

**PACIFIC FISHERY MANAGEMENT COUNCIL**

**SALMON TECHNICAL TEAM**

**Analysis of Mitchell Act Mass Marking Contributions  
to Ocean Coho-directed Selective Fisheries**

**JUNE 2002**



## **Introduction**

The Mitchell Act, passed in 1938 and amended in 1946, "authorizes the U.S. Secretary of Commerce to carry on activities for the conservation of fishery resources of the Columbia River Basin" (Federal Wildlife and Related Laws Handbook, USFWS). Salmon production from the Columbia River Basin represents a significant contribution to West Coast fisheries from California to Alaska. Adequate funding of Mitchell Act programs is essential for maintaining the viability of ocean and Columbia River Basin fisheries and meeting treaty trust responsibilities. Columbia River hatchery coho are the primary contributing stocks to mark-selective coho-directed (selective) fisheries off Oregon and Washington. Mitchell Act funded marking programs produce a substantial portion of the marked coho from the Columbia River Basin.

Mitchell Act funding levels have remained essentially level since 1993 while costs associated with hatchery production, marking, screens and fishways, facilities maintenance, and research have steadily increased. Responding to the resulting shortfall, Oregon, Washington, Idaho, and the U.S. Fish and Wildlife Service have all made considerable program reductions and are currently facing further program cuts. Reductions in mass marking programs will likely affect the amount of fishing opportunity and the level of fishery related impacts in Pacific Fishery Management Council (Council) area fisheries. The Council directed the Salmon Technical Team to assess the effects to Council area fisheries of not mass marking coho production from Mitchell Act funded hatchery facilities.

## **Methods**

The Fishery Regulation Assessment Model (FRAM) for coho was used as a tool to predict the potential effects of not mass marking future coho broods produced in hatcheries funded by the Mitchell Act. Two years were chosen to demonstrate the modeled fishery contributions of these marked coho stocks in years with low (2001) and high (2002) Columbia River hatchery coho abundance.

One of the input parameters of the FRAM is a scalar of coho stock size by production area and mark type, relative to an historic base period abundance. The FRAM was utilized during the Council regulatory processes of 2001 and 2002 where coho stock scalars were input to reflect stock strengths under current mass marking levels at Mitchell Act facilities. These FRAM inputs were then adjusted to reflect coho stock strengths, had currently mass marked coho stocks from Mitchell Act facilities been released without a mark to assess how these changes would effect modeled impacts to various coho stocks. Quotas in all coho-directed selective fisheries were then each reduced at the same rate until modeled impacts to Oregon Coastal natural (OCN) coho were similar to impacts levels originally estimated during the 2001 and 2002 regulatory processes. Coho-directed selective fisheries included in this quota reduction exercise are the Oregon ocean recreational coho fishery from Cape Falcon to Humbug Mountain, the North of Cape Falcon ocean recreational coho fishery, and the North of Cape Falcon ocean non-treaty commercial troll coho fishery.

For 2001, the regulations and FRAM run for the final fisheries package were used. At the time of the analysis the 2002 fisheries were still in the regulatory process and had not been adopted. Alternatively, the FRAM run and proposed regulations from Option I of the March Council meeting were used for 2002.

## **Results**

Table 1 shows the 2002 FRAM results in terms of ocean escapement, total exploitation rate, or other management criteria for key coho stocks in Council area fisheries under three scenarios; (1) the original regulation package considered in Option I in March and full mass marking at Mitchell Act facilities, (2) the original regulation package and no coho mass marking at Mitchell Act facilities, and (3) reduced quotas in the regulation package and no coho mass marking at Mitchell Act facilities. Table 2 shows the same type of comparisons for the 2001 final regulation package.

Fishery regulations for both year 2002 and 2001 would likely have resulted in either increased impacts to several key coho stocks or reduced fishing opportunity through reduced coho quotas.

Specifically, OCN coho impacts would have increased in 2001 and 2002 if Mitchell Act facilities had maintained the same production levels without mass marking coho and fishery regulations and selective

fishery coho quotas had remained the same. In 2001, estimated OCN coho impacts increased from an exploitation rate of 14.6% to 16.3%. In 2002, the estimated OCN coho exploitation rate increased from 7.4% to 8.4%. Several other key coastal coho stocks, including Queets Wild and Northern California, exhibit minor increases in impacts under this scenario through either decreased ocean escapements or increased marine exploitation rates.

Alternatively, if Mitchell Act facilities had maintained the same production levels without mass marking coho and fisheries were managed to keep impact levels on OCN coho constant, coho quotas in Council area selective fisheries during 2001 and 2002 would have been reduced by about one-third. Table 3 shows coho quotas as adopted or considered in 2001 and 2002 and quotas required to achieve the same OCN coho management objectives without mass marking at Mitchell Act facilities.

## **Discussion**

This method was chosen as a way to show the effects of not mass marking the Mitchell Act funded coho production and does not represent recommendations for Council action.

This analysis focused on OCN coho, because in 2001 and 2002 management objectives for this stock were often the limiting factor in determining the regulations for Council area fisheries. However, other coho stocks have been the limiting factor in previous North of Cape Falcon fisheries. Washington coastal coho stocks are frequently the driving stocks in these fisheries, and the results may be different if other stocks are limiting. Also, in any given year the mix of coho stocks are different in relative abundance, and each year's stock mix would change the outcome. Selective fishing opportunities for mass marked hatchery coho in Council area waters started in 1998, but were limited in size and area until 1999. Therefore, this analysis was limited in the range of years available for consideration.

Council area salmon fisheries are influenced by the abundance of Columbia River Basin coho stocks. In particular, coho-directed selective fisheries in Washington and Oregon rely heavily on mass marked Columbia River Basin hatchery coho. Ending mass marking of coho at Mitchell Act facilities would significantly reduce the Council's ability to maintain sport and commercial fishing opportunities while minimizing impacts to coho stocks of concern.

TABLE 1. Projected key coho stock escapements (thousands of fish) or management criteria for Council proposed fishery options, 2002. <sup>a/</sup>

Key Stock/Criteria	Projected Ocean Escapement or Other Criteria <sup>b/</sup>			Spawner Objective or Other Comparative Standard as Noted
	March Option I	Option I with no mass-marking of coho Mitchell Act coho	Option I with 1/3 reduction of coho directed fisheries (no mass-marking)	
Interior Fraser (Thompson River)	5.8% <sup>c/</sup>			≤10% Total exploitation rate for all U.S. fisheries south of the U.S./Canada border.
Skagit	40% (7.0%) 77.6	40% (7.3%) 77.4	40% (6.8%) 77.9	≤60% 2001 Annual management ceiling: total exploitation rate <sup>d/</sup> 30.0 MSP level of adult spawners Identified in FMP.
Stillaguamish	41% (9.1%) 14.0	41% (9.5%) 13.9	40% (8.9%) 14.1	≤35% 2001 Annual management ceiling: total exploitation rate <sup>d/</sup> 17.0 MSP level of adult spawners Identified in FMP.
Snohomish	40% (8.9%) 83.5	40% (9.5%) 83.1	40% (8.9%) 83.9	≤40% 2001 Annual management ceiling: total exploitation rate <sup>d/</sup> 70.0 MSP level of adult spawners Identified in FMP.
Hood Canal	53% (7.0%) 22.5	53% (7.3%) 24.6	53% (6.8%) 24.8	≤45% 2001 Annual management ceiling: total exploitation rate <sup>d/</sup> 21.5 MSP level of adult spawners Identified in FMP.
Strait of Juan de Fuca	20% (5.9%) 21.7	20% (6.2%) 18.5	19% (5.7%) 18.6	≤40% 2001 Annual management ceiling: total exploitation rate <sup>d/</sup> 12.8 MSP level of adult spawners Identified in FMP.
COASTAL NATURAL:				
Quillayute Fall	18.2	18.0	18.3	6.3-15.8 MSY adult spawner range (not annual target). Annual management objectives may be different and are subject to agreement between WDFW and the treaty tribes under U.S. District Court orders.
Hoh	6.7	6.6	6.7	2.0-5.0 MSY adult spawner range (not annual target). Annual management objectives may be different and are subject to agreement between WDFW and the treaty tribes under U.S. District Court orders.
Queets Wild	10.1	9.9	10.1	5.8-14.5 MSY adult spawner range (not annual target). Annual management objectives may be different and are subject to agreement between WDFW and the treaty tribes under U.S. District Court orders.
Queets Supplemental	1.5	1.5	1.6	-
Grays Harbor	49.6	49.2	49.7	35.4 MSP level of adult spawners. Annual management objectives may be different and are subject to agreement between WDFW and the treaty tribes under U.S. District Court orders.
Oregon Coastal Natural (threatened)	14.6%	16.3%	15.0%	≤15.0% ESA jeopardy standard for marine and freshwater fishery exploitation rate. ≤12.5% To meet Council guidance for protection of Oregon state ESA endangered lower Columbia coho.
Northern California (threatened)	9.4%	9.6%	9.6%	≤13.0% ESA jeopardy standard for surrogate R/K hatchery coho marine fishery exploitation rate.
HATCHERY:				
Columbia River Early	91.3	91.1	104.1	38.7 Minimum ocean escapement to attain hatchery egg-take goal of 19.6 early adult coho, with average conversion and no mainstem or tributary fisheries.
Columbia River Late	46.8	43.9	63.2	19.4 Minimum ocean escapement to attain hatchery egg-take goal of 15.2 late adult coho, with average conversion and no mainstem or tributary fisheries.

- a/ Projections in the table assume a West Coast Vancouver Island (WCVI) mortality of 2,000 coho; Southeast Alaska Total Allowable Catch (TAC) of 370,000 chinook per Pacific Salmon Treaty (PST) agreement; WCVI troll catch of 97,500 chinook (includes chinook in the fall of 2001).
- b/ Ocean escapement is the number of salmon escaping ocean fisheries and entering freshwater with the following clarifications. Ocean escapement for Puget Sound stocks is the estimated number of salmon entering Area 4B that are available to U.S. net fisheries in Puget Sound and spawner escapement after impacts from the Canadian, U.S. ocean, and Puget Sound troll and recreational fisheries have been deducted. Numbers in parentheses represent Council area exploitation rates for Puget sound coho stocks. For Columbia River early and late coho stocks, ocean escapement represents the number of coho after the Buoy 10 fishery. The escapement numbers provided for OCN coho are spawners in Stratified Random Survey (SRS) accounting.
- c/ Reported exploitation rates are for ocean fisheries only.
- d/ Annual management objectives may be different than FMP goals, and are subject to agreement between WDFW and the treaty tribes under U.S. District Court orders. Total exploitation rate includes Alaskan, Canadian, Council area, Puget Sound and freshwater fisheries and is calculated as total fishing mortality divided by total fishing mortality plus spawning escapement.

TABLE 2. Projected key coho stock escapements (thousands of fish) or management criteria for Council proposed fishery options, 2001.<sup>a/</sup>

Key Stock/Criteria	Projected Ocean Escapement or Other Criteria <sup>b/</sup>			Spawner Objective or Other Comparative Standard as Noted
	March Option	Option I with no mass-marking of Mitchell Act coho	Option I with 1/3 reduction of coho directed fisheries (no mass-marking)	
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Interior Fraser (Thompson River)				≤10% Total exploitation rate for all U.S. fisheries south of the U.S./Canada border.
Skagit	43%(5.0%) 46.9	43%(5.3%) 46.6	43%(4.8%) 47.1	≤60% 2001 Annual management ceiling; total exploitation rate <sup>c/</sup> 30.0 MSP level of adult spawners Identified in FMP.
Stillaguamish	45%(9.0%) 18.1	45%(9.5%) 18.0	44%(8.6%) 18.3	≤35% 2001 Annual management ceiling; total exploitation rate <sup>c/</sup> 17.0 MSP level of adult spawners Identified in FMP.
Snohomish	43%(9.0%) 96.5	43%(9.5%) 95.8	42%(8.6%) 97.1	≤40% 2001 Annual management ceiling; total exploitation rate <sup>c/</sup> 70.0 MSP level of adult spawners Identified in FMP.
Hood Canal	45%(8.8%) 40.6	46%(9.5%) 40.2	45%(8.5%) 40.8	≤45% 2001 Annual management ceiling; total exploitation rate <sup>c/</sup> 21.5 MSP level of adult spawners Identified in FMP.
Strait of Juan de Fuca	37%(10.1%) 15.2	37%(10.8%) 15.1	36%(9.8%) 15.3	≤40% 2001 Annual management ceiling; total exploitation rate <sup>c/</sup> 12.8 MSP level of adult spawners Identified in FMP.
<b>COASTAL NATURAL:</b>				
Quillayute Fall	20.6	20.3	20.6	6.3-15.8 MSY adult spawner range (not annual target). Annual management objectives may be different and are subject to agreement between WDFW and the treaty tribes under U.S. District Court orders.
Hoh	7.6	7.5	7.6	2.0-5.0 MSY adult spawner range (not annual target). Annual management objectives may be different and are subject to agreement between WDFW and the treaty tribes under U.S. District Court orders.
Queets Wild	10.6	10.5	10.7	5.8-14.5 MSY adult spawner range (not annual target). Annual management objectives may be different and are subject to agreement between WDFW and the treaty tribes under U.S. District Court orders.
Queets Supplemental	0.0	0.0	0.0	
Grays Harbor	46.6	46.3	46.8	35.4 MSP level of adult spawners. Annual management objectives may be different and are subject to agreement between WDFW and the treaty tribes under U.S. District Court orders.
Oregon Coastal Natural (threatened)	7.41%	8.40%	7.26%	≤15.0% ESA jeopardy standard for marine and freshwater fishery exploitation rate. ≤12.5% To meet Council guidance for protection of Oregon state ESA endangered lower Columbia coho.
Northern California (threatened)	3.03%	3.15%	3.01%	≤13.0% ESA jeopardy standard for surrogate R/K hatchery coho marine fishery exploitation rate.
<b>HATCHERY:</b>				
Columbia River Early	651.3	634.6	745.6	38.7 Minimum ocean escapement to attain hatchery egg-take goal of 19.6 early adult coho, with average conversion and no mainstem or tributary fisheries.
Columbia River Late	268.7	242.5	305.1	19.4 Minimum ocean escapement to attain hatchery egg-take goal of 15.2 late adult coho, with average conversion and no mainstem or tributary fisheries.

- a/ Projections in the table assume a WCVI mortality of 2,000 coho; Southeast Alaska TAC of 181,400 chinook per PST agreement; WCVI troll catch of 63,400 chinook (includes chinook in the fall of 2001).
- b/ Ocean escapement is the number of salmon escaping ocean fisheries and entering freshwater with the following clarifications. Ocean escapement for Puget Sound stocks is the estimated number of salmon entering Area 4B that are available to U.S. net fisheries in Puget Sound and spawner escapement after impacts from the Canadian, U.S. ocean, and Puget Sound troll and recreational fisheries have been deducted. Numbers in parentheses represent Council area exploitation rates for Puget sound coho stocks. For Columbia River early and late coho stocks, ocean escapement represents the number of coho after the Buoy 10 fishery. The escapement numbers provided for OCN coho are spawners in SRS accounting.
- c/ Annual management objectives may be different than FMP goals, and are subject to agreement between WDFW and the treaty tribes under U.S. District Court orders. Total exploitation rate includes Alaskan, Canadian, Council area, Puget Sound and freshwater fisheries and is calculated as total fishing mortality divided by total fishing mortality plus spawning escapement.



TABLE 3. Marked coho in Council Area selective fisheries as originally considered or adopted and as reduced to meet management objectives for OCN coho in the absence of mass marking at Mitchell Act hatchery facilities.

	2001		2002	
	March Option I	March Option I with 1/3 Reduction (no mass-marking of Mitchell Act coho)	March Option I	March Option I with 1/3 Reduction (no mass-marking of Mitchell Act coho)
<b>North of Cape Falcon Sport</b>				
Neah Bay	23,400	15,600	11,500	7,700
La Push	5,350	3,600	2,700	1,800
Westport	83,250	55,500	38,350	25,600
Columbia River	112,500	75,000	54,450	36,300
<b>North of Cape Falcon Non-Indian Commercial</b>	63,000	42,000	20,600	13,700
<b>Oregon Coast Sport</b>	55,000	36,700	25,000	16,700
<b>Total</b>	<b>342,500</b>	<b>228,400</b>	<b>152,600</b>	<b>101,800</b>

