lakes system and excludes marginal habitat. The model also sets the full seeding target for the Coastal Lakes system at 8,000 spawners. This abundance projection is for at least three Coastal Lakes Takenitch, Siltcoos, and Ten Mile Lake. The seeding targets that have been established by the Habitat based production model appear to be flawed. Does the STT/SSC really believe the seeding target of about 2,750 spawners / per Lake to actually represent full seeding?

- Data from the Mid-Coast Watersheds Council Rapid Bioassessment on fish distribution indicates fry distribution patterns may be different than model projections at the reach level. I would urge the Work Group to discuss this issue of seasonal distribution with ODFW Research and MCWC Technical Team.

- Model does not take into account significant storm events that effect overwintering survival. Accelerated sedimentation, bedload scour, and channel stability are all significant factors affecting early life history survival. Does this model take a conservative approach if data is unavailable?

- Should there be an analysis concerning differential impacts to severely depressed OCN North coast populations and Lower Columbia / Clackamas / Sandy River as a result of multiple selective fisheries off the Oregon Coast as well as North of Falcon and Buoy 10?

- The issue of nonretention fishery management has a number of components that the Council needs to consider - allocation, as well as the accuracy of the hooking mortality rates. Even though the Council has increased the hooking mortality rate for recreational fisheries we are very concerned about its accuracy. In light of the pressure to increase fishing impacts in order to have access to hatchery fish we would urge the Council to open up for independent review the range of issues related to nonretention fishery management. Issues to be reviewed include, encounter rates and disproportionate mortality from multiple nonretention fisheries.

While we strongly support Amendment 13's direction of including the critical conservation measures to the harvest impact matrix, we have concerns that must be addressed as the Habitat based life-cycle model establishes spawning abundance and impact targets. We believe that individual basins not subunits that are in the 'Critical abundance category' should constrain mixed stock ocean fisheries. There is a forum to discuss changes to the existing matrix that ODFW needs to explore i.e. watershed council process. Thousands of dollars and volunteer hours that are going into salmon recovery at the local level. This local process must be alerted to this change in direction.

We would urge state and federal agencies to fully analyze and research the identified issues of concern. We also urge the Council and NMFS to take a precautionary approach when setting OCN exploitation rates in the near term. The Independent Multidisciplinary Science Team has been very clear with their recommendations concerning this issue, "Because spawner abundances have been extremely low and recruitment for all three brood years (1995, 1996, 1997) has been below replacement, fishery impacts should be as close to zero as possible until established signs of recovery are observed."(Letter to Kay Brown 9/6/00).

We would support a strategy that would include a three brood cycles <5% total exploitation rates (freshwater as well as ocean) in order to maximize spawner recruitment.

I believe that many of the issues that been identified by the Independent Multidisciplinary Science Team (IMST) and the public may in fact be a research projects that should be initiated immediately in order to incorporate the data into the Life-Cycle Model as soon as possible. If I can be of any further assistance in developing recovery strategies do not hesitate to call.

Sincerely,

Paul Engelmeyer
NW Policy Analyst
Living Oceans Program

**INDEPENDENT
MULTIDISCIPLINARY
SCIENCE TEAM
(IMST)**

October 30, 2000

Don McIsaac
Executive Director
Pacific Fisheries Management Council
2130 SW Fifth Ave, Suite 224
Portland, OR 97201

Dear Don,

Enclosed is testimony of Stan Gregory to PFMC. While given by Stan, it is the position of the IMST on this matter. We hope this information will be helpful to ODFW and the PFMC in the review of Amendment 13.

Sincerely yours,

Logan A. Norris
Chair, IMST

Enclosure (Testimony of Stanley Gregory to PFMC)

cc: with enclosure
Director Jim Greer, ODFW
Kay Brown, ODFW
ODFW Commissioners
Roy Hemmingway, Manager, Oregon Plan
IMST

State of Oregon

**John Buckhouse
Wayne Elmore
Stan Gregory
Kathleen Kavanagh
James Lichatowich
Logan Norris, Chair
William Pearcy**

Testimony of
Stanley Gregory, Ph.D.
Independent Multidisciplinary Team
Oregon Plan for Salmon and Watersheds

To
Pacific Fishery Management Council

October 31, 2000

I am Dr. Stanley Gregory, a member of the Independent Multidisciplinary Science Team (IMST), part of the Oregon Plan for Salmon and Watershed. The mission of the Oregon Plan is the recovery of depressed stocks of wild salmonids, and the role of the IMST is to provide scientific oversight for this effort. I am here today representing the IMST.

The IMST has examined the management of salmon harvest under the Oregon Plan for Salmon and Watersheds. Previously, we identified specific issues that we feel need to be included in the PFMC process and reported these to the Oregon Department of Fish and Wildlife. The OCN Working Group invited IMST members to observe the 2000 Review of Amendment 13 to the Pacific Coast Salmon Plan.

The purpose of my testimony today is to reinforce with PFMC some key aspects of the 2000 Review of Amendment 13. These are the same points we made with ODFW earlier.

We previously concluded that:

> **Reductions of harvest impacts under Amendment 13 have been substantial and have been essential to prevent extinction of coho salmon stocks along the Oregon Coast and lower Columbia River.**
>
> **The life-cycle model and spawner monitoring surveys have strengthened salmon management in Oregon.**
>
> **The state of Oregon and PFMC have not explicitly defined recovery of depressed salmon stocks and criteria for evaluating recovery.**
>
> **Because OCN coho salmon stocks have declined to such low numbers and spawners have not replaced themselves in recent years, we continue to recommend adjusting fisheries impacts to the lowest levels possible.**
>
> **The IMST strongly endorses the development of critical conservation measures to be added to the harvest impact matrix of Amendment 13. In addition, indicators of extreme conditions may be needed as practical limits when severe conditions are observed.**
>
> **The Year 2000 Review of Amendment 13 of the Pacific Fisheries Management Council is an important opportunity for the State of Oregon to evaluate management directions and future directions for salmon harvest management.**

Specific Recommendations

The following recommendations were made by IMST to ODFW as they represent the State of Oregon in this matter to PFMC. I reiterate these today to reinforce their importance directly with PFMC.

1. The IMST recommends that ODFW advocate that new criteria be incorporated into the matrix of Amendment 13 to include "very low" OCN coho salmon parent spawner abundance and "very low" marine survival.

   This will strengthen the criteria designed for protection or recovery of populations under extreme conditions. Under these conditions, no directed coho fisheries should be allowed and fishery related impacts should be reduced to the lowest levels possible.

2. The IMST recommends that ODFW advocate the applicability of (a) the minimum sustainable escapement (MSE) concept to augment the use of (b) the number of OCN ocean recruits in setting harvest impacts.

   This could provide a safeguard against loss of stocks during periods of low freshwater or ocean survival. The National Research Council (1996) recommends this methodology to minimize extinction risks of a population or metapopulation and to enhance recovery. Because spawner abundances have been extremely low and recruitment for all three recent brood years (1995, 1996, 1997) has been below replacement, fishery impacts should be as close to zero as possible until established signs of recovery are observed.

3. The IMST recommends that ODFW advocate that decisions to change harvest levels incorporate elements of stock abundance over longer periods of time and include consideration of the spatial distribution of stocks.

   The timeframe and spatial distribution of OCN coho salmon stocks is a critical aspect of measuring recovery. Harvest policies should be revised to require responses over sufficient time to indicate real population trends. We offer the following criteria as possible examples to be incorporated into the decision process whereby harvest levels are changed.

   Criterion 1. Stock Abundance. Stock abundance has achieved a defined minimum sustainable escapement before harvest impacts can exceed 10-13%.

   Criterion 2. Duration of Recovery. Stocks have achieved greater than 1:1 spawner-to-spawner replacement for each brood year over at least three brood cycles.

Criterion 3. Spatial Distribution. Stocks have achieved two consecutive generations of recovery (spawning recruits/parental adult of >1.5) with seeding above level 2 (75% seeding of available habitat).

4. The IMST recommends that ODFW advocate initiation of a scientific review of the Fisheries Regulation Analysis Model (FRAM) used to estimate harvest levels on OCN stocks components.

   Such a review might be incorporated into the Year 2000 review of Amendment 13.

5. The IMST recommends that ODFW advocate adherence to the policy that links decisions on ocean harvest to the status of the weakest stock component.

   Oregon currently adheres to this requirement, but pressures to allow fishing by sport or commercial fishermen create challenges for following this policy.

6. The IMST recommends that ODFW advocate determining the relationship between the response of salmon juveniles and their food webs to carcass abundance.

   Criteria should be developed that consider the impacts of harvest management on carcass abundance and distribution. Strategies for stock recovery need to recognize the role of food resources and carcasses in production of smolts in freshwater habitats. As an example, management criteria could identify minimum numbers of spawners per mile of stream to provide the food base necessary to support young salmon.

7. The IMST recommends that ODFW support PFMC review of hook & release mortality or impacts.

   This is a key factor for impact analysis of indirect fisheries (e.g., impacts of chinook fisheries, impacts of sport fisheries for marked hatchery coho salmon). Analysis of hook & release mortality should continue after 2000 because uncertainty is high and ocean conditions are highly variable. Hook & release mortality rates may vary with ocean temperatures and productivity, therefore setting fixed rates may lead to additional problems in the future.

8. The IMST recommends that ODFW advocate determination of the degree to which plausible extremes in hook and release mortality and in spatial and temporal variation can influence the risk of extinction.

   Hooking mortality and encounter rates are variable, and sensitivity analysis can help evaluate their impact on probability of extinction. Current reviews have discarded upper and lower quartiles of research results. These extreme values may not represent average conditions, but they could have undesirable consequences under specific sets of conditions. The model could be used to test

the effects of extreme rates to determine the consequences of the plausible boundaries around the average rates determined in the review process. Extreme rates can also be incorporated into a randomized version of the Monte Carlo runs as a form of sensitivity analysis. Highly sensitive parameters should be strengthened by monitoring, especially by double-index tagging.

9. The IMST recommends that ODFW advocate that PFMC use an explicit analytical process that incorporates monitoring results, harvest records, and the life-history model as part of the decision process for harvest levels.

   This analysis should link spawner surveys, habitat surveys, marine survival or impacts and model projections. It should also be spatially explicit to the greatest degree allowed by the data and model structure.

10. The IMST recommends that ODFW advocate that PFMC incorporate dynamic and changing landscape conditions in the analytical process to reflect potential habitat restoration, human-related degradation, and natural disturbances.

    Use of dynamic conditions for both ocean and freshwater environments will provide more realistic projections of future population trends and risks of extinction. Such integration also recognizes regional goals to protect and restore watershed conditions along the Pacific Coast.

2000 Review of Amendment 13 to the Pacific Coast Salmon Plan

The 2000 Review has directly addressed several of the IMST's recommendations to the State of Oregon for issues related to PFMC management decisions. Following are brief comments on the important recommendations of the 2000 Review Report and their relation to our recommendations to ODFW and via this testimony today to PFMC.

In particular, the IMST strongly endorses the development of precautionary criteria for conditions of extremely low spawner abundance. Addition of the "Very Low" and "Critical" parental spawner categories to the matrix greatly strengthen the management of impacts on coastal coho salmon. These additions are consistent with the original framework of the Salmon Management Plan and incorporate aspects of the concept of "minimum sustainable escapement" that was recommended in a recent review of salmon management by the National Research Council.

The IMST has consistently supported the application of management decisions based on the status of the weakest subaggregate, which the 2000 Review has continued to endorse. A significant change is the elimination of the provision for limits on moving to higher harvest impacts when a basin exhibits less than 10% full seeding. IMST recognizes the arguments provided for the elimination of basin criteria, and the lack of precision in basin estimates of spawners is a valid concern. This change in Amendment 13 may be justifiable at this point and the additional levels of protection

within the matrix may minimize undesirable impacts, but the IMST recommends continued development of methods and information to effectively manage salmon at the scale of basins or river networks. The IMST encourages the PFMC to consider future actions that would strengthen basin-level estimates of spawners and additional local data that would permit protection of smaller basins and their stocks in the future.

The IMST has found the Nickelson/Lawson model to be scientifically rigorous and strengthens the PFMC process. We strongly encourage state and federal agencies to integrate current and future habitat condition with the modeling of fishing impacts, ocean survival, and salmon populations. At present, the model incorporates dynamic ocean conditions and changing fisheries, which is a strength. Unfortunately, the future projections do not incorporate dynamic changes in habitat, either as a result of watershed restoration or future habitat degradation. A more dynamic view of habitat could be incorporated based on readily available land use/land cover information and projections of land use policies.

The 2000 Review addresses the most critical recommendations of IMST. We would be negligent if we did not point out that several IMST recommendations were not addressed in this review—longer timeframes required before major changes in harvest impacts, incorporation of ecosystem functions of carcasses in management targets, review of the FRAM model, use of dynamic landscape information in model projections. The IMST recommends that the OCN Working Group could provide an updated assessment in the near future and possibly incorporate issues that emerge from the regional response to their report.

Public Comment Item B-3

PACIFIC COAST FEDERATION of FISHERMEN'S ASSOCIATIONS

WEB: http://www.pond.net/~pcffa

Please Respond to:
☒ Southwest Office
P.O. Box 29910
San Francisco, CA 94129-0910
Tel: (415)561-5080
Fax: (415) 561-5464

☐ Office of the President
215 Spruce Street
Half Moon Bay, CA 94019
Tel: (650) 726-1607
Fax: (650) 726-1607

☐ Northwest Office
P.O. Box 11170
Eugene, OR 97440-3370
Tel: (541) 689-2000
Fax: (541) 689-2500

Mr. Jim Lone, Chair
Pacific Fisheries Management Council
2130 SW Fifth Ave., Suite 224
Portland, OR 97201

30 Oct., 2000

Dear Mr. Lone:

We hear that the Council is considering managing ocean salmon fisheries in 2001 for a 0 to 8 percent take of OCN coho. We understand and share the Council's concern over the very low numbers of returning OCN adults; however, we submit that once the Council has provided for a 90% escapement of coho from ocean fisheries, it can do no more to expedite coho recovery by further restricting fisheries. In fact, **further restrictions in ocean fisheries may be counterproductive by giving the impression that steps are being taken while the real obstacles to coho recovery are not being addressed.**

Ocean conditions are also blamed for the failure of OCN stocks to replace their parent numbers, let alone recover, and it is true that during the 1997 El Nino ocean conditions were poor. However, by summer 1998 ocean conditions were greatly improved, at least in the southern half of Council-managed waters (which is the area OCNs inhabit, according to the Salmon Technical Team). Surface temperatures off Eureka, for example, were at least fifteen degrees lower in late summer '98 than a year earlier. These colder temperatures have recurred in '99 and '00. This statement can be confirmed by checking with the Weather Service for buoy temperature records.

If fisheries are allowing 90% + escapement, ocean conditions are much improved, and OCN coho still aren't replacing themselves, it should be obvious that the fundamental problems inhibiting recovery have not been addressed. These fish will become extinct if this situation continues. Nothing this Council can do will prevent that, even total closure of fisheries. **We believe that much of the fundamental problem is poor freshwater**

habitat caused by a variety of destructive inland land-use practices, a situation which can and must be addressed by NMFS and the States of Oregon and California if these fish are to survive. It's past time for this Council to tell these agencies to get off its back and take care of the business of protecting inland habitat. On behalf of PCFFA we ask your full support for a strong Council effort to make this happen.

Sincerely,

GHS/lt

Glen H. Spain
For PCFFA

pfmcoholtr1.doc

PACIFIC FISHERY MANAGEMENT COUNCIL

2130 SW Fifth Avenue, Suite 224
Portland, Oregon 97201

CHAIRMAN
Jim Lone

EXECUTIVE DIRECTOR
Donald O. McIsaac

Telephone: (503) 326-6352
Fax: (503) 326-6831
www.pcouncil.org

August 3, 2000

Ms. Pearl Capoeman-Baller, President
Quinault Indian Nation
PO Box 189
Taholah, WA 98587

Mr. Phil Anderson, Special Assistant to the Director
Washington Department of Fish and Wildlife
600 Capitol Way N
Olympia, WA 98501-1091

Dear Ms. Capoeman-Baller and Mr. Anderson:

At its June 2000 meeting, the Pacific Fishery Management Council (Council) discussed the implications of Amendment 14 to the salmon fishery management plan (FMP) for the management of Queets wild coho. The spawner escapement of this stock has met the annual management target agreed to by Washington Department of Fish and Wildlife (WDFW) and the Quinault Indian Nation (under U.S. District Court orders) in at least one of the past three years and; therefore, does not trigger an overfishing concern under the Council's current salmon FMP. However, the spawner escapement has fallen short of the lower end of the maximum sustainable yield range (5,800-14,500) for three consecutive years. The Council believes this failure will trigger the overfishing concern process developed under the more conservative management of Amendment 14 in conformance with the Sustainable Fisheries Act (SFA) of 1996 (see attached excerpt from the amendment).

Under Amendment 14, the Queets coho are expected to trigger an overfishing concern. However, the stock is not automatically designated as "overfished". The determination of the actual stock status is dependent on the conclusions of an assessment by the Salmon Technical Team (STT). Council recommendations for any management changes resulting from the assessment would have an initial impact in the 2002 salmon fishing season. Please refer to Section 3.2.3.2 in the attached excerpt of Amendment 14 for details of the assessment process.

To anticipate the actions which may become necessary under Amendment 14, the Council requests the Quinault Indian Nation and WDFW begin assembling information to assist the STT in completing an overfishing assessment of the Queets wild coho stock by September 1, 2001. As required by the SFA, Amendment 14 provides for one year in which the Council must develop a FMP amendment or propose regulations which will prevent or end overfishing and rebuild any stock which has triggered the overfishing concern.

By anticipating the initiation of the overfishing concern later this year, the Council hopes to allow ample time for the STT to review the status of the Queets coho stock and develop appropriate management recommendations. We encourage WDFW and the Quinault Indian Nation to expeditiously identify the appropriate entities and staff to begin assembling the appropriate data and to help coordinate and schedule the assessment effort with the STT through its chairman.

The Council will include a progress report on the STT assessment at the October/November 2000 Council meeting in Portland, Oregon. As the Council review process progresses, the public will be afforded opportunity to provide comments and input to any conclusions or management recommendations which are developed.

We greatly appreciate your assistance in this matter and look forward to a productive effort to address Council concerns consistent with the management needs of the Queets River coho resource. If you have any questions or suggestions for implementing the process, please contact Dr. John Coon of the Council staff.

Sincerely,

Jim Lone
Chair

JCC:rdh

Enclosure

c: Northwest Indian Fisheries Commission
Salmon Technical Team
Mr. Russell Svec, Makah Fisheries Management

3.2.3.2 Assessment

When an overfishing concern is triggered, the Council will direct its STT to work with state and tribal fishery managers to complete an assessment of the stock within one year (generally, between April and the March Council meeting of the following year). The assessment will appraise the actual level and source of fishing impacts on the stock, consider if excessive fishing has been inadvertently allowed by estimation errors or other factors, identify any other pertinent factors leading to the overfishing concern, and assess the overall significance of the present stock depression with regard to achieving MSY on a continuing basis.

Depending on its findings, the STT will recommend any needed adjustments to annual management measures to assure the conservation objective is met, or recommend adjustments to the conservation objective which may more closely reflect the MSY or ensure rebuilding to that level. Within the constraints presented by the biology of the stock, variations in environmental conditions, and the needs of the fishing communities, the STT recommendations should identify actions that will recover the stock in as short a time as possible, preferably within ten years or less, and provide criteria for identifying stock recovery and the end of the overfishing concern. The STT recommendations should cover harvest management, potential enhancement activities, hatchery practices, and any needed research. The STT may identify the need for special programs or analyses by experts outside the Council advisors to assure the long-term recovery of the salmon population in question. Due to a lack of data for some stocks, environmental variation, economic and social impacts, and habitat losses or problems beyond the control or management authority of the Council, it is likely that recovery of depressed stocks in some cases could take much longer than ten years.

In addition to the STT assessment, the Council will direct its Habitat Steering Group (HSG) to work with federal, state, local, and tribal habitat experts to review the status of the essential fish habitat affecting this stock and, as appropriate, provide recommendations to the Council for restoration and enhancement measures within a suitable time frame.

3.2.3.3 Council Action

Following its review of the STT report, the Council will specify the actions that will comprise its immediate response for ensuring that the stock's conservation objective is met or a rebuilding plan is properly implemented and any inadvertent excessive fishing within Council jurisdiction is ended. The Council's rebuilding plan will establish the criteria that identify recovery of the stock and the end of the overfishing concern. In some cases, it may become necessary to modify the existing conservation objective/rebuilding plan to respond to habitat or other long-term changes. Even if fishing is not the primary factor in the depression of the stock or stock complex, the Council must act to limit the exploitation rate of fisheries within its jurisdiction so as not to limit recovery of the stock or fisheries, or as is necessary to comply with ESA jeopardy standards. In cases where no action within Council authority can be identified which has a reasonable expectation of providing benefits to the stock unit in question, the Council will identify the actions required by other entities to recover the depressed stock. Upon review of the report from the HSG, the Council will take actions to promote any needed restitution of the identified habitat problems.

For those fishery management actions within Council authority and expertise, the Council may change analytical or procedural methodologies to improve the accuracy of estimates for abundance, harvest impacts, and MSY escapement levels, and/or reduce ocean harvest impacts when shown to be effective in stock recovery. For those causes beyond Council control or expertise, the Council may make recommendations to those entities which have the authority and expertise to change preseason prediction methodology, improve habitat, modify enhancement activities, and re-evaluate management and conservation objectives for potential modification through the appropriate Council process.

3.2.3.4 End of Overfishing Concern

The criteria for determining the end of an overfishing concern will be included as a part of any rebuilding plan adopted by the Council. Additionally, an overfishing concern will be ended if the STT stock analysis provides a clear finding that the Council's ability to affect the overall trend in the stock abundance through

harvest restrictions is virtually nil under the “exceptions” criteria below for natural stocks.

PROGRESS REPORT ON REVIEW OF QUEETS WILD COHO STATUS

Situation: At its June 2000 meeting, the Council recognized that the low spawner escapements of Queets wild coho over the previous three years would trigger an overfishing review under Amendment 14 to the salmon fishery management plan (FMP) approved by NMFS on September 27, 2000. To address this requirement in the recently implemented FMP amendment, the Council passed a motion requesting the Quinault Indian Nation and Washington Department of Fish and Wildlife (WDFW) to begin assembling data to assist the Salmon Technical Team (STT) in completing an overfishing review for the Queets wild coho stock by September 1, 2001. Council staff conveyed the request to the Quinault Indian Nation and WDFW via a letter on August 3, 2000 (Attachment 1). The FMP requirements for the overfishing assessment are extracted in Attachment 2.

Council Discussion:

1. Review the plans and progress of WDFW and the Quinault Indian Nation toward providing data and analyses for the overfishing review of Queets wild coho.
2. Discuss and clarify the process and schedule necessary to allow the STT to complete the overfishing review by September 1, 2001.
3. Provide guidance to the Habitat Steering Group for working with federal, state, tribal, and local managers to develop any appropriate recommendations with regard to essential fish habitat to aid the recovery of Queets wild coho.

Reference Materials:

1. Council letter to WDFW and the Quinault Indian Nation (Exhibit B.4, Attachment 1).
2. Excerpt from the salmon FMP (Exhibit B.4, Attachment 2).

PFMC
10/16/00

Exhibit B.4
Supplemental Tribal Comment
November 2000

Quinault Indian Nation

POST OFFICE BOX 189 ☐ TAHOLAH, WASHINGTON 98587 ☐ TELEPHONE (360)276-8211

RECEIVED
OCT 2 0 2000
PFMC

October 11, 2000

Dr. Donald O. McIsaac, Executive Director
Pacific Fishery Management Council
2130 SW Fifth Avenue, Suite 224
Portland, OR 97201

Re: Queets Coho Overfishing Report

Dear Dr. McIsaac:

The Quinault Indian Nation is currently gathering existing data to provide to the Salmon Technical Team in response to your August 3 request that the Nation provide the Council with assistance in connection with the preparation of an "overfishing report" on Queets River coho salmon. Please provide us with any specific information needed for the STT's assessment as quickly as possible and we will do our best to respond to the extent of our capability allows.

Unfortunately, the demands of inseason salmon management and preparation for the upcoming steelhead season will limit the amount of time available to devote to this matter until after the first of the year. Consequently, it will likely not be possible to prepare any new analyses of the status of Queets coho until late Winter. However, this should permit the incorporation of spawning escapement estimates for the 2000 season in the stock assessment. If this proves to be a problem for the Council, please let me know so that we can address the issue.

Sincerely,

Ed Johnstone

Ed Johnstone
Fishery Policy Representative

PACIFIC FISHERY MANAGEMENT COUNCIL SCHEDULE FOR
DEVELOPING 2001 OCEAN SALMON FISHERY MANAGEMENT MEASURES

Jan. 16-19	The Salmon Technical Team (STT) and Council staff economist meet in Portland, Oregon to draft *Review of 2000 Ocean Salmon Fisheries*. This report summarizes seasons, quotas, harvest, escapement, socioeconomic statistics, achievement of management goals, and impacts on species listed under the Endangered Species Act. (Feb. 9 print date, mailed to the Council Feb. 22, and available to the public Feb. 27)
Feb. 13-16	STT meets in Portland, Oregon to complete *Preseason Report I Stock Abundance Analysis for 2001 Ocean Salmon Fisheries*. This report provides key salmon stock abundance estimates and precision, harvest and escapement estimates when recent regulatory regimes are projected on 2001 abundance, and other pertinent information to aid development of management options. (Feb. 21 print date, mailed to the Council Feb. 22, and available to the public Feb. 27)
Feb. 22 through Mar. 4	State agencies, tribes, and fishers review preseason abundance projections and range of probable fishery options. The Klamath Fishery Management Council completes recommendations for ocean management options affecting Klamath River fall chinook.
Feb. 27	Council reports summarizing the 2000 salmon season and projecting the expected salmon stock abundance for 2001are available to the public from the Council office.
Mar. 5-9	Council and advisory entities meet at the Red Lion Hotel at the Quay, Portland, Oregon to adopt 2001 regulatory options for public review. The Council adopts preliminary options on March 6, tentative options for STT analysis on March 7, and final options for public review on March 9.
Mar. 12 though Apr. 1	Management agencies, tribes, and public develop their final recommendations for the regulatory options. North of Cape Falcon Forum meetings are tentatively scheduled for March 13-14 (Portland area) and March 28-29 (Seattle area).
Mar. 20	Council staff distributes *Preseason Report II Analysis of Proposed Regulatory Options for 2001 Ocean Salmon Fisheries* to the public. The report includes the public hearing schedule, comment instructions, option highlights, and tables summarizing the biological and economic impacts of the proposed management options.
Mar. 26-28	Sites and dates of public hearings to review the Council's proposed regulatory options are: Westport, Washington (Mar. 26); North Bend, Oregon (Mar. 26); and Eureka, California (Mar. 27). Additional hearings will be held by Oregon Department of Fish and Wildlife and California Department of Fish and Game as follows: Tillamook, Oregon (Mar. 27) and Moss Landing, California (Mar. 28). Comments on the options will also be taken during the Council meeting on Apr. 3 in Sacramento, California.
Apr. 2-6	Council and advisory entities meet at the Red Lion Hotel Sacramento, Sacramento, California to adopt final regulatory measures. The Council will tentatively adopt final regulatory measures for analysis by the STT on April 3. Final adoption of recommendations to National Marine Fisheries Service will be completed on April 6.
April 7-11	The STT completes *Preseason Report III Analysis of Council Adopted Regulatory Measures for 2001 Ocean Salmon Fisheries*.
April 13	Council staff mails newsletter with adopted ocean salmon fishing management recommendations.
May 1	NMFS implements federal ocean salmon fishing regulations and *Preseason Report III* is made available to the public.

PFMC
10/17/00

SALMON OPTION HEARING SITES

Situation: To plan, announce, and meet *Federal Register* deadlines for public hearing sites and the entire preseason salmon management process, staff needs to confirm details of the process prior to the end of November. The proposed 2001 process and schedule is contained in Attachment 1. It follows the same format as in previous years. However, based on recent history and staff capabilities, we suggest a reduction in the 2001 public hearing schedule.

Due to the very brief period between the March and April meetings, travel logistics, and ever increasing work demands and scheduling problems, it is difficult for the limited Council staff to cover more than three public hearings for the salmon management options. Given this situation, we suggest Council staff cover one hearing per coastal state. Based on our experience from previous years, we propose the following Council-staffed hearings:

March 26	Westport, Washington and North Bend, Oregon
March 27	Eureka, California

In 2001, the March Council meeting will occur in Portland and the April Council meeting in Sacramento. Therefore, the public comment period on Tuesday of the April meeting in Sacramento also serves as a public comment opportunity. If the states desire to have additional hearings, we suggest they organize and staff them as California has done for Moss Landing over the past three years. The table below provides the public attendance at the hearing sites since 1995 for Council reference.

Hearing Site Location [1/]	Public Attendance					
	1995	1996	1997	1998	1999	2000
Westport	49	30	22	4	18	24
Astoria	28	23	16	-	14	-
Tillamook	-	-	-	28	-	13
North Bend	22	30	27	15	31	36
Eureka	30	45	27	16	18	37
Sacramento [2/]	16	-	-	13	-	-
Santa Rosa	-	-	-	-	-	4
Moss Landing [3/]	-	-	-	100	51	50

1/ Sites in bold are proposed for Council staffing in 2001.
2/ Public comment opportunity available at April Council meeting in 2001.
3/ Hearing staffed by California Department of Fish and Game.

Council Action:

1. Confirm Council-staffed hearing sites and state intentions for additional hearings.
2. Approve staff's overall proposed schedule and process for developing 2001 ocean salmon management measures (Attachment 1).

References:

1. Proposed Pacific Fishery Management Council Schedule for Developing 2001 Ocean Salmon Fishery Management Measures (Exhibit B.5, Attachment 1).

PFMC
10/17/00

Exhibit B.5.b
Supplemental SAS Report
November 2000

SALMON OPTION HEARING SITES

The Salmon Advisory Subpanel (SAS) supports the hearing site proposal with the exception that we recommend the addition of Tillamook as an official Council hearing site. Our recommendation will be elaborated on by Oregon SAS member(s) during public comment.

PFMC
10/31/00