

FINAL DRAFT 01/14/05

**Evaluation of the 2003 and 2004 Chinook Mark-Selective Fisheries,
Marine Areas 5 and 6**

January 14, 2005

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

EXECUTIVE SUMMARY

During the summers of 2003 and 2004, a mark-selective Chinook salmon *Oncorhynchus tshawytscha* (“Chinook”) recreational fishery was implemented in waters of the Strait of Juan de Fuca with the objectives of: 1) increasing meaningful recreational 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 2003 Chinook Mark-Selective Fishery started on July 5, 2003 and ran continuously through August 3, 2003 in Marine Area 5 and the western portion of Marine Area 6. The 2004 Chinook Mark-Selective Fishery started on July 1, 2004 and ran continuously through August 8, 2004 in the same areas. 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.

Anglers were allowed to retain two marked (adipose fin clipped) Chinook ≥ 22 ” (56 cm) as part of their daily limit, and were required to immediately release, unharmed, any unmarked Chinook caught. During the Chinook Mark-Selective Fishery anglers were also allowed to retain pink *O. gorbuscha*, sockeye *O. nerka*, and marked hatchery coho *O. kisutch* salmon.

This report focuses on evaluating the two years of the pilot Chinook Mark-Selective Fishery. Some general comparisons to the 2001 and 2002 non-selective Chinook fisheries in Area 5 are presented for the purpose of evaluating success of the Mark-Selective Fishery with respect to the general objective of increasing recreational opportunity compared to non-selective alternatives. We also compared alternative methods for determining mark rates and encounters with sublegal-size fish. Expected impacts of the mark-selective fishery from the Fishery Regulation Assessment Model (FRAM) pre-season planning tool are compared with the measured outcomes. Finally, recommendations for applications to future mark-selective fisheries are also presented.

Angler opportunity increased three ways due to this selective fishery. First, recreational Chinook fishing opportunity was expanded from 10-day and 5-day seasons in 2001 and 2002, respectively, to 30-day and 39-day seasons in 2003 and 2004, respectively. Second, anglers harvested nearly twice as many Chinook in 2003 and 2004 than they did in 2001 and 2002. Third, a portion of Area 6 was open for Chinook retention during the summer compared to all of Area 6 being closed for Chinook retention during the summer in 2001 and 2002. Increases in effort were modest compared to 2001 but approximately double the effort levels observed in 2002. Other than simply having more days of fishing open for anglers, the increased opportunity is attributable to a relatively high mark rate of approximately 45% for legal-size Chinook and reasonably good catch rates (approximately one retained Chinook for every 7-8 anglers).

Success of the Pilot Project is also indicated by the results of WDFW public education and Enforcement activities. Information collected by the Enforcement program and from creel surveys over these two seasons indicated consistently high compliance with not retaining wild (unmarked) Chinook during the fishery.

Since the impacts on Chinook stocks are based on assumptions about the overall level of angler encounters with unmarked Chinook, we estimated the number of unmarked Chinook encounters and compared those estimates with the pre-season FRAM expectations. Except for the unmarked sublegal-size fish in 2003, the estimates of encounters of unmarked legal-size Chinook and unmarked sublegal-size Chinook were below predicted levels.

We tested the assumption that test boat catches were representative of angler catches and found that for marked legal-size Chinook they were similar, suggesting they were probably similar for unmarked fish and sublegal-size fish as well. In strata with sufficient sample sizes for comparison, estimates of mark rates and ratios of legal/sublegal-size derived from test boat data and Voluntary Trip Report (VTR) information were very similar. We recommend a more rigorously structured VTR program that includes training and certification by WDFW staff. Based on our findings, we recommend that test fishing or VTR data, or a combination of both, be used to provide information on both mark rates and legal/sublegal-size categories in future Chinook Mark-Selective Fisheries.

In conclusion, this mark-selective Chinook fishery was successful at many levels. First, we met our two primary objectives of increasing opportunity and collecting the information necessary to evaluate pertinent biological impacts, including impacts to coded wire tagged Chinook. Second, we have likely captured the magnitude of this mark-selective fishery in terms of effort and harvest, and that magnitude was similar to pre-season expectations. Third, a level of enforcement was achieved to ensure that angler compliance with fishing regulations was high. Fourth, we were able to evaluate two different methods of obtaining mark rates and legal to sublegal ratios, and they were very similar when sample sizes were sufficient. And finally, although dependent upon factors unique to the proposed area, season, stock composition, and management logistics, our findings have provided a solid foundation for building successful mark-selective Chinook fisheries in the future.

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 “Mark-Selective Fishing”. In recreational mark-selective fisheries, anglers are generally allowed to retain 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 mark-selective coho salmon *Oncorhynchus kisutch* (“coho”) fisheries have occurred in Oregon, Washington, and British Columbia at various times since 1998, and mark-selective Chinook salmon *O. tshawytscha* (“Chinook”) fisheries have occurred in freshwater areas since 2000, a mark-selective Chinook fishery had not been conducted in marine waters prior to 2003.

During the summers of 2003 and 2004, a mark-selective Chinook recreational fishery was implemented in waters of the Strait of Juan de Fuca with the objectives of: 1) increasing meaningful recreational 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 consider mark-selective Chinook sport fishing in this area for the 2003 and 2004 seasons as part of a pilot program. A pilot fishery limited in time and area, as described below, provided the opportunity for managers to evaluate the success of the fishery and the monitoring and sampling programs.

The 2003 Chinook Mark-Selective Fishery started on July 5, 2003 and ran continuously through August 3, 2003 in Marine Area 5 and the western portion of Marine Area 6. The 2004 Chinook Mark-Selective Fishery started on July 1, 2004 and ran continuously through August 8, 2004 in the same areas. 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). The Chinook Mark-Selective Fishery 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 sufficiently accurate 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 mark-selective fishery was a new salmon handling regulation starting in 2003 stating, “Any salmon to be released may not be brought on board a vessel.” This regulation was modified slightly and applied throughout Puget Sound in 2004, including Areas 5 and 6. The 2004 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 Mark-Selective Fishery anglers were also allowed to retain pink *O. gorbuscha* (“pink”), sockeye *O. nerka*, and marked hatchery coho salmon.

The 2003 season was scheduled to run from July 5, 2003 through August 14, 2003 (41 days), or until a quota of 3,500 hatchery Chinook salmon was caught and retained by anglers. The fishery was closed by emergency regulation effective at 11:59 p.m., August 3, 2003 because the quota was reached. The 2004 season was scheduled to run from July 1, 2004 through August 10, 2004 (41 days), or until 3,500 hatchery Chinook salmon were caught and retained by anglers. The fishery was closed by emergency regulation effective at 11:59 p.m., August 8, 2004 because the quota was reached.

Analyses of the 2003 and 2004 fisheries were completed and are reported by Thiesfeld and Hagen-Breaux (2004) and Thiesfeld et al. (2004). This report focuses on evaluating the two years of the pilot Chinook Mark-Selective Fishery. Some general comparisons to the 2001 and 2002 non-selective Chinook fisheries in Area 5 are presented for the purpose of evaluating success of the Mark-Selective Fishery with respect to the general objective of increasing recreational opportunity compared to non-selective alternatives. We also compared alternative methods for determining mark rates and encounters with sublegal-size fish. Expected impacts of the mark-selective fishery from the Fishery Regulation Assessment Model (FRAM) pre-season planning tool are compared with the measured outcomes. Recommendations for applications to future mark-selective fisheries are also presented. Recommendations include methods and sampling levels that will ensure agreed to levels of precision for estimates of key assumptions or modeling parameters.

METHODS

Methods for estimating effort and harvest, mark rates, annual coded wire tag impacts, encounters and mortalities are detailed in Thiesfeld and Hagen-Breaux (2004) and Thiesfeld et al. (2004).

Effort and Harvest

Angler participation in mark-selective and non-selective fisheries is not directly comparable due to season, bag limit and other regulation differences. Nevertheless, we examined some general comparisons of the non-selective Chinook fisheries in 2001 and 2002 with the mark-selective Chinook fisheries in 2003 and 2004 in Area 5. The 2001 fishery was restricted to a total harvest of 2,000 Chinook and anglers were allowed to retain any one legal-size Chinook they caught. The quota was obtained in ten days of fishing (July 1, 2, 3, 4, 5, 6, 7, 8, 9, and 21). The 2002 fishery was restricted to a total harvest of 2,000 Chinook and anglers were allowed to retain any one legal-size Chinook they caught. The quota was obtained in five days of fishing (July 5, 6, 7, 8, and 15). The estimated effort and harvest for 2001 and 2002 are from unpublished data obtained by WDFW. However, the techniques used to estimate effort and harvest were identical to the methods described for 2003 and 2004.

Test Fishing

We used a T-test to compare mean length of Chinook caught by test boats and Chinook caught by anglers. We then used a Smirnov test (Conover 1980) to compare the distribution of the lengths.

Mark Rates

We used a simple season long average to estimate mark rates of legal-size and sub-legal size Chinook caught on test boats and Chinook caught by anglers and reported on Voluntary Trip Reports (VTR's). We calculated a rate weighted by weekly catch to determine the proportion of fish that were legal-size and marked, legal-size and unmarked, sublegal-size and marked, and sublegal-size and unmarked.

Encounters and Mortalities

State and Tribal managers estimate the effect of their fisheries on Chinook (and coho) using the FRAM during pre-season planning. Along with numerous other metrics, the FRAM can predict the number of encounters of Chinook for the Area 5 and 6 fishery. To evaluate whether the FRAM was accurately predicting the impacts of the Area 5 and 6 Chinook Mark-Selective Fishery, we compared the estimated number of encounters from the creel surveys and apportioned them into the four categories of legal-size marked, legal-size unmarked, sublegal-size marked, and sublegal-size unmarked with the number of encounters predicted by the FRAM.

Mortalities were calculated as described in Thiesfeld and Hagen-Breaux (2004) and Thiesfeld et al. (2004). To further evaluate the success of the Area 5 and 6 Chinook Mark-Selective Fishery, we compared the estimated mortalities of unmarked legal-size Chinook in 2003 and 2004 with the estimated number of unmarked legal-size Chinook harvested during the 2001 and 2002 non-selective fisheries in Area 5.

Double Index Coded Wire Tag Impacts

Multiple year interactive and mark-selective fishery mortality potential bias on the number of unmarked double index tagged Chinook (2003 and 2004) was calculated as outlined in WDFW 2002. This bias represents the potential error caused by using the original release ratios of marked to unmarked double index tagged Chinook in estimating the unmarked mortalities rather than a ratio that was adjusted to reflect the impact of the prior year's mark-selective fisheries. To calculate the potential maximum bias, we estimated the number of unmarked double index tagged fish that died due to release mortality during the two years of the mark-selective fishery and the number of unmarked double index tagged fish that were encountered but survived the mark-selective fishery in 2003. In this analysis, we assumed that all those unmarked survivors that did not mature and also survived to 2004 would be vulnerable to the fishery in Areas 5 and 6 in 2004. Those fish then contributed to increase the unmarked to marked ratio according to an assumed harvest rate (5%). Unmarked mortalities were calculated using both the release lambda as well as the re-calculated lambda. The difference between these two estimates was used to

represent the multiple year impact of the 2003 Area 5 and 6 Chinook Mark-Selective Fishery, i.e. the maximum bias incurred by the mark-selective fishery in 2003 on the number of unmarked double index tagged mortalities in the 2004 mark-selective fishery.

Compliance with Release of Marked Chinook

An indication of angler compliance with releasing unmarked Chinook was derived from WDFW Enforcement officer contacts and violations observed. During these angler contacts, officers issued either a written warning or citation to any angler who had retained an unmarked Chinook. An additional indicator of compliance was calculated from the number of unmarked Chinook observed during the dockside creel surveys.

RESULTS AND DISCUSSION

Creel Surveys

The two years of the fishery were remarkable in their similarities, especially considering that 2003 was a “pink year” and 2004 was not. The 29,425 angler trips made in 2004 were slightly more than the 24,593 angler trips made in 2003 (Table 1). The season lasted 39 days in 2004, which was nine days longer than the 2003 fishery with the same daily limit and quota.

With the previously mentioned caveat about comparing participation in mark-selective and non-selective fisheries, we examined some general comparisons with 2001 and 2002. In 2001 and 2002, all of Area 6 was closed for Chinook retention during the summer. In 2003, about 25% of Area 6 was open for Chinook retention during the summer. Anglers in Area 5 fished for Chinook 30 days in 2003 versus 10 days in 2001 and 5 days in 2002; a three fold and six fold increase in Chinook fishing days, respectively. Anglers harvested 1,800 Chinook in Area 5 in 2001 and 1,782 in 2002. Anglers harvested 2,529 Chinook in Area 5 in 2003, plus an additional 964 in the portion of Area 6 where Chinook fishing was open, for a total Chinook catch of 3,493; nearly twice as many as in 2001 or 2002. In 2003, the number of angler trips in Area 5 during the Chinook Mark-Selective Fishery was about 23% higher than the number made during the same time period in 2001 and approximately double the effort observed during a similar period in 2002 (Table 2). During the same time periods of July 4th or 5th through August 3 in Area 5, anglers made 19,398 angler trips in 2003, compared to 15,832 and 10,505 angler trips in 2001 and 2002, respectively.

As in 2003, about one-quarter of Area 6 was open for Chinook retention during the summer compared with no opportunity during the summer in 2001 and 2002. Anglers in Area 5 fished for Chinook 39 days in 2004 versus 10 days in 2001 and 5 days in 2002; nearly a four fold and eight fold increase in Chinook fishing days, respectively. Anglers harvested 1,800 Chinook in Area 5 in 2001 and 1,782 in 2002. Anglers harvested 2,900 Chinook in Area 5 in 2004, plus an additional 676 in the portion of Area 6 where Chinook fishing was open for a total of 3,576 Chinook; again nearly twice as many as in 2001 or 2002. In 2004, angler trips in Area 5 during the Chinook Mark-Selective Fishery were only slightly higher than the same time period in 2001,

but more than double the effort observed during a similar period in 2002 (Table 3). During the same time periods of July 1 through August 8th or 9th in Area 5, anglers made 25,174 angler trips in 2004 compared to 24,075 and 11,883 angler trips in 2001 and 2002. This information shows that angler effort was higher in 2003 and 2004 than in 2001 and 2002, but more importantly, angler opportunity to fish for and retain Chinook increased to 30 and 39 days in 2003 and 2004, respectively, compared to only 10 days and 5 days in 2001 and 2002, respectively.

Sublegal-size Chinook

In Area 5, sublegal-size fish (< 22" or 56 cm total length) comprised 54% of the Chinook encountered by test boats in 2003 and 35% of the Chinook encountered in 2004. However, very few sublegal-size Chinook were caught by the test boat in Area 6 (Figure 2). In 2003, only 6 percent of the total Chinook catch in Area 6 were sublegal-size, while in 2004, only 3 percent of the total Chinook catch were sublegal-size in Area 6. Based on these rates, there were few encounters and mortalities of sublegal-size Chinook in Area 6 during the 2003 and 2004 fisheries.

Legal-size Chinook Mark Rate

The mark rate on legal-size Chinook caught by samplers on test boats was similar in both Areas 5 and 6 between years. In Area 5, the mark rate was 43% in 2003 versus 44% in 2004 (Table 4). The mark rate in Area 6 was 45% in 2003 versus 48% in 2004. For Chinook caught by the test boats in Area 5, the rate that fish were both legal-size and marked increased from 20% in 2003 to 28% in 2004. In Area 6, this rate increased from 43% to 47%.

Sampling Rates

In 2003, weekly sampling rates (catch sampled/estimated catch retained) in Area 5 ranged from 0.175 to 0.268, with a season sampling rate of 0.227 (Table 5). In Area 6, sampling rates ranged from 0.323 to 0.539, with a season sampling rate of 0.378. In 2004, weekly sampling rates in Area 5 ranged from 0.184 to 0.294, with a season sampling rate of 0.239 (Table 6). In Area 6, sampling rates ranged from 0.372 to 0.582, with a season sampling rate of 0.453.

Test Boat versus VTR's

The number of Chinook reported on VTR's in Area 5 dropped from 179 in 2003 to only 35 in 2004. Where sample sizes were adequate, test boat results matched fairly closely with VTR's (Tables 7, 8, 9 and 10). In 2003, the percent marked for legal-size and sublegal-size fish were remarkably similar given that anglers were encouraged to minimize their handling of fish and did not measure each fish. When sufficient sample sizes can be obtained from reliable VTR's, they appear to provide good information on mark rates and the proportion of fish that are marked or unmarked and legal-size or sublegal-size.

In addition to low sample sizes from VTR's in 2004, the number of Chinook caught by the test boat in Area 5 declined. A substantial portion of the reduction can be directly attributed to the

use of other fishing methods in 2004 versus using only downriggers in 2003. In Area 5, 92% of the Chinook encountered and landed by the test boat were caught using downriggers, even though they were only fished 69% 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 78% of the time. Although other methods were used by anglers, those methods clearly weren't as effective for samplers on the test boats. Lower effectiveness may be due to the level of expertise and experience needed to be competent while mooching or jigging. The presence of spiny dogfish was especially troublesome while mooching in Area 6. Samplers there were buying a significant amount of bait and still ran out daily, and encountered very few salmon.

Test Boat Catch versus Angler Catch

To evaluate the assumption that test boat samples were representative of the fishery, length frequencies of marked legal-size Chinook caught by the test boats were compared to those caught by anglers. Length frequency distributions of marked legal-size Chinook harvested by anglers and measured by creel surveys were compared to distributions of marked legal-size Chinook captured by test boats (Figures 3 and 4). Mean length of marked legal-size Chinook was not significantly different for both Area 5 ($t = 1.34$, $0.50 > P > 0.10$) and Area 6 ($t = 0.32$, $P > 0.50$). Distribution of the lengths of marked legal-size Chinook also was not significantly different in Area 5 ($T_1 = 0.190$, $0.10 > P > 0.05$) or in Area 6 ($T_1 = 0.096$, $P > 0.20$). The results indicate that for marked legal-size Chinook, the test boat was representative of angler catch, and thus suggest that the test boat was representative of angler catch for sublegal-size fish and unmarked fish.

Encounters

We used two methods for estimating the number of Chinook encountered in the fishery. The first method was based on applying the weighted test fishery proportions of marked and unmarked or legal-size and sublegal-size Chinook to the sum of landed catch plus the expanded creel interview reports of Chinook released.

Using the total number of Chinook encounters from the 2003 creel survey (18,333) and apportioning into the four categories of legal-size marked, legal-size unmarked, sublegal-size marked, and sublegal-size unmarked based on the test fishing data, suggests that anglers released an estimated 850 legal-size and marked Chinook or 20% of the fish they could have kept, 5,202 legal-size and unmarked Chinook, 2,397 sublegal-size and marked Chinook, and 6,391 sublegal-size and unmarked Chinook (Table 11).

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 and the number of fish in the other three categories were apportioned by test boat catch rates. This method resulted in an estimate for 2003 of 14,688 encounters (Table 11) with 4,151 legal-size and unmarked released, 1,922 sublegal-size and marked released, and 5,123 sublegal-size and unmarked released.

Using the total number of Chinook encounters from the 2004 creel survey (17,377) and apportioning into the four categories, anglers released an estimated 1,834 legal-size and marked

Chinook (Table 12), or 34% of the fish they could have kept, 7,493 legal-size and unmarked Chinook, 1,738 sublegal-size and marked Chinook, and 2,736 sublegal-size and unmarked Chinook. The second method for estimating the number of encounters resulted in an estimate for 2004 of 11,481 encounters (Table 12) with 4,949 legal-size and unmarked released, 1,149 sublegal-size and marked released, and 1,808 sublegal-size and unmarked released.

The first method produces a result that implies anglers were “sorting” their catch by releasing 20% to 34% of the Chinook that were legal to keep. The second method assumes that all retainable Chinook were kept. Given the catch rate of legal-size Chinook in this fishery of about one fish for every 7-8 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 of encounters.

Based on the estimated number of total encounters from the creel survey (18,333) and apportioning them based on the test boat catch rates, we estimated the 2003 fishery encountered 5,277 unmarked legal-size Chinook and 6,391 unmarked sublegal-size Chinook (Table 13), while the 2004 fishery encountered 7,498 unmarked legal-size Chinook and 2,736 unmarked sublegal-size Chinook (Table 13). Except for unmarked sublegal-size fish in 2003, these estimates are below the predicted encounters of unmarked legal-size Chinook and unmarked sublegal-size Chinook as produced in the final pre-season runs of the FRAM.

Mortalities, 2001 and 2002 vs. 2003 and 2004

For 2003, the range of encounters resulting from the two methods described above produces a corresponding range of mortalities. Using the first method and a release mortality rate of 15% for legal-size and 20% for sublegal-size fish, we estimated the total mortalities of Chinook in the mark-selective fishery at 6,158, which includes the harvest of 3,493 fish (Table 14). We estimated the total mortality of unmarked Chinook at 2,133 fish, of which 1,278 were sublegal-size fish and 855 were legal-size. Using the encounters estimated by assuming anglers kept all legal Chinook, we estimated total mortalities at 5,524 Chinook, of which 1,723 were unmarked fish (Table 14). Of the unmarked Chinook, we estimated that 1,025 were sublegal-size and 698 were legal-size.

For 2004, we estimated the total mortalities of Chinook in the mark-selective fishery at 5,870, which includes the harvest of 3,576 fish (Table 15). We estimated the total mortality of unmarked Chinook at 1,676 fish, of which 547 were sublegal-size fish and 1,129 were legal-size. Using the encounters estimated by assuming anglers kept all legal Chinook, we estimated total mortalities at 4,910 Chinook, of which 1,109 were unmarked fish (Table 15). Of the unmarked Chinook, we estimated that 362 were sublegal-size and 747 were legal-size.

During the ten-day fishery for Chinook in 2001, an estimated 1,415 legal-size unmarked Chinook were harvested (plus an additional 385 legal-size marked Chinook). During the five-day fishery for Chinook in 2002, an estimated 1,532 legal-size unmarked Chinook were harvested (plus an additional 249 legal-size marked Chinook). The range of total unmarked legal-size mortalities for the 2003 and 2004 mark-selective fisheries (698 – 1,129) is

considerably lower than the number of legal-size unmarked fish that were harvested during either 2001 or 2002 (Table 16). If the mark rate observed in 2003 or 2004 occurred in 2001 and 2002, the number of mortalities of legal-size unmarked Chinook would be about equal to the number estimated in 2003 or 2004. However, the 2003 and 2004 estimates of total mortality include drop-off mortality and released fish, which were not included in the 2001 and 2002 estimates. Although anglers were allowed to retain any Chinook in 2001 and 2002, anglers sorting for larger fish still would have released some unmarked legal-size fish. Therefore, during the Chinook Mark-Selective Fishery, anglers were able to fish for and retain nearly twice as many Chinook, and fished 20 to 34 days more, in 2003 and 2004 than they did in 2001 and 2002, with an equal or lower mortality of unmarked legal-size Chinook.

Coded wire tags and Multi-year impacts on DIT groups

Puget Sound hatchery stocks comprised 55 percent and 46 percent of the recovered coded wire tagged Chinook during the Chinook Mark-Selective Fisheries in 2003 and 2004, respectively (Appendix Tables C, D, and E). Columbia River hatchery stocks comprised 37 percent and 43 percent of the recovered coded wire tagged Chinook during the Chinook Mark-Selective Fisheries in 2003 and 2004, respectively. Canadian hatchery stocks comprised 8 percent and 12 percent of the recovered coded wire tagged Chinook during the Chinook Mark-Selective Fisheries in 2003 and 2004, respectively. Only one tag was recovered from Strait of Juan de Fuca hatchery stocks; a Hoko River fish caught in 2004.

The estimate of 10 mortalities of unmarked double index tagged fish in 2004 was similar to the estimate of 14 for 2003. For both 2003 and 2004 the number of double index coded wire tags collected during the fishery, and the estimated number of mortalities of unmarked double index tagged fish, were less than the 31 predicted by WDFW (2002).

Of the double index tagged fish encountered in 2003, the 2000 brood year Grovers Creek Chinook were estimated to be the group with the most fish surviving to 2004 (Table 17). The estimated bias due to the Area 5 and 6 Mark-Selective Fishery was very low, less than 0.10 fish for any of the tagged groups (Table 18). Such a small bias is well within the uncertainty inherent in sampling and is not considered to have any appreciable impact on the viability of the coded wire tag system.

Based on these two years of evaluation, it appears that a mark-selective Chinook fishery of this magnitude has a negligible effect on the double index tag program and that reasonable predictions of the effects of a mark-selective fishery on the double index tag program are feasible.

Compliance with Release of Unmarked Chinook

Although the Pilot Study was not designed to obtain an unbiased estimate of compliance, (anglers releasing all unmarked Chinook), data from both enforcement contacts and dockside sampling indicated a very high level of compliance.

During the Chinook Mark-Selective Fishery in 2003, enforcement officers contacted 846 anglers and issued ten warnings or citations for retaining unmarked Chinook in Areas 5 and 6. During the Chinook Mark-Selective Fishery in 2004, enforcement officers contacted 439 anglers and issued no warnings or citations for the retention of unmarked Chinook in Areas 5 and 6. Therefore, the compliance rate for releasing unmarked Chinook, based solely on these officer contacts, was 99% in 2003 and 100% in 2004.

The enforcement data for Chinook compliance matches well with the rate that unmarked Chinook were observed in the dockside creel survey during the Chinook Mark-Selective Fishery. During 2003, out of 948 Chinook sampled by creel surveyors in Areas 5 and 6, 20 (2.1%) were unmarked. In 2004, out of 996 Chinook sampled by creel surveyors, only two (0.2%) were unmarked.

CONCLUSIONS AND RECOMMENDATIONS

The Area 5 and 6 Chinook Mark-Selective Fishery Pilot Project conducted in 2003 and 2004 was a success with respect to two major objectives. First, the Pilot Project provided an opportunity to determine if mark-selective fishing for Chinook salmon in Puget Sound would increase fishing opportunity compared with recent non-selective fishery alternatives, and based on our results, we conclude that mark-selective fishing can increase the level of meaningful recreational opportunity while meeting conservation and other management constraints. Second, the Pilot Project provided an opportunity to determine if we could effectively monitor and evaluate a marine mark-selective Chinook fishery, and again based on our results, we conclude that we can effectively monitor and evaluate marine mark-selective Chinook fisheries.

Angler opportunity increased three ways due to this selective fishery. First, recreational Chinook fishing opportunity was expanded from 10-day and 5-day seasons in 2001 and 2002, respectively, to 30-day and 39-day seasons in 2003 and 2004, respectively. Second, anglers harvested nearly twice as many Chinook in 2003 and 2004 than they did in 2001 and 2002. Third, a portion of Area 6 was open for Chinook retention during the summer compared to all of Area 6 being closed for Chinook retention during the summer in 2001 and 2002. In addition, our results suggest that angler participation in Area 5 increased over effort levels during the same 30-day and 39-day time periods in 2001 and 2002. Increases in effort were modest compared to 2001 but approximately double effort levels observed in 2002. Other than simply having more days of fishing open for anglers, the increased opportunity is attributable to a relatively high mark rate of approximately 45% for legal-size Chinook and reasonably good catch rates (approximately one retained Chinook for every 7-8 anglers).

Success of the Pilot Project is also indicated by the results of WDFW public education and Enforcement activities. Information collected by the Enforcement program and from creel surveys over these two seasons indicated consistently high compliance with not retaining wild (unmarked) Chinook during the fishery.

One of the most important intentions of our Area 5 and 6 mark-selective fishery sampling and monitoring program for 2003 and 2004 was to collect information that could be used to verify

the accuracy of pre-season assumptions used in the planning process. Since the impacts on Chinook stocks are based on assumptions about the overall level of angler encounters with unmarked Chinook, we estimated the number of unmarked Chinook encounters and compared those estimates with the pre-season FRAM expectations. Except for the unmarked sublegal-size fish in 2003, the estimates of encounters of unmarked legal-size Chinook and unmarked sublegal-size Chinook were below predicted levels.

We tested the assumption that test boat catches were representative of angler catches and found that for marked legal-size Chinook they were similar, suggesting they were probably similar for unmarked fish and sublegal-size fish as well. We also compared alternative methods for determining mark rates and encounters with sublegal-size fish. In strata with sufficient sample sizes for comparison, estimates of mark rates and ratios of legal/sublegal-size derived from test boat data and Voluntary Trip Report (VTR) information were very similar. We recommend a more rigorously structured VTR program that includes training and certification by WDFW staff and additional measures that will result in increased sample sizes while ensuring the quality of data collected. Based on our findings, we recommend that test fishing or VTR data, or a combination of both, be used to provide information on both mark rates and legal/sublegal-size categories in future Chinook Mark-Selective Fisheries.

In conclusion, this mark-selective Chinook fishery was successful at many levels. First, we met our two primary objectives of increasing opportunity and collecting the information necessary to evaluate pertinent biological impacts, including impacts to coded wire tagged Chinook. Second, we have likely captured the magnitude of this mark-selective fishery in terms of effort and harvest, and that magnitude was similar to pre-season expectations. Third, a level of enforcement was achieved to ensure that angler compliance with fishing regulations was high. Fourth, we were able to evaluate two different methods of obtaining mark rates and legal to sublegal ratios, and they were very similar when sample sizes were sufficient. And finally, although dependent upon factors unique to the proposed area, season, stock composition, and management logistics, our findings have provided a solid foundation for building successful mark-selective Chinook fisheries in the future.

ACKNOWLEDGEMENTS

We thank the following individuals who contributed to this study. Numerous WDFW staff contributed to data collection and analysis. Larry Bennett, Connie Warren, and their crew collected much of this data and were quick to provide assistance with the education efforts. Mark Baltzell compiled the Voluntary Trip Reports and completed the necessary data analyses. Justin Secrist provided maps and other figures.

LITERATURE CITED

- Conover, W.J. 1980. Practical Nonparametric Statistics. John Wiley and Sons, New York, New York.
- Thiesfeld, S.L., and A. Hagen-Breaux. 2004. 2003 Chinook Selective Fishery, marine areas 5 and 6. Draft Report March 17, 2004. Washington Department of Fish and Wildlife. Olympia, Washington.
- Thiesfeld, S.L., A. Hagen-Breaux, and A. Hoffman. 2004. 2004 Chinook Selective Fishery, marine areas 5 and 6. Draft Report December 2, 2004. Washington Department of Fish and Wildlife. Olympia, Washington.
- Washington Department of Fish and Wildlife. 2002. Selective fishery proposal to Pacific Salmon Commission, November 2002. Washington Department of Fish and Wildlife. Olympia, Washington.

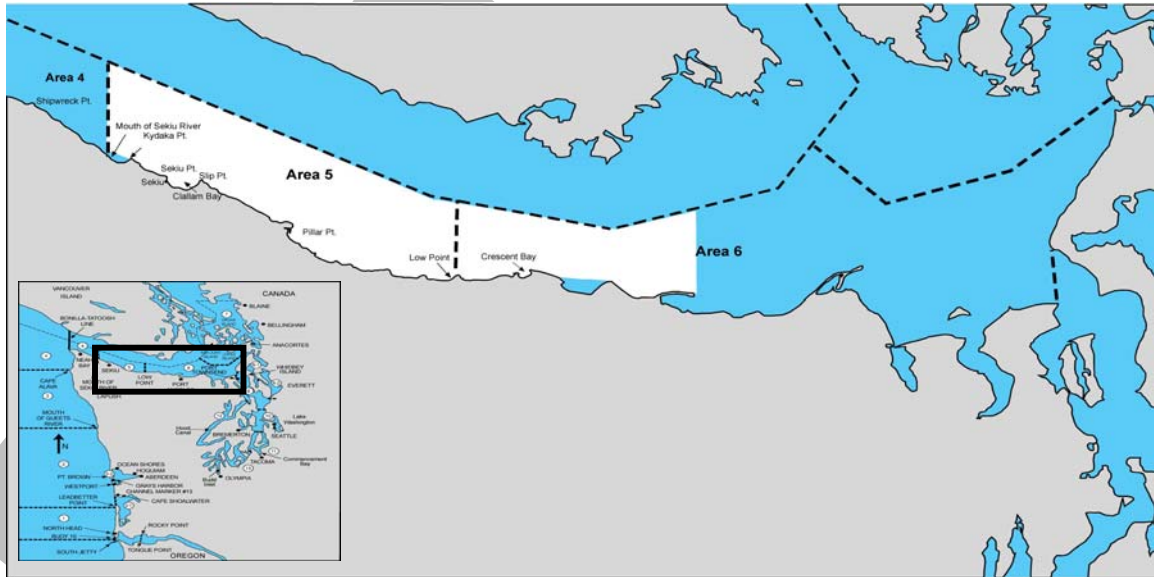


Figure 1. Location of the 2003 and 2004 Chinook Mark-Selective Fishery (shown in white) in Marine Areas 5 and 6.

Table 1. Recreational salmon catch estimates from creel surveys during the Chinook Mark-Selective Fisheries in Marine Areas 5 and 6, July 5 through August 3, 2003, and July 1 through August 8, 2004. Values may not add exactly due to rounding error.

Year	Fishery	Dates Open	Trips		Harvested			Released			
			Boats	Anglers	Chinook	Coho	Pink	Unidentified or Other	Chinook	Coho	Pink
2003	Area 5	July 5 – August 3	8,008	19,398	2,529	5,258	5,147	894	13,118	22,447	3,148
2004	Area 5	July 1 – August 8	10,709	25,174	2,900	9,459	30	113	12,392	25,800	37
2003	Area 6	July 5 – August 3	2,657	5,195	964	107	461	36	1,732	455	194
2004	Area 6	July 1 – August 8	2,251	4,251	676	78	3	3	1,409	126	3
2003	Total	July 5 – August 3	10,665	24,593	3,493	5,364	5,608	930	14,841	22,902	3,342
2004	Total	July 1 – August 8	12,960	29,425	3,576	9,537	33	116	13,802	25,926	40

Table 2. Estimated effort and harvest in the 2001 and 2002 non-selective Chinook fisheries in Area 5 compared to the 2003 Area 5 Chinook Mark-Selective Fishery, July 5 through August 3, 2003.

Year	Quota	Days Open for Chinook	Date of Comparison	Chinook Daily Limit ($\geq 22''$)	Angler Trips	Chinook Harvested ^a
2001	2,000	6 ^b	July 5 – August 3	Any 1	15,832	954
2002	2,000	5	July 4 ^c – August 3	Any 1	10,505	1,782
2003	3,500 ^d	30	July 5 – August 3	2 Marked	19,398	2,529

a. Does not include any illegal harvest during days that Chinook retention was not allowed.

b. Chinook retention was also allowed July 1 – July 4, for a total of 10 days open.

c. July 4 is the nearest date for which an estimate was made.

d. The quota applied to Area 5 and the western portion of Area 6.

Table 3. Estimated effort and harvest in the 2001 and 2002 non-selective Chinook fisheries in Area 5 compared to the 2004 Area 5 Chinook Mark-Selective Fishery, July 1 through August 8, 2004.

Year	Quota	Days Open for Chinook	Date of Comparison	Chinook Daily Limit ($\geq 22''$)	Angler Trips	Chinook Harvested ^a
2001	2,000	10	July 1 – August 9 ^b	Any 1	24,075	1,800
2002	2,000	5	July 1 – August 9 ^b	Any 1	11,883	1,782
2004	3,500 ^c	39	July 1 – August 8	2 Marked	25,174	2,900

a. Does not include any illegal harvest during days that Chinook retention was not allowed.

b. August 9 is the nearest date for which an estimate was made.

c. The quota applied to Area 5 and the western portion of Area 6.

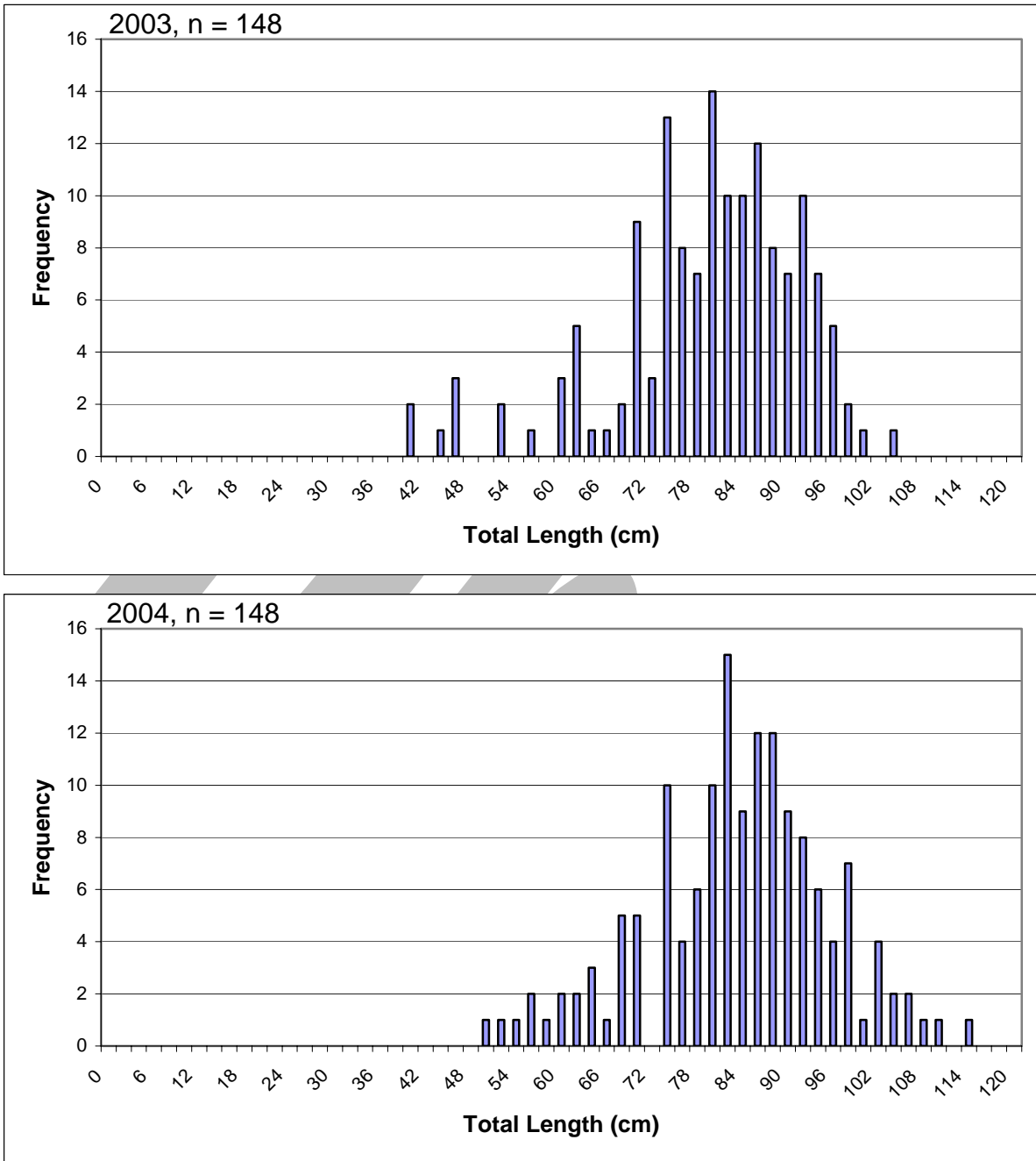


Figure 2. Length frequency histograms of Chinook salmon caught by test fishing boats sampling from July 5 through August 3, 2003 and July 1 through August 8, 2004, in Marine Area 6.

Table 4. Percent of legal-size Chinook salmon that were adipose fin clipped (mark rate) caught by test boats in the Area 5 and 6 Chinook Mark-Selective fisheries, July 5 – August 3, 2003, and July 1 – August 8, 2004.

	Year	Sample Size	Percent Marked
Area 5	2003	155	43
Area 5	2004	110	44
Area 6	2003	139	45
Area 6	2004	143	48

Table 5. Sample rates for the 2003 Area 5 and 6 Chinook Mark-Selective fisheries, July 5 – August 3, 2003.

Week	Area 5			Area 6		
	Number of Chinook Sampled	Estimated Chinook Retained	Sample Rate	Number of Chinook Sampled	Estimated Chinook Retained	Sample Rate
27	69	258	0.268	23	43	0.539
28	111	635	0.175	72	139	0.520
29	55	240	0.229	68	168	0.404
30	149	606	0.246	81	242	0.334
31	189	790	0.239	120	372	0.323
Total	573	2,529	0.227	364	964	0.378

Table 6. Sample rates for the 2004 Area 5 and 6 Chinook Mark-Selective fisheries, July 1 – August 8, 2004. Values may not add exactly due to rounding error.

Week	Area 5			Area 6		
	Number of Chinook Sampled	Estimated Chinook Retained	Sample Rate	Number of Chinook Sampled	Estimated Chinook Retained	Sample Rate
27	128	697	0.184	47	81	0.582
28	151	513	0.294	17	46	0.372
29	106	407	0.260	16	37	0.429
30	100	410	0.244	87	185	0.470
31	127	475	0.267	70	188	0.373
32	80	397	0.202	69	139	0.495
Total	692	2,900	0.239	306	676	0.453

Table 7. Percent of Chinook caught by test boats that were marked during the Chinook Mark-Selective Fishery in Marine Area 5, July 5 through August 3, 2003, and July 1 through August 8, 2004.

	2003		2004	
	Test Boats	VTR's	Test Boats	VTR's
Legal-size Percent Marked	43	44	44	20
<i>Sample Size</i>	(155)	(85)	(110)	(20)
Sublegal-size Percent Marked	27	32	36	20
<i>Sample Size</i>	(180)	(94)	(59)	(15)

Table 8. Percent of Chinook caught by test boats that were marked during the Chinook Mark-Selective Fishery in Marine Area 6, July 5 through August 3, 2003, and July 1 through August 8, 2004.

	2003		2004	
	Test Boats	VTR's	Test Boats	VTR's
Legal-size Percent Marked	45	43	48	40
<i>Sample Size</i>	(139)	(67)	(143)	(104)
Sublegal-size Percent Marked	33	38	80	25
<i>Sample Size</i>	(9)	(13)	(5)	(8)

Table 9. Weighted proportions of Chinook that were legal-size marked, legal-size unmarked, sublegal-size marked, and sublegal-size unmarked caught by test boats and as recorded by anglers on Voluntary Trip Reports (VTR's) during Chinook Mark-Selective Fishery in Marine Area 5, July 5 through August 3, 2003, and July 1 through August 8, 2004.

	2003		2004	
	Test Boats	VTR's	Test Boats	VTR's
Legal-size and marked	0.197	0.213	0.287	n/a
Legal-size and unmarked	0.254	0.290	0.424	n/a
Sublegal-size and marked	0.149	0.183	0.110	n/a
Sublegal-size and unmarked	0.400	0.314	0.178	n/a
<i>Sample Size</i>	(335)	(179)	(169)	(35)

Table 10. Weighted proportions of Chinook that were legal-size marked, legal-size unmarked, sublegal-size marked, and sublegal-size unmarked caught by test boats and as recorded by anglers on Voluntary Trip Reports (VTR's) during Chinook Mark-Selective Fishery in Marine Area 6, July 5 through August 3, 2003, and July 1 through August 8, 2004.

	2003		2004	
	Test Boats	VTR's	Test Boats	VTR's
Legal-size and marked	0.439	0.446	0.489	0.359
Legal-size and unmarked	0.485	0.459	0.477	0.570
Sublegal-size and marked	0.027	0.037	0.027	0.013
Sublegal-size and unmarked	0.049	0.058	0.007	0.058
<i>Sample Size</i>	<i>(148)</i>	<i>(80)</i>	<i>(148)</i>	<i>(112)</i>

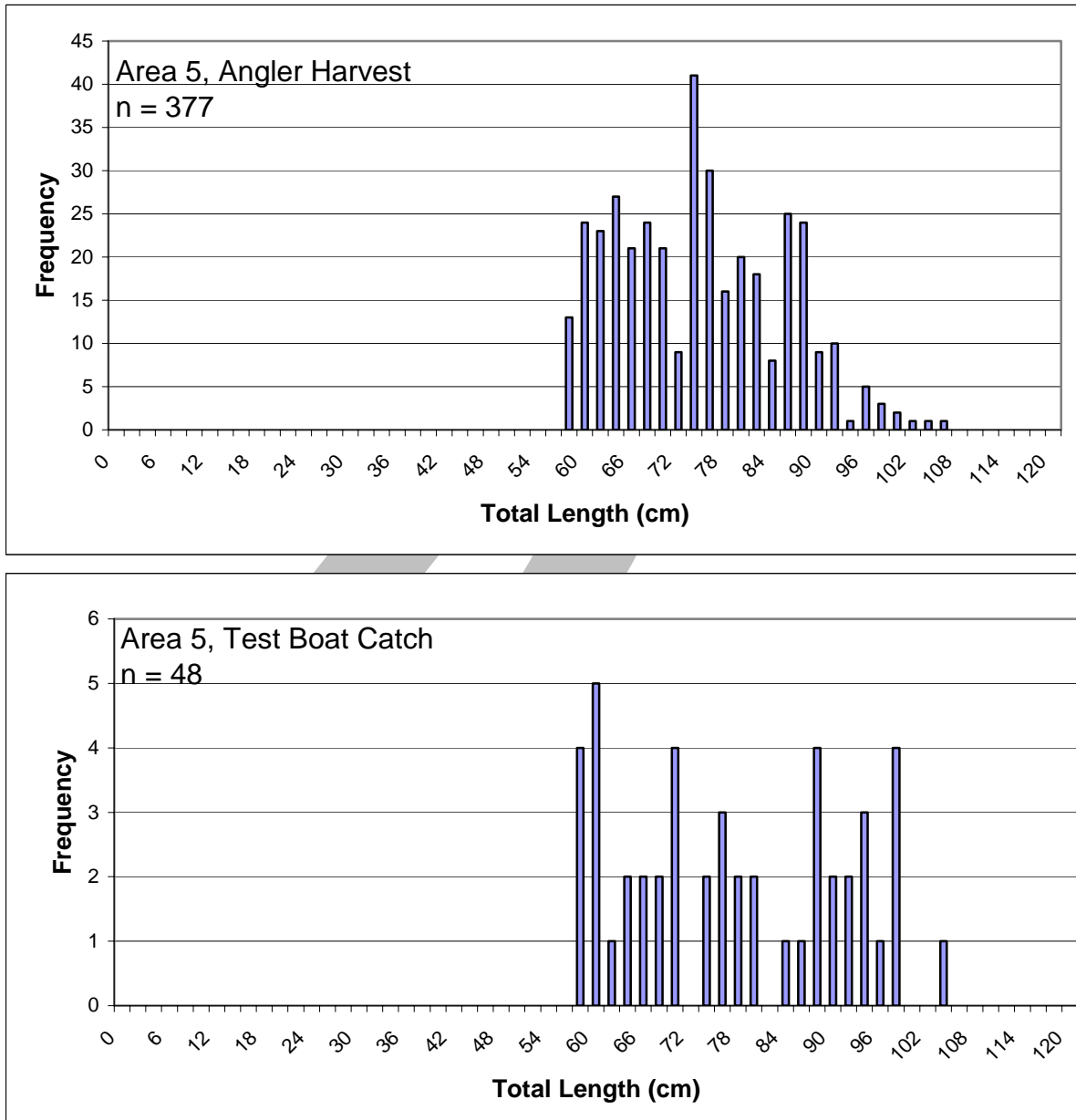


Figure 3. Length frequency distributions of marked legal-size Chinook kept by anglers and marked legal-size Chinook caught by test boat in Area 5 during the 2004 Chinook Mark-Selective Fishery, July 1 through August 8, 2004.

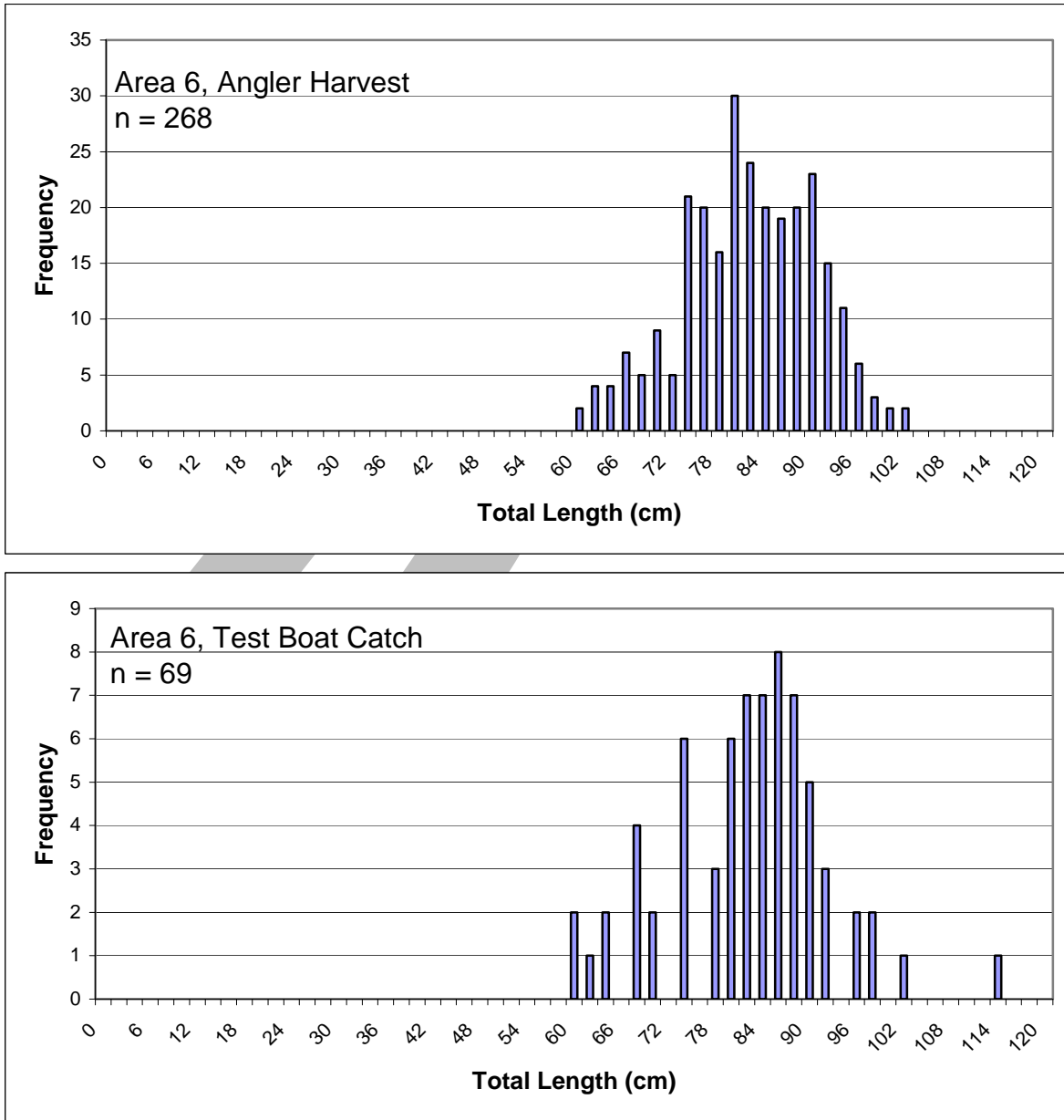


Figure 4. Length frequency distributions of marked legal-size Chinook kept by anglers and marked legal-size Chinook caught by test boat in Area 6 during the 2004 Chinook Mark-Selective Fishery, July 1 through August 8, 2004.

Table 11. Comparison of estimated encounters of Chinook in the Area 5 and 6 Chinook Mark-Selective Fishery in 2003. Test boat proportions method assumes that anglers retained all legal-size marked Chinook. 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 Released	Sublegal- size Unmarked Released	Total Encountered
Creel and Test Boat	5	2,476	613	53	3,921	2,323	6,260	15,647
	6	941	238	22	1,281	74	131	2,686
	5 & 6 Combined	3,417 ^a	850	75	5,202	2,397	6,391	18,333
Test boat Proportions	5	2,476	0	53	3,133	1,863	5,019	12,543
	6	941	0	22	1,018	59	104	2,145
	5 & 6 Combined	3,417 ^a	0	75	4,151	1,922	5,123	14,688

a. Includes up to 203 fish that may be sublegal-size and marked Chinook based on measurements during creel surveys of coded wire tagged harvested fish.

Table 12. Comparison of estimated encounters of Chinook in the Area 5 and 6 Chinook Mark-Selective Fishery in 2004. Test boat proportions method assumes that anglers retained all legal-size marked Chinook. 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 Released	Sublegal- size Unmarked Released	Total Encountered
Creel and Test Boat	5	2,900 ^a	1,489	0	6,499	1,682	2,722	15,292
	6	671 ^b	345	5	994	56	14	2,085
	5 & 6 Combined	3,571	1,834	5	7,493	1,738	2,736	17,377
Test boat Proportions	5	2,900 ^a	0	0	4,294	1,112	1,799	10,105
	6	671 ^b	0	5	654	37	10	1,377
	5 & 6 Combined	3,571	0	5	4,949	1,149	1,808	11,481

a. Includes up to 194 fish that may be sublegal-size and marked Chinook based on measurements during creel surveys.

b. Includes up to 3 fish that may be sublegal-size and marked Chinook based on measurements during creel surveys.

Table 13. Comparison of FRAM model predictions of encounters with estimated encounters from creel surveys and test fishing during the Chinook Mark-Selective Fisheries in Marine Areas 5 and 6, July 5 through August 3, 2003, and July 1 through August 8, 2004.

	2003		2004	
	FRAM	Creel & Test Fishing	FRAM	Creel & Test Fishing
Legal-size & marked	3,045	4,267	3,043	5,405
Legal-size & unmarked	7,976	5,277	7,993	7,498
Sublegal-size & marked	2,815	2,397	2,690	1,738
Sublegal-size & unmarked	4,585	6,391	4,935	2,736
Total	18,421	18,333	18,661	17,377

Table 14. Comparison of estimated mortalities of Chinook in the Area 5 and 6 Chinook Mark-Selective Fishery in 2003. Test boat proportions method assumes that anglers retained all legal-size marked Chinook. Totals may not add up exactly due to rounding error.

Method	Area	Legal-size	Legal-size	Legal-size	Legal-size	Sublegal-size	Sublegal-size	Total
		Marked Kept	Marked Released	Unmarked Kept	Unmarked Released	Marked Released	Unmarked Released	
Creel and Test Boat	5	2,476	92	53	588	465	1,252	4,926
	6	941	36	22	192	15	26	1,232
	5 & 6 Combined	3,417 ^a	128	75	780	479	1,278	6,158
Test boat Proportions	5	2,476	0	53	470	373	1,004	4,375
	6	941	0	22	153	12	21	1,148
	5 & 6 Combined	3,417 ^a	0	75	623	384	1,025	5,524

a. Includes up to 203 fish that may be sublegal-size and marked Chinook based on measurements during creel surveys of coded wire tagged harvested fish.

Table 15. Comparison of estimated mortalities of Chinook in the Area 5 and 6 Chinook Mark-Selective Fishery in 2004. Test boat proportions method assumes that anglers retained all legal-size marked Chinook. 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 Released	Sublegal-size Unmarked Released	Total Mortalities
Creel and Test Boat	5	2,900 ^a	223	0	975	336	544	4,979
	6	671 ^b	52	5	149	11	3	891
	5 & 6 Combined	3,571	275	5	1,124	348	547	5,870
Test boat Proportions	5	2,900 ^a	0	0	644	222	360	4,126
	6	671 ^b	0	5	98	7	2	783
	5 & 6 Combined	3,571	0	5	742	230	362	4,910

a. Includes up to 194 fish that may be sublegal-size and marked Chinook based on measurements during creel surveys.

b. Includes up to 3 fish that may be sublegal-size and marked Chinook based on measurements during creel surveys.

Table 16. Estimated harvest of unmarked legal-size Chinook in the 2002 non-selective Chinook fishery in Area 5 compared to the estimated mortalities of unmarked legal-size Chinook in the 2003 and 2004 Area 5 Chinook Mark-Selective Fishery.

Year	Quota	Days Open	Daily Limit ($\geq 22''$)	Unmarked Legal-size Mortalities
2001	2,000	10	Any 1	1,415 ^a
2002	2,000	5	Any 1	1,532 ^a
2003	3,500	30	2 Marked	698 - 855
2004	3,500	39	2 Marked	747 - 1,129

a. Estimated harvest only from creel surveys. Does not include drop-off or release mortality, which are included in the 2003 and 2004 estimates.

Table 17. Estimated number of encountered unmarked DIT survivors from the Area 5 and 6 Chinook Mark-Selective Fishery in 2003 to 2004.

Hatchery	Brood year	Age in 2003	Estimated encounters of unmarked DIT fish in 2003	Estimated mortality of unmarked DIT fish in 2003 ¹	Estimated number of unmarked DIT fish that survived	Maturity rate ²	Over-winter survival rate ³	Estimated Number of encountered unmarked DIT fish that survived to 2004
		<i>a</i>	$U\text{-Enc}^{2003} = M\text{-Enc}^{2003} \lambda^{\text{Rel}}$	$U^{2003} = U\text{-Enc}^{2003} * sfm$	$U\text{-Surv}^{2003} = U\text{-Enc}^{2003} (1-sfm)$	<i>M</i>	<i>S_a</i>	$U\text{-Surv}^{2003} (1-M)S$
George Adams	2000	3	11.420	1.15	10.37	0.18	0.8	6.80
Grovers Cr	1999	4	35.160	3.50	31.54	0.77	0.9	6.53
Grovers Cr	2000	3	19.780	2.01	18.05	0.08	0.8	13.28
Chilliwack	1999	4	4.070	0.40	3.60	0.51	0.9	1.59
Chilliwack	2000	3	4.070	0.41	3.67	0.18	0.8	2.41
Chilliwack	2001	2	4.180	0.41	3.69	0.03	0.7	2.50
Marblemount	1999	4	6.540	0.67	5.99	0.72	0.9	1.51
Nisqually	1999	4	7.470	0.73	6.59	0.68	0.9	1.90
Nisqually-A	2000	3	4.950	0.54	4.82	0.08	0.8	3.55
Nisqually-B	2000	3	9.900	0.98	8.80	0.08	0.8	6.48
Samish	1999	4	2.480	0.25	2.29	0.86	0.9	0.29
Soos Cr	1999	4	19.080	1.95	17.56	0.77	0.9	3.64
Soos Cr	2000	3	8.710	0.91	8.18	0.08	0.8	6.02
Wallace R	2000	3	5.710	0.58	5.25	0.10	0.8	3.78

¹ An *sfm* of 0.10 was used.² The maturity rates were taken from FRAM inputs described in the Attachment II to the 2003 Area 5 and 6 Chinook Mark-Selective Fishery proposal to the Pacific Salmon Commission – Selective Fishery Evaluation Committee. For Wallace R., there were no such FRAM values, so the values for Marblemount 3 year-old Chinook were substituted.³ The survival rates are those used by the PSC-CTC.

Table 18. Estimated bias in numbers of incidental unmarked DIT mortalities in the 2004 Area 5 and 6 Chinook Mark-Selective Fishery.

Hatchery	Brood year	Estimated harvest of marked DIT fish in 2004 ¹	Unmarked to marked ratio at release	Estimated number of encountered unmarked DIT fish	Adjusted number of encountered unmarked DIT fish ²	Estimated number of unmarked DIT mortalities ³	Adjusted number of unmarked DIT mortalities	Bias in number of unmarked DIT mortalities
		$M-Enc^{2004}$	λ^{Rel}	$U-Enc^{2004} = M-Enc^{2004} \lambda^{Rel}$	$U-AdjEnc^{2004} = U-Enc^{2004} + U-Surv^{2003} HR$	$U^{2004} = U-Enc^{2003} * sfm$	$U-Adj^{2004} = U-AdjEnc^{2003} * sfm$	$U^{2004} - U-Adj^{2004}$
George Adams	2000	7.14	1.009	7.20	7.54	0.72	0.75	-0.03
George Adams	2001	22.62	0.938	21.22	21.22	2.12	2.12	0.00
Grovers Cr	1999	0.00	0.997	0.00	0.33	0.00	0.00	0.00
Grovers Cr	2000	17.15	1.014	17.39	18.05	1.74	1.81	-0.07
Grovers Cr	2001	7.48	1.002	7.49	7.49	0.75	0.75	0.00
Chilliwack	1999	0.00	0.983	0.00	0.08	0.00	0.00	0.00
Chilliwack	2000	0.00	1.002	0.00	0.12	0.00	0.00	0.00
Chilliwack	2001	15.00	0.980	14.71	14.83	1.47	1.48	-0.01
Chilliwack	2002	3.84	0.996	3.83	3.83	0.38	0.38	0.00
Marblemount	1999	0.00	1.018	0.00	0.08	0.00	0.00	0.00
Marblemount	2000	2.68	0.990	2.65	2.65	0.27	0.27	0.00
Nisqually-A	2000	0.00	0.988	0.00	0.09	0.00	0.00	0.00
Nisqually-B	2000	1.72	1.083	1.86	2.04	0.19	0.20	-0.02
Samish	1999	5.53	1.057	5.46	5.79	0.55	0.58	-0.03
Soos Cr	1999	0.00	1.023	0.00	0.01	0.00	0.00	0.00
Soos Cr	2000	0.00	1.043	0.00	0.18	0.00	0.00	0.00

¹ The marked mortalities were taken from the 2004 WDFW post-season report on the Area 5/6 MSF.

² A harvest rate (HR) of 5% was used.

³ An *sfm* of 0.10 was used.

Appendix A. 2003 and 2004 statistical weeks used by Washington Department of Fish and Wildlife.

2003 Statistical Weeks (Monday - Sunday)

Stat. Mon	Week No.	Calendar Dates		Julian Dates		Stat. Mon	Week No.	Calendar Dates		Julian Dates	
		Start	End	Start	End			Start	End		
Jan 1	1	01-Jan	05-Jan	1	5	Jul 7	27	30-Jun	06-Jul	181	187
	2	06-Jan	12-Jan	6	12		28	07-Jul	13-Jul	188	194
	3	13-Jan	19-Jan	13	19		29	14-Jul	20-Jul	195	201
	4	20-Jan	26-Jan	20	26		30	21-Jul	27-Jul	202	208
	5	27-Jan	02-Feb	27	33		31	28-Jul	03-Aug	209	215
Feb 2	6	03-Feb	09-Feb	34	40	Aug 8	32	04-Aug	10-Aug	216	222
	7	10-Feb	16-Feb	41	47		33	11-Aug	17-Aug	223	229
	8	17-Feb	23-Feb	48	54		34	18-Aug	24-Aug	230	236
	9	24-Feb	02-Mar	55	61		35	25-Aug	31-Aug	237	243
Mar 3	10	03-Mar	09-Mar	62	68	Sep 9	36	01-Sep	07-Sep	244	250
	11	10-Mar	16-Mar	69	75		37	08-Sep	14-Sep	251	257
	12	17-Mar	23-Mar	76	82		38	15-Sep	21-Sep	258	264
	13	24-Mar	30-Mar	83	89		39	22-Sep	28-Sep	265	271
Apr 4	14	31-Mar	06-Apr	90	96	Oct 10	40	29-Sep	05-Oct	272	278
	15	07-Apr	13-Apr	97	103		41	06-Oct	12-Oct	279	285
	16	14-Apr	20-Apr	104	110		42	13-Oct	19-Oct	286	292
	17	21-Apr	27-Apr	111	117		43	20-Oct	26-Oct	293	299
	18	28-Apr	04-May	118	124		44	27-Oct	02-Nov	300	306
May 5	19	05-May	11-May	125	131	Nov 11	45	03-Nov	09-Nov	307	313
	20	12-May	18-May	132	138		46	10-Nov	16-Nov	314	320
	21	19-May	25-May	139	145		47	17-Nov	23-Nov	321	327
	22	26-May	01-Jun	146	152		48	24-Nov	30-Nov	328	334
June 6	23	02-Jun	08-Jun	153	159	Dec 12	49	01-Dec	07-Dec	335	341
	24	09-Jun	15-Jun	160	166		50	08-Dec	14-Dec	342	348
	25	16-Jun	22-Jun	167	173		51	15-Dec	21-Dec	349	355
	26	23-Jun	29-Jun	174	180		52	22-Dec	28-Dec	356	362
						53	29-Dec	31-Dec	363	365	

Appendix A. Continued.

2004 Statistical Weeks (Monday - Sunday)

Stat. Mon	Week No.	Calendar Dates		Julian Dates		Stat. Mon	Week No.	Calendar Dates		Julian Dates	
		Start	End	Start	End			Start	End		
Jan 1	1	01-Jan	04-Jan	1	4	Jul 7	27	28-Jun	04-Jul	180	186
	2	05-Jan	11-Jan	5	11		28	05-Jul	11-Jul	187	193
	3	12-Jan	18-Jan	12	18		29	12-Jul	18-Jul	194	200
	4	19-Jan	25-Jan	19	25		30	19-Jul	25-Jul	201	207
	5	26-Jan	01-Feb	26	32		31	26-Jul	01-Aug	208	214
Feb 2	6	02-Feb	08-Feb	33	39	Aug 8	32	02-Aug	08-Aug	215	221
	7	09-Feb	15-Feb	40	46		33	09-Aug	15-Aug	222	228
	8	16-Feb	22-Feb	47	53		34	16-Aug	22-Aug	229	235
	9	23-Feb	29-Feb	54	60		35	23-Aug	29-Aug	236	242
Mar 3	10	01-Mar	07-Mar	61	67	Sep 9	36	30-Aug	05-Sep	243	249
	11	08-Mar	14-Mar	68	74		37	06-Sep	12-Sep	250	256
	12	15-Mar	21-Mar	75	81		38	13-Sep	19-Sep	257	263
	13	22-Mar	28-Mar	82	88		39	20-Sep	26-Sep	264	270
Apr 4	14	29-Mar	04-Apr	89	95	Oct 10	40	27-Sep	03-Oct	271	277
	15	05-Apr	11-Apr	96	102		41	04-Oct	10-Oct	278	284
	16	12-Apr	18-Apr	103	109		42	11-Oct	17-Oct	285	291
	17	19-Apr	25-Apr	110	116		43	18-Oct	24-Oct	292	298
	18	26-Apr	02-May	117	123		44	25-Oct	31-Oct	299	305
May 5	19	03-May	09-May	124	130	Nov 11	45	01-Nov	07-Nov	306	312
	20	10-May	16-May	131	137		46	08-Nov	14-Nov	313	319
	21	17-May	23-May	138	144		47	15-Nov	21-Nov	320	326
	22	24-May	30-May	145	151		48	22-Nov	28-Nov	327	333
June 6	23	31-May	06-Jun	152	158	Dec 12	49	29-Nov	05-Dec	334	340
	24	07-Jun	13-Jun	159	165		50	06-Dec	12-Dec	341	347
	25	14-Jun	20-Jun	166	172		51	13-Dec	19-Dec	348	354
	26	21-Jun	27-Jun	173	179		52	20-Dec	26-Dec	355	361
						53	27-Dec	31-Dec	362	366	

Appendix B. Observed recoveries of coded wire tags from Chinook salmon during the Chinook Mark-Selective Fisheries in Marine Areas 5 and 6, July 5 through August 3, 2003.

Area	RecovDate	Tagcode	RcvMark	FKLcm	BroodYr	RearingHatchery	ReleaseSite	ReleaseAgency
05	Aug 1 2003	050182	AD Fin Clp	80	1999	MAKAH NFH ON SOOES R	SOOES R 20.0015	FWS
05	Jul 14 2003	054421	AD Fin Clp	87	1999	SPRING CR NFH	SPRING CR 29.0159	FWS
05	Jul 20 2003	054523	AD Fin Clp	84	2000	SPRING CR NFH	SPRING CR 29.0159	FWS
05	Aug 2 2003	060270	AD Fin Clp	61	2000	MOKELUMNE R FISH INS	JERSEY PT,SAN JOAQ.R	EBMD
05	Jul 27 2003	065459	AD Fin Clp	57	2000	NIMBUS FISH HATCHERY	WICKLAND OIL NET PEN	CDFG
05	Aug 2 2003	093250	AD Fin Clp	65	2000	BIG CR HATCHERY	BIG CR (LWR COL R)	ODFW
05	Jul 8 2003	093250	AD Fin Clp	63	2000	BIG CR HATCHERY	BIG CR (LWR COL R)	ODFW
05	Jul 27 2003	093250	AD Fin Clp	67	2000	BIG CR HATCHERY	BIG CR (LWR COL R)	ODFW
05	Jul 8 2003	182811	AD Fin Clp	62	2000	H-COWICHAN R	R-COWICHAN BAY	CDFO
05	Jul 21 2003	184124	AD Fin Clp	81	1999	H-CHILLIWACK R	R-CHILLIWACK R	CDFO
05	Jul 19 2003	184336	AD Fin Clp	92	1999	H-NANAIMO R	R-NANAIMO R	CDFO
05	Aug 3 2003	184539	AD Fin Clp	72	2000	H-COWICHAN R	R-COWICHAN R	CDFO
05	Aug 1 2003	184551	AD Fin Clp	65	2000	H-CHEHALIS R	R-CHEHALIS R	CDFO
05	Jul 6 2003	184552	AD Fin Clp	58	2000	H-NANAIMO R	R-NANAIMO R	CDFO
05	Jul 26 2003	184614	AD Fin Clp	53	2000	H-CHILLIWACK R	R-CHILLIWACK R	CDFO
05	Aug 1 2003	184916	AD Fin Clp	56	2001	H-CHILLIWACK R	R-CHILLIWACK R	CDFO
05	Aug 1 2003	210135	AD Fin Clp	78	1998	KALAMA CR HATCHERY	KALAMA CR 11.0017	NISQ
05	Jul 21 2003	210151	Unmarked	92	1998	MARBLEMOUNT HATCHERY	SKAGIT R 03.0176	WDFW
05	Aug 1 2003	210153	AD Fin Clp	68	1999	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
05	Aug 3 2003	210153	AD Fin Clp	78	1999	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
05	Jul 6 2003	210153	AD Fin Clp	75	1999	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
05	Jul 13 2003	210153	AD Fin Clp	57	1999	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
05	Jul 25 2003	210153	AD Fin Clp	54	1999	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
05	Jul 25 2003	210153	AD Fin Clp	88	1999	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
05	Jul 26 2003	210153	AD Fin Clp	78	1999	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
05	Jul 27 2003	210153	AD Fin Clp	83	1999	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
05	Jul 30 2003	210153	AD Fin Clp	97	1999	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
05	Jul 30 2003	210153	AD Fin Clp	97	1999	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
05	Jul 12 2003	210166	AD Fin Clp	70	1999	NISQUALLY HATCHERY	CLEAR CR 11.0013C	NISQ
05	Jul 27 2003	210166	AD Fin Clp	72	1999	NISQUALLY HATCHERY	CLEAR CR 11.0013C	NISQ
05	Jul 7 2003	210221	AD Fin Clp	67	1999	BERNIE GOBIN HATCH	TULALIP CR 07.0001	TULA
05	Jul 11 2003	210269	AD Fin Clp	64	2000	KALAMA CR HATCHERY	KALAMA CR 11.0017	NISQ
05	Jul 19 2003	210269	AD Fin Clp	57	2000	KALAMA CR HATCHERY	KALAMA CR 11.0017	NISQ
05	Jul 30 2003	210269	AD Fin Clp	56	2000	KALAMA CR HATCHERY	KALAMA CR 11.0017	NISQ
05	Jul 31 2003	210269	AD Fin Clp	68	2000	KALAMA CR HATCHERY	KALAMA CR 11.0017	NISQ
05	Aug 2 2003	210272	AD Fin Clp	70	2000	BERNIE GOBIN HATCH	TULALIP CR 07.0001	TULA
05	Jul 11 2003	210272	AD Fin Clp	65	2000	BERNIE GOBIN HATCH	TULALIP CR 07.0001	TULA
05	Jul 13 2003	210273	AD Fin Clp	56	2000	BERNIE GOBIN HATCH	TULALIP CR 07.0001	TULA
05	Aug 2 2003	210279	AD Fin Clp	55	2000	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
05	Aug 3 2003	210279	AD Fin Clp	81	2000	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
05	Jul 20 2003	210279	AD Fin Clp	65	2000	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
05	Jul 26 2003	210279	AD Fin Clp	62	2000	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
05	Jul 26 2003	210279	AD Fin Clp	75	2000	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
05	Aug 2 2003	210294	AD Fin Clp	54	2000	PUYALLUP TRIBAL HATC	DIRU CR 10.0029	PUYA
05	Jul 27 2003	630164	AD Fin Clp	70	1999	MARBLEMOUNT HATCHERY	CASCADE R 03.1411	WDFW
05	Aug 1 2003	630171	AD Fin Clp	87	1999	SOOS CREEK HATCHERY	BIG SOOS CR 09.0072	WDFW
05	Aug 3 2003	630171	AD Fin Clp	79	1999	SOOS CREEK HATCHERY	BIG SOOS CR 09.0072	WDFW
05	Jul 8 2003	630171	AD Fin Clp	56	1999	SOOS CREEK HATCHERY	BIG SOOS CR 09.0072	WDFW
05	Jul 26 2003	630171	AD Fin Clp	77	1999	SOOS CREEK HATCHERY	BIG SOOS CR 09.0072	WDFW
05	Jul 30 2003	630171	AD Fin Clp	73	1999	SOOS CREEK HATCHERY	BIG SOOS CR 09.0072	WDFW
05	Jul 18 2003	630173	AD Fin Clp	77	1999	SAMISH HATCHERY	FRIDAY CR + SAMISH R	WDFW
05	Jul 16 2003	630186	AD Fin Clp	71	1999	COWLITZ SALMON HATCH	TOUTLE R-NF 26.0314	WDFW
05	Aug 3 2003	630189	AD Fin Clp	73	2000	NISQUALLY HATCHERY	CLEAR CR 11.0013C	NISQ
05	Jul 6 2003	630189	AD Fin Clp	67	2000	NISQUALLY HATCHERY	CLEAR CR 11.0013C	NISQ
05	Jul 13 2003	630196	AD Fin Clp	58	2000	ELOCHOMAN HATCHERY	ELOCHOMAN R 25.0236	WDFW
05	Jul 18 2003	630197	AD Fin Clp	76	1999	MARBLEMOUNT HATCHERY	CASCADE R 03.1411	WDFW
05	Jul 27 2003	630197	AD Fin Clp	84	1999	MARBLEMOUNT HATCHERY	CASCADE R 03.1411	WDFW
05	Jul 21 2003	630279	AD Fin Clp	66	2000	KALAMA FALLS HATCHRY	KALAMA R 27.0002	WDFW
05	Jul 8 2003	630282	AD Fin Clp	61	2000	PORTAGE BAY HATCHERY	PORTAGE BAY/SHIP CNL	UW
05	Jul 8 2003	630282	AD Fin Clp	68	2000	PORTAGE BAY HATCHERY	PORTAGE BAY/SHIP CNL	UW
05	Jul 13 2003	630282	AD Fin Clp	62	2000	PORTAGE BAY HATCHERY	PORTAGE BAY/SHIP CNL	UW
05	Jul 25 2003	630282	AD Fin Clp	65	2000	PORTAGE BAY HATCHERY	PORTAGE BAY/SHIP CNL	UW
05	Jul 27 2003	630282	AD Fin Clp	69	2000	PORTAGE BAY HATCHERY	PORTAGE BAY/SHIP CNL	UW
05	Aug 1 2003	630398	AD Fin Clp	64	2000	PORTAGE BAY HATCHERY	PORTAGE BAY/SHIP CNL	UW
05	Jul 31 2003	630399	AD Fin Clp	70	2000	PORTAGE BAY HATCHERY	PORTAGE BAY/SHIP CNL	UW
05	Jul 31 2003	630399	AD Fin Clp	70	2000	PORTAGE BAY HATCHERY	PORTAGE BAY/SHIP CNL	UW
05	Jul 26 2003	630469	AD Fin Clp	58	1999	SIMILKAMEEN HATCHERY	SIMILKAMEEN R 490325	WDFW

Appendix B. Continued.

Area	RecovDate	Tagcode	RcvMark	FKLcm	BroodYr	RearingHatchery	ReleaseSite	ReleaseAgency
05	Jul 5 2003	630476	AD Fin Clp	62	1999	LYONS FERRY HATCHERY	SNAKE R-LOWR 33.0002	WDFW
05	Jul 13 2003	630476	AD Fin Clp	58	1999	LYONS FERRY HATCHERY	SNAKE R-LOWR 33.0002	WDFW
05	Jul 7 2003	630668	AD Fin Clp	57	2000	WALLACE R HATCHERY	WALLACE R 07.0940	WDFW
05	Jul 13 2003	630669	AD Fin Clp	55	2000	SOOS CREEK HATCHERY	BIG SOOS CR 09.0072	WDFW
05	Jul 27 2003	630669	AD Fin Clp	53	2000	SOOS CREEK HATCHERY	BIG SOOS CR 09.0072	WDFW
05	Jul 26 2003	630677	AD Fin Clp	56	2000	LYONS FERRY HATCHERY	BIG CANYON ACCL POND	NEZP
06	Aug 2 2003	630683	AD Fin Clp	69	2000	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW
06	Jul 24 2003	630683	AD Fin Clp	60	2000	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW
06	Jul 27 2003	630683	AD Fin Clp	58	2000	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW
06	Aug 1 2003	630687	AD Fin Clp	53	2000	NISQUALLY HATCHERY	CLEAR CR 11.0013C	NISQ
06	Jul 11 2003	630687	AD Fin Clp	56	2000	NISQUALLY HATCHERY	CLEAR CR 11.0013C	NISQ
06	Jul 16 2003	630697	AD Fin Clp	70	1999	COWLITZ SALMON HATCH	COWLITZ R 26.0002	WDFW
06	Aug 1 2003	630789	AD Fin Clp	55	2000	COWLITZ SALMON HATCH	COWLITZ R 26.0002	WDFW
06	Jul 19 2003	630789	AD Fin Clp	71	2000	COWLITZ SALMON HATCH	COWLITZ R 26.0002	WDFW
06	Aug 2 2003	630790	AD Fin Clp	55	2000	COWLITZ SALMON HATCH	COWLITZ R 26.0002	WDFW
06	Jul 8 2003	630790	AD Fin Clp	52	2000	COWLITZ SALMON HATCH	COWLITZ R 26.0002	WDFW
06	Jul 26 2003	630790	AD Fin Clp	55	2000	COWLITZ SALMON HATCH	COWLITZ R 26.0002	WDFW
06	Jul 30 2003	630793	AD Fin Clp	56	2000	COWLITZ SALMON HATCH	COWLITZ R 26.0002	WDFW
06	Jul 27 2003	630794	AD Fin Clp	51	2000	COWLITZ SALMON HATCH	COWLITZ R 26.0002	WDFW
06	Jul 26 2003	630795	AD Fin Clp	50	2000	COWLITZ SALMON HATCH	COWLITZ R 26.0002	WDFW
06	Jul 11 2003	630867	AD Fin Clp	56	2000	COWLITZ SALMON HATCH	COWLITZ R 26.0002	WDFW
06	Jul 11 2003	630867	AD Fin Clp	63	2000	COWLITZ SALMON HATCH	COWLITZ R 26.0002	WDFW
06	Jul 27 2003	630867	AD Fin Clp	58	2000	COWLITZ SALMON HATCH	COWLITZ R 26.0002	WDFW
06	Aug 2 2003	630868	AD Fin Clp	56	2000	COWLITZ SALMON HATCH	COWLITZ R 26.0002	WDFW
06	Aug 1 2003	630872	AD Fin Clp	55	2000	COWLITZ SALMON HATCH	COWLITZ R 26.0002	WDFW
06	Jul 26 2003	630872	AD Fin Clp	59	2000	COWLITZ SALMON HATCH	COWLITZ R 26.0002	WDFW
06	Jul 27 2003	630872	AD Fin Clp	54	2000	COWLITZ SALMON HATCH	COWLITZ R 26.0002	WDFW
06	Jul 5 2003	630877	AD Fin Clp	55	2000	WASHOUGAL HATCHERY	WASHOUGAL R 28.0159	WDFW
06	Jul 24 2003	630989	AD Fin Clp	58	2000	COWLITZ SALMON HATCH	COWLITZ R 26.0002	WDFW
06	Aug 2 2003	630990	AD Fin Clp	53	2000	COWLITZ SALMON HATCH	COWLITZ R 26.0002	WDFW
06	Jul 26 2003	630995	AD Fin Clp	50	2000	WELLS HATCHERY	COLUMBIA NEAR WELLS	WDFW
06	Jul 27 2003	631272	AD Fin Clp	53	2000	EASTBANK + DRYDEN	WENATCHEE R 45.0030	WDFW
06	Aug 2 2003	631273	AD Fin Clp	48	2000	LYONS FERRY HATCHERY	SNAKE R-LOWR 33.0002	WDFW
06	Jul 27 2003	631273	AD Fin Clp	49	2000	LYONS FERRY HATCHERY	SNAKE R-LOWR 33.0002	WDFW
06	Jul 21 2003	631312	AD Fin Clp	83	1999	COWLITZ SALMON HATCH	COWLITZ R 26.0002	WDFW

Appendix C. Observed Recoveries of coded wire tags from Chinook salmon during the Chinook Mark-Selective Fisheries in Marine Areas 5 and 6, July 1 through August 8, 2004.

Area	RecovDate	Tagcode	RcvMark	FKLcm	BroodYr	RearingHatchery	ReleaseSite	ReleaseAgency
05	Jul 11 2004	050780	AD Fin Clp	76	2001	SPRING CR NFH	SPRING CR 29.0159	FWS
05	Jul 17 2004	050780	AD Fin Clp	91	2001	SPRING CR NFH	SPRING CR 29.0159	FWS
05	Jul 24 2004	050780	AD Fin Clp	66	2001	SPRING CR NFH	SPRING CR 29.0159	FWS
05	Aug 1 2004	050784	AD Fin Clp	70	2001	MAKAH NFH ON SOOES R	SOOES R 20.0015	FWS
05	Jul 25 2004	062761	AD Fin Clp	43	2002	FEATHER R HATCHERY	BENICIA	CDWR
05	Jul 29 2004	065288	AD Fin Clp	55	2001	TRINITY R HATCHERY	TRINITY R HATCHERY	HVT
06	Jul 25 2004	093452	AD Fin Clp	76	2001	BIG CR HATCHERY	BIG CR (LWR COL R)	ODFW
05	Jul 11 2004	093628	AD Fin Clp	55	2001	BONNEVILLE HATCHERY	UMATILLA R	ODFW
05	Jul 21 2004	184448	AD Fin Clp	76	2001	H-COWICHAN R	R-COWICHAN BAY	CDFO
06	Jul 23 2004	184645	AD Fin Clp	70	2001	H-COWICHAN R	R-COWICHAN R	CDFO
05	Jul 4 2004	184706	AD Fin Clp	74	2001	H-SHUSWAP R	R-SHUSWAP R MID	CDFO
05	Jul 2 2004	184909	AD Fin Clp	69	2001	H-INCH CR	R-STAVE R	CDFO
05	Jul 6 2004	184909	AD Fin Clp	65	2001	H-INCH CR	R-STAVE R	CDFO
05	Jul 25 2004	184909	AD Fin Clp	74	2001	H-INCH CR	R-STAVE R	CDFO
05	Jul 24 2004	184914	AD Fin Clp	64	2001	H-CHILLIWACK R	R-CHILLIWACK R	CDFO
05	Jul 5 2004	184916	AD Fin Clp	63	2001	H-CHILLIWACK R	R-CHILLIWACK R	CDFO
05	Jul 6 2004	184916	AD Fin Clp	61	2001	H-CHILLIWACK R	R-CHILLIWACK R	CDFO
05	Jul 25 2004	184916	AD Fin Clp	76	2001	H-CHILLIWACK R	R-CHILLIWACK R	CDFO
05	Aug 1 2004	184921	AD Fin Clp	52	2002	H-CHEHALIS R	R-CHEHALIS R	CDFO
05	Jul 17 2004	185533	AD Fin Clp	48	2002	H-CHILLIWACK R	R-CHILLIWACK R	CDFO
05	Jul 2 2004	210279	AD Fin Clp	71	2000	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
05	Jul 10 2004	210279	AD Fin Clp	75	2000	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
05	Jul 14 2004	210279	AD Fin Clp	61	2000	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
06	Jul 17 2004	210279	AD Fin Clp	61	2000	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
06	Jul 24 2004	210279	AD Fin Clp	83	2000	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
05	Jul 4 2004	210293	AD Fin Clp	67	2000	PUYALLUP TRIBAL HATC	COWSKULL ACCLIM POND	PUYA
05	Jul 17 2004	210294	AD Fin Clp	74	2000	PUYALLUP TRIBAL HATC	DIRU CR 10.0029	PUYA
06	Jul 29 2004	210294	AD Fin Clp	89	2000	PUYALLUP TRIBAL HATC	DIRU CR 10.0029	PUYA
05	Jul 16 2004	210324	AD Fin Clp	53	2001	BERNIE GOBIN HATCH	TULALIP CR 07.0001	TULA
05	Jul 10 2004	210343	AD Fin Clp	60	2001	COWSKL & RUSHWTR PDS	COWSKL & RUSHWTR PDS	PUYA
05	Jul 17 2004	210343	AD Fin Clp	65	2001	COWSKL & RUSHWTR PDS	COWSKL & RUSHWTR PDS	PUYA
06	Jul 24 2004	210343	AD Fin Clp	72	2001	COWSKL & RUSHWTR PDS	COWSKL & RUSHWTR PDS	PUYA
06	Jul 29 2004	210343	AD Fin Clp	60	2001	COWSKL & RUSHWTR PDS	COWSKL & RUSHWTR PDS	PUYA
05	Jul 25 2004	210344	AD Fin Clp	60	2001	PUYALLUP TRIBAL HATC	DIRU CR 10.0029	PUYA
05	Aug 1 2004	210390	AD Fin Clp	57	2001	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
05	Aug 1 2004	210390	AD Fin Clp	59	2001	GROVERS CR HATCHERY	GROVERS CR HATCHERY	SUQ
05	Jul 17 2004	210391	AD Fin Clp	65	2001	MARBLEMOUNT HATCHERY	SKAGIT R 03.0176	WDFW
05	Jul 2 2004	210392	AD Fin Clp	56	2001	KALAMA CR HATCHERY	KALAMA CR 11.0017	NISQ
05	Jul 2 2004	212950	AD Fin Clp	75	2000	MARBLEMOUNT HATCHERY	RED CR 03.1325	WDFW
05	Jul 10 2004	212951	AD Fin Clp	95	1999	HOKO FALLS HATCHERY	HOKO R 19.0148	MAKA
05	Jul 4 2004	630183	AD Fin Clp	59	2000	LYONS FERRY HATCHERY	CAPTAIN JOHNS PD	NEZP
06	Jul 3 2004	630189	AD Fin Clp	75	2000	NISQUALLY HATCHERY	CLEAR CR 11.0013C	NISQ
05	Jul 18 2004	630282	AD Fin Clp	88	2000	PORTAGE BAY HATCHERY	PORTAGE BAY/SHIP CNL	UW
05	Jul 10 2004	630398	AD Fin Clp	66	2000	PORTAGE BAY HATCHERY	PORTAGE BAY/SHIP CNL	UW
06	Jul 16 2004	630398	AD Fin Clp	79	2000	PORTAGE BAY HATCHERY	PORTAGE BAY/SHIP CNL	UW
05	Jul 24 2004	630398	AD Fin Clp	80	2000	PORTAGE BAY HATCHERY	PORTAGE BAY/SHIP CNL	UW
05	Jul 31 2004	630398	AD Fin Clp	76	2000	PORTAGE BAY HATCHERY	PORTAGE BAY/SHIP CNL	UW
05	Jul 1 2004	630668	AD Fin Clp	80	2000	WALLACE R HATCHERY	WALLACE R 07.0940	WDFW
06	Jul 3 2004	630669	AD Fin Clp	79	2000	SOOS CREEK HATCHERY	BIG SOOS CR 09.0072	WDFW
05	Jul 14 2004	630669	AD Fin Clp	78	2000	SOOS CREEK HATCHERY	BIG SOOS CR 09.0072	WDFW
06	Jul 21 2004	630669	AD Fin Clp	65	2000	SOOS CREEK HATCHERY	BIG SOOS CR 09.0072	WDFW
05	Aug 1 2004	630678	AD Fin Clp	57	2000	LYONS FERRY HATCHERY	SNAKE R @PITTSBURG L	NEZP
05	Jul 23 2004	630678	AD Fin Clp	53	2000	LYONS FERRY HATCHERY	SNAKE R @PITTSBURG L	NEZP
05	Jul 31 2004	630678	AD Fin Clp	63	2000	LYONS FERRY HATCHERY	SNAKE R @PITTSBURG L	NEZP
06	Jul 23 2004	630683	AD Fin Clp	75	2000	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW
06	Jul 14 2004	630684	AD Fin Clp	86	2000	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW
06	Jul 29 2004	630684	AD Fin Clp	81	2000	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW
05	Jul 10 2004	630687	AD Fin Clp	80	2000	NISQUALLY HATCHERY	CLEAR CR 11.0013C	NISQ
06	Jul 23 2004	630687	AD Fin Clp	65	2000	NISQUALLY HATCHERY	CLEAR CR 11.0013C	NISQ
06	Jul 27 2004	630694	AD Fin Clp	76	2000	MARBLEMOUNT HATCHERY	CASCADE R 03.1411	WDFW
05	Jul 1 2004	630783	AD Fin Clp	68	2000	MCALLISTER HATCHERY	MCALLISTER CR11.0324	WDFW
05	Jul 25 2004	630794	AD Fin Clp	68	2000	COWLITZ SALMON HATCH	COWLITZ R 26.0002	WDFW
06	Jul 25 2004	630883	AD Fin Clp	75	2000	TUMWATER FALLS HATCH	CAPITOL LK (13)	WDFW
05	Jul 29 2004	630883	AD Fin Clp	83	2000	TUMWATER FALLS HATCH	CAPITOL LK (13)	WDFW
05	Aug 1 2004	630889	AD Fin Clp	51	2001	TURTLE ROCK HATCHERY	COL.R. @ TURTLE ROCK	WDFW
05	Jul 16 2004	630889	AD Fin Clp	65	2001	TURTLE ROCK HATCHERY	COL.R. @ TURTLE ROCK	WDFW
05	Jul 18 2004	630889	AD Fin Clp	55	2001	TURTLE ROCK HATCHERY	COL.R. @ TURTLE ROCK	WDFW
05	Jul 30 2004	630889	AD Fin Clp	60	2001	TURTLE ROCK HATCHERY	COL.R. @ TURTLE ROCK	WDFW
05	Jul 9 2004	630891	AD Fin Clp	54	2001	TURTLE ROCK HATCHERY	COL.R. @ TURTLE ROCK	WDFW
05	Jul 16 2004	630891	AD Fin Clp	58	2001	TURTLE ROCK HATCHERY	COL.R. @ TURTLE ROCK	WDFW
05	Jul 17 2004	630891	AD Fin Clp	53	2001	TURTLE ROCK HATCHERY	COL.R. @ TURTLE ROCK	WDFW
05	Jul 25 2004	630891	AD Fin Clp	51	2001	TURTLE ROCK HATCHERY	COL.R. @ TURTLE ROCK	WDFW
05	Jul 25 2004	630891	AD Fin Clp	45	2001	TURTLE ROCK HATCHERY	COL.R. @ TURTLE ROCK	WDFW
06	Jul 31 2004	630896	AD Fin Clp	71	2001	MARBLEMOUNT HATCHERY	CASCADE CR 03.2584	WDFW

Appendix C. Continued.

Area	RecovDate	Tagcode	RcvMark	FKLcm	BroodYr	RearingHatchery	ReleaseSite	ReleaseAgency
05	Jul 6 2004	630996	AD Fin Clp	66	2000	SIMILKAMEEN HATCHERY	SIMILKAMEEN R 490325	WDFW
05	Jul 10 2004	631273	AD Fin Clp	66	2000	LYONS FERRY HATCHERY	SNAKE R-LOWR 33.0002	WDFW
05	Jul 11 2004	631273	AD Fin Clp	64	2000	LYONS FERRY HATCHERY	SNAKE R-LOWR 33.0002	WDFW
05	Jul 17 2004	631273	AD Fin Clp	67	2000	LYONS FERRY HATCHERY	SNAKE R-LOWR 33.0002	WDFW
05	Jul 30 2004	631273	AD Fin Clp	61	2000	LYONS FERRY HATCHERY	SNAKE R-LOWR 33.0002	WDFW
05	Jul 30 2004	631294	AD Fin Clp	63	2001	COWLITZ SALMON HATCH	COWLITZ R 26.0002	WDFW
05	Jul 21 2004	631379	AD Fin Clp	64	2001	COWLITZ SALMON HATCH	COWLITZ R 26.0002	WDFW
05	Jul 25 2004	631382	AD Fin Clp	58	2001	PRIEST RAPIDS HATCHE	COLUMBIA R AT PRIEST	WDFW
05	Jul 17 2004	631469	AD Fin Clp	56	2001	COWLITZ SALMON HATCH	COWLITZ SALMON HATCH	WDFW
05	Jul 24 2004	631548	AD Fin Clp	60			Unknown release data	
05	Jul 30 2004	631549	AD Fin Clp	54	2001	WELLS HATCHERY	COLUMBIA NEAR WELLS	WDFW
05	Jul 31 2004	631549	AD Fin Clp	62	2001	WELLS HATCHERY	COLUMBIA NEAR WELLS	WDFW
05	Jul 31 2004	631549	AD Fin Clp	55	2001	WELLS HATCHERY	COLUMBIA NEAR WELLS	WDFW
05	Aug 1 2004	631585	AD Fin Clp	53	2001	LYONS FERRY HATCHERY	SNAKE R-LOWR 33.0002	WDFW
05	Jul 5 2004	631585	AD Fin Clp	49	2001	LYONS FERRY HATCHERY	SNAKE R-LOWR 33.0002	WDFW
05	Jul 6 2004	631585	AD Fin Clp	52	2001	LYONS FERRY HATCHERY	SNAKE R-LOWR 33.0002	WDFW
05	Jul 11 2004	631585	AD Fin Clp	60	2001	LYONS FERRY HATCHERY	SNAKE R-LOWR 33.0002	WDFW
05	Jul 15 2004	631585	AD Fin Clp	56	2001	LYONS FERRY HATCHERY	SNAKE R-LOWR 33.0002	WDFW
05	Jul 17 2004	631585	AD Fin Clp	55	2001	LYONS FERRY HATCHERY	SNAKE R-LOWR 33.0002	WDFW
05	Jul 18 2004	631585	AD Fin Clp	50	2001	LYONS FERRY HATCHERY	SNAKE R-LOWR 33.0002	WDFW
05	Jul 21 2004	631585	AD Fin Clp	57	2001	LYONS FERRY HATCHERY	SNAKE R-LOWR 33.0002	WDFW
05	Jul 21 2004	631585	AD Fin Clp	53	2001	LYONS FERRY HATCHERY	SNAKE R-LOWR 33.0002	WDFW
05	Jul 29 2004	631585	AD Fin Clp	56	2001	LYONS FERRY HATCHERY	SNAKE R-LOWR 33.0002	WDFW
05	Jul 29 2004	631585	AD Fin Clp	53	2001	LYONS FERRY HATCHERY	SNAKE R-LOWR 33.0002	WDFW
05	Jul 18 2004	631587	AD Fin Clp	47	2001	DRYDEN POND	WENATCHEE R 45.0030	WDFW
05	Jul 27 2004	631587	AD Fin Clp	56	2001	DRYDEN POND	WENATCHEE R 45.0030	WDFW
05	Jul 29 2004	631780	AD Fin Clp	47	2002	VOIGHTS CR HATCHERY	VOIGHT CR 10.0414	WDFW
06	Jul 3 2004	636322	AD Fin Clp	65	2001	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW
05	Jul 4 2004	636322	AD Fin Clp	63	2001	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW
05	Jul 10 2004	636322	AD Fin Clp	61	2001	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW
05	Jul 17 2004	636322	AD Fin Clp	69	2001	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW
05	Jul 20 2004	636322	AD Fin Clp	56	2001	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW
05	Jul 25 2004	636322	AD Fin Clp	45	2001	GEORGE ADAMS HATCHRY	PURDY CR 16.0005	WDFW

Appendix D. Chinook stocks observed in coded wire tagged Chinook caught during the Chinook Mark-Selective Fisheries in Marine Areas 5 and 6, July 5 through August 3, 2003, and July 1 through August 8, 2004.

Stock	Region	2003	2004
Chilliwack River	Fraser River	3	5
Harrison River	Fraser River	1	1
Shuswap River	Fraser River	0	1
Stave River	Fraser River	0	3
Cowichan River	Georgia Strait/Vancouver Island	2	2
Nanaimo River	Georgia Strait/Vancouver Island	2	0
Hoko River	Strait of Juan de Fuca	0	1
Big Soos Creek	Puget Sound	7	3
Clear Creek	Puget Sound	6	3
Deschutes River	Puget Sound	0	2
George Adams	Puget Sound	3	9
Grovers Creek	Puget Sound	15	7
Kalama Creek	Puget Sound	5	1
McAllister Creek	Puget Sound	0	1
Portage Bay UW	Puget Sound	8	5
Samish River	Puget Sound	1	0
Skagit River	Puget Sound	1	1
Skagit River	Puget Sound	3	3
Skykomish River	Puget Sound	3	1
Tulalip	Puget Sound	1	1
Voight Creek	Puget Sound	1	9
Wallace River	Puget Sound	1	0
Soees River	Washington Coast	1	1
Abernathy Creek	Lower Columbia River	1	0
Big Creek Hatchery	Lower Columbia River	3	1
Cowlitz River	Lower Columbia River	20	3
Elochoman River	Lower Columbia River	1	0
Kalama River	Lower Columbia River	1	0
Spring Creek	Lower Columbia River	1	3
Washougal River	Lower Columbia River	1	0
Umatilla River	Mid-Columbia River	0	1
Priest Rapids Hatchery	Upper Columbia River	0	1
Similkameen River	Upper Columbia River	1	1
Wells Hatchery	Upper Columbia River	1	12
Wenatchee River	Upper Columbia River	1	2
Lyons Ferry Hatchery	Snake River	5	19
American River	California	1	0
Feather River	California	0	1
Mokelumne River	California	1	0
Trinity River	California	0	1

