

Mitchell Act Hatchery Funding

A Proposal from

**Idaho Department of Fish and Game
Oregon Department of Fish and Wildlife
Washington Department of Fish and Wildlife
US Department of Fish and Wildlife
Confederated Tribes and Bands of the Yakama Nation
Nez Perce Tribe
Confederated Tribes of the Umatilla Indian Reservation
Shoshone-Bannock Tribes of Fort Hall
Confederated Tribes of the Colville Reservation**

for

***A Multi-Year Regional Approach to
Management and Funding of Actions
Authorized under Public Law 75-502 Mitchell Act***

June 20, 2005

Mitchell Act Funded Hatcheries

To provide for the conservation of the fishery resources of the Columbia River, establishment, operation, and maintenance of one or more stations in Oregon, Washington, and Idaho, and for the conduct of necessary investigations, surveys, stream improvements, and stocking operations for these purposes.

Public Law 75-502, commonly referred to as the Mitchell Act (Act) was passed in 1938 and amended in 1946. The Act responded to decreases in the fishery resources (Appendix 1. The Mitchell Act). The original purpose was primarily to provide harvest for the local fishery and the continued ability of the program to contribute to this goal is shown by the attached information relative to recent fisheries (Appendix 2. Partial Listing of Sportfisheries Supported by Mitchell Act Funding). Due to the migratory behavior of Pacific salmon and steelhead, fish originating in the Columbia River also contribute to distant fisheries, for example, a large proportion of the Chinook catch in Southeast Alaska fisheries are from the Columbia River. In-river and near-shore fisheries provide economic and sociological support for local treaty Tribal and non-treaty communities.

The Mitchell Act Program in operation for over 50 years, was designed to meet the needs of the fishery resource. In addition to the 23 hatcheries constructed or funded, there is extensive involvement in the placement and maintenance of fish screens and fishways in the three states. This program is a valuable resource in the protection of natural and hatchery produced fish. However, funding for the entire Mitchell Act program has not been sufficient to maintain the basic service level; maintenance of facilities has been deferred, facilities have been closed, facilities have shifted to non-Mitchell Act production and funding, funds have not been available for needed monitoring or assessment, construction of needed screens or fishways has not occurred, federally required mass marking programs, ESA related evaluation programs, and the ability to respond to biological or social needs has not been possible (Appendix 3. List of Mitchell Act Facilities and Associated Production). The funding level for the basic program in the last decade has had no increases to offset the approximately 30 percent decrease in purchasing power due to inflation (Appendix 4. Funding Levels and Inflation). Requested funding for the next five years is detailed in Table 1. This table includes yearly increases along with a time frame and associated funds for major maintenance, construction, or operational efforts. An associated need is for guidelines for developing alternative proposals that would more aggressively address the O&M backlog as well as additional capital needs and costs of integrating the Mitchell Act program more fully into restoration programs.

Under Congressional direction, the mass marking of hatchery origin juvenile salmon and steelhead through the removal of the adipose fin is used to designate harvestable fish in fisheries that may be limited by ESA take limits on depressed segments of the mixed stocks. The tribes do not see mass marking as a conservation measure but rather as means of segregating hatcheries rather than integrating them into a comprehensive salmon restoration program. Mass-marking programs and the mark selective fisheries they support are in conflict with most tribal salmon restoration efforts. Tribal restoration plans emphasize supplementation programs to restore and rebuild naturally spawning

salmon in tributaries throughout the basin. The tribes continue to oppose any use of Mitchell Act funds for mass marking activities unless such activities are part of a comprehensive hatchery reform program designed to rebuild naturally spawning salmon populations.

In the Puget Sound area, in response to a 1999 request from Washington state's Congressional representatives, a group of leading scientists presented its recommendations for Hatchery Reform to the US Congress in a report entitled "*The Reform of Salmon and Steelhead Hatcheries in Puget Sound and Coastal Washington to Recover Natural Stocks While Providing Fisheries*". The report determined that the potential exists for hatcheries to provide benefits to the recovery of naturally spawning salmon. The report called for a comprehensive hatchery reform effort to conserve indigenous genetic resources; assist with the recovery of naturally spawning populations; provide for sustainable fisheries; conduct scientific research; and improve the quality and cost-effectiveness of hatchery programs. Congress adopted and funded these recommendations launching the Hatchery Reform Project, led by the Hatcheries Scientific Review Group (HSRG). This project is a systematic, science driven approach aimed to evaluate hatcheries and provide recommendations for how hatcheries can be used to help and to improve their operation.. The HSRG has evaluated every aspect of Puget Sound hatchery programs and come up with approximately 1000 recommendations. In the Columbia Basin, now is the time to cooperatively reassess the operation of the facilities in the light of current goals and circumstances and modify and improve the various facilities or programs to assure progress in meeting current goals and objectives.

A regional proposal is being advanced that uses the most recent scientific advice to manage Mitchell Act fish hatcheries in a genetically friendly, recovery oriented and sustainable manner. This must be accomplished without abandoning the federal responsibility to mitigate for populations depressed due to development since the latter part of the 19th century. The programs developed for the individual hatcheries will depend upon their locations, water supplies, facilities' designs, rearing conditions, and other factors relating to their capabilities. Some people refer to this as "hatchery reform," it may be better expressed as, "program assessment, improvement, and alignment to address current needs and expectations of the program." Use of adaptive management is critically needed within the Mitchell Act hatchery system at this time to coordinate and implement existing and new information essential for the success of salmon and steelhead hatcheries. Structural changes within the hatcheries will be required to implement new strategies for rearing, such as the integration or segregation of hatchery and wild fish, and to provide for the marking of juvenile hatchery salmon and steelhead.

The fishery managers of the various jurisdictions will be asked to assess the resource across jurisdictional boundaries. The individual programs must be viewed as part of a larger conglomeration that functions to aid the resource. In some cases sensitive but significant policy issues, such as the need to develop and implement long-term agreements between the states and tribes regarding mass marking of salmonids will require candid discussions for proper portrayal and resolution.

With the advent of severely depressed anadromous fish populations in the Pacific Northwest and the accompanying federal actions to list many of the stocks under the Endangered Species Act, there is an emerging need to refocus Mitchell Act fish hatcheries where appropriate. Each program must contribute benefits to the overall resource. The program must also be aligned with current court agreements, address the trust relationship for the Tribes, be responsive to harvest agreements for in-river and distant fisheries. Additionally, it should incorporate habitat conservation and other recovery plans, while functioning as a steward to the resource.

Funding for the proper functioning of the programs must also be available within a specific, reasonable period of time. Many assessments fail because once needs have been identified, funding is not provided. Currently one way to address this would be for Congress to designate an additional increment of funding prior to the assessment. The jurisdictions could then implement "hatchery reform" in a structured and timely manner.

**Mitchell Act Budget
and Mass Marking Budget**

	Approximate Distribution				
	2005	2006	2007	2008	2009
Currently Funded Activities					
Idaho Department of Fish and Game					
Fish screens	1,363,504	1,797,635	1,851,564	1,907,111	1,964,324
	1,363,504	1,797,635	1,851,564	1,907,111	1,964,324
Oregon Department of Fish and Wildlife					
Hatchery O&M	3,703,072	4,437,000	4,570,110	4,707,213	4,848,429
Fish Screening and Fishways	1,640,534	2,074,000	2,136,220	2,200,306	2,266,315
	5,343,606	6,511,000	6,706,330	6,907,519	7,114,744
United States Fish and Wildlife Service					
Hatcheries O&M	3,171,054	3,948,016	4,031,196	4,542,631	4,678,910
	3,171,054	3,948,016	4,031,196	4,542,631	4,678,910
Washington Department of Fish and Wildlife					
Hatchery O&M	4,167,678	5,054,678	5,206,318	5,362,508	5,523,383
Monitoring, Evaluation, and Reform	480,215	494,621	509,460	524,744	540,486
Screens/Fishways O&M	209,962	396,800	408,704	420,965	433,594
	4,857,855	5,946,099	6,124,482	6,308,217	6,497,463
Clickitat Hatchery O&M*					
Maintenance*	537,020	553,130	569,724	586,815	604,420
Prosser Hatchery O&M	185,000	190,550	196,267	202,154	208,219
Clickitat Fishways O&M*	17,218	17,734	18,266	18,814	19,379
	185,000	190,550	196,267	202,154	208,219
*Clickitat budget amounts are currently included with WDFW, this illustrates funds to be shifted to YN after planned ownership change					
National Marine Fisheries Service					
NEPA Preparation	300,000				
Total Existing Activities	15,221,019	18,393,300	18,909,839	19,867,632	20,463,661
					21,077,571

New Activities						
Oregon Department of Fish and Wildlife						
Hatcheries M&E and Reform	300,000	330,000	340,000	350,000	360,000	
Deferred Maintenance	150,000	250,000	400,000	300,000	300,000	
Intake Structure Modifications						
Sandy Hatchery	300,000					
Oxbow Hatchery	200,000					
	950,000	580,000	740,000	650,000	660,000	
United States Fish and Wildlife Service						
Deferred Maintenance						
Carson	41,000		570,000			
Little White Complex	361,000	264,000	151,000	236,000	232,000	
Spring Creek			31,000			
Eagle Creek		125,000	49,369	376,000		
Lower Col. Fish Health Ctr.	9,049	9,320	9,600	9,888	10,184	
Columbia Program Office	67,414	69,436	71,519	73,665	75,874	
Biological Evaluations	367,000	367,000	236,000	236,000	141,000	
	845,463	834,756	1,118,488	931,553	459,058	
Washington Department of Fish and Wildlife						
Deferred Maintenance	100,000	200,000	206,000	212,180	218,545	
Elochoman Rack and Adult Facility		50,000	10,000	2,700,000		
Elochoman Clear Cr Intake					100,000	
Washougal River Intake			100,000			
Washougal Adult Handling			125,000			
Skamania West Fork Intake and Barrier		1,500,000				
Kalama Barrier, Ladder and Adult Ponds				2,000,000		
North Toutle Upper Intake and Pipeline			750,000			
North Toutle Lower Intake		100,000	750,000			
North Toutle Bridge		200,000	1,000,000			
Ringold Pipeline Repair				50,000		
Major Construction Wind River		250,000	2,150,000			
Screen Shop Improvement		150,000				
	100,000	2,450,000	5,091,000	4,962,180	318,545	

Cooperated Tribes of Umatilla Indian Reservation					
Pond #25 Intake	250,000				238,702
Wahkiacus Hatchery and Acclimation Facility O&M		225,000		231,750	
Lyle Falls Fishway Reconstruction & Broodstock Capture-design accomplished with other funds		2,500,000			350,960
Monitoring, Evaluation, and Reform	300,000	312,000	324,480	337,460	1,113,615
Mid-Col Coho Restoration (shared funding with PUDs)		990,000	1,029,600	1,070,784	
	300,000	1,552,000	4,079,080	1,639,994	1,703,277
Nez Perce Tribe					
Clearwater Coho transportation and acclimation	120,000	123,600	127,308	131,127	135,061
Monitoring and evaluation		220,000	226,600	233,398	240,400
Clearwater Acclimation Pond			60,000	255,000	63,654
Grand Ronde O&M				61,800	309,000
Monitoring and evaluation				300,000	300,000
Wallowa modifications					
	120,000	343,600	413,908	981,325	1,048,115
Yankee Fork Acclimation					
Slate Creek Release	2,000	500	515	530	546
Yankee Fork Acclimation	48,000	49,440	50,923	52,451	54,024
	50,000	49,940	51,438	52,981	54,571
Confederated Tribes of Umatilla Indian Reservation					
Coded Wire Tagging	10,786	11,110	11,443	11,786	12,140
Transportation Costs	4,000	4,120	4,244	4,371	4,502
Walla Walla Acclimation Pond		55,000	1,000,000		
Acclimation O&M				11,000	11,330
	14,786	70,230	1,015,686	27,157	27,972
Bridgeport Acclimation Pond					
Bridgeport Acclimation Pond	40,000	350,000	240,000	247,000	255,000
Rearing at USFWS Willard			40,000	41,000	42,000
Acclimation at Bridgeport					
	40,000	350,000	280,000	288,000	297,000
Total New Activities					
	2,420,249	6,230,526	12,789,601	9,533,191	4,568,538

Mass Marking O & M not included in Mitchell Act Appropriation but administered by NMFS					
ODFW	364,177	797,259	1,190,735	1,226,457	1,263,250
USFWS	352,419	362,992	373,881	385,098	408,550
WDFW	330,000	787,200	810,816	835,140	860,195
Total for Mass Marking O&M	1,046,596	1,947,451	2,375,432	2,446,695	2,531,995

Mass Marking (MM) Capital Expenditures (informational not included in calculations)

ODFW MM Capital-informational not included in calculations	900,000
WDFW MM Capital-informational not included in calculations	2,164,620

Summary					
Existing Activities					
Idaho Department of Fish and Game	1,363,504	1,797,635	1,851,564	1,907,111	1,964,324
Oregon Department of Fish and Wildlife	5,343,606	6,511,000	6,706,330	6,907,519	7,114,744
United States Fish and Wildlife Service	3,171,054	3,948,016	4,031,196	4,542,631	4,678,910
Washington Department of Fish and Wildlife	4,857,855	5,946,099	6,124,482	6,308,217	6,497,463
U.S. Department of the Interior Bureau of Reclamation	185,000	190,550	196,267	202,154	208,219
National Marine Fisheries Service	300,000	0	0	0	0
Total for Existing Activities	15,221,019	18,393,300	18,909,839	19,867,632	20,463,661
New Activities Combined					
Oregon Department of Fish and Wildlife	950,000	950,000	580,000	740,000	650,000
United States Fish and Wildlife Service	845,463	845,463	834,756	1,118,488	931,553
Washington Department of Fish and Wildlife	100,000	100,000	2,450,000	5,091,000	4,962,180
U.S. Department of the Interior Bureau of Reclamation	300,000	300,000	1,552,000	4,079,080	1,639,994
Nez Perce Tribe	120,000	120,000	343,600	413,908	981,325
Shasta County Flood Control District	50,000	50,000	49,940	51,438	52,981
Confederated Tribes of Umatilla Indian Reservation	14,786	14,786	70,230	1,015,686	27,157
U.S. Department of the Interior Bureau of Land Management	40,000	40,000	350,000	280,000	288,000
Total for New Activities	2,420,249	2,420,249	6,230,526	12,789,601	9,533,191
Mitchell Act Existing and New Activities	15,221,019	20,813,549	25,140,365	32,657,233	29,996,851
Mass Marking O&M	1,046,596	1,947,451	2,375,432	2,446,695	2,531,995
Sum Mitchell Act and Mass Marking O&M	16,267,615	22,761,000	27,515,797	35,103,928	32,528,846

Background

To provide for the conservation of the fishery resources of the Columbia River, establishment, operation, and maintenance of one or more stations in Oregon, Washington, and Idaho, and for the conduct of necessary investigations, surveys, stream improvements, and stocking operations for these purposes. (Appendix 1. Text of Mitchell Act)

The fishery in the Columbia River has been decreasing slowly since the turn of the century. The constant inroads of civilization have continually worked to the detriment of the fish populations. First irrigation diversions, then small hydroelectric dams on several tributaries, then more and larger irrigation diversions, over-fishing by the commercial interests, increase in sport fishing, gaffing of fish on the spawning grounds and increasing industrial and domestic pollution bringing pressure constantly against the fish populations, have slowly decreased their former abundance. So many factors were at work in so many ways that the public's attention was never riveted for any length of time on the decreasing value of this enormous asset.

The initial reports on the development of the Columbia River for navigation, irrigation, power, and flood control purposes, which did not include adequate protection for the fisheries, brought sharply to the public's attention that this asset was in perilous danger of being completely extinguished by such developments. Public opinion was directed intensively on the problems of the preservation of the Columbia River fishery which was already greatly diminished by the development of power and irrigation projects in the tributary streams. The State of Washington restricted the commercial fishery on its side of the river by the passage of Initiative #77; the pressure of public opinion forced the construction of adequate protective devices for the fish at the Bonneville Dam; at a cost of some \$220,000 an additional fish ladder was built by the Puget Sound Power and Light Company on the Rock Island Dam; the U.S. Bureau of Fisheries was allotted a sum of money for the investigation of the problems of the Columbia River watershed; the Washington Department of Fisheries was able to secure funds for their long proposed program of screening the more than 200 irrigation and power diversions in the Columbia watershed that for the past 35 years had been diminishing the fish populations by the destruction of vast numbers of the young seaward migrants annually. The future of the Columbia River fishery began to look up a little.

The previous two paragraphs were taken from: *Report of the Preliminary Investigations into the Possible Methods of Preserving the Columbia River Salmon and Steelhead at the Grand Coulee Dam* by B. M. Brennan, Director of Washington Department of Fisheries, January 1938. It is clear that there was acknowledgement of trouble with the resource, coincidentally this is the same period that saw the initiation of the Public Law 75-502, The Mitchell Act.

Excerpts from Congressional Testimony

The House Committee on Merchant Marine and Fisheries of the Seventy-Fifth Congress held a hearing on April 12, 1938. Testimony from state and federal agencies, and representatives of conservation and planning associations and were unanimous in support for the legislation and addressed virtually the same issues.

- The fishery was decreasing and the species captured in the fishery are changing
- The locations for spawning and rearing of the most valuable runs (Chinook) were in most cases above the location of the new Bonneville Dam
- The recent mainstem dams focused interest on the plight of the salmon but they are just links in the long chain of interference and destruction
- The most damaging inroads occurred from large reclamation and irrigation projects that completely shut off migration
- Tributary power dams played havoc with migration
- Soil erosion had covered vast spawning grounds
- Deforestation and excessive grazing reduced the feeding grounds for salmon and the too rapid drainage washed away and destroyed the spawn
- Hatcheries were a potential solution but research needed to be performed to assess the effects and location where needed
- Reestablishment of runs in potential spawning areas not utilized may be effective but the other the other ills needed to be corrected
- Hatcheries needed to be located below Bonneville Dam because of the uncertainty of passage

Testimony of the Yakima, Umatilla, and Warm Springs Tribes were submitted and also Tommy Thompson, Chief of the Wy-am or Celilo provided comments. These comments had much to do with the continuation of the Tribal fishery in traditional locations, especially Celilo.

Developments since the passage of Mitchell Act

The Mitchell Act was passed in 1938 when Congress recognized that the salmon fishery in the Columbia River was in serious and progressive decline. Years later, Congress passed the Magnuson-Stevens Fisheries and Conservation and Management Act (Magnuson-Stevens Act) to establish additional measures to protect the nation's fisheries. In addition, the Federal government must protect tribal fishing rights guaranteed to the Columbia River Indian tribes in treaties with the U.S. government and reaffirmed in subsequent court decisions (e.g., U.S. v. Oregon), as well as fulfill the Federal tribal trust responsibilities to all tribal entities. NOAA Fisheries will follow these laws and mandates when developing the Mitchell Act EIS.

Appendix 1. The Mitchell Act

The Mitchell Act (Public Law 75-502)

To provide for the conservation of the fishery resources of the Columbia River, establishment, operation, and maintenance of one or more stations in Oregon, Washington, and Idaho, and for the conduct of necessary investigations, surveys, stream improvements, and stocking operations for these purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Interior is authorized and directed to establish on or more salmon-cultural stations in the Columbia River Basin in each of the States of Oregon, Washington, and Idaho. Any sums appropriated for the purpose of establishment of such stations may be expended, and such stations shall be established, operated, and maintained, in accordance with the provision of the Act entitled "An Act to provide for a five-year construction and maintenance program for the United States Bureau of Fisheries:, approved May 21, 1930, insofar as the provisions of such Act are not inconsistent with the provisions of this Act.

Sec. 2. The Secretary of the Interior is further authorized and directed (1) to conduct such investigations, and such engineering and biological surveys and experiments, as may be necessary to direct and facilitate conservation of the fishery resources of the Columbia River and its tributaries; (2) to construct and install devices in the Columbia River Basin for the improvement of feeding and spawning conditions for fish, for the protection of migratory fish from irrigation projects, and for facilitating free migration of fish over obstructions; and (3) to perform all other activities necessary for the conservation of fish in the Columbia River Basin in accordance with law.

Sec. 3. In carrying out the authorizations and duties imposed by section 2 of this Act, the Secretary of the Interior is authorized to utilize the facilities and services of the agencies of the States of Oregon, Washington, and Idaho responsible for the conservation of the fish and wildlife resources in such States, under the terms of agreements entered into between the United States and these States, without regard to the provisions of section 3709 of the Revised Statutes, and funds appropriated to carry out the purposes of this Act may be expended for the construction of facilities on and the improvement of lands not owned or controlled by the United States; Provided, That the appropriate agency of the State wherein such construction or improvement is to be carried on first shall have obtained without cost to the United States the necessary title to, interest therein, right-of-way over, or licenses covering the use of such lands.

Approved May 11, 1938, amended August 8, 1946
(52 Stat. 345) (60 Stat. 932)

Appendix 2. Partial Listing of Sport Fisheries Supported by Mitchell Act Funding

2001 Oregon and Washington recreational salmonid angler trips for fisheries with Mitchell Act Hatchery contributions.

Fishery	Angler Trips
Ocean Salmon Fishery ¹	211,200
Buoy 10 Salmon Fishery	122,000
LCR Fall Fishery	97,200
LCR Summer Fishery	37,000
LCR Spring Fishery	175,800
Willamette Spring Fishery	101,500
Clackamas Spring Fishery	10,500

Grand Total ²

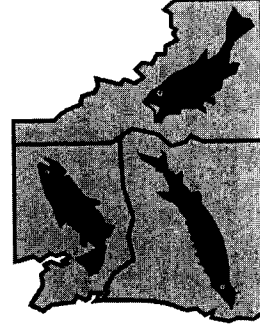
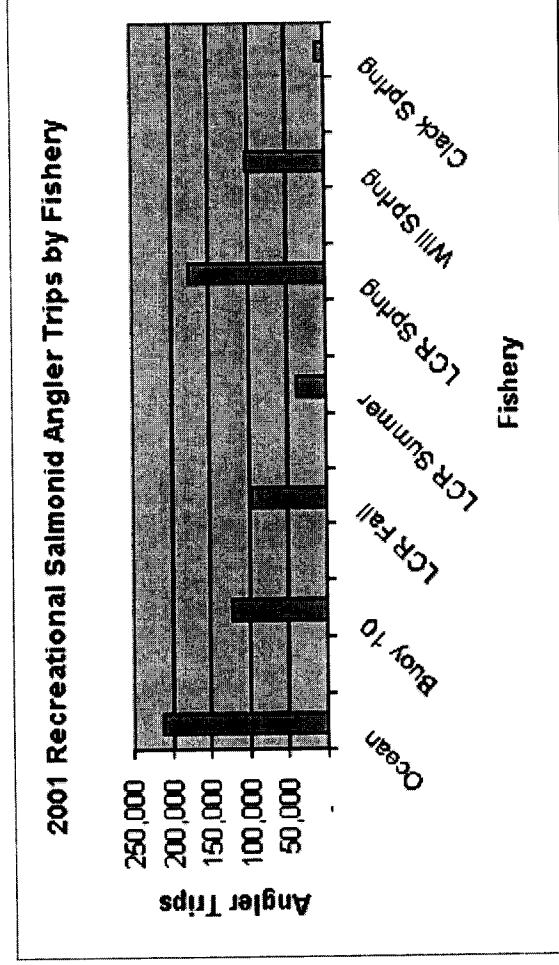
755,200

\$104,217,600 ³

¹ Includes all recreational salmon angler trips between Humbug Mtn, OR and Neah Bay, WA.

² Additional angler trips occur in tributary areas that are not included in this summary.

³ A Columbia River Spring Salmon angler trip is valued at \$138 per day



Provided Courtesy of:
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Appendix 3. List of Mitchell Act Hatcheries and Programmed Production (January 27, 2005)

List of Hatcheries

Agency/ Hatchery	Species Reared	Stock	Location	Congressional District	Production Began	Status	Origin of Hatchery Population
U.S. Fish and Wildlife Service							
Abernathy	Fall Chinook	Tule	Longview, WA	WA-3rd	1959	Inactive	Lower Columbia/Spring Cr. Hat
Carson	Spring Chinook	Carson	Carson, WA	WA-4th	1932	Active	Bonn. Dam Trapping/ 1955-60's
Eagle Creek	Coho Steelhead	Early Winter	Estacada, OR	OR-2nd	1957	Active	Sandy/Clackamas Rivers Clackamas River
Little White Salmon	Fall Chinook Spring Chinook	Upriver Bright	Cook, WA	WA-4th	1898	Active	Bonneville/Priest Rapids Hat. Carson
Spring Creek ³	Fall Chinook Spring Chinook	Tule Carson	Underwood, WA	WA-4th	1901	Active	Big White Salmon River Carson Hatchery
Willard ⁴	Coho	Early	Cook, WA	WA-4th	1951	Active- being mothballed	Lower Columbia River

¹ Shaded programs are at Mitchell Act hatcheries but are funded by other sources.

² In the Purpose Column- H refers to harvest, C to conservation, and D to dual purpose

³ Funding for Spring Creek is split between NMFS under the Mitchell Act and the Corps of Engineers under John Day Mitigation. The URB program originally at Spring Creek is now being conducted at Little White Salmon and the Little White Salmon tule program is at Spring Creek.

⁴ Willard is currently operated as part of a complex with Little White Salmon.

Oregon Department of Fish and Wildlife							
Big Creek	Fall Chinook Coho Steelhead Cutthroat	Tule Rogue River ⁵ Early Winter Sea Run	Astoria, OR	OR-1st	1938	Active	Lower Columbia Cole River Hatchery Big Creek Big Creek Big Creek
Bonneville ⁶	Fall Chinook Spring Chinook Coho	Upriver Bright Varies Early	Cascade Locks, OR	OR-3rd	1909	Active	Trapping at Bonneville Dam From Various Hatcheries Lower Columbia
Cascade	Coho	Early	Bonneville, OR	OR-3rd	1958	Active	Bonneville Hatchery
Clackamas ⁷	Spring Chinook Steelhead	Clackamas Winter	Estacada, OR	OR-2nd	1979	Active	Clackamas Clackamas
Gnat Creek	Steelhead Cutthroat	Summer Winter Sea Run	Clatskanie, OR	OR-1st	1960	Inactive ⁸	S. Santiam/Skamanian Big Creek Big Creek
Klaskanine	Fall Chinook	Rogue River ⁹	Astoria, OR	OR-1st	1911	Inactive ¹⁰	Cole Rivers Hatchery

⁵The Rogue River program is funded by Clatsop Economic Development Commission and BPA. It has been transferred to Klaskanine Hatchery because of high adult stray rates.

⁶ Bonneville is funded 55% by NMFS under the Mitchell Act and 45% by the Corps of Engineers under John Day Mitigation.

⁷ In addition to 29.5% from NMFS, Clackamas is funded by the State of Oregon, City of Portland, and Portland General Electric.

⁸ Being operated utilizing non-Mitchell Act funding (BPA). Gnat Creek's production programs are being carried out at Big Creek and Bonneville.

⁹The Rogue River program is being moved to Klaskanine Hatchery with State and BPA funding as part of the C.E.D.C. program.

¹⁰ Being operated utilizing non-Mitchell Act funding (BPA).

		Coho Steelhead	Early Winter						Lower Columbia Big Creek
	OxBow	Coho Spring Chinook	Early Clackamas	Cascade Locks, OR	OR-2nd	1938	Active		Bonneville Hatchery Eagle Creek Hatchery
	Sandy	Coho	Early	Sandy, OR	OR-2nd	1950	Active		Sandy River
	Stayton Pond	Fall Chinook	Tule	Stayton, OR	OR-2nd	1971	Inactive		Bonneville Hatchery
Washington Department of Fish and Wildlife									
	Beaver Creek	Steelhead Cutthroat	Winter Summer Sea Run	Cathlamet, WA	WA-3rd	1958	Inactive		Beaver Cr/Cowlitz/Chambers Cr Skamania Hatchery Beaver Cr/Coastal Mix
	Elochoman	Fall Chinook Coho	Tule Early/Type S Late/Type N	Cathlamet, WA	WA-3rd	1954	Active		Lower Columbia Mix Lower Columbia Lower Columbia
	Grays River	Fall Chinook Coho Chum	Tule Early/Type S Grays River	Grays River, WA	WA-3rd	1961	Inactive		Lower Columbia Mix Lower Columbia Wild Grays River Fish
	Kalama Falls ¹¹	Fall Chinook Spring Chinook Coho	Tule Kalama Falls Late/Type S	Kalama, WA	WS-3rd	1959	Active		Lower Columbia Kalama River Lower Columbia
	Klickitat	Fall Chinook Spring Chinook Coho	Upriver Bright Klickitat Late/Type N	Glenwood, WA	WA-4th	1950	Active		U. Columbia River Mix Klickitat Lower Columbia
	Fallert Creek ¹²	Spring Chinook	Kalama Falls	Kalama, WA	WA-3rd		Active		Kalama River

¹¹ Includes the coho program at Lewis River Hatchery, a non-Mitchell Act hatchery being partially funded to benefit the Mitchell Act program.

¹² Fallert Creek (also known as Lower Kalama) is operated as a satellite of Kalama Falls Hatchery and shouldn't be counted as a separate Mitchell Act hatchery.

Ringold Hatchery ¹³ 14	Spring Chinook ¹⁵ Fall Chinook	Carson URB	Mesa, WA	WA-5th	1962	Active	Carson Hatchery Bonneville
Ringold Trout	Steelhead	Summer	Mesa, WA	WA-5th	1962	Active	Well Dam
Skamania	Steelhead	Summer Winter	Washougal, WA	WA-4th	1956	Active	Washougal/Klickitat Mix Beaver Creek Hatchery
Toutle	Fall Chinook Coho	Tule Early/Type S	Toutle, WA	WA-3rd	1952	Active	Lower Columbia Mix Lower Columbia
Washougal	Fall Chinook Coho	Tule Late/Type N	Washougal, WA	WS-4th	1958	Active	Lower Columbia Mix Lower Columbia

¹³ The two Ringold facilities are being operated as a single complex.

¹⁴ Ringold also provides short-term acclimation for URB fall chinook each year as part of the Corp funded John Day mitigation program.

¹⁵ Hatchery currently does not release spring chinook funded by Mitchell Act, although that is a part of the S.F. Walla Walla restoration by the Umatilla Tribe.

Programmed Production^{16 17}

Agency	Hatchery	Species	Stock	Purpose	Tribal	Non Tribal	Mark	Number	Stage	Site	Comments
ODFW	Big Creek	Coho	Big Creek	H		X	25K AdCWT 119K Ad	144,000	Smolts	On-station	April Release
ODFW	Big Creek	Coho	Big Creek	H		X	25K AdCWT 366K Ad	391,000	Smolts	On-station	May Release
ODFW	Bonneville	Coho	Tanner Creek	D(H/C)		X	25K AdCWT 325K Ad	350,000	Smolts	On-station	May Release
ODFW	Bonneville	Coho	Tanner Creek	D(H/C)		X	25K AdCWT 800K Ad	825,000	Smolts	On-station	June Release
ODFW	Bonneville/ Herman Cr	Coho	Tanner Creek	H		X	25K AdCWT 800K Ad	825,000	Pre-smolts	CEDC	October Transfer
ODFW	Cascade	Coho	Tanner Creek	D(C/H)	X		350K CWT (plus other marks)	350,000	Smolts	Icicle Cr, WA	Mid-Col Stock
ODFW	Cascade	Coho	Tanner Creek	D(C/H)	X		100K CWT (plus other marks)	100,000	Smolts	Beaver Cr, WA	Mid-Col Stock
ODFW	Cascade	Coho	Tanner Creek	D(C/H)	X		100K CWT (plus other marks)	100,000	Smolts	Chumstick Cr, WA	Mid-Col Stock
ODFW	Cascade	Coho	Tanner Creek	D(C/H)	X		150K CWT (plus other marks)	150,000	Smolts	Nason Cr, WA	Mid-Col Stock
ODFW	Cascade	Coho	Tanner Creek	D(C/H)	X		50K AdCWT	1,000,000	Smolts	Umatilla River OR	Tribal Reintroduction
ODFW	OxBow	Coho	Tanner Creek	D(C/H)	X		25K AdCWT	500,000	Smolts	Umatilla R	Tribal Reintroduction
ODFW	Cascade	Coho	Tanner Creek	H		X	25K AdCWT 375K Ad	400,000	Pre-smolts	CEDC- Youngs Bay	

¹⁶ Shaded programs are at Mitchell Act hatcheries but are funded by other sources.

¹⁷ In the Purpose Column- H refers to harvest, C to conservation, and D to dual purpose

ODFW	Cascade	Coho	Tanner Creek	H		X	25K AdCWT 175K Ad	200,000	Pre-Smolts	CEDC- Tongue Pt.	
ODFW	Sandy	Coho	Sandy	D(C/H)		X	25K AdCWT 325K Ad	350,000	Smolts	On-station	Unique Brood Stock April Release
ODFW	Sandy	Coho	Sandy	D(C/H)		X	25K AdCWT 25K CWT 300 Ad	350,000	Smolts	On-station	Unique Brood Stock May Release
ODFW	Sandy	Coho	Sandy	H		X	25K AdCWT 275K Ad	300,000	Pre-Smolts	CEDC- Blind Slough	May Transfer
USFWS	Eagle Creek	Coho	Eagle Creek	H		X	950K Ad 50K AdCWT	1,000,000	Smolts	CEDC	
USFWS	Eagle Creek	Coho	Eagle Creek	H		X	450K Ad, 25K AdCWT, 25K CWT	500,000	Smolts	On-station	
USFWS	Eagle Creek	Coho	Eagle Creek	D(C/H)	X		No Mark	550,000	Smolts	Nez Perce	Tribal Reintroduction
USFWS	L. White Salmon/ Willard	Coho		D(C/H)	X		500K CWT	500,000	Smolts	Methow/Wena tchee	
USFWS	L. White Salmon/ Willard	Coho		H	X	X	900K Ad 50K AdCWT 50K CWT	1,000,000	Smolts	On-station	
USFWS	L. White Salmon/ Willard	Coho		D(C/H)	X		500K CWT	500,000	Smolts	Yakama	
WDFW	Elochoman	Coho- Type N	Elochoman	H		X	15K Ad	15,000	Smolts	Elochoman R	Cathlamet FFA
WDFW	Elochoman	Coho- Type N	Elochoman	H		X	30K AdCWT 467K Ad	497,000	Smolts	On-station	
WDFW	Elochoman	Coho- Type S	Elochoman	H		X	30K AdCWT 388K Ad	418,000	Smolts	On-station	
WDFW	Kalama Falls	Coho- Type N	Kalama R.	H		X	30K AdCWT 320K Ad	350,000	Smolts	On-station	

WDFW	Kalama Falls	Coho- Type S	Kalama R.	H		X	30K AdCWT 320K Ad	350,000	Smolts	Fallert Creek/ Kalama R.	
WDFW	Klickitat	Coho- Type N	Klickitat	H	X	X	45K AdCWT 955K Ad	1,000,000	Smolts	On-station	
WDFW	N. Toutle	Coho- Type S	Toutle R.	H		X	30K AdCWT 770K Ad	800,000	Smolts	On-station	
WDFW	Washougal	Coho	Type-N	H		X	30K AdCWT 470K Ad	500,000	Smolts	On-station	
WDFW	Washougal	Coho	Type-N	H	X	X	60K AdCWT	2,500,000	Smolts	Klickitat	Remainder unclipped
ODFW	Big Creek	Fall Chinook	Tule	H		X	200K AdCWT	5,700,000	Smolts	On-station	Not 100%- Logistics
ODFW	Big Creek	Fall Chinook	Salmon Area Brights	H		X	25K AdCWT 275K BWT	800,000	Prec smolts	CHDC Youngs Bay	BPA Funded
ODFW	Big Creek	Fall Chinook	Salmon Area Brights	H		X	25K AdCWT 475K BWT	200,000	Prec smolts	CHDC Klaskanine	BPA Funded June Transfer
ODFW	Big Creek	Fall Chinook	Salmon Area Brights	H		X	25K AdCWT 575K BWT	500,000	Prec smolts	CHDC Klaskanine	BPA Funded August Transfer
ODFW	Bonnaville	Fall Chinook	URB	D(H/C)		X	50K AdCWT	50,000	Smolts	On-Station	Corps Funded July Release
ODFW	Bonnaville	Fall Chinook	URB	D(H/C)		X	50K AdCWT	1,400,000	Smolts	On-Station	Corps Funded August Release Not 100%- Logistics
ODFW	Bonnaville	Fall Chinook	URB	D(C/H)	X	X	32K AdCWT 215K BWT	240,000	Smolts	Umanilla	Corps Funded Feb Transfer
ODFW	Bonnaville	Fall Chinook	URB	D(C/H)	X	X	25K AdCWT 215K BWT	240,000	Smolts	Umanilla	Corps Funded March Transfer
USEWS	L. White Salmon/ Willard	Fall Chinook	URB	D(C/H)	X	X	200K AdCWT	1,500,000	Smolts	Yakama	Corps Funded Not 100%- Logistics

USFWS	Tri-White Salmon/Willard	Fall Chinook	URB	H	X	X	200K AdCWT	2,000,000	Smolts	On-station	Corp. Funding: Not 100%- Logistics
USFWS	Spring Creek	Fall Chinook	Tule	D(H/C)	X	X	450K AdCWT	15,300,000	Smolts	On-station	Unique Broodstock Not 100%- Logistics
WDFW	Elochoman	Fall Chinook	Tule	H		X	90K AdCWT	2,000,000	Smolts	On-station	Not 100%- Logistics
WDFW	Kalama Falls	Fall Chinook	Tule	H		X	90K AdCWT	2,500,000	Smolts	Fallert Creek/ Kalama R.	Not 100%- Logistics
WDFW	Kalama Falls	Fall Chinook	Tule	H		X	90K AdCWT	2,500,000	Smolts	On-station	Not 100%- Logistics
WDFW	Klickitat	Fall Chinook	URB	H	X	X	572.9K AdCWT	3,772,900	Smolts	On-station	Not 100%- Logistics
WDFW	N. Toutle	Fall Chinook	Tule	H		X		2,500,000	Smolts	On-station	Not 100%- Logistics
WDFW	Ringold ¹⁸	Fall Chinook	URB	H	X	X	200K AdCWT	3,450,000	Smolts	On-station	Not 100%- Logistics
WDFW	Washougal	Fall Chinook	Tule	H		X	90K AdCWT	4,000,000	Smolts	On-station	Not 100%- Logistics
ODFW	Bonneville	S. Steelhead	S Santiam/ Skamania	H		X	40K Ad	40,000	Smolts	Sandy	
ODFW	Bonneville	S. Steelhead	S Santiam/ Skamania	H		X	175K Ad	175,000	Smolts	Clackamas	
WDFW	Elochoman ¹⁹	S. Steelhead	Lewis River	H		X	30K Ad	30,000	Smolts	On-station	
WDFW	Kalama Falls	S. Steelhead	Kalama R- Wild	C		X	60K Ad Blank Creek CWT	60,000	Smolts	On-station	
WDFW	Kalama Falls	S. Steelhead	Skamania	H		X	30K	30,000	Smolts	Kalama R/ Fallert Cr	

¹⁸ From Bonneville as part of John Day Mitigation, funded by BPA while reared and marked at Bonneville and then hauled to Ringold. Funded by CRFDP while acclimating at Ringold.

¹⁹ Fish released from Elochoman but are partially reared and Ad clipped at Merwin. Funding from CRFDP and PacifiCorp.

WDFW	Ringold	S. Steelhead		H	X	X	180K Ad RV	180,000	Smolts	On-station	
WDFW	Skamania	S. Steelhead		H	X	X	204K Ad	204,000	Smolts	On and off-station	
WDFW	Skamania	S. Steelhead		H		X	50K Ad +RV	50,000	Smolts	Lewis River	Fish First
WDFW	Skamania	S. Steelhead		H		X	25K Ad	25,000	Smolts	Cowlitz G&A	South Fork Toutle R
WDFW	N. Toutle	S. Steelhead	Skamania	H		X	25K Ad	25,000	Smolts	On-station	
ODFW	OxBow	Sockeye	Snake R.	C			100% Marked	40,000	Smolts	Idaho Lakes	Eggs from Captive Brood
ODFW	Clackamas	Spring Chinook	Wild Sandy	D(C/H)		X	50k AdCWT 250k Ad	300,000	Smolts	Sandy	Wild Broodstock
ODFW	Clackamas	Spring Chinook	Clackamas	H		X	50k AdCWT 250k Ad	300,000	Fall Release	On-station	Unique Broodstock, 0+ Program
ODFW	Clackamas	Spring Chinook ²⁰	Clackamas	H		X	50k AdCWT 50K CWT 470K Ad	570,000	Smolts	On-station	Unique Broodstock
ODFW	Clackamas	Spring Chinook	Clackamas	H		X	50K Ad	50,000	Smolts	Cassidy Pond	Unique Broodstock
ODFW	Clackamas	Spring Chinook ²¹	Clackamas	H		X	60 AdLM	60,000	Smolts	Eagle Creek	Unique Broodstock
USFWS	Carson	Spring Chinook	Carson	H	X	X	1.345M Ad 75K AdCWT	1,420,000	Smolts	On-station	

²⁰ Starting in 2006, 60,000 will be acclimated at Eagle Creek NFH and release in Eagle Creek.

²¹ Starting in 2006. 100% marked with AdLM mark.

USFWS	L. White Salmon/Willard	Spring Chinook		H	X	X	925K Ad 75K AdCWT	1,000,000	Smolts	On-station	
USFWS	L. White Salmon/Willard	Spring Chinook		D(C/H)	X	X	300K Ad 40K AdCWT	250,000	Smolts	On-station	BBP Banding
WDFW	Kalama Falls	Spring Chinook	Kalama Falls	H			125K AdCWT 125K Ad	250,000	Smolts	Fallert Creek/ Kalama R.	
WDFW	Kalama Falls	Spring Chinook	Kalama Falls	H			125K AdCWT 125K Ad	250,000	Smolts	Gobar Pond/ Kalama R.	
WDFW	Klickitat	Spring Chinook	Klickitat	D(H/C)	X		172.9K AdCWT 427.1K Ad	600,000	Smolts	Klickitat R.	
WDFW	Klickitat	Spring Chinook	Klickitat	D(H/C)	X		300K Ad	300,000	Pre-Smolts	Klickitat R.	Tribal restoration program
ODFW	Big Creek	W. Steelhead	Big Creek	H			60K Ad	60,000	Smolts	On-station	Unique Broodstock
ODFW	Big Creek	W. Steelhead	Big Creek	H			40K Ad	40,000	Smolts	Gnat Creek	
ODFW	Big Creek	W. Steelhead	Big Creek	H			60K Ad	60,000	Smolts	Klaskanine	
ODFW	Bonneville	W. Steelhead	Wild Clackamas	D(C/H)			100K AdLM	100,000	Smolts	Clackamas	Wild Broodstock
ODFW	Bonneville	W. Steelhead	Wild Sandy	D(C/H)			60K Ad	60,000	Smolts	Sandy	Unique Broodstock 2-year smolts
ODFW	Bonneville	W. Steelhead	Wild Sandy	D(C/H)			100K Ad	100,000	Smolts	Sandy	Unique Broodstock 1-year smolts, via Irrigon
ODFW	Clackamas	W. Steelhead	Wild Clackamas	C			15K AdLM	15,000	Smolts	On-station	Wild Broodstock
USFWS	Eagle Creek	W. Steelhead	Eagle Creek	H			150K AdRV	150,000	Smolts	On-station	
WDFW	Elochoman	W. Steelhead	Elochoman	H			105K Ad	105,000	Smolts	On-Station	

WDFW	Elochoman	W. Steelhead	Elochoman	H		X	5K Ad	5,000	Smolts		Coweeman Pond
WDFW	Kalama Falls	W. Steelhead	Wild Kalama	C		X	45K Ad Blank CWT	45,000	Smolts	Gobar Pond/ Kalama R	Wild Stock- ESA
WDFW	Kalama Falls	W. Steelhead	Kalama	C		X	45K Ad	45,000	Smolts	Gobar Pond/ Kalama R	
WDFW	Skamania	W. Steelhead		H	X	X	170K Ad	170,000	Smolts	On and off- station	
WDFW	Skamania	W. Steelhead		H		X	20K Ad	20,000	Smolts	Salmon Cr., Vancouver	Klineline Pond

Appendix 4. Funding Levels and Inflation

Comparison of Relative Effectiveness of Mitchell Act Appropriations

Consumer Price Index Calculations				Listed in Millions of Dollars			
Federal Fiscal Year	82-84=100	proportional change from 82-84 base to 93 base	93=100	Base Funds (no Salmon Restoration funds included)	Base Funds adjusted for Inflation	Base Funds with Salmon Restoration Funded Items included	Base Funds with Salmon Restoration Funded Items included adjusted for inflation
1993	144.5	1.00000000	100.0	18.500	18.500	18.500	18.500
1994	148.2	1.02560554	102.6	18.500	18.038	18.500	18.038
1995	152.4	1.05467128	105.5	18.600	17.636	18.600	17.636
1996	156.9	1.08581315	108.6	15.000	13.815	15.000	13.815
1997	160.5	1.11072664	111.1	15.655	14.094	15.655	14.094
1998	163.0	1.12802768	112.8	16.520	14.645	16.520	14.645
1999	166.6	1.15294118	115.3	18.065	15.669	18.065	15.669
2000	172.2	1.19169550	119.2	15.420	12.940	15.420	12.940
2001	177.1	1.22560554	122.6	17.420	14.213	17.420	14.213
2002	179.9	1.24498270	124.5	14.822	11.905	16.522	13.271
2003	184.0	1.27335640	127.3	14.822	11.640	19.212	15.088
2004	188.9	1.30726644	130.7	14.822	11.338	17.622	13.480

 *US Fish and Wildlife
Service Pacific Region*

 *NOAA Fisheries Service**

 *Idaho Department of
Fish and Game*

 *Oregon Department of
Fish and Wildlife*

 *Washington Department
of Fish and Wildlife*

 *Confederated Tribes
and Bands of the
Yakama Nation*

 *Nez Perce Tribe*

 *Confederated Tribes of
the Umatilla Indian
Reservation*

 *Confederated Tribes of
Colville Reservation*

*Shoshone-Bannock
Tribes*

 *Northwest Marine
Technologies*

 *Westport Charterboat
Association*

 *Puget Sound Anglers
State Board*

 *Northwest Sportfishing
Industry Association*

 *Recreational Fishing
Alliance*

Oregon Anglers

*Hans Radtke, Natural
Resource Economist*

**ex officio*

Mitchell Act

c o a l i t i o n

Mitchell Act Success Stories

Introduction: Mitchell Act Hatcheries are the mainstay of commercial, recreational and treaty-Tribal and non-treaty fisheries in the Columbia River Basin and contribute to distant ocean fisheries from California to Alaska. These hatcheries produce nearly 50 percent of the salmon and steelhead released annually into the Columbia River. Fish produced by these hatcheries partially compensate for fish and habitat losses caused by the construction of dams within the Federal Columbia River Power System. In recent years Congress has appropriated about \$17 million annually under the Mitchell Act for operation and maintenance of 18 Federal, State and Tribal hatcheries in Oregon and Washington. Hatchery raised fish comprise about 75% of present salmon and steelhead runs in the Columbia River basin. Under the Mitchell Act the appropriated funds are also used for the construction and maintenance of fish passage facilities such as irrigation

To provide for the conservation of the fishery resources of the Columbia River, establishment, operation, and maintenance of one or more stations in Oregon, Washington, and Idaho, and for the conduct of necessary investigations, surveys, stream improvements, and stocking operations for these purposes.

- Mitchell Act PL 75-502 Chapter 1

diversion screens and fish ladders. These facilities prevent the annual loss of thousands of juvenile salmon and steelhead and improve adult fish migration to spawning and rearing habitat. Funds are also used to support important research and monitoring activities at the hatcheries. The Mitchell Act Program can be described with four H's: **H**atcheries to produce fish for **H**arvest and to mitigate for fish **H**abitat lost due to **H**ydro development.

Legislative History:

- In 1938, Congress passed the Mitchell Act providing federal agencies with the authority to work with the states to set up and operate a series of hatcheries and passage facilities to counter declining fish runs in the Columbia River.
- On August 8, 1946, the Act was amended by Congress to allow the Secretary of Interior to transfer funds to the states for specific projects to develop salmon resources (i.e. hatcheries, screens and fishways).
- In 1947, the Columbia River Fisheries Development Program (CRFDP) was formed to plan and coordinate the use of Mitchell Act funds.
- In 1956, Congress expanded the Mitchell Act to include the preservation of fisheries resources above McNary Dam.
- The Reorganization Plan of 1970 shifted the administration of the Mitchell Act from the Department of the Interior to the Department of Commerce.

- Today, the Mitchell Act is administered by the National Oceanic and Atmospheric Administration (NOAA) Fisheries which directs funding to the US Fish and Wildlife Service, Oregon,

NOTES:

Washington and Idaho along with treaty Tribes for operation and maintenance of mitigation hatcheries.

- The Mitchell Act, through the CRFDP, includes providing for upgrades to irrigation diversion, screening, and fishways and for stream improvement programs.

Funding: Mitchell Act Program funding has remained flat over the past 10 years, essentially starving the hatchery production

December 2005 report titled “*Economic effects from Columbia River Basin Anadromous Salmonid Fish Production*,” these anglers spend about 12 million days fishing within the Columbia River Basin for a variety of resident and anadromous species. The direct trip and equipment expenditures (e.g., gasoline, fishing tackle, etc.) from angler trips, are estimated to be about \$2 billion total for the Pacific Northwest. The geographic area of the

Columbia River Basin accounts for 46 percent of these expenditures or \$883 million annually. In addition, fish produced from the Columbia River Basin are also an important economic component of the Canadian and Alaska ocean fisheries.

- The total Columbia River Basin household personal income generated from

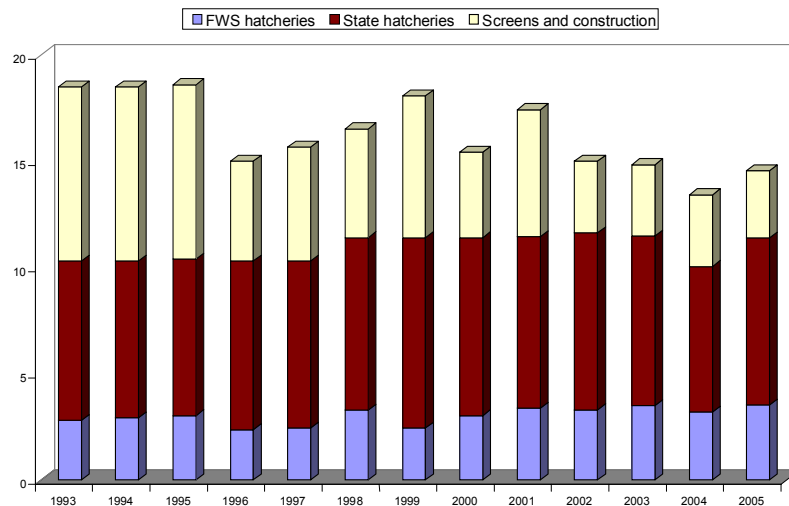
Columbia Basin fisheries are about \$408 million, of which \$142 million (63 percent in the Basin and 37 percent coastal) come from anadromous wild and hatchery salmon and steelhead.¹

- Of that amount, a preliminary estimate is that roughly 30 percent or \$42.5 million can be attributed to harvest of hatchery-produced fish from Mitchell Act facilities, as this is the approximate proportion of hatchery smolts produced annually in the Columbia River Basin by these facilities.²

- In addition the expenditures on hatchery-related and other Mitchell Act funded activities generate an estimated total \$25 million of personal income in regions where hatcheries are located.

- Therefore, for every dollar appropriated these facilities generate about \$4

Mitchell Act Funding



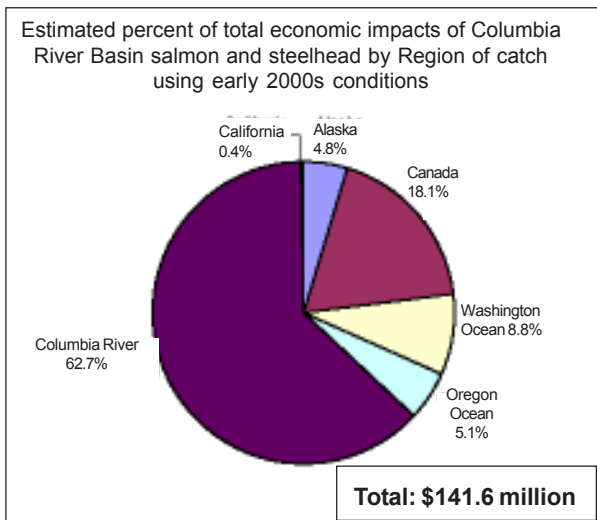
programs from being able to keep up with inflation. In 1993, the Mitchell Act funded 23 hatcheries and two large rearing ponds in the Columbia River Basin. In total, these hatcheries produced over 110 million fish per year, making major contributions to the diverse fishing interests in this region. Starting in 1996, production at five of these hatcheries (one federal and four state facilities) and two rearing ponds was discontinued due to inadequate funding. This resulted in a 40% reduction in annual production to 65 million fish released per year.

Economic Benefits of Mitchell Act Fisheries:

- The estimated number of anglers, within the Columbia River Basin, may be as high as 1.2 million. Based on research conducted by the Independent Economic Analysis Board in their

total income for fishery harvest and fish production related activities. This is based on the amount appropriated (~\$17.0 million) versus the total personal income generated (\$42.5 million harvest income plus \$25 million from Mitchell Act funded operations equals \$67.5 million).

settlement. Returns in more recent times have varied from a low of 750,000 in 1995 to a high of 3.2 million in 2001. There are today over 250 reservoirs that inundate much of the spawning and juvenile rearing habitats in the basin and around 150 hydro-electric projects that affect fish passage. These impacts in combination with other factors have dramatically affected the number of fish that can be naturally produced in the Basin. As a result fish produced by hatcheries have become an increasingly important component of returning fish: nearly three of every four returning salmon and steelhead originates from a hatchery. It is unlikely that the Basin's Tribal, recreational, and commercial fisheries could be maintained without support from the Mitchell Act and its hatcheries. The following examples are fishery resources supported in whole or in part by the Mitchell Act.



- This analysis does not take into consideration cultural, religious, and ceremonial value to Native Americans; Tribal and international treaty obligations; or non-use values (e.g., wildlife watching). Consideration of these values would add substantially to the importance of Mitchell Act production facilities.

(Footnotes)

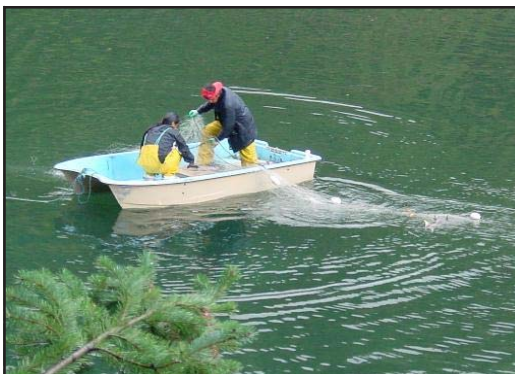
¹ This figure is based on hatchery production, Smolt to Adult Returns (SAR), and harvests at early 2000's levels which is higher than historical survival rates but is more indicative of current fishery management strategies. (per Hans Radtke, Natural Resource Economist).

² Each Mitchell Act facility's economic contribution may be different based on the species they produce and their location within the Columbia River Basin. The economic contribution for each Mitchell Act facility will be available in the upcoming NOAA-Fisheries Mitchell Act Environmental Impact Statement.

Fisheries supported by Mitchell Act:

An estimated 10-16 million adult salmon and steelhead returned annually to the Columbia River Basin prior to European

Tribal Fisheries - Salmon catches in the tribal commercial fisheries declined five-fold between 1988 and 1994 and some, like the summer Chinook commercial fishery, ended 40 years ago. The cultural and spiritual value of salmon to the Tribes is incalculable but economically, it is estimated that restoration of salmon runs is worth millions in personal income each year for tribal communities. The Columbia River Fisheries Development Program initiated restoration of coho and fall Chinook salmon runs above the Bonneville Dam. As a result of negotiations and using Mitchell Act funding, Federal, State and Tribal



Drano Lake Tribal gillnet fishery

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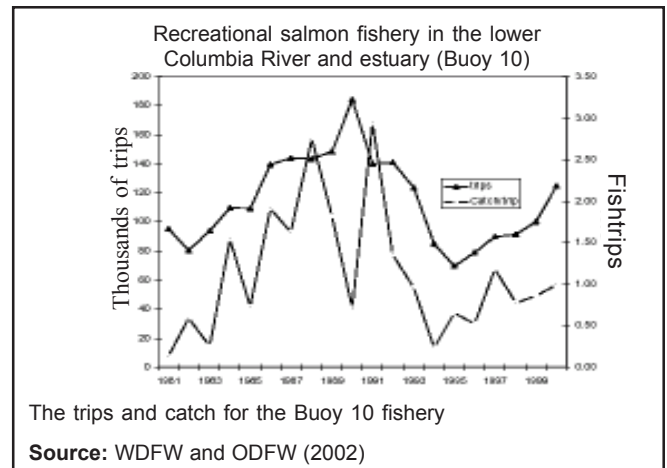
governments have cooperated to re-establish extinct or severely depleted runs of coho and fall Chinook salmon for the Yakama, Umatilla, and Nez Perce Tribes. Other species like spring Chinook salmon and steelhead are also funded. Mitchell Act-funded facilities have all contributed to Tribal restoration efforts: Eagle Creek NFH, Little White Salmon/Willard Complex (USFWS); the Washougal Hatchery Complex, Ringold Springs, Washington Department of Fish and Wildlife (WDFW), and the Bonneville/Cascade Complex and Umatilla H, Oregon Department of Fish and Wildlife (ODFW).

- The Yakima/Klickitat Fisheries Project is rebuilding coho and fall Chinook salmon runs in the Yakima and Klickitat Rivers and to other streams important to the Yakama Nation. To rebuild from a historical low of 5,000 returning adult fish, over 20 million eggs and fish have been transferred from Mitchell Act funded hatcheries to Prosser Hatchery and to acclimation sites in the basin. In addition, two substocks of fall Chinook (Yakima and Marion Drain) are being recovered. Adult fish trapped at Prosser Dam and Marion Drain are spawned and their progeny used for supplementation after rearing at Prosser Hatchery. Goals are to support annual harvests by Tribal and other anglers.

- The Mitchell Act funded Klickitat Hatchery, recently leased from WDFW to the Yakama Nation, supplements and enhances natural production of spring Chinook salmon while maintaining augmentation of fall Chinook and coho salmon for harvest. Coho smolts (2.5 million) from the Washougal Hatchery are planted into the Klickitat River solely for harvest by tribal and recreational fishers. The proposed Lyle Falls local Broodstock Collection & Monitoring Facility

increases fish access to high quality habitat and allow collection of broodstock to meet supplementation goals and to provide for harvest.

- The Yakama Nation's mid-Columbia Basin Program restores coho to the Wenatchee and Methow Rivers annually using up to 1.5 million fish from Mitchell Act-funded hatcheries. Until runs have been re-established and suitable habitat is available, fertilized eggs from locally adapted returning adults are reared at available hatcheries.



ies. At the smolt stage, these are returned and released back to the Wenatchee/Methow Basins.

- Over 4.5 million eggs and yearling coho from Eagle Creek NFH have been stocked by the Nez Perce Tribe to initiate a tribal and sports fishery in the Clearwater River of Idaho.

Buoy 10 Fishery - The Buoy 10 fishery encompasses the lower Columbia River from the legal boundary of the Pacific Ocean (i.e., Buoy 10) upstream to Rocky Point, Washington and Tongue Point, Oregon. Buoy 10 has been an important recreational fishery for well over 60 years with an average annual catch in the late 1940s of 13,500 Chinook and 3,800 coho. The popularity of this fishery increased sharply in the 1980s, as the adjacent ocean area outside of Buoy 10 was closed during most years between 1982 and 1993. Over this period the number

of angler trips increased to an average of 94,400 with catches of 67,000 coho and 12,800 Chinook annually. In the mid 1990s near record low returns and Endangered Species Act (ESA) protections afforded to listed fall Chinook constrained the fishery to



Little White Salmon National Fish Hatchery

3,800 coho and 700 Chinook salmon. But by 2001, improved fish management strategies and liberalized bag limits, increased catches to 132,000 mass marked coho and 12,700 Chinook. The number of angler trips also increased seven fold to 122,000. Mitchell Act hatchery production contributes significantly to this fishery.

Terminal Fisheries - Mitchell Act funding has been used to establish and maintain numerous terminal fisheries throughout the Basin. For example, two successful spring Chinook stocks return above Bonneville Dam to the Little White Salmon and Wind Rivers. Both sport and Tribal harvest occurs in these terminal fisheries that concentrates effort on the catch of hatchery-origin fish. A lottery tribal gillnet fishery occurs coincident with the spring Chinook sport fishery in the Little White Salmon River (Drano Lake). The Wind River and Drano

Lake fishery provides approximately 10,300 and 7,600 fish respectively per year.

- The Columbia River Terminal Fisheries Project was initiated in 1993 to capitalize on fish cultured in net pens. Coho salmon harvested at Select Area (SAFE) fisheries have contributed from 14% to 99% of the lower Columbia River commercial coho harvest. The economic benefits of these terminal fisheries to local communities totaled \$4.6 million in personal income in 2003. Annual coho smolt releases from the SAFE sites were about 4.0 million in 1998 but declined to 1.66 million by 2003. Production of one million coho salmon by the Mitchell Act for the SAFE project was discontinued because of funding shortfalls.

Zone 6 Fishery - Zone 6 is a 146 mile stretch of the Columbia River and tributaries between Bonneville and McNary Dams. This tribal fishing area was appropriated by the Treaty of 1855 and reaffirmed under the *U.S. v Oregon* agreement to Native American tribes for subsistence and commercial fishing due to the loss of fishing area resulting from the construction of several hydropower projects (i.e., Bonneville, The Dalles, and John Day dams). The Native American tribes that have access to fish these waters include the Yakama, Warm Springs, Umatilla and Nez Perce Tribes, represented by the Columbia River Inter-Tribal Fish Commission (CRITFC). Target species for subsistence use or commercial sale and produced at Mitchell Act funded facilities include adult spring Chinook, fall Chinook salmon (tule and up-river bright), coho salmon, and steelhead. The Mitchell Act also supports substantial recreational fisheries throughout Zone 6 for these species.

Ocean Fishery - Due to the migratory behavior of Pacific salmon and steelhead, fish originating from Mitchell Act hatcheries contribute significantly to recreational and commercial ocean

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fisheries off the coasts of California, Oregon, Washington, British Columbia and Alaska. To put the production from these facilities into perspective, one of the 18 hatcheries funded by the Mitchell Act, Spring Creek National Fish Hatchery has historically contributed up to 9% of the Chinook salmon catch in the West Coast Vancouver Island fishery and 27% of the Chinook catch off the Washington and northern Oregon Coasts. These fisheries are all multi-million dollar industries that benefit local rural communities dependent on recreational tourist dollars for their survival.

Conservation/Restoration/Hatchery

Reform Benefits: Since the initial ESA salmon listings in the 1990's, Mitchell Act hatcheries have been given a new role in addition to supporting fisheries — that of conserving naturally produced salmon and steelhead. Many programs have been revised to support this new role. Production from long standing Mitchell Act funded programs of spring Chinook, coho and fall Chinook salmon at Federal and State hatcheries have been used to initiate Tribal restoration programs in a number of upper Columbia and Snake River watersheds where native populations had been extirpated. Other reintroductions are planned for areas that are currently blocked by impassable dams (e.g., Condit Dam), but that are expected to become accessible.

Mitchell Act hatcheries, operated by the US Fish and Wildlife Service, are undergoing a review to determine what retooling needs to be incorporated to meet ESA and recovery goals. New or upgraded facilities, to sort and handle returning hatchery and naturally produced adults, are needed to meet conservation and broodstock management goals. Examples of facilities where upgrades are needed include the Elochoman, Grays River, North Fork Toutle, Skamania, and Big Creek hatcheries.

- Mitchell Act funded spring Chinook salmon from Ringold Springs hatchery (WDFW), Carson and Little White

Salmon NFH's helped the Confederated Tribes of the Umatilla Indian Reservation initiate a spring Chinook salmon restoration program in the Umatilla River from which salmon have been absent for nearly 100 years.

- Mitchell Act funds contributed to the *reintroduction of an extirpated stock of coho salmon* in the Wenatchee River, Washington. Coho salmon are reared at the Oregon Department of Fish and Wildlife Cascade Hatchery (a stock that has been maintained by the Mitchell Act program). Successive generations of coho returning to the Wenatchee River are collected and spawned at Dryden Dam. The subsequent use of these progeny has led to the development of a locally adapted stock of fish in the Wenatchee River.
- Mitchell Act funds at Little White Salmon NFH are used to rear and transfer spring Chinook salmon for release into the South Fork Walla Walla River to assist the Confederated Tribes of the Umatilla Indian Reservation with the development of locally adapted broodstock for restoration purposes. Spring Chinook salmon had been extirpated from the Walla Walla River over 75 years ago.



Condit Dam

USGS photo by Pat Connolly

- Mitchell Act funded coho salmon are provided to the Yakama Nation for restoration efforts in the Yakima River, in Washington, and to the Nez Perce Tribe for restoration efforts in the Clearwater River in Idaho. Native

coho salmon populations in both of these areas had been extirpated because of past habitat degradation and over-fishing. Adult returns from these programs are now allowing some level of local broodstock collection in the tribal-guided programs to transition to locally adapted broodstocks.

- Tule stock fall Chinook salmon at Spring Creek NFH will be used to restore runs to the Big White Salmon River after the removal of Condit Dam within the next five years. For the past 50 years Mitchell Act and John Day Dam mitigation funding has supported hatchery production of this stock which originated from the Big White Salmon River over 100 years ago. This unique genetic stock would have been lost decades ago without Mitchell Act funding support.
- Cascade and Oxbow State Hatcheries provide Mitchell Act funded coho salmon to the Confederated Tribes of the Umatilla Indian Reservation for restoration in the Umatilla River. Adult returns from these upriver releases have provided natural production and tribal and sport fishery opportunities where native salmon populations had been absent for nearly 100 years. More recently, Confederated Tribes of the Umatilla Indian Reservation, State of Oregon, and federal parties are reviewing a master plan to initiate a coho salmon restoration program in the Grand Ronde River in northeast Oregon. This reintroduction program will utilize approximately one-third of the Mitchell Act coho salmon production from Cascade and Oxbow hatcheries that is currently released into the Umatilla River.
- ODFW, NOAA Fisheries, and Portland General Electric (PGE), have worked together to change the source of broodstock for the Sandy River Hatchery spring Chinook salmon program. The goal is to change to a locally adapted broodstock prior to the removal of Marmot Dam in 2007. When Marmot Dam is removed, fish

managers will no longer be able to prevent hatchery spring Chinook from spawning with naturally produced spring Chinook salmon in the upper Sandy River basin. To minimize adverse genetic effects on listed Sandy River spring Chinook salmon, naturally produced (unmarked) spring Chinook salmon were collected at Marmot Dam and used as broodstock. These endemic spring Chinook salmon are now returning to the basin, and will be the only hatchery-produced spring Chinook salmon present in the basin once the dam is removed.

- To minimize the genetic adverse effects of hatchery winter steelhead spawning naturally, ODFW also changed the source of the broodstock for Sandy Hatchery-reared winter steelhead and Clackamas Hatchery-reared winter steelhead. These hatchery programs now better mimic the naturally spawning populations. Broodstock was collected from wild late-run winter steelhead in each of the basins. The program in the Sandy River basin will also minimize genetic impacts on the naturally spawning population when Marmot Dam is removed. Currently, the strategy of releasing the fish at the hatchery instead of in the upper basin has reduced the number of hatchery-reared winter steelhead reaching Marmot Dam to less than 3% in the last few years.

Research, Monitoring and Evaluation (RM&E):

These activities are essential to carrying out an effective mitigation program. More recently, the emphasis on studies has declined, not because they are not important or needed, but because hatchery operational and maintenance dollars have been eroded to critical levels from years of flat or declining funding. Except for some small evaluation studies being funded through normal hatchery operational costs, most RM&E activities have gone unfunded. The following are examples of current RM&E successes:

- Mitchell Act continues to fund intensive studies at the WDFW Kalama

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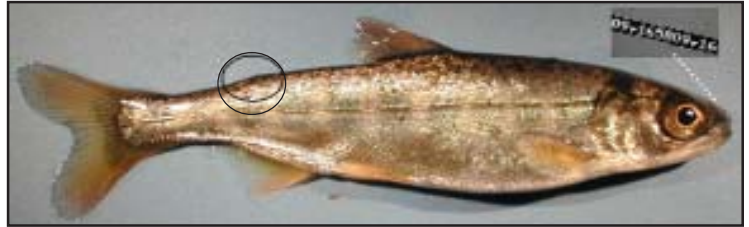
River Research Station evaluating the effects of using hatchery steelhead to supplement naturally produced populations. These studies have been instrumental in the development of current steelhead management plans and hatchery operations throughout the Columbia River Basin and the Pacific Northwest.

- Mitchell Act funding has been used in the development and evaluation of alternative methods of anesthetizing adult Chinook and coho salmon during sorting and spawning operations. The electro-anesthetizing systems at Carson and Eagle Creek NFHs have proven very successful in processing large numbers of adults, quickly and easily while minimizing human labor and injury to the fish.

- Monitoring of Mitchell Act hatchery production programs, to evaluate hatchery performance and contribution, is conducted through tagging techniques such as coded-wire tagging (CWT) and passive integrated transponder (PIT).
- Healthy fish translate to increased success for recovery, reintroduction and mitigation projects. Mitchell Act funding of fish health centers ensures that fish produced from Mitchell Act programs are healthy and meet necessary fish health standards prior to their release.
- Hatchery evaluation studies have demonstrated the effectiveness of hatchery-production programs and extensive rearing density studies have directly informed rearing protocols for salmon hatcheries throughout North America.

The following are examples of past RM&A successes that can no longer be carried out or are limited under current budget constraints:

- Mitchell Act hatcheries are implementing hatchery reform efforts to ensure they are operated using the best scientific principles and contribute to sustainable fisheries and the recovery of naturally spawning populations of salmon. However, they are required to seek funding sources other than the Mitchell Act to develop and implement these reforms.



Marking with coded-wire tag and removal of adipose fin

- Funding through the Mitchell Act led to the development of new, more effective fish feeds such as the Abernathy Dry Diet. Today these feeds support a multi-million dollar aquaculture industry and fish production programs throughout the world.
- In the early Mitchell Act era more effective ways of identifying juvenile salmon were pioneered including the development of the color coded wire tags (a precursor to the coded wire tag).

Marking: Most coho, spring and fall Chinook salmon produced at Mitchell Act hatcheries are mass marked with an adipose fin clip for external visual identification. This allows for a selected harvest of these fish in a mixed-stock fishery composed of both hatchery and wild-origin fish. Sport anglers are allowed to harvest fin-clipped fish while releasing non-clipped fish to help protect ESA-listed and naturally produced salmon stocks. Since 2004, mass marking at Mitchell Act facilities has been facilitated through Congressional add-ons.

Screening Program: The death and injury of juvenile fish at water diversion intakes have long been identified as a major source

of fish mortality. Fish diverted into power turbines incur up to 15 percent mortality, while also experiencing injury, disorientation and delay of migration that may increase predation-related losses. Fish entrained into agricultural and municipal water diversions can experience up to 100 percent mortality. Nearly 80 percent of all water diversions in the Pacific Northwest are unscreened. Historically the Mitchell Act funded the construction of new screens annually and is responsible for screening nearly 1,000 irrigation diversions. Today the program is focused almost solely on the operation and maintenance of aging screens because of limited funding.

- In order to maintain and operate the more than 750 screens and over 500 gravity pumps, Federal and State fishery agencies work with screen shops in Salmon, Idaho; The Dalles, John Day, and Enterprise, Oregon; and Yakima, Washington. Mitchell Act provides significant funding for the operation of these important fish screening facilities.

Fishways & Ladders: The Mitchell Act began constructing fishways (fish ladders) and removing or modifying fish barriers as another means to increase the abundance of salmon and steelhead in the Columbia

River Basin. Data on various populations of salmon and steelhead were collected in the mid 1940's to identify impassable waterfalls, log and debris jams, splash dams, and sources of pollution. After the 1946 Mitchell Act amendment and the first appropriation of money in 1949 a fishway and stream improvement program was initiated. Since its inception, The Mitchell Act Program has improved access to more than 2,500 miles of anadromous fish habitat and passage by constructing approximately 45 fishways ranging in size from simple step pool-and-weir fishways over small barriers to large multi-entranced fish ladders built to pass fish above the 60-foot high Willamette Falls. In addition to fishways, the Mitchell Act has constructed 49 rock cut fish ladders to ease passage or provide access to areas once accessible to salmon.

More Information:

- NOAA Mitchell Act Program website:
<http://www.nwr.noaa.gov/Salmon-Harvest-Hatcheries/Hatcheries/Mitchell-Act-Programs.cfm>
- NOAA Mitchell Act Economic Impact Statement website:
<http://www.nwr.noaa.gov/Salmon-Harvest-Hatcheries/Hatcheries/NEPA-Activities-Mitchell-Act-EIS.cfm>

FEDERAL REGISTER NOTICES

**Groundfish and Halibut Notices
February 14, 2006 through March 15, 2006**

Documents available at National Marine Fisheries Service (NMFS) Sustainable Fisheries
Groundfish Web Site <http://www.nwr.noaa.gov/1sustfsh/gdfsh01.htm>

71 FR 8489. Pacific Coast Groundfish Fishery; Specifications and Management Measures.

Action: Final Rule. NMFS is implementing revisions to the 2006 Commercial and Recreational Groundfish Fishery Management Measures. Management Measures that are new for 2006 are intended to: achieve but not exceed optimum yields; prevent overfishing; rebuild overfished species; and reduce and minimize the incidental catch and discard of overfished species - 2/17/06

71 FR 10614. Pacific Coast Groundfish Fishery; Limited Entry Fixed Gear Sablefish Fishery Permit Stacking Program.

Action: Final Rule. NMFS is implementing portions of Amendment 14 to the Pacific Coast Groundfish Fishery Management Plan for 2007 and beyond - 3/2/06

71 FR 10850. Pacific Halibut Fisheries; Catch Sharing Plan.

Action: Final rule; annual management measures for Pacific Halibut fisheries and approval of Catch Sharing Plan; changes to the plan and to sport fishing management in Area 2A - 3/3/06

71 FR 13097. Pacific Coast Groundfish Fishery; Intent to Prepare an Environmental Impact Statement for Fishing Conducted Under the Pacific Coast Groundfish Fishery Management Plan.

Action: Notice of intent to prepare an Environmental Impact Statement; announcement of public scoping period; request for written comments - 3/14/06

February 27, 2006

D. Robert Lohn
Administrator, Northwest Region
NMFS
7600 Sand Point Way NE
Seattle, Washington 98115

Dear Mr. Lohn:

On behalf of The Nature Conservancy, we would like to provide our comments and observations on a proposed rulemaking by the Department of Commerce published in the Federal Register January 12, 2006. The proposed rule is to implement Amendment 19 to the Pacific Coast Groundfish Fishery Management Plan (FMP).

Amendment 19 provides a comprehensive program to describe, identify and protect essential fish habitat (EFH) for west coast groundfish in California, Oregon and Washington. EFH provisions in the Magnuson-Stevens Act require NOAA Fisheries to minimize, to the extent practicable, adverse effects on EFH from fishing and fishing gears.

The Nature Conservancy strongly supports the adoption and implementation of Amendment 19 and firmly believes that both NOAA Fisheries and the Pacific Fisheries Management Council handled this complex and contentious issue in a professional and balanced manner. Furthermore, it is clear that this Council demonstrated superb leadership by crafting a comprehensive plan that will have a significant impact on conserving and enhancing EFH while allowing for the groundfish fishery to continue to prosper. And, we would be remiss not to acknowledge the hard and innovative work accomplished by the Northwest Regional NOAA staff who worked closely with the Council, fishing community, NGO community and the public to find a workable solution. Examples of this type of bold leadership are exceedingly rare. Consequently, those who care about sustaining our oceans and its productivity for the long term should be pleased and uplifted by this outcome.

One component of Amendment 19 that is particularly impressive is the discrete areas that are closed to fishing with specified gear types. Numerous ecologically important areas will be banned to bottom trawling and some habitats, like seamounts, will be closed to all bottom-contacting gear. Due to this foresight and precautionary management practice, the ecological integrity of large areas of seafloor habitat will be protected not only for the suite of west coast groundfish, but for hundreds or thousands of species of marine

biodiversity that are also supported by these habitats. This action will help set the stage for moving towards ecosystem-based management along the Pacific Coast.

Sincerely,

/s/

Chuck Cook
Marine Program Director
The Nature Conservancy of California

cc: Vice Admiral Conrad C. Lautenbacher
Under Secretary of Commerce for Oceans and Atmosphere

Dr. William T. Hogarth
Assistant Administrator for NOAA Fisheries

UPDATE ON ODFW MASS MARKING PROGRAMS

Proposed 2006 adipose fin marking and Coded Wire Tagging programs for Columbia River basin and Oregon coastal Chinook and coho salmon (brood year 2005) are attached.

Included mass marking (adipose fin mark only) programs can be summarized as follows:

Columbia River:

- 750,000 spring run Chinook from Gnat Creek Hatchery on the Lower Columbia River.
- 260,000 spring run Chinook from Bonneville Hatchery on the Lower Columbia River to be released in the Clackamas River.
- 1,113,000 spring run Chinook from McKenzie Hatchery on the McKenzie River.
- 1,547,000 spring run Chinook from Marion Forks Hatchery on the North Santiam River. Of these, 260,000 will be released in the Lower Columbia River (Sandy River release), 580,000 will be released in the Clackamas River and 707,000 will be released in the North Santiam River.
- 250,000 spring run Chinook from South Santiam Hatchery on the South Santiam River.
- 2,450,000 spring run Chinook from Willamette Hatchery on the Willamette River. Of these, 210,000 will be released in the Clackamas River, 70,000 in the Molalla River, 731,000 in the South Santiam River and 1,439,000 in the Middle Fork Willamette River.
- 542,000 spring run Chinook from Umatilla Hatchery on the Umatilla River.
- 283,000 spring run Chinook from Lookingglass Hatchery on the Grande Ronde River. Of these, 244,000 will be released in the Imnaha River and 39,000 in the Upper Grande Ronde River.
- 550,000 fall run Chinook from Umatilla Hatchery on the Lower Columbia River to be released in the Snake River.
- 485,000 coho from Big Creek Hatchery on the Lower Columbia River.
- 2,662,000 coho from Cascade Hatchery on the Lower Columbia River.
- 900,000 coho from Sandy Hatchery on the Sandy River. Of these, 625,000 will be released in the Sandy River and 275,000 in the Lower Columbia River.

Coastal Oregon:

- 203,000 spring run Chinook from Trask Hatchery on the northern Oregon Coast.
- 85,000 spring run Chinook from Cedar Creek Hatchery on the northern Oregon Coast.
- 292,000 spring run Chinook from Rock Cr. Hatchery on the Umpqua River.
- 1,762,000 spring run Chinook from Cole M. Rivers Hatchery on the Rogue River.
- 100,000 coho from Nehalem Hatchery on the northern Oregon Coast.
- 175,000 coho from Salmon River Hatchery on the central Oregon Coast.
- 72,000 coho from Rock Creek Hatchery on the Umpqua River.
- 150,000 coho from Cole M. Rivers Hatchery on the Rogue River.

For 2007, ODFW will likely propose similar marking and tagging strategies as 2006 with the following additions contingent on additional federal funding:

- 5.5 million fall run (Tule stock) Chinook at Mitchell Act funded facilities on the lower Columbia River.
- 7.7 million fall run (Upriver Bright stock) Chinook at other federally funded facilities on the Lower Columbia River.

PROPOSED MARKING AND TAGGING

Species: Spring Chinook

Brood: 2005

Release Year: 2006/2007

Area/Region	Hatchery	Stock	Number of fish to be released with a CWT		Number of fish to be released without a CWT		Ideal Marking Start Time		Proposed to be Marked This Year (Y/N)	Marked in Previous Year (Y/N)
			Ad Clipped	Not Ad Clipped	Ad Clipped	Not Ad Clipped	Month	Year		
Northwest-N	Bonneville	19	50,000		260,000		March	2006	Y	Y
Northwest-N	Cedar Cr.	47	25,000		85,000		March	2006	Y	Y
Northwest-N	Gnat Cr.	22	100,000		750,000		June	2006	Y	Y
Northwest-N	Trask	34	50,000		303,000		March	2006	Y	Y
Total for Region			225,000		1,398,000					
Northwest-S	McKenzie	23	210,000	50,000	1,114,000		July	2006	Y	Y
Northwest-S	Marion Fk.	11	50,000		260,000		July	2006	Y	Y
Northwest-S	Marion Fk.	19	50,000		580,000		July	2006	Y	Y
Northwest-S	Marion Fk.	21	60,000		707,000		July	2006	Y	Y
Northwest-S	S.Santiam	24	50,000		250,000		August	2006	Y	Y
Northwest-S	Willamette	19	30,000		210,000		May	2006	Y	Y
Northwest-S	Willamette	22	160,000	50,000	1,439,000		May	2006	Y	Y
Northwest-S	Willamette	24	120,000		801,000		May	2006	Y	Y
Total for Region			730,000	100,000	5,361,000					
Southwest	Cole R.	52	110,000	50,000	1,762,000		April	2006	Y	Y
Southwest	Rock Cr	55	50,000		292,000		April	2005	Y	Y
Total for Region			160,000	50,000	2,054,000					
Northeast	Lookingglass	29	183,000		244,000		June	2006	Y	Y
Northeast	Lookingglass	80	78,000	24,000	39,000		June	2006	Y	Y
Northeast	Lookingglass	200	228,000				June	2006	Y	Y
Northeast	Lookingglass	201	74,000				June	2006	Y	Y
Northeast	Umatilla	91	60,000		542,000		August	2006	Y	Y
Total for Region			623,000	24,000	825,000					
High Desert	Round Butte	50	98,000				July	2006	Y	Y
High Desert	Round Butte	66	363,000				July	2006	Y	Y
Total for Region			461,000	0	0					
TOTAL			2,199,000	174,000	9,638,000					

PROPOSED MARKING AND TAGGING

Species: Fall Chinook
 Brood: 2005
 Release Year: 2006/2007

Area/Region	Hatchery	Stock	Number of fish to be released with a CWT		Number of fish to be released without a CWT		Ideal Marking Start Time		Proposed to be Marked This Year (Y/N)	Marked in Previous Year (Y/N)
			Ad Clipped	Not Ad Clipped	Ad Clipped	Not Ad Clipped	Month	Year		
Northwest-N	Big Cr.	13	200,000			5,500,000	April	2006	Y	Y
Northwest-N	Big Cr.	52	50,000			1,425,000	June	2006	Y	Y
Northwest-N	Cedar Cr.	47				100,000			N	N
Northwest-N	Bonneville	91	50,000	430,000*			August	2006	Y	Y
Northwest-N	Bonneville	95	300,000			7,694,000	April	2006	Y	Y
Northwest-N	Trask	34	50,000			88,000	June	2006	Y	Y
Northwest-N	Youngs Bay	52	50,000			600,000	April	2006	Y	Y
Northwest-N	Wild(lives Is.)	195	30,000				May	2006	Y	Y
Total for Region			730,000	430,000	0	15,407,000				
Northwest-S	Salmon R.	36	200,000				May	2006	Y	Y
Northwest-S	Salmon R.	146	25,000			25,000	May	2006	Y	Y
Total for Region			225,000	0	0	25,000				
Southwest	Bandon	37	60,000			2,497,000	May	2006	Y	Y
Southwest	Butte Falls	44	25,000			150,000	July	2006	Y	Y
Southwest	Canyonville	151				50,000			N	N
Southwest	Cole R.	37	25,000				June	2006	Y	Y
Southwest	Elk R.	35	200,000			125,000	May	2006	Y	Y
Southwest	Elk R.	96	25,000			125,000	May	2006	Y	Y
Southwest	Gardiner	151				100,000			N	N
Southwest	Indian Cr.	61	25,000			50,000	June	2006	Y	Y
Southwest	Rock Creek	151	25,000			45,000	May	2006	Y	Y
Southwest	STEP	18				50,000			N	N
Total for Region			385,000	0	0	3,192,000				
Northeast	Umatilla	91	600,000				March	2006	Y	Y
Northeast	Umatilla	97	200,000		550,000		March	2006	Y	Y
Total for Region			800,000	0	550,000					
TOTAL			2,140,000	430,000*	550,000	18,624,000				

* Agency BLANK Wire Tags

PROPOSED MARKING AND TAGGING

Species: Coho
 Brood: 2005
 Release Year: 2007

Area/Region	Hatchery	Stock	Number of fish to be released with a CWT			Number of fish to be released without a CWT			Ideal Marking Start Time		Proposed to be Marked This Year (Y/N)	Marked in Previous Year (Y/N)
			Ad Clipped	Not Ad Clipped		Ad Clipped	Not Ad Clipped		Month	Year		
Northwest-N	Big Cr.	13	50,000			485,000			June	2006	Y	Y
Northwest-N	Bonneville	14	25,000						August	2006	Y	Y
Northwest-N	Cascade	14	100,000			2,662,000	950,000		June	2006	Y	Y
Northwest-N	Cascade	508		650,000*					August	2006	Y	Y
Northwest-N	Nehalem	34	50,000			50,000			September	2006	Y	Y
Northwest-N	Nehalem	99	50,000			50,000			September	2006	Y	Y
Northwest-N	Oxbow	14	75,000				480,000		August	2006	Y	Y
Northwest-N	Sandy	11	75,000	25,000		900,000			May	2006	Y	Y
	Total for Region		425,000	675,000		4,147,000	1,430,000					
Northwest-S	Salmon R.	33	25,000			195,000			May	2006	Y	Y
	Total for Region		25,000	0		195,000	0					
Southwest	Cole R.	52	25,000	25,000		150,000			August	2006	Y	Y
Southwest	Rock Creek	18	25,000			35,000			August	2006	Y	Y
Southwest	Rock Creek	55	25,000			37,000			August	2006	Y	Y
Southwest	STEP	37									N	N
	Total for Region		75,000	25,000		222,000	0					
TOTAL			525,000	700,000		4,564,000	1,430,000					

* 650,000 CWTed by USFWS for Yakama Indian Nation

FWS COLUMBIA RIVER 2006 CHINOOK MASS MARKING

2/6/2006

Species: Chinook
 Area: Columbia River
 Brood: 2005
 Release Year: 2006 and 2007

Program Levels: Actual releases and marking levels may be somewhat higher or lower depending on actual rearing cycle.

Agency	Hatchery	Stock	Number of fish to be released with a CWT		Number of fish to be released without a CWT		Total Production	Proposed to be marked this year (Y/N)	Marked in previous year (Y/N)	Comments
			Ad Clipped	Uncolipped	Ad Clipped	Uncolipped				
FWS	Spring Creek NFH	Spring Creek - Tule Falls	450,000	450,000	14,100,000	0	15,000,000	Y	Y	
FWS	Little White Salmon NFH	Little White Salmon - URB Falls	200,000	200,000	1,600,000	0	2,000,000	Y	Y	
FWS	Little White Salmon NFH	Little White Salmon - URB Falls	200,000	0	0	1,500,000	1,700,000	N	N	YN-Prosser release
WDFW	Priest Rapids	Priest Rapids - URB Falls	0	0	1,700,000	0	1,700,000	Y	N	Marked by FWS
Total Fall Chinook			850,000	650,000	17,400,000	1,500,000	20,400,000			
FWS	Carson NFH	Carson - Springs 1+	75,000	0	1,095,000	0	1,170,000	Y	Y	Drano L. rel. (from Carson in '05)
FWS	Willard NFH	Little White Salmon - Springs 1+	50,000	0	200,000	0	250,000	Y	Y	
FWS	Little White Salmon NFH	Little White Salmon - Springs 1+	75,000	0	675,000	0	750,000	Y	Y	
FWS	Little White Salmon NFH	Little White Salmon - Springs 1+	50,000	0	200,000	0	250,000	Y	Y	Walla Walla R. release
FWS	Little White Salmon NFH	Little White Salmon - Springs 1+	40,000	0	170,000	0	210,000	Y	Y	Umatilla R. release
FWS	Warm Springs NFH	Warm Springs - Springs 1+	750,000	0	0	0	750,000	Y	Y	
FWS	Leavenworth NFH	Leavenworth - Springs 1+	800,000	0	825,000	0	1,625,000	Y	Y	
FWS	Entiat NFH	Entiat - Springs 1+	400,000	0	0	0	400,000	Y	Y	
FWS	Winthrop NFH	Methow - Springs 1+	0	600,000	0	0	600,000	N	N	Restoration program
FWS	Kooskia NFH	Kooskia NFH - Springs 1+	100,000	0	500,000	0	600,000	Y	Y	
FWS	Dworshak NFH	Dworshak - Springs 1+	120,000	0	930,000	0	1,050,000	Y	Y	
Total Spring Chinook			2,460,000	600,000	4,595,000	0	7,655,000			
Total Chinook			3,310,000	1,250,000	21,995,000	1,500,000	28,055,000			

Total Chinook Production 28,055,000
Total Percent Marked 90%

FWS COLUMBIA RIVER 2006 COHO MASS MARKING

2/6/2006

Species: Coho
Area: Columbia River
Brood: 2005
Release Year: 2007

Program Levels: Actual releases and marking levels may be somewhat higher or lower depending on actual rearing cycle.

Agency	Hatchery	Stock	Number of fish to be released with a CWT		Number of fish to be released without a CWT		Total Production	Proposed to be marked this year (Y/N)	Marked in previous year (Y/N)	Comments
			Ad Clipped	Uncipped	Ad Clipped	Uncipped				
FWS	Eagle Creek NFH	Eagle Creek - 1+	25,000	25,000	450,000	0	500,000	Y	Y	Potlatch R. Release - NPT
FWS	Eagle Creek NFH	Eagle Creek - 1+	50,000	50,000	0	175,000	275,000	N	N	Lapwai Cr. Release - NPT
FWS	Eagle Creek NFH	Eagle Creek - 1+	50,000	50,000	0	175,000	275,000	N	N	Yakima R. Release - YN
FWS	Eagle Creek NFH	Eagle Creek - 1+	0	0	600,000	0	600,000	Y	Y	Yakima R. Release - YN
FWS	Willard NFH	Wenatchee - 1+	0	550,000	0	0	550,000	N	N	Wenatchee R. Release - YN
ODFW	Cascade Hatchery	Wenatchee - 1+	0	700,000	0	0	700,000	N	N	Wen. R. Rel. - YN (Tagged by FWS)
YN	Prosser Hatchery	Yakima - 1+	0	0	0	500,000	500,000	N	N	LV Clip - YN (Marked by FWS)
FWS	Winthrop NFH	Wenatchee - 1+	0	250,000	0	0	250,000	N	N	YN restoration program
FWS	Kooskia NFH	Dworshak - 1+	0	120,000	0	160,000	280,000	N	N	NPT restoration program
Total Coho			125,000	1,745,000	1,050,000	1,010,000	3,930,000			
Total Coho Production			3,930,000							
Total Percent Marked			30%							

FWS NORTH COAST AND PUGET SOUND 2006 CHINOOK MASS MARKING

2/6/2006

Species: Chinook
 Area: North Coast and Puget Sound
 Brood: 2005
 Release Year: 2006

Program Levels: Actual releases and marking levels may be somewhat higher or lower depending on actual rearing cycle.

Agency	Hatchery	Stock	Number of fish to be released with a CWT		Number of fish to be released without a CWT		Total Production	Proposed to be marked this year (Y/N)	Marked in previous year (Y/N)	Comments
			Ad Clipped	Unclipped	Ad Clipped	Unclipped				
FWS	Makah NFH	Makah Falls	260,000	0	1,940,000	0	2,200,000	Y	Y	
FWS	Makah NFH	Makah Falls	0	0	100,000	0	100,000	Y	Y	Educket Cr. Release
FWS	Quinault NFH	Quinault Falls	200,000	0	400,000	0	600,000	Y	Y	
Total Chinook			460,000	0	2,440,000	0	2,900,000			
Total Chinook Production			2,900,000							
Total Percent Marked			100%							

FWS NORTH COAST AND PUGET SOUND 2006 COHO MASS MARKING

2/6/2006

Species: Coho
Area: North Coast and Puget Sound
Brood: 2005
Release Year: 2007
Program Levels: Actual releases and marking levels may be somewhat higher or lower depending on actual rearing cycle.

Agency	Hatchery	Stock	Number of fish to be released with a CWT		Number of fish to be released without a CWT		Total Production	Proposed to be marked this year (Y/N)	Marked in previous year (Y/N)	Comments
			Ad Clipped	Uncipped	Ad Clipped	Uncipped				
FWS	Makah NFH	Makah	40,000	40,000	120,000	0	200,000	Y	Y	
FWS	Makah NFH	Makah	0	0	40,000	0	40,000	Y	Y	Educket Cr. Release
FWS	Quinalt NFH	Quinalt	80,000	80,000	500,000	0	660,000	Y	Y	
FWS	Quicene NFH	Quicene	48,000	48,000	304,000	0	400,000	Y	Y	
FWS	Quicene NFH	Quicene	45,000	0	155,000	0	200,000	Y	Y	Quilcene Bay Release
Total Coho			213,000	168,000	1,119,000	0	1,500,000			
Total Coho Production			1,500,000							
Total Percent Marked			89%							

FWS COLUMBIA RIVER 2006 STEELHEAD MASS MARKING

2/6/2006

Species: Steelhead
Area: Columbia River
Brood: 2006
Release Year: 2007

Program Levels: Actual releases and marking levels may be somewhat higher or lower depending on actual rearing cycle.

Agency	Hatchery	Stock	Number of fish to be released with a CWT		Number of fish to be released without a CWT		Proposed to be marked this year (Y/N)	Marked in previous year (Y/N)	Comments
			Ad Clipped	Unclipped	Ad Clipped	Unclipped			
FWS	Eagle Creek NFH	Eagle Creek	150,000	0	0	0	Y	Y	1.2M Released On-station
FWS	Dworshak NFH	Dworshak	120,000	0	1,780,000	0	Y	Y	S. Fk. Clearwater Release
FWS	Dworshak NFH	Dworshak	0	200,000	0	0	N	N	
FWS	Hagerman NFH	Salmon River	80,000		1,120,000	0	Y	Y	
Total steelhead			350,000	200,000	2,900,000	0	3,450,000		
Total Steelhead Production			3,450,000						
Total Percent Marked			94%						

FWS NORTH COAST AND PUGET SOUND 2006 STEELHEAD MASS MARKING

2/6/2006

Species: Steelhead
 Area: North Coast and Puget Sound
 Brood: 2006
 Release Year: 2007
 Program Levels: Actual releases and marking levels may be somewhat higher or lower depending on actual rearing cycle.

Agency	Hatchery	Stock	Number of fish to be released with a CWT		Number of fish to be released without a CWT		Proposed to be marked this year (Y/N)	Marked in previous year (Y/N)	Comments
			Ad Clipped	Unclipped	Ad Clipped	Unclipped			
FWS	Makah NFH	Makah	0	0	158,000	0	Y	Y	
FWS	Makah NFH	Makah	0	0	22,000	0	Y	Y	Educket Cr. Release
FWS	Quinalt NFH	Quinalt	20,000	0	170,000	0	Y	Y	
Total Steelhead			20,000	0	350,000	0		370,000	
Total Steelhead Production			370,000						
Total Percent Marked			100%						

CHINOOK

Program		Number	State	Federal	Local	Comments
Puget Sound						
Total number currently marked		27,777,000	\$859,968	\$473,340	\$0	Additional marking by tribes
Additional number needed to be marked		0				
Number not marked	Elwha fall chinook White River spring chinook	2,100,000 250,000				Conservation program Conservation program
	Total	2,350,000				
Coast						
Total number currently marked		2,200,000	\$14,400	\$91,200	\$0	
Additional number needed to be marked		0				
Number not marked	Nemah Naselle Mayr Brothers Humptulips Solduc (summers)	1,800,000 5,050,000 200,000 300,000 250,000				\$364,800 to mark this production
	Total	7,600,000				
Columbia River - spring chinook						
Total number currently marked		2,472,000		\$42,720	\$80,256	
Additional number needed to be marked		0				
Number not marked	Cowlitz Klickitat	300,000 300,000				Conservation program Conservation program
Columbia River - summer chinook						
Total number currently marked		0				All are adipose fin clipped and CWT'ed
Additional number needed to be marked		0				
Number unmarked	Turtle Rock	700,000				US v OR Bridge Agreement
Columbia River - fall chinook						
Total number currently marked		0				
Additional number needed to be marked	Cowlitz Elochoman N Toutle Kalama Falls Fallert Creek Washougal	4,800,000 1,910,000 2,410,000 2,410,000 2,410,000 3,910,000		\$91,680 \$115,680 \$115,680 \$115,680 \$187,680	\$230,400	Tacoma PUD Mitchell Act Mitchell Act Mitchell Act Mitchell Act
	Total	17,850,000		\$626,400	\$230,400	
Number unmarked	Priest Rapids - URBs Ringold - URBs Klickitat	5,000,000 3,250,000 3,350,000				1.7M federal prod marked by USFWS Mitchell Act - marked by ODFW Mitchell Act
	Total	11,600,000				
Statewide chinook						
Total number currently marked		32,449,000	\$874,368	\$607,260	\$80,256	
Total number DIT marked		1,500,000	\$118,800	\$43,200	\$0	
	Total		\$993,168	\$650,460	\$80,256	
Additional number needed to be marked		17,850,000	\$0	\$626,400	\$230,400	

WDFW MASS MARKING 2006

DRAFT

1/26/2006

COHO

Program	Number	State	Federal	Local	Comments
Puget Sound					
Total number currently marked	9,078,000	\$305,424	\$130,320	\$0	Additional marking by tribes
Additional number needed to be marked	0				
Number not marked	600,000				Conservation program
Coast					
Total number currently marked	5,370,000	\$233,760	\$24,000	\$0	Additional marking by tribes
Additional number needed to be marked	0				
Number not marked	0				
Columbia River					
Total number currently marked	8,632,000	\$0	\$185,153	\$228,240	
Additional number needed to be marked	0				
Number not marked	100,000 2,400,000				Conservation program Harvest allocation issue
Statewide					
Total number currently marked	23,080,000	\$539,184	\$339,473	\$228,240	\$154,320 Tribal offset, \$185,153 Mitchell
Total number DIT marked	525,000	\$40,500	\$16,200	\$0	
		\$579,684	\$355,673	\$228,240	
Additional number needed to be marked	0				

**2005 Chinook Selective Fishery,
Marine Areas 5 and 6**

March 21, 2006

**Washington Department of Fish and Wildlife
Fish Program
600 Capitol Way North
Olympia, Washington 98501**

EXECUTIVE SUMMARY

During the summer of 2005, the third year of a recreational Chinook salmon *Oncorhynchus tshawytscha* (“Chinook”) fishery that was limited to retention of marked (adipose clipped) hatchery Chinook salmon occurred in Marine Area 5 and the western portion of Marine Area 6 in Puget Sound. Objectives were: 1) increase recreational fishing opportunity while meeting conservation goals for Puget Sound Chinook salmon defined by the Puget Sound Chinook Harvest Management Plan; and 2) collect information necessary to enable evaluation and planning of future potential Chinook mark-selective fisheries. Marine Areas 5 and 6 are located in Washington waters of the Strait of Juan de Fuca. The Chinook Selective Fishery was scheduled to begin on July 1, 2005 and continue through August 10 (41 days) or until a ceiling catch of 3,500 Chinook was kept, whichever occurred first. The fishery started on July 1, 2005 and ran continuously for 41 days through August 10 without the quota being reached.

Chinook and coho catch and catch rates in 2005 were less than observed in 2003 and 2004. For the first time in the three years of the fishery, the Chinook ceiling was not reached and the fishery extended through the entire 41 day period. We estimated that anglers made 34,086 trips during the Chinook Selective Fishery (July 1 – August 10). Those anglers kept an estimated 2,078 Chinook, 3,723 coho salmon *O. kisutch* (“coho”), and 14,850 pink salmon *O. gorbuscha* (“pink”). Area 5 accounted for 88% of the effort (30,115 angler trips) and 80% of the Chinook kept (1,669) for a rate of 0.06 Chinook kept per angler trip. Area 6 accounted for 3,971 angler trips and 408 Chinook kept for a higher catch rate of 0.10 Chinook kept per angler trip. Based on interviews, Area 5 anglers released an estimated 5,772 Chinook, 10,381 coho, 3,894 pink, and 118 other or unidentified salmon. Also based on interviews, Area 6 anglers released an estimated 636 Chinook, 50 coho, 10 pink, and 2 other or unidentified salmon.

During the Chinook Selective Fishery (July 1-August 10), samplers fishing from test boats landed 137 Chinook in Area 5 and 17 Chinook in Area 6. In Area 5, 98% of the Chinook encountered and landed by the test boat were caught using downriggers, even though they were only fished 87% of the time. In Area 6, all the Chinook encountered and landed by the test boat were caught using downriggers, even though they were only fished 75% of the time. Utilizing other gear types resulted in fewer encounters and fewer biological samples for both areas than would have occurred if the test boats had used downriggers exclusively as they did in 2003.

During the Chinook Selective Fishery time period, 55% of the legal-size fish caught by test boats were marked in Area 5 and 41% of the legal-size Chinook were marked in Area 6. The mark rate on sublegal-size Chinook was 47% (n=64) for Area 5, but no sublegal-size Chinook were caught by the test boat in Area 6. Chinook caught on test boats were larger in Area 6 than in Area 5. The percent of legal-size chinook (22” or larger) was significantly different ($X^2 = 85.4$, $p < 0.0001$) between Area 6 (100%) and Area 5 (53%).

Sixty-four Chinook were recorded on Voluntary Trip Reports (VTR’s) in Area 5 during the 2005 Chinook Selective Fishery, while 40 Chinook were recorded on VTR’s in Area 6. In Area 5, 45% of the fish recorded on VTR’s were legal-size and 31% of these were marked. In Area 6, 92% of the Chinook encountered were legal-size and 35% of these were marked.

Thirty-three double index coded wire tags were recovered in Areas 5 and 6 from July 1 through August 10. Based on the proportion of the catch that was sampled and the ratio of marked to unmarked double index coded wire tagged Chinook for each hatchery, we estimated that anglers caught and released 105 legal-size, unmarked double index tagged Chinook, and that the mortality of unmarked legal-size double index tagged Chinook due to this selective fishery was 11 fish.

Using the total number of Chinook encounters from the creel survey (8,495) and apportioning into four categories of legal-size marked, legal-size unmarked, sublegal-size marked, and sublegal-size unmarked (as encountered on test boats in Area 5 and as encountered by test boats and anglers reporting their catch on Voluntary Trip Reports in Area 6) suggests that anglers released 665 legal-size and marked Chinook, or 30% of the fish they could have kept. We also estimated the number of encounters by assuming that anglers kept all Chinook that were legal-size and marked. For this second method, total encounters were estimated by dividing the number of legal-size marked fish that anglers retained by the weighted proportion of legal-size marked fish from the test boats (and a combination of test boat and VTR data in Area 6). The number of encounters in the remaining three categories was then obtained by multiplying the total encounters by the proportions for each corresponding category. Using this method, we estimated the total encounters at 6,240 Chinook. The true number of encounters likely lies between the two estimates of encounters, i.e. between 6,240 and 8,495 Chinook.

Using the encounters from the creel survey and a release mortality rate of 15% for legal-size fish and 20% for sublegal-size fish, we estimated the total mortalities of Chinook in the selective fishery at 3,197, of which 785 were unmarked. Using the encounters estimated by assuming anglers kept all legal fish and a release mortality rate of 15% for legal-size fish and 20% for sublegal-size fish, we estimated total mortalities at 2,810 fish, of which 588 were unmarked fish.

Although we believe the true number of mortalities lies between our two estimates, we used the higher number to compare estimated mortalities against pre-season predictions of mortalities. Based on the estimated number of total encounters from the creel survey and apportioning them based on the test boat catch rates, we estimated the 2005 fishery resulted in the mortality of 413 unmarked legal-size Chinook and 372 unmarked sublegal-size Chinook. These estimates are well below the predicted mortalities of 1,701 unmarked legal-size Chinook and 975 unmarked sublegal-size Chinook as produced in the final pre-season run of the Fishery Regulation Assessment Model (FRAM; Model 2705, April 8, 2005), and suggests this fishery did not hinder nor jeopardize achievement of the overall conservation goals for Puget Sound Chinook.

Compliance with existing regulations, and the regulation prohibiting bringing unmarked salmon on board a vessel, was considered an integral part of a successful fishery. Only a few citations or warnings were issued for retention of unmarked Chinook, or for bringing an unmarked salmon on board a vessel.

In summary, the third year of the Area 5 and 6 Chinook selective fishery was successful with respect to the objective of increasing recreational fishing opportunity within conservation constraints for Puget Sound Chinook. Anglers were allowed to fish for and retain Chinook for 41 days in Areas 5 and 6, compared with only 10 days and 5 days in Area 5 in 2001 and 2002,

respectively. Angler effort in Area 5 was double the effort in 2002 during the same time frame. Based on data from the test fishery sampling during the Chinook Selective Fishery, half of the legal-size Chinook encountered were marked and could be retained by anglers.

The fishery was also successful with respect to the objective of implementing monitoring and sampling programs to obtain management information for evaluation and planning of potential future selective Chinook fisheries. Estimated encounters were less than pre-season predictions. Compliance with fishing regulations was good during the fishery. The estimated number of mortalities of unmarked double index coded wire tagged fish was negligible.

INTRODUCTION

In recent years, abundant runs of hatchery salmon have been mixed with depressed runs of wild salmon in the Northwest in both marine and freshwater environments. Providing opportunities to harvest those abundant hatchery stocks while protecting wild stocks has been challenging. One tool for allowing harvest of abundant hatchery fish while limiting impacts on wild stocks is “Selective Fishing”. In recreational selective fisheries, anglers are generally allowed to retain adipose fin clipped (“marked”) hatchery fish and are required to release unclipped (“unmarked”) fish. These unmarked fish are typically wild fish, but also include some unmarked hatchery fish. While selective coho salmon *Oncorhynchus kisutch* (“coho”) fisheries have occurred in Oregon, Washington, and British Columbia at various times since 1998, and selective Chinook salmon *O. tshawytscha* (“Chinook”) fisheries have occurred in freshwater areas since 2000, a selective Chinook fishery had not been conducted in marine waters prior to 2003.

During the summers of 2003, 2004, and 2005, a selective Chinook recreational fishery was implemented in waters of the Strait of Juan de Fuca with the objectives of: 1) increasing recreational fishing opportunity while meeting conservation goals for Puget Sound Chinook salmon defined by the Puget Sound Chinook Harvest Management Plan; and 2) collecting information necessary to enable evaluation and planning of future potential Chinook mark-selective fisheries. The Northwest Treaty Tribes and the Washington Department of Fish and Wildlife (WDFW) reached agreement to continue selective Chinook sport fishing in this area for the 2005 season. The 2005 fishery was scheduled for the same time and area as the 2003 and 2004 fisheries.

The 2005 Chinook Selective Fishery started on July 1, 2005 and ran continuously through August 10, 2005 in Marine Area 5 and the western portion of Marine Area 6. Marine Areas 5 and 6 (hereafter: Areas 5 and 6) are located in Washington waters of the Strait of Juan de Fuca, running from the Sekiu River easterly to Low Point, and from Low Point to approximately Whidbey Island, respectively (Figure 1). Chinook selective fishing in Area 6 was open only from Low Point easterly to Ediz Hook because the eastern portion of Area 6 has many more boat ramps and other access points, and would have required substantially more sampling effort to obtain precise estimates of harvest and effort. Additional closures to help achieve fishery objectives were established: 1) in the eastern half of Marine Area 4; 2) near the mouths of the Sekiu and Hoko rivers; 3) near the mouth of the Elwha River; and 4) in Port Angeles Harbor.

Anglers were allowed to retain two marked (adipose fin clipped) Chinook salmon ≥ 22 ” (56 cm) as part of their daily limit, and were required to immediately release, unharmed, any unmarked Chinook caught. Integral to the selective fishery was the same salmon handling regulation used in 2004. The 2005 regulation stated “It is illegal to bring a wild salmon, or a species of salmon, aboard a vessel if it is unlawful to retain those salmon. “Aboard a vessel” was defined as “inside the gunwale”. During the Chinook Selective Fishery anglers were also allowed to retain pink *O. gorbuscha* (“pink”), sockeye *O. nerka*, and marked hatchery coho salmon.

The 2005 season was scheduled to run from July 1, 2005 through August 10, 2005 (41 days), or until a ceiling of 3,500 hatchery Chinook salmon was caught and retained by anglers. The

fishery was closed at 11:59 p.m., August 10, 2005 as scheduled, without the ceiling being reached.

Preliminary analyses of the 2003 and 2004 fisheries were completed and are reported by Thiesfeld and Hagen-Breaux (2005a, 2005b), and WDFW (2005). This report focuses on methods and results from 2005.

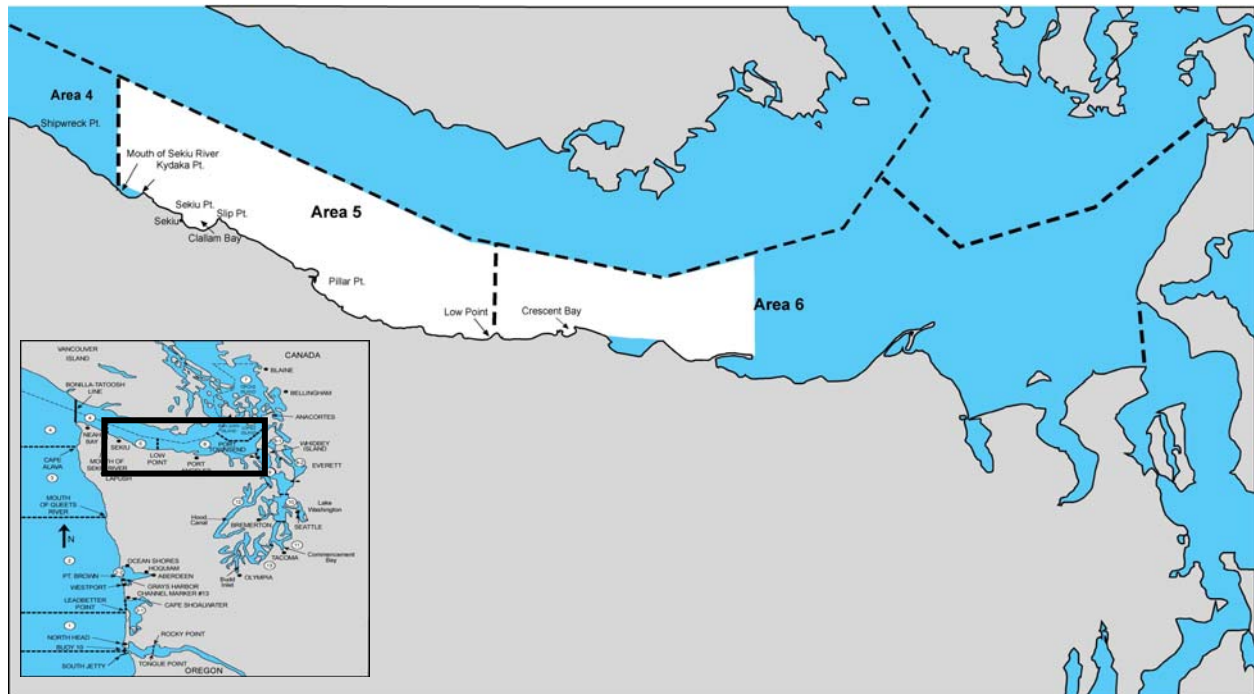


Figure 1. Location of the 2005 Chinook Selective Fishery (shown in white) in Marine Areas 5 and 6.

METHODS

Methods in 2005 were similar to those in 2003 and 2004; a detailed description of which is available in Thiesfeld and Hagen-Breaux (2005a, 2005b). We describe only changes to methods here, or methods that needed elaboration from those presented in the 2003 and 2004 reports.

Access Site Size Determination

Between July 1 and August 10, four surveys were conducted by boat in Area 5, and seven surveys in Area 6, to determine the proportion of effort (or “size”) for each access site.

Angler Interviews

Samplers collected total lengths measured to the nearest millimeter from randomly selected Chinook. Samplers collected scales and lengths from 453 Chinook in Area 5 and from 133 Chinook in Area 6. Fifteen additional scale and length samples were collected in Area 6 by samplers that were not collecting data as part of the Murthy estimate.

Anglers on all boats were surveyed from a selected set of two docks or access points per area during a day; except that if some boats and anglers could not be surveyed, the boats were enumerated and harvest and effort data were expanded to account for the missed boats. During the Chinook Selective Fishery, only 33 boats were missed in Area 5 while 3,586 were interviewed, and no boats were missed in Area 6 while 779 were interviewed.

As time permitted, surveyors also randomly recorded the predominant (based on time) angling method used to encounter Chinook (kept and released) by the boat being interviewed if the boat had encountered Chinook according to the following categories: weight and bait (either mooching or trolling), downrigger trolling, trolling with divers, jigging, or other (e.g. fly fishing). Data was collected only for those boats that actually encountered Chinook. Test fishing boats used results of the angling method survey in order to more accurately represent the fishery (see Test Fishing).

Test Fishing

One test boat fished out of Sekiu (Area 5) from July 1 through September 27, and one boat fished out of Port Angeles (Area 6) from July 1 through August 15. Only data collected between July 1 and August 10 were reported and analyzed in this report. Both areas were fished 35 of the 41 open days during the Chinook Selective Fishery.

Samplers attempted to capture Chinook from July 1 through August 10 through their choice of area to fish, depth, gear type and fishing methods. Samplers attempted to fish with gear types in the same proportion of time as anglers were encountering Chinook with each gear type as estimated from the angler interviews (see Angler Interviews).

Samplers measured both total and fork length on captured Chinook. Total length was used for all analyses in this report.

Voluntary Trip Reports

Additional information on mark rates and the percentage of fish that were legal-size was obtained from Voluntary Trip Reports (VTR's). In 2003 and 2004, VTR's were provided to any angler that wished to collect data. To increase the reliability of the VTR data, in 2005, only selected anglers were issued VTR's. Selected anglers were required to attend a class during which they received detailed information on salmon species identification and became familiar with the data forms, were instructed what data to collect, how to fill out the forms, and how to turn in the forms. Participating anglers recorded the date, number of anglers, target species, which Area they were fishing in, each Chinook or coho caught, whether the fish was kept or released, the species of fish, total length to nearest 1/8th inch, and whether the fish was adipose fin clipped or not.

RESULTS AND DISCUSSION

Effort and Catch

Chinook and coho catches and catch rates in 2005 were less than observed in 2003 and 2004. For the first time in the three years of the fishery, the Chinook ceiling was not reached and the fishery extended through the entire 41 day period. We estimated that anglers made 34,086 trips during the Chinook Selective Fishery (July 1 – August 10, statistical weeks 27 - 33; see Appendix A for dates associated with statistical weeks). Those anglers kept an estimated 2,078 Chinook, 3,723 coho and 14,850 pink (Table 1). Area 5 accounted for 88% of the effort (30,115 angler trips) and 80% of the Chinook kept (1,669) for a rate of 0.06 Chinook kept per angler trip. Area 6 accounted for 3,971 angler trips and 408 Chinook kept for a higher catch rate of 0.10 Chinook kept per angler trip. Based on interviews, Area 5 anglers released an estimated 5,772 Chinook, 10,381 coho, 3,894 pink, and 118 other or unidentified salmon. Also based on interviews, Area 6 anglers released an estimated 636 Chinook, 50 coho, 10 pink, and 2 other or unidentified salmon. The total of 30,115 angler trips in Area 5 was more than double the effort observed during a similar period in 2002. From July 1 through August 9, 2002, anglers made 11,883 trips in Area 5 to catch 1,792 Chinook.

Despite the poor fishing, effort in Area 5 remained high throughout the first five weeks of the fishery before declining at the end of the season (Figure 2). In Area 6, effort was fairly constant, except for a sharp increase in late July (statistical week 31) when fishing improved (Figure 3). Chinook harvest was extremely low throughout the fishery except in mid- to late July (statistical week 30) in Area 5 (Figure 4) and Area 6 (statistical week 31; Figure 5). Anglers made 831 trips per day in 2005, compared to 820 per day in 2003 and 754 per day in 2004. A bonus limit of two additional pink salmon per day probably contributed to maintaining high angler effort throughout the 2005 fishery.

The number of Chinook kept per angler in Area 5 was very low throughout the fishery except during week 30 (Figure 6). The number of Chinook kept per angler in Area 6 was higher in the last half of the season than the first half the season (Figure 7), continuing a general trend observed in 2003 and 2004.

For Areas 5 and 6 combined, a total of 2,078 Chinook were kept during the Chinook Selective Fishery. Of this total, 2,025 were marked and 53 were unmarked (Table 2). One hundred of the kept marked fish were sublegal-size (5%) and 30 of the kept unmarked fish were sub-legal size (57%). A total of 6,408 Chinook were released during the fishery based on angler interviews and the appropriate expansions. We estimated that anglers encountered 7,442 Chinook in Area 5 and 1,044 in Area 6, for a total of 8,486 encounters. Angler interview data suggested that 31% of the fish were marked in Area 5 and 47% were marked in Area 6. Approximately 90% of the unmarked Chinook caught and released by anglers were caught in Area 5 (Table 3). Weekly sampling data and estimates are presented in Appendices B, C, D and E.

Table 1. Recreational salmon catch estimate during the Chinook Selective Fishery in Marine Areas 5 and 6, July 1 through August 10, 2005 based on angler interviews during creel surveys. Values may not add exactly due to rounding error.

Fishery	Trips		Harvested			Released			
	Boats	Anglers	Chinook	Coho	Pink	Unidentified or Other	Chinook	Coho	Pink
Area 5	11,968	30,115	1,669	3,710	14,609	118	5,772	10,381	3,894
Area 6	2,116	3,971	408	13	241	2	636	50	10
Total	14,084	34,086	2,078	3,723	14,850	120	6,408	10,431	3,904

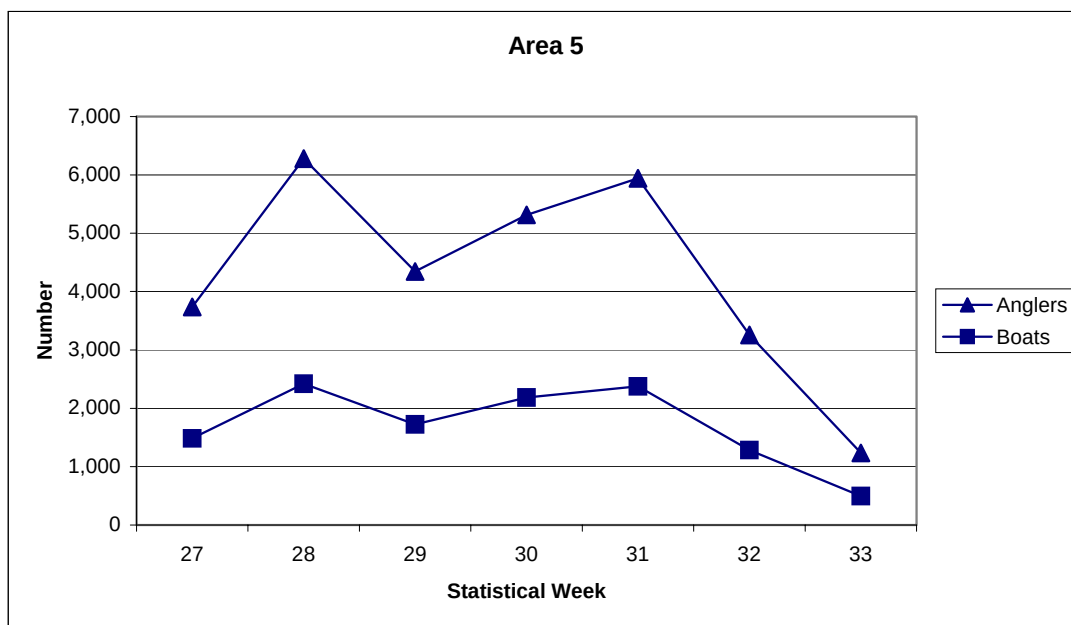


Figure 2. Angler effort in Marine Area 5, by week, for the 2005 Chinook Selective Fishery, July 1 through August 10, 2005. Note the first and last weeks include only three days each.

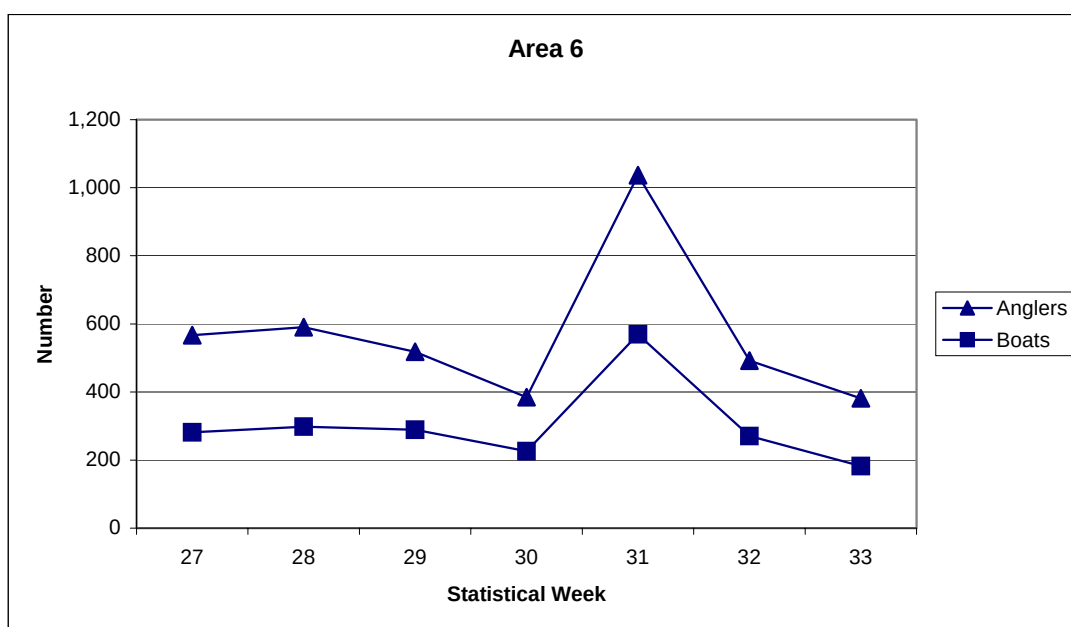


Figure 3. Angler effort in Marine Area 6, by week, for the 2005 Chinook Selective Fishery, July 1 through August 10, 2005. Note the first and last weeks include only three days each.

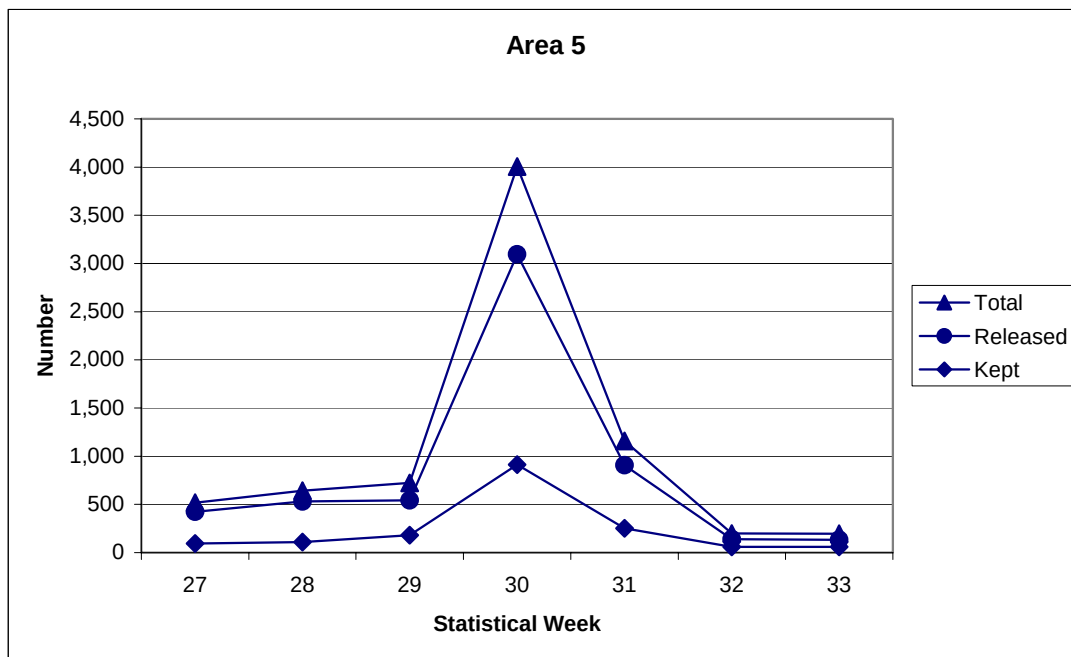


Figure 4. Catch of Chinook salmon from angler interviews in Marine Area 5, by week, for the 2005 Chinook Selective Fishery, July 1 through August 10, 2005. Note the first and last weeks include only three days each.

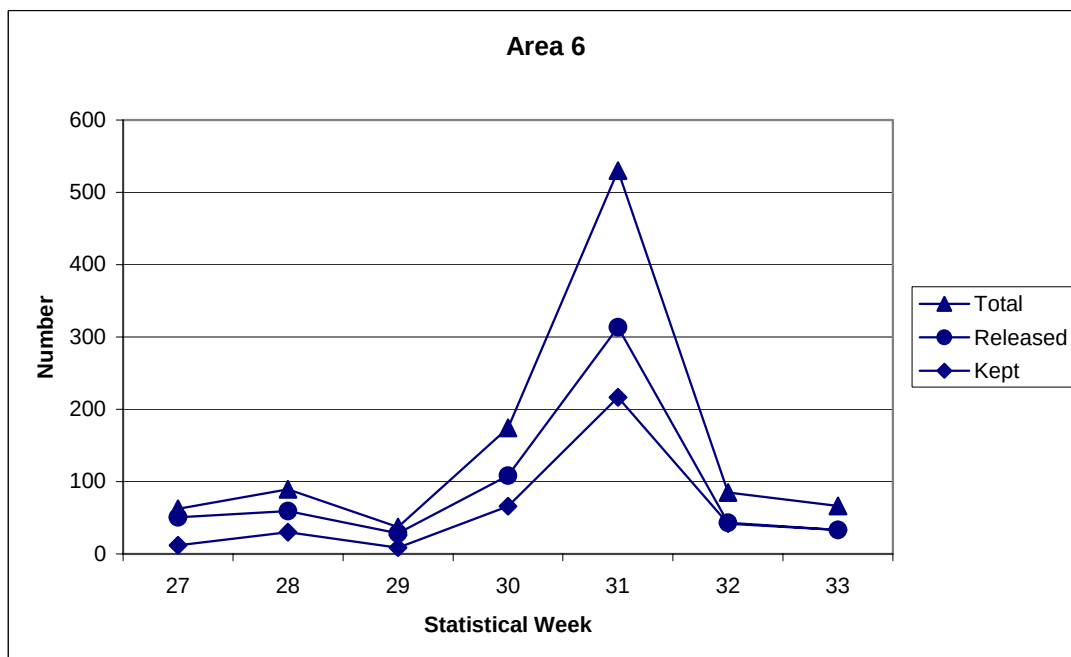


Figure 5. Catch of Chinook salmon from angler interviews in Marine Area 6, by week, for the 2005 Chinook Selective Fishery, July 1 through August 10, 2005. Note the first and last weeks include only three days each.

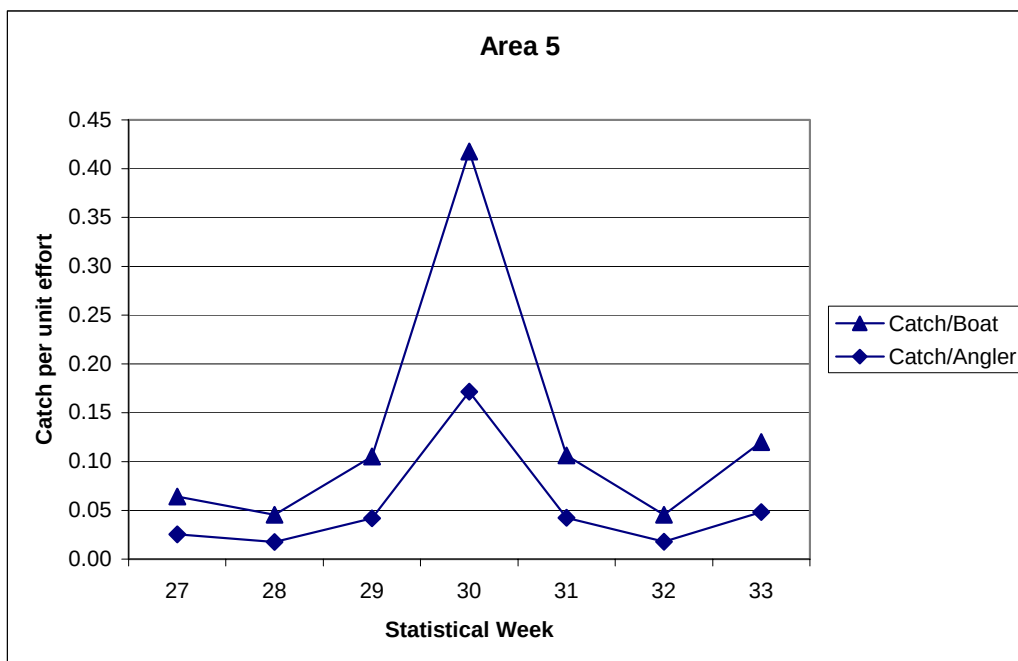


Figure 6. Catch per unit effort for kept Chinook salmon in Marine Area 5, by week, for the 2005 Chinook Selective Fishery, July 1 through August 10, 2005. Note the first and last weeks include only three days each.

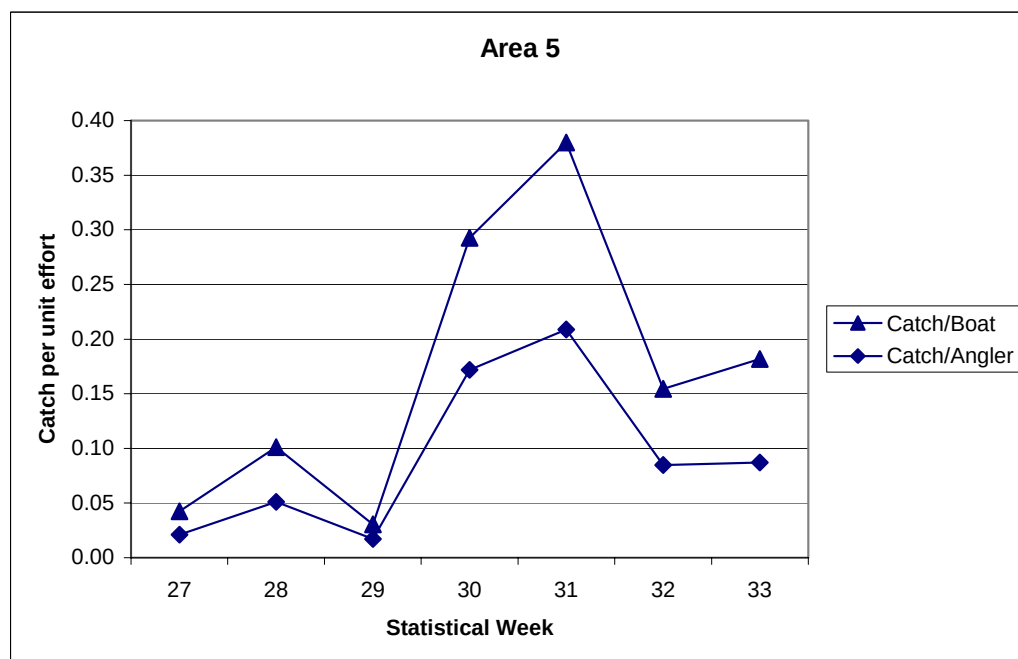


Figure 7. Catch per unit effort for kept Chinook salmon in Marine Area 6, by week, for the 2005 Chinook Selective Fishery, July 1 through August 10, 2005. Note the first and last weeks include only three days each.

Table 2. Creel survey estimates of Chinook kept and released, by mark status, during the Chinook Selective Fishery in Marine Areas 5 and 6, July 1 through August 10, 2005. Values may not add exactly due to rounding error.

	Marked Kept	Unmarked Kept	Total Kept	Marked Released	Unmarked Released	Unknown Released	Total Released	Total Encounters
Area 5	1,620	49	1,669	542	4,664	566	5,772	7,442
Area 6	404	4	408	85	549	3	636	1,044
Total	2,025	53	2,078	627	5,213	568	6,408	8,486

Table 3. Summary of creel survey estimates of marked and unmarked Chinook catch and variances (in parentheses) during the Chinook Selective Fishery in Marine Areas 5 and 6, July 1 through August 10, 2005. Values may not add exactly due to rounding error.

Area	Chinook Kept			Chinook Released			
	Marked	Unmarked	Total	Marked	Unmarked	Unknown	Total
5	1,620 (26,662)	49 (268)	1,669 (26,930)	542 (4,526)	4,664 (135,221)	566 (16,642)	5,772 (156,388)
6	404 (14,938)	4 (3)	408 (14,941)	85 (4,540)	549 (17,679)	3 (1)	636 (22,220)
5 and 6 Combined	2,025 (41,600)	53 (270)	2,078 (41,871)	627 (9,066)	5,213 (152,900)	568 (16,643)	6,408 (178,608)

Test Fisheries

Test boats attempted to replicate the fishing methods used by anglers encountering Chinook by utilizing fishing methods in the same proportions reported by anglers. Fishing was extremely slow in Area 6, and the number of Chinook encounters there was very low. During the Chinook Selective Fishery (July 1-August 10), samplers fishing from the test boats landed 137 Chinook in Area 5 (Table 4) and 17 Chinook in Area 6 (Table 5). The low sample size in Area 6 precluded calculation of weighted proportions of Chinook into legal-size marked, legal-size unmarked, sublegal-size marked, and sublegal-size unmarked categories.

Downriggers were the most commonly used method by anglers who encountered Chinook in both areas, followed by bait (Table 6); therefore, downriggers were the most commonly used method by samplers fishing from the test boats (Table 7). In Area 5, 98% of the Chinook landed by the test boat were caught using downriggers (Table 8), even though they were only fished 87% of the time. In Area 6, all the Chinook landed by the test boat were caught using downriggers (Table 8), even though they were only fished 75% of the time. Samplers caught only three Chinook using other gear types and all three fish were sublegal-size. Test fishing with other gear types resulted in fewer encounters and fewer biological samples for both areas than would have occurred if the samplers had used exclusively downriggers as they did in 2003.

During the Chinook Selective Fishery time period, 55% of the legal-size fish were marked in Area 5 and 41% of the legal-size Chinook were marked in Area 6 (Table 9). Based on these data, anglers could retain one of every two legal-size Chinook they encountered during the fishery. The mark rate on sublegal Chinook was 47% ($n = 64$) for Area 5, but no sublegal Chinook were encountered in Area 6 (Table 9). The low sample size in Area 6 precluded meaningful comparison of mark rates between areas (Figure 8).

Chinook caught by test boats were larger in Area 6 than in Area 5 (Figures 9 and 10). The average size of fish in Area 5 was 61 cm with a minimum of 37 cm and a maximum of 101 cm ($n = 137$), while the average size in Area 6 was 77 cm with a minimum of 63 cm and a maximum of 92 cm ($n = 17$). Despite the low sample size in Area 6, the percent of fish that were legal size (22" or larger) was significantly different ($X^2 = 85.4$, $p < 0.0001$) between Area 6 (100%) and Area 5 (53%).

Table 4. Catch data and calculations used to estimate weekly weighted mark rate and variance for Chinook salmon caught on the test boat during the Chinook Selective Fishery in Marine Area 5, July 1 through August 10, 2005. Upper table shows the catch by week. Middle table shows the rates of marked and unmarked fish by week. Bottom table shows the weekly rate weighted (multiplied) by proportion of the total catch, and a season-long weighted mark rate (sum of the weekly data).

Size	Mark Status	Week							Total
		27	28	29	30	31	32	33	
Legal	Marked	0	2	3	19	10	4	2	40
	Unmarked	1	1	3	14	8	1	5	33
Sublegal	Marked	0	2	11	11	5	0	1	30
	Unmarked	0	0	9	19	5	0	1	34
Total		1	5	26	63	28	5	9	137

Weekly Rates	Week						
	27	28	29	30	31	32	33
Legal Mark Rate	0.000	0.667	0.500	0.576	0.556	0.800	0.286
Sublegal Mark Rate		1.000	0.550	0.367	0.500		0.500
Combined Mark Rate	0.000	0.800	0.538	0.476	0.536	0.800	0.333
Proportion Legal and Marked	0.000	0.400	0.115	0.302	0.357	0.800	0.222
Proportion Legal and Unmarked	1.000	0.200	0.115	0.222	0.286	0.200	0.556
Proportion Sublegal and Marked	0.000	0.400	0.423	0.175	0.179	0.000	0.111
Proportion Sublegal and Unmarked	0.000	0.000	0.346	0.302	0.179	0.000	0.111

	Week							Season-long Weighted Rate	Standard Error
	27	28	29	30	31	32	33		
Proportion of Catch (from Creel)	0.057	0.066	0.109	0.546	0.152	0.035	0.035		
Legal Mark Rate	0.000	0.044	0.055	0.315	0.084	0.028	0.010	0.54	0.152
Sublegal Mark Rate		0.066	0.060	0.200	0.076		0.018	--	--
Combined Mark Rate	0.000	0.053	0.059	0.260	0.081	0.028	0.012	0.49	0.158
Proportion Legal and Marked	0.000	0.026	0.013	0.165	0.054	0.028	0.008	0.29	0.137
Proportion Legal and Unmarked	0.057	0.013	0.013	0.121	0.043	0.007	0.020	0.27	0.194
Proportion Sublegal and Marked	0.000	0.026	0.046	0.095	0.027	0.000	0.004	0.20	0.112
Proportion Sublegal and Unmarked	0.000	0.000	0.038	0.165	0.027	0.000	0.004	0.23	0.116

Table 5. Catch by week for Chinook salmon caught on the test boat during the Chinook Selective Fishery in Marine Area 6, July 1 through August 10, 2005.

Size	Mark Status	Week							Total
		27	28	29	30	31	32	33	
Legal	Marked	0	1	2	1	0	1	2	7
	Unmarked	0	4	0	3	0	2	1	10
Sublegal	Marked	0	0	0	0	0	0	0	0
	Unmarked	0	0	0	0	0	0	0	0
Total		0	5	2	4	0	3	3	17

Table 6. Predominate gear type used by anglers (% of boat trips) to encounter Chinook (kept and released) during the Chinook Selective Fishery in Marine Areas 5 and 6, July 1 through August 10, 2005.

Statistical Week	Area 5					Area 6			
	Down-rigger	Weight and Bait	Diver	Jig	Other	Down-rigger	Weight and Bait	Diver	Jig
27	73	19	8	1	0	77	12	4	8
28	90	7	2	0	0	55	14	3	28
29	91	7	2	0	0	60	25	0	15
30	83	8	9	0	1	52	18	2	27
31	67	13	19	0	1	57	23	0	19
32	80	15	6	0	0	73	23	0	5
33	83	9	4	4	0	68	18	9	5
Weighted Average	82	10	8	0	0	61	19	2	17

Table 7. Percent of time that test boats fished various methods during the Chinook Selective Fishery in Marine Areas 5 and 6, July 1 through August 10, 2005.

Statistical Week	Area 5				Area 6			
	Down-rigger	Weight and Bait	Diver	Jig	Down-rigger	Weight and Bait	Diver	Jig
27	100	0	0	0	100	0	0	0
28	100	0	0	0	98	0	0	2
29	76	18	6	0	67	13	7	13
30	83	13	4	0	65	14	0	21
31	91	6	2	0	61	26	0	13
32	85	7	9	0	89	11	0	0
33	100	0	0	0	100	0	0	0
Weighted Average	87	9	4	0	75	13	1	11

Table 8. Percent of Chinook that test boats caught using various methods during the Chinook Selective Fishery in Marine Areas 5 and 6, July 1 through August 10, 2005.

Statistical Week	Area 5				Area 6			
	Down-rigger	Weight and Bait	Diver	Jig	Down-rigger	Weight and Bait	Diver	Jig
27	100	0	0	0	--	--	--	--
28	100	0	0	0	100	0	0	0
29	92	8	0	0	100	0	0	0
30	98	2	0	0	100	0	0	0
31	100	0	0	0	--	--	--	--
32	100	0	0	0	100	0	0	0
33	100	0	0	0	100	0	0	0
Weighted Average	98	2	0	0	100	0	0	0

Table 9. Summary of the number of marked and unmarked, legal-size and sublegal-size Chinook salmon caught by test boats during the Chinook Selective Fishery in Marine Areas 5 and 6, July 1 through August 10, 2005.

	Legal-size			Sublegal-size			Total		
	Marked	Unmarked	%	Marked	Unmarked	%	Marked	Unmarked	%
Area 5	40	33	55	30	34	47	70	67	51
Area 6	7	10	41	0	0	--	7	10	41
Total	47	43	52	30	34	47	77	77	50

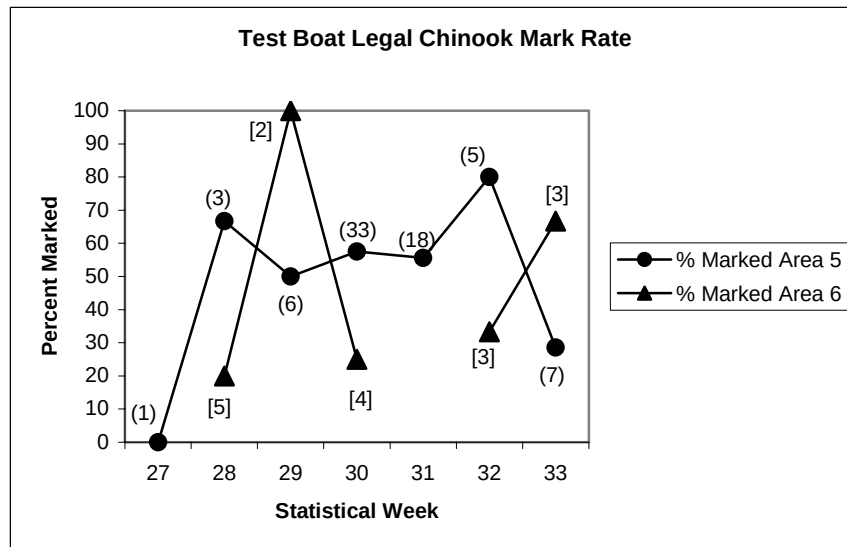


Figure 8. Mark rate (% adipose fin clipped) of legal-size Chinook caught by WDFW test boats in Marine Areas 5 and 6 during 2005. Sample sizes for Marine Area 5 are in parentheses (), while sample sizes for Marine Area 6 are in brackets []. The Chinook Selective Fishery occurred from July 1 through August 10, 2005 (statistical weeks 27 – 33). Note the first and last weeks include only three days each.

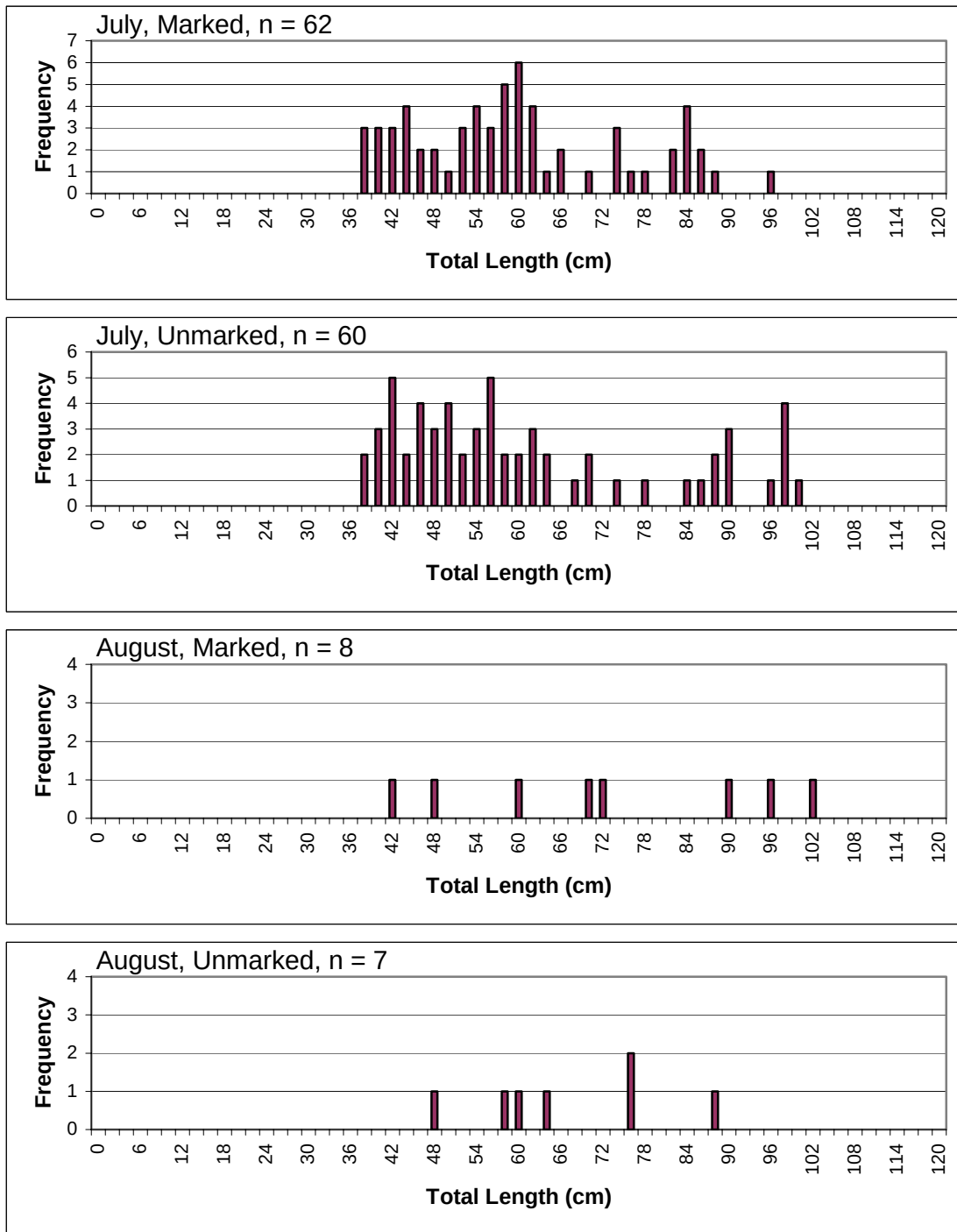


Figure 9. Length frequency histograms of Chinook salmon caught by test fishing boats sampling from July 1 through August 10, 2005, in Marine Area 5.

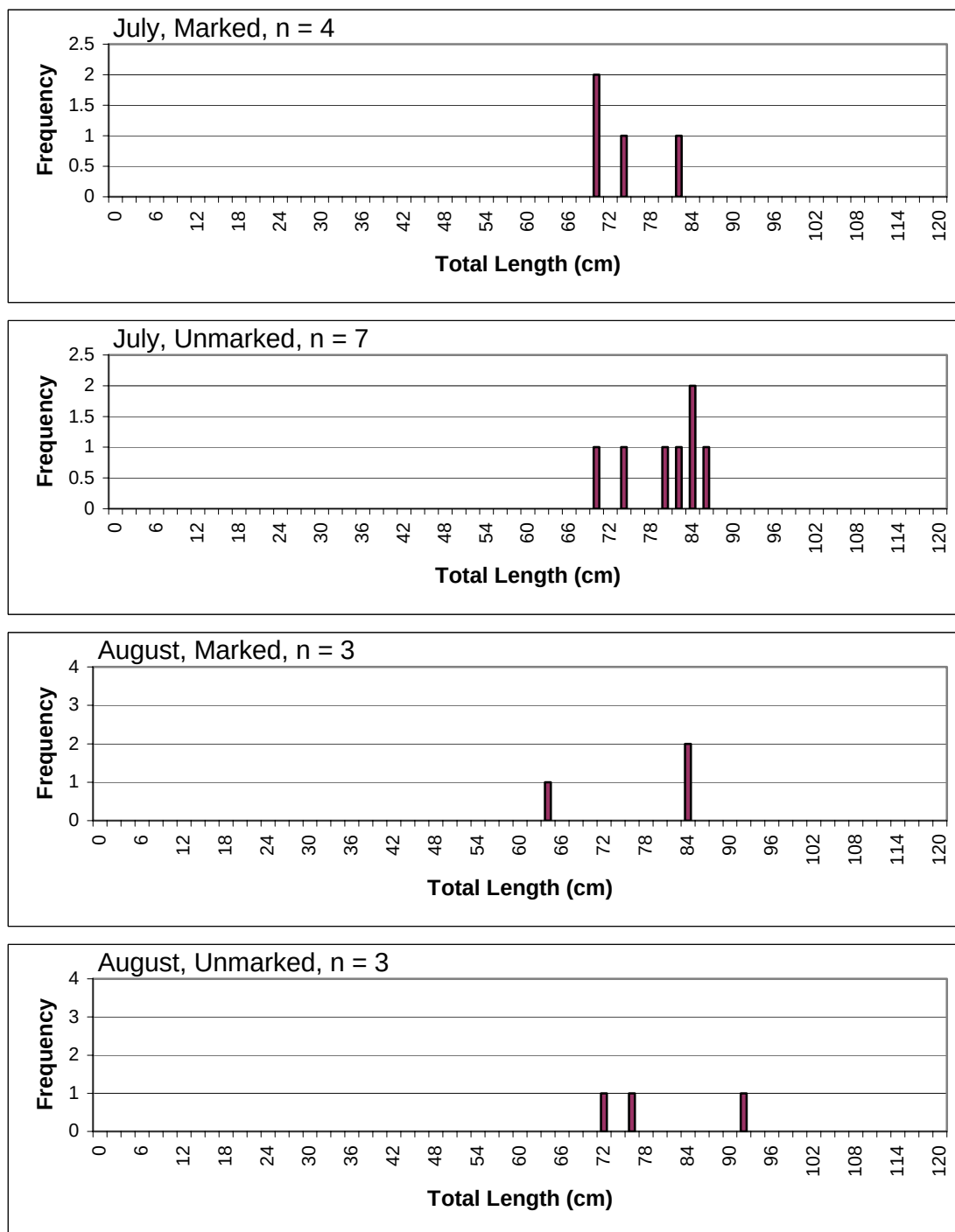


Figure 10. Length frequency histograms of Chinook salmon caught by test fishing boats sampling from July 1 through August 10, 2005, in Marine Area 6.

Voluntary Trip Reports (VTR's)

Sixty-four Chinook were recorded on VTR's in Area 5 during the 2005 Chinook Selective Fishery (Table 10), while 40 Chinook were recorded on VTR's in Area 6 (Table 11). In Area 5, 45% of the fish recorded on VTR's were legal-size and 31% of these were marked. However, because no catch was reported in week 33, we were unable to calculate a weighted mark rate. In Area 6, 93% of the Chinook encountered were legal-size and 33% of these were marked (Tables 11 and 12). It was difficult to discern any pattern in mark rate of legal-size fish from the VTR's (Figure 11). In Area 5, VTR's generally showed a lower mark rate for legal-size fish than the test fishery (Figure 12). No trend was evident between the two methods for mark rates of legal-size Chinook in Area 6 (Figure 13).

Coded Wire Tags

Samplers recovered 82 coded wire tags from harvested Chinook during the Chinook Selective Fishery (Appendix F). Of these, 69 percent were Puget Sound stocks, 19 percent were Columbia River stocks, 9 percent were Canadian stocks, and the remainder from elsewhere. Thirty-three double index coded wire tags were recovered in Areas 5 and 6 from July 1 through August 10 (Table 13). Fish from George Adams, Grovers Creek, and Samish hatcheries contributed the highest number of double index tags. We estimated that anglers caught and released 105 legal-size, unmarked double index tagged Chinook, and that the mortality of unmarked legal-size double index tagged Chinook due to this selective fishery was 11 fish (Table 14).

Encounters and Total Mortalities

We used two methods for estimating Chinook encountered in the fishery. The first method was based on applying the weighted proportions of marked and unmarked, legal and sublegal size Chinook to the sum of landed catch plus the creel interview reports of Chinook released. For Area 5, we only used the test boat catches to calculate the weighted proportions. Due to the small sample of fish caught by the test boat in Area 6, we combined the test boat and VTR data into a single data set, and calculated weighted proportions of marked and unmarked, legal and sublegal-size fish in Area 6 for this analysis (Table 15). Using the estimate of total Chinook encounters from the creel survey and apportioning encounters into the four categories of legal-size marked, legal-size unmarked, sublegal-size marked, and sublegal-size unmarked from the combined data set resulted in slightly fewer encounters in Area 6 of legal-size marked fish (398) than the estimated number retained in the creel survey (404). To remedy this situation, we set the number of encounters of legal-size marked fish in Area 6 at the estimated number of fish retained, or 404 fish. Due to this adjustment, the final number of encounters for area 6 is slightly higher than reported in the creel survey. Using these methods, we estimated that anglers encountered 8,495 Chinook in Areas 5 and 6 combined. We estimated that anglers released 665 legal-size and marked Chinook in Area 5 and zero legal-size and marked Chinook in Area 6 (Table 16). The 665 fish released in Area 5 suggests that anglers released 30% of the fish they could have kept. Given the poor overall fishing during the 2005 Chinook Selective Fishery, we believe most anglers would have kept a greater percentage of the fish they caught and that the

calculated release rate of 30% is unrealistically high. Using this method, we estimated the total Chinook mortality during this fishery at 3,197 fish (Table 16).

The second method for estimating the number of encounters was based on the assumption that anglers kept all fish that were legal-size and marked. Total encounters were estimated by dividing the number of legal-size marked fish that anglers retained by the weighted proportion of legal-size marked fish from the test boats (and a combination of test boat and VTR data in Area 6). The number of encounters in the remaining three categories was then obtained by multiplying the total encounters by the proportions for each corresponding category. This method resulted in an estimate of 6,240 encounters (Table 17) compared to 8,495 encounters for the first method.

The first method produced a result that implied anglers were “sorting” their catch by releasing one-third of the fish that were legal to keep. The second method assumed that all retainable Chinook were kept. Given the extremely low catch rate of marked legal-size Chinook in this fishery (about one fish for every 16 anglers), it seems unlikely that extensive sorting was occurring. It is also unlikely that all legal-size and marked fish were kept; even in low success fisheries barely legal-size fish may be voluntarily released in hopes of landing a larger one. The true number of encounters likely lies between the two estimates, i.e. between 6,240 and 8,495 Chinook (Table 18).

The range of encounters resulting from the two methods produces a corresponding range of mortalities. Using the first method and a release mortality rate of 15% for legal size Chinook and 20% for sublegal-size Chinook, we estimated the total mortalities of Chinook in the selective fishery at 3,197, which includes the harvest of 2,078 fish (Table 19). Based on the estimated 7,441 Chinook encounters in Area 5 from angler interviews, we estimated the total mortality of Chinook in this area at 2,689 fish, including the 1,669 harvested. Based on the estimated 1,054 encounters of Chinook in Area 6 from angler interviews, we estimated the total mortality of Chinook in this area at 508 fish, including the 408 harvested. Overall, we estimated the total mortality of unmarked fish at 785 fish, of which 372 were sublegal-size fish and 413 were legal-size fish.

Using the encounters estimated by assuming anglers kept all legal fish (method two) we estimated total mortalities at 2,810 fish, of which 588 were unmarked fish (Table 19). Of the unmarked fish, we estimated that 267 were sublegal-size and 322 were legal-size.

Although we believe the true number of mortalities lies between our two estimates, we used the higher number to compare estimated mortalities against pre-season predictions of mortalities. Based on the estimated number of total encounters from the creel survey and apportioning them based on the test boat catch rates, we estimated the 2005 fishery resulted in the mortality of 413 unmarked legal-size Chinook and 372 unmarked sublegal-size Chinook (Table 16). These estimates are well below the predicted mortalities of 1,701 unmarked legal-size Chinook and 975 unmarked sublegal-size Chinook as produced in the final pre-season run of the Fishery Regulation Assessment Model (FRAM; Model 2705, April 8, 2005), and suggests this fishery did not hinder nor jeopardize achievement of the overall conservation goals for Puget Sound Chinook.

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Table 10. Catch by week for Chinook salmon caught by anglers reporting their catch on Voluntary Trip Reports (VTR's) during the Chinook Selective Fishery in Marine Area 5, July 1 through August 10, 2005.

Size	Mark Status	Week							Total
		27	28	29	30	31	32	33	
Legal	Marked	1	0	0	1	5	2	0	9
	Unmarked	0	3	3	6	8	0	0	20
Sublegal	Marked	1	1	1	3	5	0	0	11
	Unmarked	1	2	1	0	19	1	0	24
Total		3	6	5	10	37	3	0	64

Table 11. Catch data and calculations used to estimate weekly weighted mark rate and variance for Chinook salmon caught by anglers reporting their catch on Voluntary Trip Reports (VTR's) during the Chinook Selective Fishery in Marine Area 6, July 1 through August 10, 2005. Upper table shows the catch by week. Middle table shows the rates of marked and unmarked fish by week. Bottom table shows the weekly rate weighted (multiplied) by proportion of the total catch, and a season-long weighted mark rate (sum of the weekly data).

Size	Mark Status	Week							Total
		27	28	29	30	31	32	33	
Legal	Marked	0	1	0	0	6	5	1	13
	Unmarked	1	2	3	1	7	10	0	24
Sublegal	Marked	2	0	0	0	1	0	0	3
	Unmarked	0	0	0	0	0	0	0	0
Total		3	3	3	1	14	15	1	40

Weekly Rates	Week						
	27	28	29	30	31	32	33
Legal Mark Rate	0.000	0.333	0.000	0.000	0.462	0.333	1.000
Sublegal Mark Rate	1.000				1.000		
Combined Mark Rate	0.667	0.333	0.000	0.000	0.500	0.333	1.000
Proportion Legal and Marked	0.000	0.333	0.000	0.000	0.429	0.333	1.000
Proportion Legal and Unmarked	0.333	0.667	1.000	1.000	0.500	0.667	0.000
Proportion Sublegal and Marked	0.667	0.000	0.000	0.000	0.071	0.000	0.000
Proportion Sublegal and Unmarked	0.000	0.000	0.000	0.000	0.000	0.000	0.000

	Week							Season-long Weighted Rate	Standard Error
	27	28	29	30	31	32	33		
Proportion of Catch (from Creel)	0.029	0.074	0.022	0.162	0.529	0.103	0.081		
Legal Mark Rate	0.000	0.025	0.000	0.000	0.244	0.034	0.081	0.38	0.257
Sublegal Mark Rate	0.042	--	--	--	0.750	--	--	--	--
Combined Mark Rate	0.020	0.025	0.000	0.000	0.265	0.034	0.081	0.42	0.257
Proportion Legal and Marked	0.000	0.025	0.000	0.000	0.227	0.034	0.081	0.37	0.252
Proportion Legal and Unmarked	0.010	0.049	0.022	0.162	0.265	0.069	0.000	0.58	0.257
Proportion Sublegal and Marked	0.020	0.000	0.000	0.000	0.038	0.000	0.000	0.06	0.112
Proportion Sublegal and Unmarked	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.000

Table 12. Summary of the number of marked and unmarked, legal-size and sublegal-size Chinook salmon caught by volunteers reporting their catch on Voluntary Trip Reports (VTR's) during the Chinook Selective Fishery in Marine Areas 5 and 6, July 1 through August 10, 2005.

	Legal-size			Sublegal-size			Total		
	Marked	Unmarked	%	Marked	Unmarked	%	Marked	Unmarked	%
Area 5	9	20	31	11	24	31	20	44	31
Area 6	13	24	35	3	0	100	16	24	40
Total	22	44	33	14	24	37	36	68	35

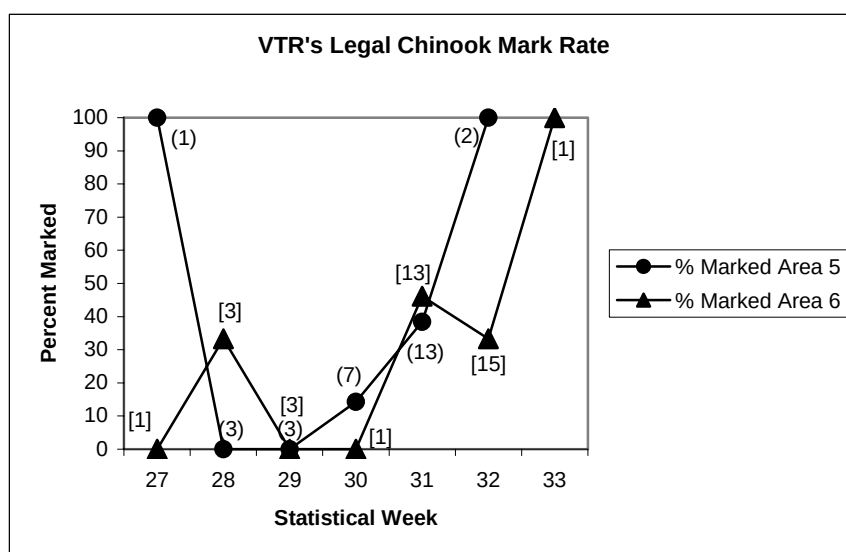


Figure 11. Mark rate (% adipose fin clipped) of legal-size Chinook caught by anglers submitting Voluntary Trip Reports for Marine Areas 5 and 6 during 2005. Sample sizes for Marine Area 5 are in parentheses (), while sample sizes for Marine Area 6 are in brackets []. The Chinook Selective Fishery occurred from July 1 through August 10, 2005 (statistical weeks 27 – 33). Note the first and last weeks include only three days each.

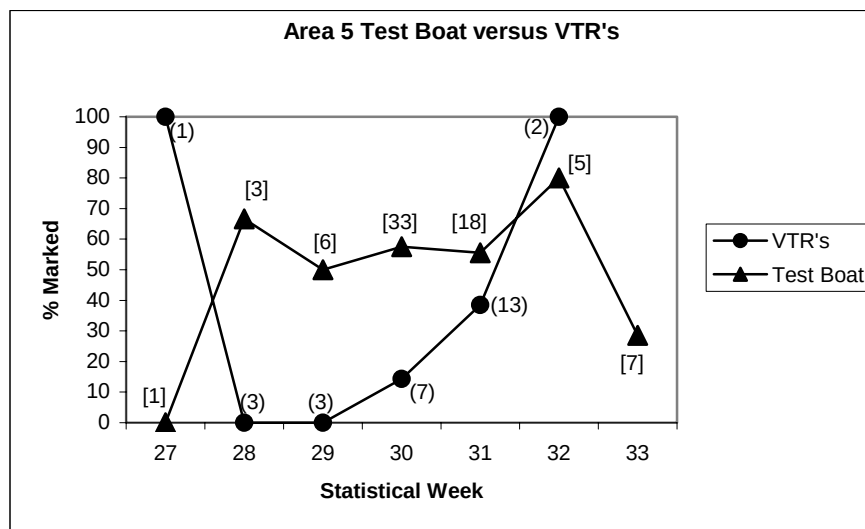


Figure 12. Mark rate (% adipose fin clipped) of legal-size Chinook salmon caught by the WDFW test boat and anglers recording their catch on Voluntary Trip Reports (VTR's) in Marine Area 5 during 2005. Sample sizes for the test boat are in brackets [], while sample sizes for VTR's are in parentheses (). The Chinook Selective Fishery was from July 1 through August 10. Note the first and last weeks include only three days each.

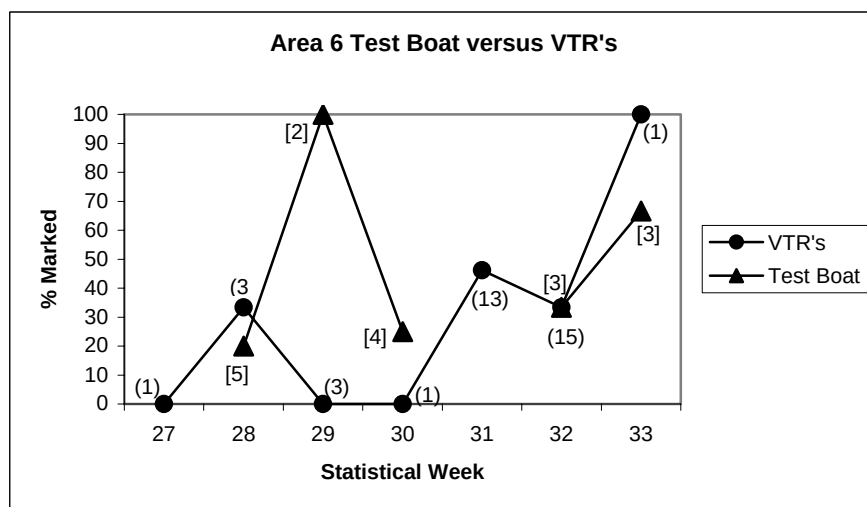


Figure 13. Mark rate (% adipose fin clipped) of legal-size Chinook salmon caught by the WDFW test boat and anglers recording their catch on Voluntary Trip Reports (VTR's) in Marine Area 6 during 2004. Sample sizes for the test boat are in brackets [], while sample sizes for VTR's are in parentheses (). The Chinook Selective Fishery was from July 1 through August 10. Note the first and last weeks include only three days each.

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Table 13. Observed harvested Chinook salmon with Double Index Tag (DIT) coded wire tags during the Chinook Selective Fishery in Marine Areas 5 and 6, July 1 through August 10, 2005.

Area	Recovery Date	Tag code	Brood Year	Rearing Hatchery	Release Site	Release Agency	Fork Length (cm)
06	8-Jul-05	210390	2001	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ	75
06	15-Jul-05	210390	2001	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ	82
06	8-Aug-05	210390	2001	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ	73
06	8-Aug-05	210390	2001	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ	79
05	2-Jul-05	210407	2002	DUNGENESS HATCHERY	GRAY WOLF R 18.0048	WDFW	70
06	1-Jul-05	210479	2002	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ	61
06	26-Jul-05	210483	2002	NISQUALLY HATCHERY	CLEAR CR 11.0013C	NISQ	74
05	20-Jul-05	210548	2003	NISQUALLY HATCHERY	CLEAR CR 11.0013C	NISQ	39
06	8-Jul-05	631371	2002	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW	68
05	21-Jul-05	631371	2002	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW	64
05	22-Jul-05	631371	2002	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW	52
05	23-Jul-05	631371	2002	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW	62
05	23-Jul-05	631371	2002	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW	59
05	23-Jul-05	631371	2002	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW	52
06	24-Jul-05	631371	2002	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW	63
05	10-Aug-05	631371	2002	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW	72
05	10-Aug-05	631371	2002	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW	61
05	6-Aug-05	631375	2001	SOOS CREEK HATCHERY	BIG SOOS CR 09.0072	WDFW	86
05	23-Jul-05	631377	2001	SAMISH HATCHERY	FRIDAY CR 03.0017	WDFW	84
05	7-Aug-05	631377	2001	SAMISH HATCHERY	FRIDAY CR 03.0017	WDFW	72
05	21-Jul-05	631387	2002	WALLACE R HATCHERY	WALLACE R 07.0940	WDFW	59
05	22-Jul-05	631414	2002	MARBLEMOUNT HATCHERY	CASCADE R 03.1411	WDFW	56
05	22-Jul-05	631414	2002	MARBLEMOUNT HATCHERY	CASCADE R 03.1411	WDFW	56
05	20-Jul-05	631546	2002	KENDALL CR HATCHERY	DEADHORSE CR 01.0495	WDFW	55
05	20-Jul-05	631774	2002	SAMISH HATCHERY	FRIDAY CR 03.0017	WDFW	61
05	21-Jul-05	631774	2002	SAMISH HATCHERY	FRIDAY CR 03.0017	WDFW	58
06	23-Jul-05	631774	2002	SAMISH HATCHERY	FRIDAY CR 03.0017	WDFW	60
05	23-Jul-05	631776	2002	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ	57
05	21-Jul-05	631784	2002	SOOS CREEK HATCHERY	BIG SOOS CR 09.0072	WDFW	61
05	20-Jul-05	631789	2003	KENDALL CR HATCHERY	NOOKSACK R -NF 01.01	WDFW	42
05	23-Jul-05	636322	2001	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW	67
06	25-Jul-05	636322	2001	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW	83
06	4-Aug-05	636322	2001	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW	83

Table 14. Observed number of double index tagged (DIT) Chinook kept by anglers, and the estimated mortality of unmarked double index tagged Chinook due to catch and release mortality, during the Chinook Selective Fishery in Marine Areas 5 and 6, July 1 through August 10, 2005.

Hatchery	Brood Year	DIT Tagged fish Observed	Estimated Harvest of Marked DIT fish	Variance of Estimated Harvest of Marked DIT Fish	Estimated Angler Releases of Unmarked DIT fish	Estimated Mortality of Unmarked DIT fish	Variance of Estimated Mortality of Unmarked DIT Fish	Standard Error of Estimated Mortality of Unmarked DIT Fish
Dungeness	2002	1	2.51	3.78	2.43	0.24	0.04	0.19
George Adams	2001	3	12.02	44.23	11.27	1.13	0.39	0.97
George Adams	2002	9	27.43	61.40	27.32	2.73	0.61	2.23
Grovers Creek	2001	4	8.25	9.74	8.26	0.83	0.10	0.59
Grovers Creek	2002	2	5.63	11.62	5.50	0.55	0.11	0.44
Kendall Creek	2002	1	3.65	9.67	3.71	0.37	0.10	0.32
Kendall Creek	2003	1	3.65	9.67	4.46	0.45	0.14	0.38
Marblemount	2002	2	7.30	19.34	7.33	0.73	0.19	0.62
Nisqually	2002	1	6.17	31.93	6.92	0.69	0.40	0.63
Nisqually	2003	1	3.65	9.67	3.60	0.36	0.09	0.31
Samish	2001	2	6.08	13.13	5.94	0.59	0.13	0.49
Samish	2002	3	9.13	20.87	9.23	0.92	0.21	0.75
Soos Creek	2001	1	2.43	3.46	2.21	0.22	0.03	0.17
Soos Creek	2002	1	3.65	9.67	3.81	0.38	0.11	0.32
Wallace River	2002	1	3.65	9.67	3.72	0.37	0.10	0.32
Total		33	105.19		105.70	10.57		

Table 15. Catch data and calculations used to estimate weekly weighted mark rate and variance for Chinook salmon caught by the WDFW test boat and anglers reporting their catch on Voluntary Trip Reports (VTR's) during the Chinook Selective Fishery in Marine Area 6, July 1 through August 10, 2005. Upper table shows the catch by week. Middle table shows the rates of marked and unmarked fish by week. Bottom table shows the weekly rate weighted (multiplied) by proportion of the total catch, and a season-long weighted mark rate (sum of the weekly data).

Size	Mark Status	Week							Total
		27	28	29	30	31	32	33	
Legal	Marked	0	2	2	1	6	6	3	20
	Unmarked	1	6	3	4	7	12	1	34
Sublegal	Marked	2	0	0	0	1	0	0	3
	Unmarked	0	0	0	0	0	0	0	0
Total		3	8	5	5	14	18	4	57

Weekly Rates	Week						
	27	28	29	30	31	32	33
Legal Mark Rate	0.000	0.250	0.400	0.200	0.462	0.333	0.750
Sublegal Mark Rate	1.000				1.000		
Combined Mark Rate	0.667	0.250	0.400	0.200	0.500	0.333	0.750
Proportion Legal and Marked	0.000	0.250	0.400	0.200	0.429	0.333	0.750
Proportion Legal and Unmarked	0.333	0.750	0.600	0.800	0.500	0.667	0.250
Proportion Sublegal and Marked	0.667	0.000	0.000	0.000	0.071	0.000	0.000
Proportion Sublegal and Unmarked	0.000	0.000	0.000	0.000	0.000	0.000	0.000

	Week							Season-long Weighted Rate	Standard Error
	27	28	29	30	31	32	33		
Proportion of Catch (from Creel)	0.029	0.074	0.022	0.162	0.529	0.103	0.081		
Legal Mark Rate	0.000	0.018	0.009	0.032	0.244	0.034	0.061	0.40	0.159
Sublegal Mark Rate	0.029	--	--	--	0.529	--	--	--	--
Combined Mark Rate	0.020	0.018	0.009	0.032	0.265	0.034	0.061	0.38	0.153
Proportion Legal and Marked	0.000	0.018	0.009	0.032	0.227	0.034	0.061	0.38	0.153
Proportion Legal and Unmarked	0.010	0.055	0.013	0.129	0.265	0.069	0.020	0.56	0.156
Proportion Sublegal and Marked	0.020	0.000	0.000	0.000	0.038	0.000	0.00	0.06	0.112
Proportion Sublegal and Unmarked	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.000

Table 16. Calculations used to estimate encounters and total mortality of Chinook salmon during the 2005 Chinook Selective Fishery in Marine Areas 5 and 6, July 1 through August 10. Uses the number of encounters obtained from dockside creel estimates, and apportion those encounters into categories of legal marked, legal unmarked, sublegal marked and sublegal unmarked according to the proportions those fish were caught by test fishing in Area 5 and by a combination of test fishing and Voluntary Trip Report data in Area 6.

Chinook Mortalities in the Recreational Chinook Selective Fisheries in Areas 5 and 6

July 1 - August 10, 2005

Area 5

Area 5			Kept Marked		Kept Unmarked		Released
Total Encounters (E)	7,441	=	1,620	+	49	+	5,772
V(E)	183,318	=	26,662	+	268	+	156,388

Test fishing proportions are used to split total encounters into legal marked/legal un-marked/sub-legal marked/sub-legal unmarked

				Release													
Test Fishery	V(TF)	Encounters		Mortality				Mortality				Release	Total				
				Retained	V(Ret)	Rate	Mortality	Released	Rate	Mortality	Mortality						
% legal marked	0.294	0.0189	2184	1520	23809	100%	1520	665	15%	100	1619	41103	203	1222	2017	0.125	
% legal Unmarked	0.274	0.0376	2039	23	93	100%	23	2016	15%	302	325	47218	217	-100	751	0.668	
% sub-legal marked	0.199	0.0124	1480	100	449	100%	100	1380	20%	276	376	28040	167	48	704	0.445	
% sub-legal unmarked	0.234	0.0135	1738	26	108	100%	26	1712	20%	342	368	30368	174	27	710	0.473	
Total			7,441					1,669	5,772	1,020		2,689					

Area 6

rea 6			Kept Marked		Kept Unmarked		Released
Total Encounters (E)	1,044	=	404	+	4	+	636
V(E)	37,161	=	14,938	+	3	+	22,220

Test fishing and VTR proportions are used to split total encounters into legal marked/legal un-marked/sub-legal marked/sub-legal unmarked

Test Fishery & VTR's				Release								VAR					StErr	LCI	UCI	%SE
				Mortality				Mortality												
V(TF)	Encounters	Retained	V(Ret)	Rate	Mortality	Released	Rate	Mortality	Mortality											
% legal marked	0.381	0.0233	398	404	14,938	100%	404	0	15%	0	404	11486	107	194	614	0.265				
% legal Unmarked	0.561	0.0244	586	0	0		586	15%	88	88	862	29	30	145	0.334					
% sub-legal marked	0.057	0.0125	60	0	0		60	20%	12	12	550	23	-34	58	1.956					
% sub-legal unmarked	0.000	0.0000	0	4	3	100%	4	0	20%	0	4	864	29	30	145	0.334				
Total			1,044	408				646	100		508									

Computation of Variance on Total Mortality

E = Encounters

PPN Test = Proportions legal marked or legal unmarked or sub-legal marked or sub-legal unmarked from test fishery

sfm = Selective Fishery Mortality Rate

$$\text{Variance} = (1 - \text{sfm})^2 * V(\text{Ret}) + (E^2 * V(\text{TF}) + V(\text{Tot Enc}) * \text{PPN Test}^2) * \text{sfm}^2$$

Table 17. Estimated encounters of Chinook in the Area 5 and 6 Chinook selective fishery in 2005, assuming that anglers retained all legal-size marked Chinook. Total encounters were estimated by dividing the number of legal-size marked fish that anglers retained by the weighted proportion of legal-size marked fish from the test boats (and a combination of test boat and VTR data in Area 6). The number of encounters in the remaining three categories was then obtained by multiplying the total encounters by the proportions for each corresponding category. Values may not add exactly due to rounding error.

	Area	Legal-size Marked	Legal-size Unmarked	Sublegal-size Marked	Sublegal-size Unmarked	Total
Proportions	5	0.294	0.274	0.199	0.234	
	6	0.381	0.561	0.057	0.000	
Estimated Encounters	5	1,520	1,419	1,030	1,209	5,177
	6	404	594	61	4	1,063
	5 & 6 Combined	1,924	2,013	1,091	1,213	6,240

Table 18. Comparison of estimated encounters of Chinook in the Area 5 and 6 Chinook selective fishery in 2005. Method 1 assumes that the number of encounters estimated by creel survey is accurate and uses the proportion of legal-size marked, legal-size unmarked, sublegal-size marked, and sublegal-size marked fish as encountered by test fishing in Area 5 and a combination of test fishing and volunteer reporting in area 6. Method 2 assumes that anglers did not release any legal-size marked fish, and total encounters were estimated by dividing the number of legal-size marked fish that anglers retained by the weighted proportion of legal-size marked fish from the test boats (and a combination of test boat and VTR data in Area 6). The number of encounters in the remaining three categories was then obtained by multiplying the total encounters by the proportions for each corresponding category. Values may not add exactly due to rounding error.

Method	Area	Legal-size Marked Kept	Legal-size Marked Released	Legal-size Unmarked Kept	Legal-size Unmarked Released	Sublegal-size Marked Kept	Sublegal-size Marked Released	Sublegal-size Unmarked Kept	Sublegal-size Unmarked Released	Total Encountered
1. Total encounters from Creel Surveys	5	1,520	665	23	2,016	100	1,380	26	1,712	7,441
	6	404	0	0	586	0	60	4	0	1,054
	Total	1,924	665	23	2,602	100	1,440	30	1,712	8,495
2. Total encounters from legal-size marked fish retained	5	1,520	0	23	1,396	100	929	26	1,183	5,177
	6	404	0	0	594	0	61	4	0	1,063
	Total	1,924	0	23	1,990	100	990	30	1,183	6,240

Table 19. Comparison of estimated mortalities of Chinook in the Area 5 and 6 Chinook selective fishery in 2005. Method 1 assumes that the number of encounters estimated by creel survey is accurate and uses the proportion of legal-size marked, legal-size unmarked, sublegal-size marked, and sublegal-size marked fish as encountered by test fishing in Area 5 and a combination of test fishing and volunteer reporting in area 6. Method 2 assumes that anglers did not release any legal-size marked fish, and apportions the remaining categories by the same proportions used in method 1. Values may not add exactly due to rounding error.

Method	Area	Legal-size Marked Kept	Legal-size Marked Released	Legal-size Unmarked Kept	Legal-size Unmarked Released	Sublegal-size Marked Kept	Sublegal-size Marked Released	Sublegal-size Unmarked Kept	Sublegal-size Unmarked Released	Total Encountered
1. Total encounters from Creel Surveys	5	1,520	100	23	302	100	276	26	342	2,689
	6	404	0	0	88	0	12	4	0	508
	Total	1,924	100	23	390	100	288	30	342	3,197
2. Total encounters from legal-size marked fish retained	5	1,520	0	23	209	100	186	26	237	2,301
	6	404	0	0	89	0	12	4	0	509
	Total	1,924	0	23	298	100	198	30	237	2,810

COMPLIANCE WITH REGULATIONS

Compliance with existing regulations, and the regulation prohibiting bringing unmarked salmon on board a vessel, was considered an integral part of a successful fishery. Between July 1 and August 10, officers contacted 499 anglers in Area 5 and 228 anglers in Area 6. From those contacts, five citations and no warnings were issued for retention of unmarked Chinook, all in Area 5. Two citations and one warning were issued for bringing an unmarked salmon on board a vessel. Also, out of 592 Chinook sampled by creel surveyors, only 19 were unmarked (3.2%) which expands to an estimated 53 unmarked fish retained (23 legal-size and 30 sublegal-size). Although the number of unmarked fish retained is up slightly from previous years, it is still well below the 613 unmarked legal-size fish used in the FRAM model for 2005, and well below the 8% rate of unmarked encounters used for modeling purposes. Applying an 8% illegal retention rate of unmarked legal-size encounters to the lowest estimate of unmarked legal-size encounters in 2005 predicts that anglers would have retained 169 unmarked fish. We believe the slightly higher retention of unmarked fish in 2005 versus 2004 is a result of the extremely low catch rate on Chinook and anglers switching their target species to pink salmon and then incorrectly identifying small Chinook as pink salmon. Additional educational and enforcement efforts will be necessary in 2006 and especially in 2007 to ensure that anglers are correctly identifying their salmon. Nonetheless, from the perspective of protecting wild Chinook and ensuring proper handling during release, the high compliance rate suggests that conservation objectives were obtained in 2005. Although this study was not designed to obtain an unbiased estimate of compliance, these data suggest a high level of compliance in the fishery.

SUMMARY

Total Chinook catch was down considerably from previous years and the quota was not reached for the first time. Catch per unit effort was very poor except for one or two weeks of fishing. Despite the poor success on Chinook, angler effort remained high throughout the duration of the fishery. A bonus limit of two additional pink salmon per day probably contributed to keeping angler effort high during the fishery.

This third year of the Area 5 and 6 Chinook selective fishery was successful with respect to the objective of increasing recreational fishing opportunity within conservation constraints for Puget Sound Chinook. Anglers were allowed to fish for and retain Chinook for 41 days in Areas 5 and 6, compared with only 10 days and 5 days of non-selective fishing in Area 5 in 2001 and 2002, respectively. Angler effort in Area 5 in 2005 was double the effort in 2002 during the same time frame. Based on data from the test fishery sampling during the Chinook Selective Fishery, half of the legal-size Chinook encountered were marked and could be retained by anglers.

Measured impacts of the fishery were less than pre-season expectations. Estimated encounters were less than pre-season predictions. Compliance with fishing regulations was good during the fishery. The estimated number of mortalities of unmarked double index coded wire tagged fish was negligible. The fishery was also successful with respect to the objective of implementing monitoring and sampling programs to obtain management information for evaluation and planning of potential future selective Chinook fisheries.

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Appendix A. 2005 statistical weeks used by Washington Department of Fish and Wildlife.

2005 Statistical Weeks (Monday - Sunday)

Stat.	Week	Calendar Dates		Julian Dates	
Mon	No.	Start	End	Start	End
Jan	1	01-Jan	02-Jan	1	2
	2	03-Jan	09-Jan	3	9
	3	10-Jan	16-Jan	10	16
	4	17-Jan	23-Jan	17	23
	5	24-Jan	30-Jan	24	30
Feb	6	31-Jan	06-Feb	31	37
	7	07-Feb	13-Feb	38	44
	8	14-Feb	20-Feb	45	51
	9	21-Feb	27-Feb	52	58
Mar	10	28-Feb	06-Mar	59	65
	11	07-Mar	13-Mar	66	72
	12	14-Mar	20-Mar	73	79
	13	21-Mar	27-Mar	80	86
Apr	14	28-Mar	03-Apr	87	93
	15	04-Apr	10-Apr	94	100
	16	11-Apr	17-Apr	101	107
	17	18-Apr	24-Apr	108	114
	18	25-Apr	01-May	115	121
May	19	02-May	08-May	122	128
	20	09-May	15-May	129	135
	21	16-May	22-May	136	142
	22	23-May	29-May	143	149
June	23	30-May	05-Jun	150	156
	24	06-Jun	12-Jun	157	163
	25	13-Jun	19-Jun	164	170
	26	20-Jun	26-Jun	171	177
Jul	27	27-Jun	03-Jul	178	184
	28	04-Jul	10-Jul	185	191
	29	11-Jul	17-Jul	192	198
	30	18-Jul	24-Jul	199	205
	31	25-Jul	31-Jul	206	212
Aug	32	01-Aug	07-Aug	213	219
	33	08-Aug	14-Aug	220	226
	34	15-Aug	21-Aug	227	233
	35	22-Aug	28-Aug	234	240
Sep	36	29-Aug	04-Sep	241	247
	37	05-Sep	11-Sep	248	254
	38	12-Sep	18-Sep	255	261
	39	19-Sep	25-Sep	262	268
Oct	40	26-Sep	02-Oct	269	275
	41	03-Oct	09-Oct	276	282
	42	10-Oct	16-Oct	283	289
	43	17-Oct	23-Oct	290	296
	44	24-Oct	30-Oct	297	303
Nov	45	31-Oct	06-Nov	304	310
	46	07-Nov	13-Nov	311	317
	47	14-Nov	20-Nov	318	324
	48	21-Nov	27-Nov	325	331
Dec	49	28-Nov	04-Dec	332	338
	50	05-Dec	11-Dec	339	345
	51	12-Dec	18-Dec	346	352
	52	19-Dec	25-Dec	353	359
	53	26-Dec	31-Dec	360	365

Appendix B. Sample rates for the 2005 Area 5 and 6 Chinook Selective fisheries, July 1 – August 10, 2005.

Week	Area 5			Area 6		
	Number of Chinook Sampled	Estimated Chinook Retained	Sample Rate	Number of Chinook Sampled	Estimated Chinook Retained	Sample Rate
27	38	95	0.399	6	12	0.504
28	23	110	0.209	18	30	0.596
29	58	182	0.319	6	9	0.681
30	250	912	0.274	36	66	0.545
31	47	253	0.186	35	216	0.162
32	24	58	0.412	19	42	0.455
33	21	59	0.353	13	33	0.392
Total	461	1,669	0.276	133	408	0.326

Appendix C1. Weekly sampling data from creel surveys conducted during the Chinook Selective Fishery in Marine Area 5, July 1 through August 10, 2005.

Statistic	Week							Total
	27	28	29	30	31	32	33	
Kept Chinook Sampled	38	23	58	250	47	24	21	461
Kept Chinook Marked	37	23	58	241	43	23	19	444
Released Chinook	160	135	193	901	168	55	40	1,652
Released Chinook Unmarked	118	117	164	736	123	49	35	1,342
Released Chinook Marked	27	11	13	71	24	2	1	149
Released Chinook Unknown Mark Status	15	7	16	94	21	4	4	161
Mark Rate (%)	35	23	30	30	35	33	35	30
Catch Proportion ¹	0.06	0.07	0.11	0.55	0.15	0.03	0.04	
Weighted Mark Rate (%)	2.0	1.5	3.3	16.1	5.2	1.2	1.3	30.5
Variance								9

1. The weekly estimated harvest of Chinook divided by the estimated season total Chinook harvest (see Appendix D).

Appendix C2. Weekly sampling data from creel surveys conducted during the Chinook Selective Fishery in Marine Area 6, July 1 through August 10, 2005.

Statistic	Week							Total
	27	28	29	30	31	32	33	
Kept Chinook Sampled	6	18	6	36	35	19	13	133
Kept Chinook Marked	6	18	5	34	34	19	13	129
Released Chinook	22	31	22	55	47	21	7	205
Released Chinook Unmarked	21	29	20	54	44	18	7	193
Released Chinook Marked	1	1	2	1	2	3	0	10
Released Chinook Unknown Mark Status	0	1	0	0	1	0	0	2
Mark Rate (%)	25	40	25	38	44	55	65	41
Catch Proportion ¹	0.03	0.07	0.02	0.16	0.53	0.10	0.08	
Weighted Mark Rate (%)	0.7	2.9	0.5	6.2	23.6	5.6	5.3	44.9
Variance								85

1. The weekly estimated harvest of Chinook divided by the estimated season total Chinook harvest (see Appendix E).

Appendix D. Weekly creel survey estimates of marked and unmarked Chinook catch and variances (in parentheses) during the Chinook Selective Fishery in Marine Area 5, July 1 through August 10, 2005. Values may not add exactly due to rounding error.

Statistical Week	Chinook Kept			Chinook Released			
	Marked	Unmarked	Total	Marked	Unmarked	Unknown	Total
27	93 (157)	3 (4)	95 (160)	71 (453)	309 (1,459)	42 (140)	423 (2,052)
28	110 (241)	0 (0)	110 (241)	35 (88)	477 (2,929)	20 (73)	532 (3,089)
29	182 (1,603)	0 (0)	182 (1,603)	36 (160)	475 (6,698)	31 (141)	542 (6,999)
30	892 (18,674)	20 (85)	912 (18,759)	282 (3,462)	2,459 (61,782)	353 (15,557)	3,093 (80,801)
31	233 (5,625)	20 (164)	253 (5,789)	111 (351)	705 (60,902)	90 (656)	906 (61,910)
32	57 (58)	2 (1)	58 (59)	4 (3)	127 (309)	10 (18)	141 (329)
33	55 (306)	5 (13)	59 (319)	4 (9)	113 (1,142)	19 (57)	135 (1,208)
Total	1,620 (26,662)	49 (268)	1,669 (26,930)	542 (4,526)	4,664 (135,221)	566 (16,642)	5,772 (156,388)

Appendix E. Weekly creel survey estimates of marked and unmarked Chinook catch and variances (in parentheses) during the Chinook Selective Fishery in Marine Area 6, July 1 through August 10, 2005. Values may not add exactly due to rounding error.

Statistical Week	Chinook Kept			Chinook Released			
	Marked	Unmarked	Total	Marked	Unmarked	Unknown	Total
27	12 (41)	0 (0)	12 (41)	5 (17)	46 (421)	0 (0)	51 (438)
28	30 (50)	0 (0)	30 (50)	1 (0)	57 (95)	1 (1)	59 (96)
29	7 (4)	1 (1)	9 (4)	3 (1)	26 (21)	0 (0)	28 (23)
30	63 (128)	3 (2)	66 (130)	3 (9)	105 (165)	0 (0)	108 (174)
31	216 (14,221)	0 (0)	216 (14,221)	69 (4,509)	243 (16,154)	1 (0)	313 (20,663)
32	42 (341)	0 (0)	42 (341)	4 (3)	39 (387)	0 (0)	43 (390)
33	33 (154)	0 (0)	33 (154)	0 (0)	33 (437)	0 (0)	33 (437)
Total	404 (14,938)	4 (3)	408 (14,941)	85 (4,540)	549 (17,679)	3 (1)	636 (22,220)

Appendix F. Recoveries of coded wire tags from Chinook salmon during the Chinook Selective Fisheries in Marine Areas 5 and 6, July 1 through August 10, 2005.

Area	Recovery Date	Tagcode	Recovery Mark	Fork Length (cm)	Total Length (mm)	Brood Year	Rearing Hatchery	Release Site	Release Agency
05	Jul 22 2005	062763	AD Fin Clp	74	785	2002	FEATHER R HATCHERY	BENICIA	CDWR
05	Jul 10 2005	090119	AD Fin Clp	82	--	2000	WILLAMETTE HATCHERY	BLIND SL (LWR COL R)	ODFW
05	Jul 4 2005	183224	AD Fin Clp	80	--	2001	H-CLAYOQUOT	R-KENNEDY R LOW	CDFO
05	Jul 20 2005	185527	AD Fin Clp	60	650	2002	H-NANAIMO R	R-NANAIMO R	CDFO
05	Jul 30 2005	185660	AD Fin Clp	49	514	2003	H-COWICHAN R	R-COWICHAN R UP	CDFO
06	Aug 8 2005	210390	AD Fin Clp	73	742	2001	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
06	Aug 8 2005	210390	AD Fin Clp	79	811	2001	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
06	Jul 8 2005	210390	AD Fin Clp	75	800	2001	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
06	Jul 15 2005	210390	AD Fin Clp	82	861	2001	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
05	Aug 10 2005	210402	AD Fin Clp	70	755	2001	MARBLEMOUNT HATCHERY	BAKER R 03.0435	WDFW
06	Aug 7 2005	210406	AD Fin Clp	80	831	2001	LUMMI SEA PONDS	SLATER SLOUGH 1.0156	LUMM
05	Jul 2 2005	210407	AD Fin Clp	70	716	2002	DUNGENESS HATCHERY	GRAY WOLF R 18.0048	WDFW
06	Jul 1 2005	210479	AD Fin Clp	61	635	2002	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
06	Jul 26 2005	210483	AD Fin Clp	70	742	2002	NISQUALLY HATCHERY	CLEAR CR 11.0013C	NISQ
05	Jul 20 2005	210485	AD Fin Clp	69	719	2002	COWSKULL ACCLIM POND	COWSKULL ACCLIM POND	PUYA
05	Jul 8 2005	210506	AD Fin Clp	59	--	2002	KALAMA CR HATCHERY	KALAMA CR 11.0017	NISQ
05	Jul 24 2005	210506	AD Fin Clp	60	703	2002	KALAMA CR HATCHERY	KALAMA CR 11.0017	NISQ
06	Jul 24 2005	210506	AD Fin Clp	67	715	2002	KALAMA CR HATCHERY	KALAMA CR 11.0017	NISQ
06	Jul 25 2005	210506	AD Fin Clp	78	783	2002	KALAMA CR HATCHERY	KALAMA CR 11.0017	NISQ
06	Jul 30 2005	210506	AD Fin Clp	70	713	2002	KALAMA CR HATCHERY	KALAMA CR 11.0017	NISQ
05	Jul 31 2005	210506	AD Fin Clp	55	--	2002	KALAMA CR HATCHERY	KALAMA CR 11.0017	NISQ
05	Jul 21 2005	210508	AD Fin Clp	64	678	2002	LUMMI SEA PONDS	LUMMI SEA PONDS	LUMM
05	Jul 12 2005	210509	AD Fin Clp	81	821	2002	LUMMI SEA PONDS	NOOKSACK R 01.0120	LUMM
05	Jul 22 2005	210509	AD Fin Clp	70	730	2002	LUMMI SEA PONDS	NOOKSACK R 01.0120	LUMM
05	Jul 29 2005	210511	Unmarked	52	560	2002	WHITE RIVER HATCHERY	WHITE R 10.0031	MUCK
05	Jul 20 2005	210548	AD Fin Clp	39	425	2003	NISQUALLY HATCHERY	CLEAR CR 11.0013C	NISQ
05	Jul 23 2005	612659	AD Fin Clp	53	561				Nez Perce
05	Jul 14 2005	630399	AD Fin Clp	69	740	2000	PORTAGE BAY HATCHERY	PORTAGE BAY/SHIP CNL	UW
06	Aug 8 2005	630783	AD Fin Clp	68	698	2000	MCALLISTER HATCHERY	MCALLISTER CR11.0324	WDFW
05	Jul 9 2005	630865	AD Fin Clp	66	704	2001	GORST CR REARING PND	GORST CR 15.0216	SUQ
05	Jul 20 2005	630890	AD Fin Clp	74	786	2001	LYONS FERRY HATCHERY	SNAKE R-LOWR 33.0002	WDFW
05	Jul 23 2005	631007	AD Fin Clp	53	571	2002	TURTLE ROCK HATCHERY	COLUMBIA R - GENERAL	WDFW
05	Aug 10 2005	631371	AD Fin Clp	72	773	2002	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW
05	Aug 10 2005	631371	AD Fin Clp	61	688	2002	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW
06	Jul 8 2005	631371	AD Fin Clp	68	712	2002	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW
05	Jul 21 2005	631371	AD Fin Clp	64	696	2002	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW
05	Jul 22 2005	631371	AD Fin Clp	52	563	2002	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW
05	Jul 23 2005	631371	AD Fin Clp	62	634	2002	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW
05	Jul 23 2005	631371	AD Fin Clp	59	612	2002	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW
05	Jul 23 2005	631371	AD Fin Clp	52	771	2002	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW
06	Jul 24 2005	631371	AD Fin Clp	63	654	2002	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW
05	Aug 6 2005	631375	AD Fin Clp	86	883	2001	SOOS CREEK HATCHERY	BIG SOOS CR 09.0072	WDFW
05	Aug 7 2005	631377	AD Fin Clp	72	751	2001	SAMISH HATCHERY	FRIDAY CR 03.0017	WDFW
05	Jul 23 2005	631377	AD Fin Clp	84	878	2001	SAMISH HATCHERY	FRIDAY CR 03.0017	WDFW

Appendix F. Continued.

Area	Recovery Date	Tagcode	Recovery Mark	Fork Length (cm)	Total Length (mm)	Brood Year	Rearing Hatchery	Release Site	Release Agency
05	Jul 21 2005	631387	AD Fin Clp	59	656	2002	WALLACE R HATCHERY	WALLACE R 07.0940	WDFW
05	Jul 22 2005	631414	AD Fin Clp	56	582	2002	MARBLEMOUNT HATCHERY	CASCADE R 03.1411	WDFW
05	Jul 22 2005	631414	AD Fin Clp	56	595	2002	MARBLEMOUNT HATCHERY	CASCADE R 03.1411	WDFW
05	Jul 24 2005	631436	AD Fin Clp	65	673	2002	GORST CR REARING PND	GORST CR 15.0216	SUQ
06	Jul 26 2005	631436	AD Fin Clp	72	741	2002	GORST CR REARING PND	GORST CR 15.0216	SUQ
05	Jul 16 2005	631545	AD Fin Clp	63	660	2002	LYONS FERRY HATCHERY	SNAKE R-LOWR 33.0002	WDFW
05	Jul 20 2005	631546	AD Fin Clp	55	583	2002	KENDALL CR HATCHERY	DEADHORSE CR 01.0495	WDFW
05	Jul 22 2005	631548	AD Fin Clp	67	696	2002	WELLS HATCHERY	WELLS DAM- CHIEF JOE	WDFW
05	Jul 22 2005	631552	AD Fin Clp	75	777	2002	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW
05	Jul 23 2005	631553	AD Fin Clp	65	720	2002	GORST CR REARING PND	GORST CR 15.0216	SUQ
05	Jul 21 2005	631555	AD Fin Clp	57	603	2002	BIG BEEF CR HATCHERY	BIG BEEF CR HATCHERY	WDFW
06	Aug 4 2005	631558	AD Fin Clp	75	782	2002	MINTER HATCHERY	MINTER CR 15.0048	WDFW
05	Jul 22 2005	631585	AD Fin Clp	66	680	2002	LYONS FERRY HATCHERY	SNAKE R-LOWR 33.0002	WDFW
05	Jul 1 2005	631587	AD Fin Clp	89	920	2002	DRYDEN POND	WENATCHEE R 45.0030	WDFW
05	Jul 16 2005	631771	AD Fin Clp	73	763	2002	PORTAGE BAY HATCHERY	PORTAGE BAY/SHIP CNL	UW
05	Jul 20 2005	631774	AD Fin Clp	61	652	2002	SAMISH HATCHERY	FRIDAY CR 03.0017	WDFW
05	Jul 21 2005	631774	AD Fin Clp	58	633	2002	SAMISH HATCHERY	FRIDAY CR 03.0017	WDFW
06	Jul 23 2005	631774	AD Fin Clp	60	624	2002	SAMISH HATCHERY	FRIDAY CR 03.0017	WDFW
05	Jul 23 2005	631776	Unmarked	57	594	2002	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
05	Jul 21 2005	631777	AD Fin Clp	62	653	2002	HOODSPORT HATCHERY	FINCH CR 16.0222	WDFW
06	Jul 29 2005	631777	AD Fin Clp	71	752	2002	HOODSPORT HATCHERY	FINCH CR 16.0222	WDFW
05	Jul 22 2005	631780	AD Fin Clp	59	619	2002	VOIGHTS CR HATCHERY	VOIGHT CR 10.0414	WDFW
05	Jul 22 2005	631780	AD Fin Clp	54	573	2002	VOIGHTS CR HATCHERY	VOIGHT CR 10.0414	WDFW
05	Jul 26 2005	631780	AD Fin Clp	65	682	2002	VOIGHTS CR HATCHERY	VOIGHT CR 10.0414	WDFW
05	Jul 2 2005	631781	AD Fin Clp	60	610	2002	TUMWATER FALLS HATCH	DESCHUTES R 13.0028	WDFW
05	Jul 21 2005	631784	AD Fin Clp	61	638	2002	SOOS CREEK HATCHERY	BIG SOOS CR 09.0072	WDFW
05	Jul 20 2005	631789	AD Fin Clp	42	447	2002	KENDALL CR HATCHERY	NOOKSACK R -NF 01.01	WDFW
05	Jul 20 2005	631799	AD Fin Clp	56	591	2002	WALLACE R HATCHERY	WALLACE R 07.0940	WDFW
05	Aug 10 2005	631887	AD Fin Clp	60	633	2002	GLENWOOD SPRINGS	EAST SOUND BAY-ORCAS	WDFW
05	Jul 16 2005	631887	AD Fin Clp	50	540	2002	GLENWOOD SPRINGS	EAST SOUND BAY-ORCAS	WDFW
05	Aug 10 2005	631898	AD Fin Clp	56	584	2002	COWLITZ SALMON HATCH	COWLITZ R 26.0002	WDFW
05	Jul 16 2005	631969	AD Fin Clp	55	582	2002	COWLITZ SALMON HATCH	COWLITZ R 26.0002	WDFW
05	Jul 17 2005	631974	AD Fin Clp	60	626	2002	COWLITZ SALMON HATCH	COWLITZ R 26.0002	WDFW
05	Jul 1 2005	632167	AD Fin Clp	53	562	2002	LYONS FERRY HATCHERY	SNAKE R-LOWR 33.0002	WDFW
05	Jul 21 2005	632167	AD Fin Clp	62	651	2002	LYONS FERRY HATCHERY	SNAKE R-LOWR 33.0002	WDFW
05	Jul 24 2005	632167	AD Fin Clp	50	535	2002	LYONS FERRY HATCHERY	SNAKE R-LOWR 33.0002	WDFW
06	Aug 4 2005	636322	AD Fin Clp	83	842	2002	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW
05	Jul 23 2005	636322	AD Fin Clp	67	692	2002	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW
06	Jul 25 2005	636322	AD Fin Clp	83	831	2002	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW

WDFW Puget Sound Sampling Program

Monthly Progress Report for February 2006: **Areas 8-1 and 8-2 Selective Chinook Fishery Monitoring**

1. Introduction

On October 1, 2005 the Puget Sound Sampling Program began intensively monitoring the selective chinook fishery in Areas 8-1 and 8-2. We are generating estimates of salmon catch (including total chinook and coho landed and released) and angler effort (total boats and anglers) and reporting these estimates on a monthly basis, for the period from October 1, 2005 through April 30, 2006.

During the month of February, as in the previous months of the fishery, sampling was implemented as planned in our sample design document. The study design was based on Murthy's estimator (Cochran 1977) to obtain daily estimates of total catch and effort. Two ramp samplers were stationed at selected sampled sites in Area 8-1, and two ramp samplers were stationed at selected sampled sites in Area 8-2. Permanent sampling staff conducted four boat surveys in Area 8-1 and four boat surveys in Area 8-2 during February, to estimate the percent of effort from sampled sites (versus non-sampled sites) and the proportion of angler effort at each sampled site.

We operated two test boats, one in Area 8-1 and the other in Area 8-2. The crew consisted of two WDFW technicians per boat. These test boats fished approximately four to five days per week during February, but less days during weeks when adverse weather and unsafe conditions on the water precluded fishing. For each hook-up, the encounter number, time sampled, species, mark status, and DNA vial number (if applicable) was recorded. Samplers collected scales, fork lengths, and total lengths on all chinook brought on board. All fish were immediately released.

In this progress report we include in-season preliminary estimates of catch, effort, and encounter rates with accompanying variance estimates for the month of February 2006. In addition, we present cumulative estimates to date for the months of October 2005 through February 2006 combined. We also include preliminary test fishing results, documentation of how the fishery is going to date, progress of implementing the sampling plan, and any adjustments needed.

2. Dockside Sampling Methods

Sampling Strata and Shifts

Sampling strata were divided into weekday (Monday through Thursday) and 'weekend' (Friday, Saturday, and Sunday) strata. Each week we randomly selected two days from the Monday through Thursday stratum for dockside sampling. Selected sample days within weekday strata included February 2nd, 8th, 9th, 14th, 15th, and 23rd. In addition, we sampled every Friday, Saturday, and Sunday during the month. We did not sample on the President's Day holiday, which was on Monday, February 20th. We assumed fishing behavior on this holiday would be similar to that of a typical weekend day, thus we included President's Day in a 'weekend' stratum definition for the period from February 18th through 20th. Dockside sampling shifts lasted from approximately dawn until dark in order to intercept all boats.

Sampled Sites

Sites to be sampled were selected as follows: Access sites in Areas 8-1 and 8-2 were divided into sampled and non-sampled sites. Access sites with low effort, as determined from boat survey data (see section 3 below) were excluded in the sample. All anglers and fish exiting the fishery

through the sampled sites were counted. Any boats that were missed at sampled sites were counted and recorded on the sampling forms.

Area 8-1 Sites

In Area 8-1, for each scheduled sampling day, two sites were randomly selected for sampling based on a weighted random site selection process. We calculated the “weights” (or “size measures”) of Area 8-1 sites based on the most recently available boat survey data. We conducted four boat surveys in Area 8-1 during February to update the size measures, as documented in section 3 below.

The ‘sampled sites’ for Area 8-1 included Camano Island State Park Ramp, Cornet Bay Public Ramp, Freeland Ramp (also called Holmes Harbor Ramp), Oak Harbor Public Ramp, Maple Grove Ramp, Utsalady Ramp, LaConner Ramp, and Coupeville Ramp (Table 1). Table 1 also lists the dates that these ramps were randomly selected for sampling during February.

Table 1. List of possible ‘sampled sites’ for the Area 8-1 selective chinook fishery and dates that the sites were actually sampled during February 2006.

Area 8-1 Sampled Sites	Dates Sampled in February 2006
Camano Island State Park Ramp	2 nd , 4 th , 5 th , 9 th , 10 th , 11 th , 12 th , 14 th , 23 rd , 24 th , 25 th
Cornet Bay Public Ramp	--
Freeland Ramp (Holmes Harbor)	8 th , 19 th
Oak Harbor Public Ramp	2 nd , 4 th , 5 th , 9 th , 11 th , 12 th , 14 th , 17 th , 18 th , 25 th
Maple Grove Ramp	3 rd , 10 th , 15 th , 19 th , 26 th
Utsalady Ramp	8 th , 17 th , 18 th , 23 rd , 24 th , 26 th
LaConner Ramp	15 th
Coupeville Ramp	3 rd

Area 8-2 Sites

In Area 8-2, for each scheduled sampling day, two samplers were stationed at the Everett Ramp. In addition, during each week, one day in the weekday stratum and one day in the weekend stratum was randomly selected for sampling at an additional site in order to compute a variance between sites. A third sampler (existing permanent staff based in Central Sound) was stationed at the alternate site on the randomly selected days in each stratum. We sampled an alternate site on the following randomly selected days in February: 3rd, 8th, 12th, 14th, 19th, and 26th.

In addition to Everett Ramp, the possible alternate ‘sampled sites’ are listed in Table 2, as well as the dates that the ramps were randomly selected for sampling during February. We calculated the weights of Area 8-2 sites based on the most recently available boat survey data. We conducted four boat surveys in Area 8-2 during February to update the weights, as documented in section 3 below.

Table 2. List of possible ‘sampled sites’ for the Area 8-2 selective chinook fishery and dates that the sites were actually sampled during February 2006.

Area 8-2 Sampled Sites	Dates Sampled in February 2006
Everett Ramp	2 nd , 3 rd , 4 th , 5 th , 8 th , 9 th , 10 th , 11 th , 12 th , 14 th , 15 th , 17 th , 18 th , 19 th , 23 rd , 24 th , 25 th , 26 th
Camano Island State Park Ramp	3 rd , 8 th , 12 th , 26 th
Dagmars Landing	19 th
Langley Ramp	14 th
Mukilteo Public Ramp	--
Kayak Point Ramp	--

3. Boat Surveys

Methods

Boat surveys were used to estimate the percent of effort from sampled sites (versus non-sampled sites) and the proportion of angler effort at each sampled site. Boat surveys covered the entire area to pick up effort from all launch sites. We asked boat occupants where they intended to tie up or exit the fishery rather than where they launched. We excluded non-fishing vessels and charter boats from the boat survey data. Charter boats were treated separately and excluded from our Murthy estimate due to their significantly higher CPUE compared to kicker boats, and because charter vessels were not necessarily exiting the fishery via our “sampled sites,” which precluded sampling their catch (see the subheading “Charter Boats” within Section 4: Estimated Harvest and Effort).

Results

Area 8-1

In Area 8-1, we conducted boat surveys on February 3rd, 8th, 11th, and 19th (two week days and two weekend days). For these four boat surveys combined, and including the four boat surveys conducted in January, a total of 109 boats and 208 anglers were surveyed. Of these anglers, 85% exited the fishery via sampled sites.

Area 8-2

In Area 8-2, we conducted boat surveys on February 11th, 15th, 24th and 25th (two week days and two weekend days). For these four boat surveys combined, plus the four boat surveys conducted in January, a total of 143 boats and 273 anglers were surveyed. Of these anglers, 79% exited the fishery via sampled sites.

As of statistical week 9, we added Mukilteo Public Ramp back into our pool of possible “sampled sites” for our site selection process, because this site was once again showing up regularly in our boat survey data. Apparently, even though the docks are not yet re-installed at the Mukilteo Ramp, some boats are able to operate from this site on days when the weather is favorable enough for launching and exiting.

4. Harvest and Effort Estimates

The catch and effort (excluding charter vessels) observed at sampled sites was expanded to all access sites, based on their “size measure”, to estimate total daily catch and effort in Areas 8-1 and 8-2. Sample data were combined and expanded to create stratum estimates of harvest and effort with variances (Tables 3 through 6).

Area 8-1

We estimated that a total of 121 chinook (118 marked and 3 unmarked) were landed in 640 angler trips during the month of February, with a catch per unit effort (CPUE) of 0.19 chinook per angler trip (Table 3). For the months of October through February combined, we estimated that a total of 292 chinook (289 marked and 3 unmarked) were landed in 2,866 angler trips, with an overall CPUE of 0.10 chinook per angler trip (Table 4).

In addition, we estimated that 238 chinook were released during February (44 marked, 122 unmarked, and 72 unknown mark status). The total number of chinook encountered (retained plus released) in Area 8-1 during February was estimated at 359 (Table 3).

From October 1 through February 26, we estimated that a total of 934 chinook were released (304 marked, 351 unmarked, and 279 unknown mark status) (Table 4). The total number of chinook encountered (retained plus released) in Area 8-1 during the five months of the fishery was estimated at 1,226.

Other than chinook, we estimated that there were 3 unmarked coho landed and 3 coho of unknown mark status released during February in Area 8-1. In comparison, during the months of November through January we estimated that no species of salmon other than chinook were landed or released. During October we estimated that 55 coho (24 marked and 31 unmarked) and 7 chum were landed, while 8 unknown species of salmon were released (Table 4).

Area 8-2

We estimated that a total of 216 chinook (205 marked and 11 unmarked) were landed in 1,280 angler trips in Area 8-2 during the month of February, with a CPUE of 0.17 chinook per angler trip (Table 5). For October through February combined, we estimated that a total of 504 chinook (480 marked and 24 unmarked) were landed in 5,570 angler trips, with an overall CPUE of 0.09 chinook per angler trip (Table 6).

In addition, we estimated that 578 chinook were released during February (150 marked, 201 unmarked and 227 unknown mark status). The total number of chinook encountered (retained plus released) during the month was estimated at 794.

From October through February, we estimated that a total of 1,647 chinook were released (279 marked, 491 unmarked, and 877 unknown mark status) in Area 8-2. Thus, the total number of chinook encountered (retained plus released) in this area during the five months of the fishery was estimated at 2,151 (Table 6).

In addition to chinook, we estimated that anglers landed 404 coho (105 marked and 299 unmarked), 8 chum, and one pink salmon during the months of October through February. Total estimates of released salmon other than chinook for the five months included 149 coho (5 marked, 16 unmarked, and 128 unknown mark status), 4 chum, 1 pink, and 148 unknown species of salmon (Table 6).

Charter Boats

Methods

After consulting with the WDFW biometrician early in the study, we elected to separate charter vessels from kicker boats in generating the catch estimates for Areas 8-1 and 8-2, to reduce potential bias and improve the precision in our estimates. Charter boats were treated separately and excluded from our Murthy estimate due to their high catch per unit of effort compared to kicker boats. In addition, charter boats were not necessarily exiting the fishery via our “sampled sites”, and the landed catch from these vessels was not being sampled.

This stratification of charter and kicker vessels was an adjustment compared to our initial study design due to the unique situation of this fall/winter fishery in which the fishery is very slow and sample sizes are extremely low (unlike high effort summer fisheries, such as the chinook selective fishery in Areas 5 and 6). We modified our approach to include a census of catch from the charter boats operating in the fishery. We relied on the Murthy estimator method to estimate total salmon encounters for kicker boats in Areas 8-1 and 8-2, while a complete census approach was used for charter boats.

We contacted all possible charter boat operators that fished in Areas 8-1 or 8-2 during the months of October through February. The charter operators reported complete counts of salmon encounters and number of trips via Voluntary Trip Report (VTR) forms. VTR data included the date of the fishing trip, number of anglers, target species, CRC Area, each chinook or coho hooked, whether the fish was kept or released, species (if they positively identified the fish), total length to the nearest 1/8th inch, and whether the fish was adipose fin-clipped or not clipped.

Results

Two charter boat operators fished in Area 8-2 during February and reported a total of 10 chinook encounters in 11 angler trips. These 10 encounters included 2 ad-marked retained chinook and 8 released chinook (7 ad-marked and 1 unmarked) (Table 7).

The CPUE for charter boats was 0.19 chinook per angler trip in Area 8-2 during February. In comparison, the CPUE for kicker boats was estimated at 0.17 chinook per angler trip for the month, nearly the same as that for charter boats. In contrast, in previous months of the Area 8-2 fishery, the CPUE for charter boats was four to six times higher than that of kicker boats.

For the months of October through February combined, the CPUE for kicker boats fishing in Area 8-2 was 0.09 chinook per angler trip, while that for charter boats was 0.50 chinook per angler trip. Thus, over the five months of the fishery, anglers were nearly six times more successful in landing chinook on charter vessels compared to kicker vessels under the particular circumstances of this fishery (Table 7).

Total Estimates: Areas 8-1 and 8-2 Combined

Adding the estimated chinook encounters in Area 8-2 for kicker boats (794) to the counts of chinook encounters reported from charter boats (10), estimates that a total of 804 chinook were encountered in Area 8-2 during February (218 retained and 586 released) (Table 7).

Combining the Area 8-1 and Area 8-2 estimates results in a **total of 1,163 estimated chinook encounters (339 retained and 824 released) for the two areas during the month of February. To date, for the months of October through February, we estimated a total of 3,549 chinook encounters in Areas 8-1 and 8-2 combined** (Table 7).

5. Observed versus Predicted Mortalities

In a preliminary analysis, we compared observed versus predicted mortalities for unmarked chinook encountered in the fishery during the months of October through February, for Areas 8-1 and 8-2 combined (Table 8). The observed unmarked chinook mortalities were determined based on preliminary estimates of chinook encounters from creel surveys and an assumed mortality rate of 20% for released chinook.

The Fishery Regulation Assessment Model (FRAM) predicted a total of 2,608 impacts on unmarked chinook encountered in the fishery from October through April, for Areas 8-1 and 8-2 combined. We applied the monthly proportions of effort used in FRAM to the total number of modeled impacts for the fishery in order to determine the predicted monthly impacts shown in Table 8.

Results of our comparison showed that the observed unmarked mortalities were far below the mortalities predicted from FRAM. The modeled cumulative mortalities totaled 1,995 through February, whereas cumulative observed impacts totaled 343 (Table 8). In this preliminary analysis we did not separate out legal versus sub-legal sized chinook to estimate the mortalities; we applied an assumed mortality rate of 20% (mortality rate assumed for sub-legal chinook) for all released fish. Therefore, the estimate of observed impacts is considered a high estimate.

Table 3. Preliminary Area 8-1 Recreational Fishery In-season Catch Estimates (Extrapolated Numbers), Based on Dockside Angler Interviews, January 30 through February 26, 2006.

Start Date	End Date	Est. Effort		Est. Retained Catch						Est. Releases										
		Boats	Anglers	Chinook		Coho		Chum	Pink	Chinook				Coho				Chum	Pink	Unk. Salmon
				Marked	Unmark	Marked	Unmark			Total	Mark	Unmark	Unk.	Total	Mark	Unmark	Unk.			
30-Jan	2-Feb	13	26	6	0	0	0	0	0	6	0	3	3	0	0	0	0	0	0	0
3-Feb	3-Feb	5	10	7	0	0	0	0	0	6	2	2	2	0	0	0	0	0	0	0
4-Feb	4-Feb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5-Feb	5-Feb	6	11	3	0	0	0	0	0	4	2	2	0	0	0	0	0	0	0	0
6-Feb	9-Feb	74	110	22	0	0	0	0	0	41	0	32	9	0	0	0	0	0	0	0
10-Feb	10-Feb	19	44	5	0	0	0	0	0	9	2	6	1	1	0	1	0	0	0	0
11-Feb	11-Feb	35	61	13	0	0	0	0	0	34	3	14	17	2	0	0	2	0	0	0
12-Feb	12-Feb	45	77	11	3	0	3	0	0	32	12	14	6	0	0	0	0	0	0	0
13-Feb	16-Feb	14	24	6	0	0	0	0	0	11	0	7	4	0	0	0	0	0	0	0
17-Feb	17-Feb	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18-Feb	20-Feb	68	147	23	0	0	0	0	0	51	13	16	22	0	0	0	0	0	0	0
21-Feb	23-Feb	5	10	0	0	0	0	0	0	10	0	10	0	0	0	0	0	0	0	0
24-Feb	24-Feb	5	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25-Feb	25-Feb	36	64	7	0	0	0	0	0	28	7	16	5	0	0	0	0	0	0	0
26-Feb	26-Feb	19	46	15	0	0	0	0	0	6	3	0	3	0	0	0	0	0	0	0
TOTAL		347	640	118	3	0	3	0	0	238	44	122	72	3	0	1	2	0	0	0
Statistics for Grand Total Estimates:																				
Standard Error		54	110	24	3	3				36	11	26	22	1	1				1	
CV		15.46%	17.16%	20.31%	90.42%	90.42%				14.98%	25.22%	21.27%	30.27%	31.16%	57.65%				36.79%	
Upper 95% CI		453	856	165	37	37				308	66	173	115	15	8				11	
Lower 95% CI		241	424	71	1	1				168	22	71	29	2	1				1	

Table 4. Total Area 8-1 Recreational Fishery In-season Catch Estimates (Extrapolated Numbers), Based on Dockside Angler Interviews, October 1 2005 through February 26 2006.

Month	Dates	Est. Effort		Est. Retained Catch						Est. Releases							
		Boats	Anglers	Chinook		Coho		Chum	Pink	Chinook				Coho	Chum	Pink	Unk. Salmon
				Marked	Unmark	Marked	Unmark			Total	Mark	Unmark	Unk.				
OCT	Oct 1 - Oct 30	637	1,154	41	0	24	31	7	0	305	130	88	87	0	0	0	8
NOV	Oct 31 - Dec 1	200	350	44	0	0	0	0	0	100	26	49	25	0	0	0	0
DEC	Dec 2 - Dec 31	236	427	49	0	0	0	0	0	169	65	68	36	0	0	0	0
JAN	Jan 1 - Jan 29	161	295	37	0	0	0	0	0	122	39	24	59	0	0	0	0
FEB	Jan 30 - Feb 26	347	640	118	3	0	3	0	0	238	44	122	72	3	0	0	0
TOTAL Oct-Feb		1,581	2,866	289	3	24	34	7	0	934	304	351	279	3	0	0	8
Statistics for Grand Total Estimates:																	
Standard Error		194	348	49	3	15	18	6		105	73	56	51	1			8
CV		12.25%	12.16%	17.12%	90.42%	61.01%	52.46%	85.67%		11.21%	23.97%	15.84%	18.12%	31.16%			94.04%
Upper 95% CI		1,961	3,549	386	37	54	70	22		1,139	447	460	378	15			26
Lower 95% CI		1,201	2,183	192	1	4	7	1		729	161	242	180	2			1

Table 5. Preliminary Area 8-2 Recreational Fishery In-season Catch Estimate (Extrapolated Numbers), Based on Dockside Angler Interviews, January 30 through February 26, 2006.

Start Date	End Date	Est. Effort		Est. Retained Catch						Est. Releases											
		Boats	Anglers	Chinook		Coho		Chum	Pink	Chinook				Coho				Chum	Pink	Unk. Salmon	
				Marked	Unmark	Marked	Unmark			Total	Mark	Unmark	Unk.	Total	Mark	Unmark	Unk.				
30-Jan	2-Feb	21	54	9	4	0	0	0	0	48	13	31	4	0	0	0	0	0	0	0	
3-Feb	3-Feb	8	12	2	0	0	0	0	0	23	4	11	8	0	0	0	0	0	0	0	
4-Feb	4-Feb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5-Feb	5-Feb	13	22	0	0	0	0	0	0	20	4	7	9	0	0	0	0	0	0	0	
6-Feb	9-Feb	117	225	72	4	0	0	0	0	110	32	59	19	0	0	0	0	0	0	0	
10-Feb	10-Feb	33	59	9	0	0	0	0	0	18	2	7	9	0	0	0	0	0	0	0	
11-Feb	11-Feb	127	234	24	0	0	0	0	0	116	31	15	70	2	0	0	2	0	0	0	
12-Feb	12-Feb	105	208	19	3	0	0	0	0	64	21	20	23	1	1	0	0	0	0	0	
13-Feb	16-Feb	11	17	3	0	0	0	0	0	6	3	3	0	0	0	0	0	0	0	0	
17-Feb	17-Feb	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
18-Feb	20-Feb	92	185	34	0	0	0	0	0	92	31	21	40	2	0	2	0	0	0	0	
21-Feb	23-Feb	7	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
24-Feb	24-Feb	12	23	2	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	0	
25-Feb	25-Feb	65	134	17	0	0	0	0	0	31	5	12	14	0	0	0	0	0	0	0	
26-Feb	26-Feb	44	89	14	0	0	0	0	0	43	4	15	24	0	0	0	0	0	0	0	
TOTAL		657	1,280	205	11	0	0	0	0	578	150	201	227	5	1	2	2	0	0	0	
Statistics for Grand Total Estimates:																					
Standard Error		32	67	25	5					37	20	27	15	1	1	0	0				
CV		4.92%	5.24%	11.99%	43.93%					6.38%	13.12%	13.57%	6.65%	12.48%	62.40%	0.00%	0.00%				
Upper 95% CI		720	1,411	253	22					650	189	255	257	7	9	2	2				
Lower 95% CI		594	1,149	157	5					506	111	147	197	3	1	2	2				

Table 6. Total Area 8-2 Recreational Fishery In-season Catch Estimates (Extrapolated Numbers), Based on Dockside Angler Interviews, October 1 2005 through February 26 2006.

Month	Dates	Est. Effort		Est. Retained Catch						Est. Releases										
		Boats	Anglers	Chinook		Coho		Chum	Pink	Chinook				Coho				Chum	Pink	Unk. Salmon
				Marked	Unmark	Marked	Unmark			Total	Mark	Unmark	Unk.	Total	Mark	Unmark	Unk.			
OCT	Oct 1 - Oct 30	1,486	2,911	27	2	104	299	7	1	330	15	17	298	141	4	14	123	2	1	144
NOV	Oct 31 - Dec 1	187	343	21	2	0	0	1	0	63	0	14	49	0	0	0	0	2	0	4
DEC	Dec 2 - Dec 31	249	461	90	4	1	0	0	0	246	26	76	144	1	0	0	1	0	0	0
JAN	Jan 1 – Jan 29	306	575	137	5	0	0	0	0	430	88	183	159	2	0	0	2	0	0	0
FEB	Jan 30 – Feb 26	657	1,280	205	11	0	0	0	0	578	150	201	227	5	1	2	2	0	0	0
Total Oct-Feb		2,885	5,570	480	24	105	299	8	1	1,647	279	491	877	149	5	16	128	4	1	148
Statistics for Grand Total Estimates																				
Standard Error		146	284	41	6	16	27	2	0.43	86	23	40	72	17	2	4	16	1	0.43	25
CV		5.04%	5.10%	8.50%	27.06%	15.11%	9.04%	22.22%	42.74%	5.22%	8.10%	8.24%	8.26%	11.34%	34.79%	22.13%	12.83%	27.80%	42.74%	17.08%
Upper 95% CI		3,170	6,127	560	37	136	352	12	6	1,816	324	571	1,019	182	11	24	160	9	6	198
Lower 95% CI		2,600	5,013	400	11	74	246	4	1	1,478	234	411	735	116	2	8	96	2	1	98

Table 7. Total Chinook Encounters Estimated for Kicker Vessels in Areas 8-1 and 8-2, and Censused from Charter Vessels in Area 8-2, October 1 2005 through February 26 2006.

Area	Month	Fishing Method ^{1/}	Angler Trips	CHINOOK ENCOUNTERS						
				Retained		Released				Total Encounters (Retained + Released)
				Marked	Unmark	Total	Mark	Unmark	Unk.	
8-2	OCT	Kicker Charter	2,911	27	2	330	15	17	298	359
			56	14	0	11	2	9	0	25
	Total Oct.		2,967	41	2	341	17	26	298	384
	NOV	Kicker Charter	343	21	2	63	0	14	49	86
			19	8	0	17	12	5	0	25
	Total Nov.		362	29	2	80	12	19	49	111
	DEC	Kicker Charter	461	90	4	246	26	76	144	340
			22	16	0	42	22	20	0	58
	Total Dec.		483	106	4	288	48	96	144	398
	JAN	Kicker Charter	575	137	5	430	88	183	159	572
			15	21	0	27	14	13	0	48
	Total Jan.		590	158	5	457	102	196	159	620
FEB	Kicker Charter	1,280	205	11	578	150	201	227	794	
		11	2	0	8	7	1	0	10	
Total Feb.		1,291	207	11	586	157	202	227	804	
Area 8-2 Total Oct-Feb		5,693	541	24	1,752	336	539	877	2,317	
8-1	OCT	Kicker Charter	1,154	41	0	305	130	88	87	346
			0	0	0	0	0	0	0	0
	Total Oct.		1,154	41	0	305	130	88	87	346
	NOV	Kicker Charter	350	44	0	100	26	49	25	144
			0	0	0	0	0	0	0	0
	Total Nov.		350	44	0	100	26	49	25	144
	DEC	Kicker Charter	427	49	0	169	65	68	36	218
			0	0	0	0	0	0	0	0
	Total Dec.		427	49	0	169	65	68	36	218
	JAN	Kicker Charter	295	37	0	122	39	24	59	159
			2	0	0	6	2	4	0	6
	Total Jan.		297	37	0	128	41	28	59	165
FEB	Kicker Charter	640	118	3	238	44	122	72	359	
		0	0	0	0	0	0	0	0	
Total Feb.		640	118	3	238	44	122	72	359	
Area 8-1 Total Oct-Feb		2,868	289	3	940	306	355	279	1,232	
GRAND TOTAL (Areas 8-1 & 8-2)			8,561	830	27	2,692	642	894	1,156	3,549
^{1/} We applied the Murthy estimator method to estimate total salmon encounters for kicker boats in Area 8-2, while a complete census approach was used for charter boats.										

^{1/} We applied the Murthy estimator method to estimate total salmon encounters for kicker boats in Area 8-2, while a complete census approach was used for charter boats.

Table 8. Observed unmarked chinook mortalities in the Areas 8-1 and 8-2 selective chinook fishery, based on preliminary estimates of chinook encounters from creel surveys, versus impacts predicted from the FRAM model, by month for Areas 8-1 and 8-2 combined.

Month	Proportion of Effort	Estimated Mortalities: Unmarked Chinook Encounters			
		Modeled Impacts	Modeled Cumulative	Observed ^{1/} Impacts	Observed Cumulative
October	0.1898	495	495	68	68
November	0.1181	308	803	25	93
December	0.1397	364	1,167	60	152
January	0.1189	310	1,477	76	228
February	0.1983	517	1,995	115	343
March	0.1204	314	2,309	TBD	TBD
April	0.1148	299	2,608	TBD	TBD

^{1/} For this preliminary analysis we did not separate out legal versus sub-legal sizes of chinook to estimate mortalities; we applied the mortality rate of 20% (assumed rate for sub-legal chinook) for all released fish. Therefore, the estimated observed impacts are considered a high estimate.

6. Dockside Fishing Method Question

Methods

During dockside interviews, samplers recorded the predominant (based on time) angling method employed by the boat being interviewed, for the boats that actually encountered chinook. Responses were recorded on the sampling form according to the following five fishing method categories:

1. Weight & Bait (W): Mooching or slow trolling with lead and herring/anchovy.
2. Downrigger Trolling (DR): Using either hardware or bait or any combination.
3. Jigging (J): Drifting, jerking pole up and down; for example using Buzz Bombs, Point Wilson Darts, or Crippled Herring.
4. Diver Trolling (DV): For example trolling with a Deep Six or a Pink Lady, using either hardware or bait or any combination.
5. Other (O): For example fly fishing, or trolling bucktails with or without weight.

The sampling supervisor summarized the above information for anglers encountering chinook and instructed test boat samplers on which method to employ in order to adequately represent the fishing methods used by the recreational fleet. We assigned proportions of time that the test boat should spend on the different fishing methods on weekly basis, based on the dockside fishing method summary from the previous statistical week. Fishing methods employed by the test boat were also scheduled in a way that made sense as far as the tides, what was happening in the fishery, and other environmental variables.

The test boat samplers recorded the fishing method that they implemented on their sampling form. At the end of a test fishing day, the test boat crew summarized the amount of time they spent on fishing each method (see section 6 below, "Test Fishing").

Results

As in previous months of the fishery, downriggers were the predominant fishing method employed by anglers in Areas 8-1 and 8-2 during February. In Area 8-1, out of 150 interviews with anglers that successfully encountered chinook, all 150 boats used downriggers as their predominant fishing method. In Area 8-2, out of 228 interviews with anglers that successfully encountered chinook, 226 (99.2%) boats employed downriggers as their predominant fishing method, while one boat (0.4%) used the weight and bait method, and another boat (0.4%) used the jigging method. Thus, for Areas 8-1 and 8-2 combined, 99.5% of the boats that successfully encountered chinook used downriggers as their predominant fishing method.

For the months of October through February combined, we recorded a total of 1,028 responses to the fishing method question for anglers that successfully encountered chinook (366 boats in Area 8-1 and 662 boats in Area 8-2). Of these, 1,024 boats (99.6%) used downriggers as the predominant fishing method, while 3 boats (0.3%) employed the weight and bait method, and one boat (0.1%) used the jigging method.

6. Test Fishing**Methods**

We operated two test boats, one in Area 8-1 and the other in Area 8-2. The crew on each boat consisted of two WDFW technicians per boat. These test boats fished approximately four to five days per week (Monday through Friday) on average throughout February (weather permitting). If adverse weather conditions precluded test fishing on a scheduled fishing day, the sampling supervisors rescheduled test fishing to an alternate day on the weekend, or the crew worked on boat maintenance and other duties.

For each hook-up, the encounter number, time sampled, species, mark status, and DNA vial number (if applicable) was recorded. Care was taken to handle all fish as gently as possible. Chinook were brought on board in a cotton mesh net and measured while still in the net. Samplers collected three scales for each chinook brought on board. In addition, samplers recorded the fork length, total length, and mark status for each chinook on the scale card (legal size chinook were 22 inches and larger, while and sub-legal size chinook were less than 22 inches total length). Samplers also used scissors to remove a 1 cm² piece of the caudal fin for DNA analysis. All fish were released carefully and as soon as possible.

The test boat samplers recorded the fishing method that they implemented on their sampling form. At the end of a test fishing day, the test boat crew summarized the amount of time they spent on fishing each method.

Results

The test boat in Area 8-1 encountered a total of 71 chinook (30 legal and 41 sub-legal) during February, and the test boat in Area 8-2 encountered a total of 50 chinook (25 legal and 25 sub-legal) (Table 9). Samplers collected DNA samples from each of these fish, as well as scale samples, fork lengths, and total lengths.

The test boats in both areas employed downriggers 100% of the time during February. Adverse weather conditions precluded fishing five days per week during certain weeks in the month, with particularly rough conditions on the water in both areas during the third week of February (statistical week 8).

To date, for the months of October through February combined, the test boat in Area 8-1 has encountered a total of 340 chinook (105 legal and 235 sub-legal), while the test boat in Area 8-2 has encountered a total of 216 chinook (92 legal and 124 sub-legal) (Table 9).

Based on the combined test fishing data for October through February, the adipose mark rate in Area 8-1 was 61% for legal-sized chinook and 56% for sub-legal chinook. In Area 8-2, the adipose mark rate was 57% for legal-sized chinook and 65% for sub-legal chinook (Table 9).

Literature Cited

Cochran, W.G. 1977. Sampling Techniques. John Wiley.

Table 9. Total weekly chinook encounters and number of DNA samples collected in the Areas 8-1 and 8-2 test fishery from October 1 2005 through February 26 2006 (statistical weeks 41 through 9), by mark status (M=marked; UM=unmarked) and legal or sub-legal size^{1/}.

Month	Statistical Week	AREA 8-1						AREA 8-2					
		LEGAL ^{1/}			SUB-LEGAL ^{1/}			LEGAL ^{1/}			SUB-LEGAL ^{1/}		
		M	UM	Total	M	UM	Total	M	UM	Total	M	UM	Total
OCT	41	2	0	2	10	6	16	0	0	0	1	0	1
	42	0	0	0	5	2	7	0	1	1	4	3	7
	43	2	0	2	5	2	7	0	2	2	14	5	19
	44	0	0	0	8	4	12	1	0	1	5	6	11
OCT TOTAL		4	0	4	28	14	42	1	3	4	24	14	38
Percent		100%	0%		67%	33%		25%	75%		63%	37%	
NOV	45	0	0	0	2	2	4	0	1	1	3	1	4
	46	1	1	2	2	2	4	1	0	1	6	2	8
	47	2	6	8	8	5	13	2	0	2	5	3	8
	48	4	2	6	4	2	6	4	3	7	5	1	6
	49	4	3	7	11	8	19	1	4	5	3	3	6
NOV TOTAL		11	12	23	27	19	46	8	8	16	22	10	32
Percent		48%	52%		59%	41%		50%	50%		69%	31%	
DEC	50	4	0	4	4	10	14	4	5	9	1	4	5
	51	2	1	3	3	4	7	3	2	5	0	1	1
	52	0	0	0	1	2	3	1	0	1	2	2	4
	53-1	3	3	6	1	1	2	6	2	8	2	2	4
DEC TOTAL		9	4	13	9	17	26	14	9	23	5	9	14
Percent		69%	31%		35%	65%		61%	39%		36%	64%	
JAN	2	2	1	3	2	5	7	0	0	0	0	0	0
	3	1	4	5	12	10	22	0	0	0	0	0	0
	4	7	11	18	9	7	16	11	7	18	8	3	11
	5	7	2	9	20	15	35	4	2	6	2	2	4
JAN TOTAL		17	18	35	43	37	80	15	9	24	10	5	15
Percent		49%	51%		54%	46%		63%	38%		67%	33%	
FEB	6	8	0	9	8	5	13	5	6	11	5	1	6
	7	10	3	13	9	4	13	6	4	10	6	4	10
	8	1	2	3	4	4	8	1	0	1	2	0	2
	9	4	2	6	4	3	7	2	1	3	6	1	7
FEB TOTAL		23	7	30	25	16	41	14	11	25	19	6	25
Percent		77%	23%		61%	39%		56%	44%		76%	24%	
GRAND TOTAL		64	41	105	132	103	235	52	40	92	80	44	124
Percent		61%	39%		56%	44%		57%	43%		65%	35%	

^{1/} Legal size chinook were 22 inches and larger in total length, while sub-legal size chinook were less than 22 inches total length.

Genetic Stock Identification and Full Parental Genotyping for Management of California's Chinook Salmon Fisheries

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Genetic tools have a long history in fishery management, with the use of genetic “tags” to distinguish hatchery and wild trout described more than 20 years ago (Taggart and Ferguson 1984). More recently, the use of genetic stock identification (GSI) techniques have been used to elucidate ocean migration patterns and to estimate stock proportions in a mixed stock fishery context (e.g. Teel et al. 2004). Such GSI for estimation of stock proportions can occur either post-season or in-season. An in-season GSI system requires a facility with dedicated staff and can typically produce stock proportion estimates from fishery or port samples within approximately one day of delivery (Beacham et al. 2004). Such stock composition estimates can then be used to adaptively focus fishery effort to avoid stocks of conservation concern, or to best target abundant stocks.

Because of the current and potential future utility of GSI methods to assist in fishery management, the Pacific Salmon Commission has recently funded a collaborative effort to develop a coastwide genetic database for GSI of Chinook salmon. This \$1.1 million effort has resulted in an unprecedented database of 13 microsatellite loci, which have been standardized across most major Pacific salmon genetics labs, typed in over 105 Chinook salmon populations (~120 fish per population) from Alaska to California and is capable of accurately distinguishing most major stocks of Chinook salmon in the northeast Pacific. The Southwest Fisheries Science Center in Santa Cruz is the California representative to this consortium of collaborating salmon genetics labs.

The ability of the coastwide genetic database to distinguish Chinook salmon from the different basins and ESUs in California is straightforward and relatively trivial with this database, due to substantial genetic differences between CA Chinook salmon populations (Figure 1). These differences are also reflected in the performance of individual assignment tests, which correctly identify nearly every fish to basin/stock/ESU of origin. This is particularly true with salmon from the Klamath/Trinity basin, which are correctly distinguished from other California ESUs with near-perfect accuracy, because of their substantial genetic divergence from all other California Chinook salmon stocks (Figure 1; Waples et al. 2004). The coastwide GSI database can also identify individual fish to tributary of origin more than 80% of the time. Additional microsatellite genes in use by our lab can increase that accuracy to above 95%.

The existence of this database for GSI thus provides a powerful tool for determining and minimizing fishery impacts on salmon stocks of conservation concern. For example, a well-designed GSI program can be used to distinguish salmon from the Klamath/Trinity basin from those of the Central Valley and Coastal ESUs in fishery catches. Such information can be used to directly measure fishery impacts on fish from the Klamath ESU, as well as provide a much clearer picture of ocean migration/distribution patterns of all California Chinook salmon stocks. We believe that such information could be used to design fishing regimes that minimize impacts on Klamath/Trinity Chinook salmon, while allowing maximum exploitation of abundant stocks, such as the Central Valley Fall run.

The current fishery management regime for Chinook salmon is based on cohort reconstruction, and therefore requires more information than just the stock of origin provided by traditional GSI. Traditionally, genetic methods have not been able to provide cohort/broodyear information for salmonids. However, we have developed a novel genetic technique that provides both stock and cohort of origin for individual salmonids from hatcheries: precisely the same information provided by a traditional coded wire tag (CWT) system. This method, termed full parental genotyping (FPG; Anderson and Garza 2005), actually provides more information than just stock and cohort of origin; it identifies the specific parent pair for a sampled fish.

The basic idea behind FPG is that DNA is an individual-specific “fingerprint” which is transmitted from one generation to the next in reproduction. Therefore, by collecting genotype data from all broodstock adults at a hatchery (or theoretically, but not practically, in-stream), one can identify offspring of particular matings through parentage analysis on fishery samples. By identifying the particular parent pair, the stock and cohort of origin are then known. Anderson and Garza (in prep) have shown how this can be done essentially without error using a surprisingly modest amount of genetic information.

Two other important elements of an FPG tagging system are that its implementation provides a 100% tagging rate for those hatcheries where it is practiced and that the tagging costs are much lower than with CWTs or any other tagging system with which we are familiar. Tag recovery, through determination of the genotype of a fish sampled in the fishery or at escapement, is currently more expensive than recovery of a CWT, but the overall cost of the two systems should be roughly similar. Moreover, substantial cost-savings are possible with genetic-based tagging methods; the cost of such work in the human genetics area is several times less than it is in fishery and wildlife genetics. Implementation of an FPG tagging program at the Trinity River and Iron Gate Hatcheries could be achieved at modest cost and provide the ability to identify every fish from these facilities in a mixed fisheries context. This would provide a potentially important improvement to the data used in stock assessment and forecasting for Klamath Chinook salmon.

One of the greatest advantages of an FPG tagging system is that it is easily and economically integrated with a GSI system (Anderson and Garza 2005). This allows a staged genetic analysis to be employed on both marked (adipose fin clipped) and unmarked fish, with GSI yielding stock of origin for every sampled fish. Those fish that are assigned to “stocks” that are hatcheries where FPG is performed would then be subjected to additional genetic analysis yielding cohort of origin. Such an integrated system can also easily accommodate samples from released sub-legals and strays from stocks that normally are not detected in fishery sampling.

We suggest that management agencies charged with determining salmon fishery regulations support a pilot study to evaluate the utility of genetic based methods to help further define ocean distribution of California’s Chinook salmon stocks and possibly replace CWTs for stock assessment. We also recommend that they consider whether an in-season rapid response GSI system might help to best meet both conservation and fishery access goals for California’s salmon fisheries.

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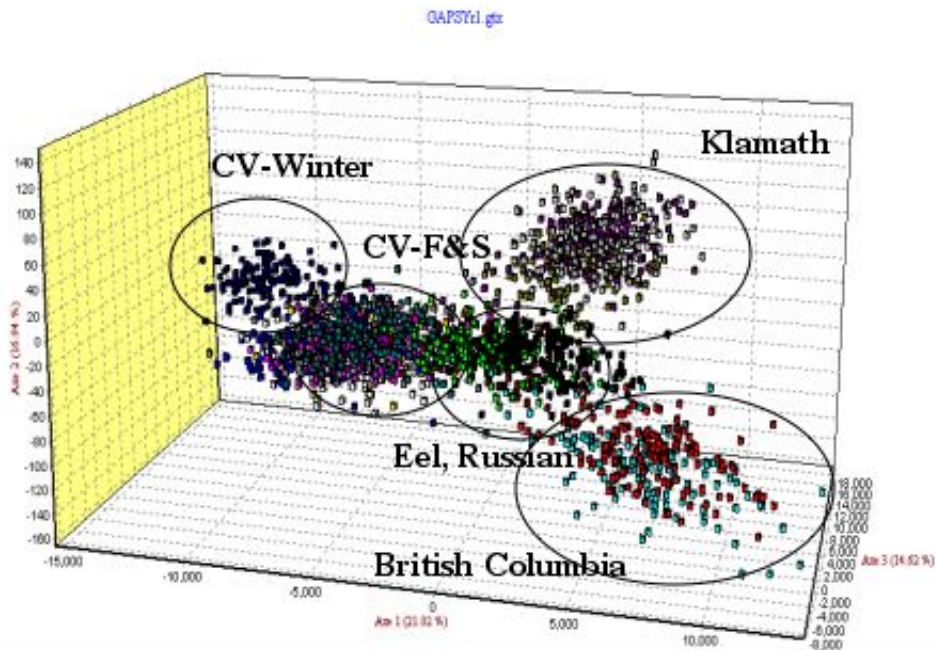


Figure 1: Factorial Correspondence Analysis of individual genotypes for Chinook salmon from California and three populations from Canada. The ability to easily distinguish Central Valley, Coastal and Klamath/Trinity salmon is evident from the lack of overlap in the distribution of genotypes.

Use of otoliths to identify river and hatchery of origin of California Central Valley Chinook salmon in the ocean fishery: potential application to Klamath River Chinook salmon

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SUMMARY:

Ocean harvest models aim to quantify impacts of fishing mortality in the marine environment, with specific mandates to manage the overall resource to minimize impacts on endangered or threatened populations. This creates a particular challenge for managing salmonid resources, given that few tools exist to determine the extent of movement or mixing of stocks in a common marine environment, especially when populations differ significantly in size (McKinnell et al. 1997, PFMC 2001). Current use of coded wire tags provides limited insight into the role of individual natal sources to Chinook salmon population dynamics due to small numbers of tagged fish and even fewer recoveries (<10% of hatchery releases and far fewer wild fish are tagged).

We developed novel techniques to determine whether otoliths (fish earbones) can be used as natural population markers to identify individual sources of salmon from the fall-run California Central Valley (CCV) in adults caught in the ocean fishery. Our research shows that otolith microstructure and geochemical composition provide discrete tags for determining production source (hatchery vs. wild) and individual hatchery and stream-of-origin for adult Chinook salmon. Hatchery and wild individuals can be distinguished with 90% correct classification based on differences in otolith microstructure (width and variability of daily growth bands and distinctness of exogenous feeding check) formed during early growth in hatcheries or wild rearing environments. Growth rates of fish reared in hatcheries are greater and less variable than those of wild fish resulting in the physical banding pattern in otoliths that is diagnostic between the two production types. A less distinct exogenous feeding check is deposited on otoliths of hatchery fish because hatchery fish are fed supplemental food prior to depleting maternal yolk, which results in a smooth transition to exogenous feeding and no disruption of otoliths growth. Sr isotopes (⁸⁷Sr/⁸⁶Sr) in fish from the ten natural spawning rivers in the CCV are significantly different from one another and can be used to identify the natal origin of wild adults with 95% accuracy. In addition, Sr isotopes (⁸⁷Sr/⁸⁶Sr) are distinct among juveniles from each of the five hatcheries and these distinctive markers are identifiable in otoliths from adults captured in the ocean fishery. This match between natal sources and otolith signatures in ocean-caught adults was ground-truthed by examining otoliths of adults that had been tagged with coded wire at their natal tributary.

We are using these techniques to identify the origin of fishes caught in the ocean fishery to determine whether some river/ hatchery sources are contributing disproportionately to the fishery, which has direct implications for targeting restoration efforts on critical salmon habitat

and quantifying the role of hatcheries in supplementing natural populations. A spatial analysis of our mixed-stock fishery data indicates that fish caught in schools from Bodega Bay south to Monterey Bay during salmon fishing season are comprised of fish from all potential wild and hatchery sources. These results confirm current ocean harvest models, which assume that fish from the 15 potential spawning sources in the Central Valley are mixed in the ocean fishery at the scale of regions and schools. A similar study can be conducted in the Klamath-Trinity system to determine if otolith microchemistry and microstructure can be used to identify individual sources of fish. The results from that study in conjunction with information already derived for Central Valley Chinook salmon have the potential to identify the stock origin (Central Valley versus Klamath-Trinity) as well as individual rivers and hatcheries for both stocks of fish caught in the ocean. Analyses of these data could elucidate movement patterns, spatial structure, and how different source populations contribute to fisheries distributed along the coast to aid in sustainable management.

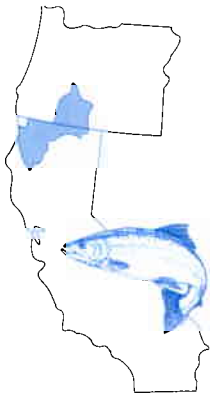
TECHNIQUE BACKGROUND:

The chemical and isotopic composition of the otoliths has been used in a variety of ways to aid in stock identification of fish populations. Otoliths are formed by the daily deposition of a layer of a calcium carbonate and protein matrix. Because ninety percent of the calcium carbonate and trace elements that comprise otolith material is derived from surrounding water, the chemical and isotopic composition of otoliths provides a signature map of specific water masses. In California, volcanic rock dominates the Cascade Mountain range to the north, while older granitic rock is widespread along the western slope of the Sierra Nevada mountain range. The north-to-south gradient in rock type and age produces a trend of low strontium isotopic ratios in the north to high values in the south. The watershed of the major salmon-spawning rivers drain across these different geologic formations, transferring the natural isotopic markers to the otoliths of the fish in the rivers. Otoliths serve as a permanent record of the natal rearing environment. To identify hatchery fish from wild fish that co-occur on the same rivers and therefore are predicted to reflect similar isotopic chemistry, we developed additional population markers using otolith microstructure.

Otolith microstructure, the pattern in concentric bands in otoliths has also been used in stock identification especially when growth rates among populations are known to occur. Like tree rings, otoliths provide a record of age and growth in fishes and therefore can be used in juvenile salmon to record growth rates during the life of the fish. Environmental factors that effect fish growth such as temperature, photoperiod, stress, developmental changes and food resources have been demonstrated to influence otolith microstructure (Campana and Neilson 1985). Otolith microstructure was used to discriminate between hatchery and wild Chinook salmon in British Columbia based on wider and less variable increment widths found in hatchery produced individuals (Zhang et al. 1995). The potential differences in rearing environments between hatcheries and natural rivers, with hatcheries providing a more constant and abundant feeding environment, may contribute to differences in microstructure between production sources.

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Klamath Fishery Management Council

Working to Restore Anadromous Fish in the Klamath River Basin

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MAR 17 2006

California Commercial
Salmon Fishing Industry

California Department
of Fish and Game

California Offshore Sport Fishery

Hoopa Valley Tribe

Klamath In-River Sport Fishery

National Marine Fisheries Service

Non-Hoopa Indians Representative

Oregon Commercial
Salmon Fishing Industry

Oregon Department
of Fish and Wildlife

Pacific Fishery Management
Council

U.S. Department of the Interior

Don Hansen, Chairman
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 200
Portland, Oregon 97220-1384

REC

MAR 22 2006

PFM

Subject: Marking Rates at Iron Gate Hatchery

Dear Mr. Hansen:

The Klamath Fishery Management Council (KFMC) wishes to draw your attention to an extremely important issue in the management of Klamath River fall Chinook salmon: the low marking rates of Klamath River fall Chinook at Iron Gate Hatchery. The KFMC requests your assistance in informing the Federal Energy Regulatory Commission (FERC) on the importance of constant fractional marking of Klamath River fall Chinook at Iron Gate Hatchery, which is funded by PacifiCorp as a condition of its license to operate its hydropower facilities in the Klamath River of Oregon and California.

PacifiCorp is in the process of renewing its FERC license (FERC 2082). The existing license expired on March 6, 2006. It may be several years before a new long term license is issued. In the meantime, it is expected that PacifiCorp will be operating under a series of annual licenses based upon the terms of the previous license. It is not uncommon for FERC to issue multiple annual licenses, occasionally taking over a decade to implement new license conditions.

Contemporary practices at large-scale salmon production hatcheries, such as Iron Gate Hatchery, require proper accounting for contribution to fisheries, facility efficiency, review of release strategies, and minimizing effects on naturally produced fish.

As you know, the KFMC and its Technical Advisory Team (Team) are responsible for assessing the annual spawning abundance and ocean and river harvests of Klamath River fall Chinook. Among the most critical elements of the assessment is the recovery of coded wire tags (CWT) from fish marked and released from Iron Gate and Trinity River Hatcheries. The CWT recoveries provide information on the distribution, timing, and relative magnitude of catches

of Klamath River fall Chinook off Washington, Oregon, and California, in the recreational and tribal fisheries in the Klamath Basin, as well as the magnitude of the returns to hatcheries and natural spawning areas.

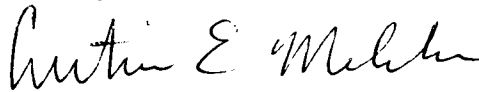
Stock analysis using CWT information is critical in managing Pacific salmon populations. The Pacific Fishery Management Council and National Marine Fisheries Service use this information in developing annual salmon fishing regulations for the west coast. Their ability to manage fisheries is strongly influenced by the marking rates of fish released from Iron Gate and Trinity River Hatcheries. Since 2000, the marking rates of Trinity River Hatchery fingerlings have been a constant fractional 25% of production. In contrast, marking rates of Chinook fingerlings at Iron Gate Hatchery have been about 4% of the production. Due to the low marking rates, Iron Gate CWT fish are not frequently recovered. When they are recovered, a very high expansion factor is assigned to them, which reduces the accuracy of harvest rate predictions for a given time and area.

Under the interim annual license, FERC has the option to require PacifiCorp to increase the marking rate now. During the traditional re-licensing process, many state and federal agencies, tribes and non-governmental organizations have requested FERC to direct PacifiCorp to increase the marking rate of Iron Gate Hatchery fall Chinook. To date, FERC has not responded to these requests.

The KFMC respectfully requests that the Pacific Fishery Management Council inform FERC of the need to increase the marking rate of Klamath River fall Chinook at Iron Gate Hatchery. The improved marking rate should be applied for the entire duration of the interim licenses. When a new license is issued, the appropriate marking rates should be included in any hatchery management regime.

Thank you for your consideration of this issue. If you have questions, please contact Phil Detrich, Yreka Fish and Wildlife Office, at (530) 842-5763.

Sincerely,

A handwritten signature in black ink, appearing to read "Curt E. Melcher". The signature is fluid and cursive, with the first name "Curt" and last name "Melcher" clearly distinguishable.

Curt Melcher, Chairman
Klamath Fishery Management Council