INFORMATION REPORTS

NUMBER 2008-01

FISH DIVISION
Oregon Department of Fish and Wildlife

Oregon North Coast Spring Chinook Stock Assessment – 2005-06

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March, 2008

Final report for Grant 05-006, funded in part by the Restoration and Enhancement Program administered by the Oregon Department of Fish and Wildlife.

CONTENTS

INTRODUCTION

Chinook salmon populations of the Oregon coast exhibit two general life history types, classified as either spring-run or fall-run depending on adult life-history traits. Fall chinook are present in most Oregon coastal basins, and the Oregon Department of Fish and Wildlife (ODFW) has identified 28 fall chinook populations in this area (ODFW 2005). Spring chinook salmon are found in larger river basins on the Oregon coast, and the upper portions of the Umpqua and Rogue rivers. This is a more limited distribution than coastal fall chinook and includes only 10 populations (ODFW 2005). Oregon coastal fall chinook stocks have been monitored through a set of 56 standard spawning ground surveys, many conducted since the 1950's. There has not been a similar, consistent, coast-wide monitoring program for Oregon coastal spring chinook spawners. Abundance of these populations has been monitoring through a variety of methods including; freshwater harvest estimates, counts at dams and weirs, summer resting hole counts, and spawning ground surveys.

In 1998, the National Marine Fisheries Service (NMFS) reviewed west coast chinook salmon populations in regards to status under the Federal Endangered Species Act (ESA). The NMFS identified a total of 15 Evolutionarily Significant Units (ESUs) of chinook salmon (Myers et al. 1998). Oregon coastal chinook are predominantly in the Oregon Coast ESU (Necanicum River to Elk River). This ESU includes both spring and fall chinook, and was determined to not warrant listing (Federal Register Notice 1998). In 2005, ODFW conducted a review of Oregon native fish status, in regards to the State's Native Fish Conservation Policy. This review grouped populations by Species Management Unit (SMU), and examined coastal spring and fall chinook populations separately. The review determined the near-term sustainability of the Coastal Fall Chinook SMU was not at risk, but the Coastal Spring Chinook SMU was at risk (ODFW 2005). The Tillamook and Nestucca spring chinook populations were of particular concern because they failed to pass the interim criteria for abundance, productivity, and reproductive independence.

Hatchery supplementation of spring chinook has occurred in the Tillamook and Nestucca basins since the early 1900's. Currently, approximately 450,000 spring chinook smolts are released annually from Trask Hatchery, Cedar Creek Hatchery (Nestucca), and from a STEP program at Whiskey Creek. These hatchery smolts have been mass marked with an adipose fin clip since the 1998 brood year. Therefore, hatchery origin adult spring chinook may now be positively identified by the lack of an adipose fin. Declining trends in wild coastal spring chinook populations have resulted in management actions to target harvest on adipose fin clipped hatchery fish, and to restrict harvest of wild origin fish.

Results of status reviews, and changes in management practices have required a more thorough evaluation of stock status for the Tillamook and Nestucca spring chinook populations (Keith Braun, personal communication). Therefore, ODFW developed a monitoring plan for spring chinook in these basins. The monitoring plan identified four project objectives; 1) Determine adult spring chinook abundance in the Trask, Wilson, and Nestucca Rivers, 2) Determine hatchery vs. wild ratios for these three basins, 3) Determine age structure and sex ratios for adult spawners, and 4) Determine distribution and abundance for spring chinook recycled from local ODFW hatcheries. This project began in 2004 with an exploratory season to determine distribution, survey methodology, and feasibility of the proposed protocol. In 2005

and 2006 a more intensive sampling effort was implemented, designed to cover the entire distribution of spring chinook spawning in the Nestucca, Trask, and Wilson rivers.

Since 2004, project field work has been funded with Restoration and Enhancement Program (R&E) funds, administered by Oregon Department of Fish and Wildlife. Project administration is covered through existing funding for the ODFW Oregon Adult Salmonid Inventory and Sampling Project (OASIS). Funding from R&E is scheduled to continue through the 2008 spawning season. Further monitoring will require a new funding source for project field work. This report documents results for project Objectives 1 to 4, including the abundance and distribution of spring chinook spawners during 2005 and 2006 in Oregon's Trask, Wilson, and Nestucca river basins.

METHODS

Field protocols, data collection, and analysis used by this project is similar to that used in coastal fall chinook, chum salmon, and coho salmon surveys (Jacobs et al. 2002). The main difference is that this project attempts to visit each survey once every two weeks, where the fall spawning surveys are conducted once every 10 days. The project monitoring area consists of 27 survey reaches in the Wilson, Trask, and Nestucca Rivers. These reaches total 93.8 stream miles, and are believed to encompass the entire distribution of spring chinook spawning in these basins (Table 1). Two crews, of two surveyors each, surveyed reaches from mid-August through mid-October, encompassing the entire spawning season. Survey reaches covered the mainstem and some of the larger tributaries in each of the basins. Exploratory surveys conducted in 2004 were used to determine the distribution of spring chinook, and to set up surveys appropriate for this distribution. Survey effort across all basins was not uniform between seasons. Logistical constraints resulted in the Nestucca being surveyed at half the effort in 2005 than in 2006. Although effort was lower in the 2005 Nestucca season, we did still encompass the peak of spawning activity.

RESULTS AND DISCUSSION

Assessment of Survey Conditions

Oregon coastal spring chinook generally spawn from late August through the early part of October. Peak spawning activity generally occurs during the second and third weeks of September. Survey conditions during this time period are generally very mild and are typified by stream flows at or near annual lows. Figure 1 shows the mean daily stream discharge for the Wilson River in 2005 and 2006 in comparison to the 80th and 20th percentiles of mean daily flows for the last 90 years (1916 through 2005). The 2005 Wilson River flows were typical of average stream flows, with high peak flows in the winter and spring and the lowest flows of the year in August and September. These stream flow conditions allowed surveyors to conduct very consistent survey rotations. During the spawning season surveyors are not usually constrained by poor visibility or long periods where they are unable to conduct surveys due to high and turbid flows.

Table 1. Survey effort summary for the 2005 and 2006 spring chinook spawner survey seasons.

Basin	Reach	Length (mi)	Survey Days		Total Miles Surveyed in Season	
			2005	2006	2005	2006
Nestucca:	25410 Seg 1	5.8	1	3	5.8	17.5
	25436 Seg 1	7.1	2	5	14.3	35.7
	25464 Seg 1	5.1	3	3	15.3	15.3
	25476 Seg 1	4.5	1	3	4.5	13.6
	25496 Seg 1	1.3	1	3	1.3	4.0
	25502 Seg 1	3.4	2	3	6.8	10.3
	25504 Seg 1	2.3	1	2	2.3	4.7
	Total:	**29.7**	**11**	**22**	**50.5**	**101.0**
Trask:	25582 Seg 1	2.9	0	4	0.0	11.4
	25588 Seg 1	2.2	0	3	0.0	6.6
	25594 Seg 1	4.1	5	4	20.6	16.5
	25594 Seg 2	5.1	4	2	20.5	10.2
	25605 Seg 2	3.8	4	3	15.4	11.5
	25606 Seg 1	0.5	1	3	0.5	1.5
	25618 Seg 1	4.6	5	3	22.9	13.7
	25622 Seg 1	3.6	4	3	14.5	10.9
	25622 Seg 2	2.1	4	3	8.4	6.3
	25624 Seg 1	1.6	4	3	6.3	4.7
	25625 Seg 1	1.0	2	3	1.9	2.9
	25627 Seg 1	1.9	2	3	3.7	5.6
	Total:	**33.4**	**35**	**37**	**114.7**	**102.0**
Wilson:	25636 Seg 1	2.7	0	4	0.0	11.0
	25640 Seg 1	4.4	3	3	13.3	13.3
	25650 Seg 1	4.6	3	4	13.7	18.3
	25664 Seg 1	6.6	2	2	13.1	13.1
	25676 Seg 1	5.1	4	3	20.5	15.4
	25679 Seg 1	1.3	2	2	2.5	2.5
	25682 Seg 1	3.4	4	2	13.4	6.7
	25685 Seg 1	2.6	1	2	2.6	5.2
	Total:	**30.7**	**19**	**22**	**79.2**	**85.5**

Adult Spawner Abundance and Distribution

Results of surveys conducted in 2005 and 2006 for spring chinook are summarized in Table 2. A total of 86 miles of streams were surveyed in 2005 and a total of 93.8 were surveyed in 2006 (Table 1). Of the 27 surveys, only three reaches were not surveyed in 2005. These include 5.1 miles on the Trask and 2.7 miles on the Wilson. Peak counts of fish were highest in the lower portions of the basins which usually coincided with higher proportions of hatchery fish (see maps in Appendix A and B).

Table 3 shows the total number of live fish and carcasses recovered from three monitoring basins in 2005 and 2006. More live fish were counted and more carcasses were recovered in 2005 than in 2006. A total of 1,315 live fish and 673 carcasses were recovered in 2005. In 2006, 971 live fish were counted and 440 carcasses were recovered. The Trask River produced the highest numbers of live and dead fish for both seasons, and the Wilson River

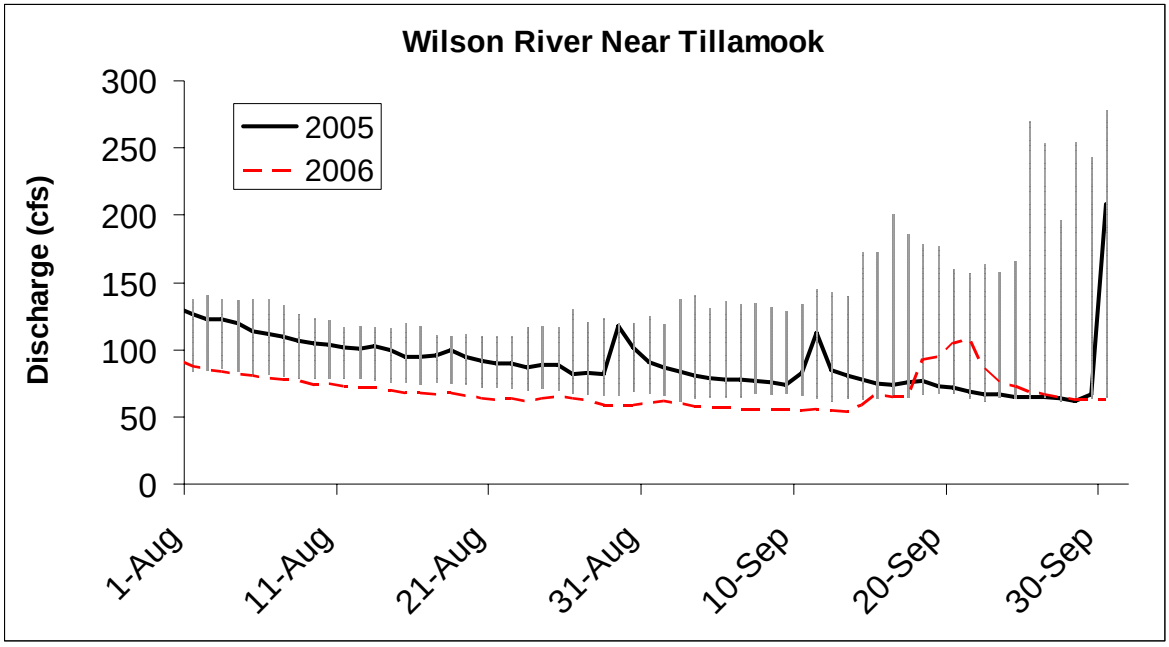


Figure 1. Daily mean river discharge in cubic feet per second for the 2005 and 2006 spawning season in the Wilson River near Tillamook. Vertical bars represent limits of the 80th and 20th percentiles of mean daily flows for the period 1916 through 2005.

produced the lowest numbers of live and dead fish for both seasons. This difference in total fish counted was partially due to a higher sampling effort in 2005, as noted earlier (Table 1).

Based on peak densities in the survey area (Table 2), spring chinook adult spawning distribution has shown a consistent pattern for the 2005 and 2006 seasons. Overall there has been a higher density of spawners lower in each of the basins (Appendix B). This usually coincides with higher proportions of hatchery fish recovered on the surveys. The highest peak density of 41.8 fish/mile was in a Trask River survey from Peninsula Park down to Loren's Drift in 2005. This survey reach encompasses the Trask Hatchery area at Gold Creek. There were four survey reaches in which there were no fish observed or carcasses recovered. These include the East Fork of the South Fork Trask, North Fork of the North Fork Trask, Cedar Creek on the Wilson, and the West Fork of the North Fork on the Wilson. All of these reaches are tributaries of the mainstem, or are in the upper portions of each of the basins surveyed.

On the Nestucca River, the highest peak counts were found in the Farmer to Tony Cr survey in both 2005 and 2006 with a peak density of 14.7 and 13.6 fish/mile, respectively. The lowest counts for 2005 and 2006 in the Nestucca were in the Alder Glen to Hoag Pass survey with a peak density of 0.9 and 0.4 fish/mile in 2005 and 2006, respectively. This demonstrates the distribution trend of lower densities higher up in the basin.

Table 2. Spring chinook peak densities (fish/mile) for 2005 and 2006 spawning seasons. Surveys are numbered from the mouth to upstream, and are displayed accordingly.

Basin	Reach	Survey Description	Peak Density	
Nestucca:			**2005**	**2006**
	25410 Seg 1	Cloverdale to Farmer Cr	4.1	3.8
	25436 Seg 1	Farmer Cr to Tony Cr	14.7	13.6
	25464 Seg 1	Tony Cr to Moon Cr	13.1	8.2
	25476 Seg 1	Moon Cr to Powder Cr	3.5	5.5
	25496 Seg 1	Nestucca Bridge to Rocky Bend	1.5	5.3
	25502 Seg 1	Rocky Bend to Alder Glenn	8.8	2.0
	25504 Seg 1	Alder Glen to Hogg Pass	0.9	0.4
Trask:				
	25582 Seg 1	Long Prairie Bridge to Hwy 101	n.a.	2.1
	25588 Seg 1	Loren's Drift to Long Prairie Bridge	n.a.	25.4
	25594 Seg 1	Peninsula Park to Loren's Drift	41.8	24.8
	25594 Seg 2	Trask Park to Peninsula Park	33.0	7.8
	25605 Seg 2	Trask SF Bridge to Bill Cr	31.5	6.2
	25606 Seg 1	Trask East Fork of South Fork	0.0	0.0
	25618 Seg 1	Trask NF, Confluence to Bark Shanty	14.8	3.3
	25622 Seg 1	Trask NF, Bark Shanty to Bridge Timbers	12.4	5.5
	25622 Seg 2	Trask NF, Bridge Timbers to Clear Cr	3.3	8.6
	25624 Seg 1	Trask NF, Clear Cr to NF of NF	5.1	15.8
	25625 Seg 1	Trask NF, NF of NF to Schetky Rd	0.0	0.0
	25627 Seg 1	Trask MF of NF up 2 Miles	2.1	0.5
Wilson:				
	25636 Seg 1	Hughey Cr to Sollie Smith	n.a.	9.5
	25640 Seg 1	Siskeyville to Hughey Cr	11.5	7.9
	25650 Seg 1	Sprague Wayside to Siskeyville	5.5	3.5
	25664 Seg 1	Jordan Cr to Sprague Wayside	1.4	2.6
	25676 Seg 1	Jones Cr to Jordan Cr	6.0	12.5
	25679 Seg 1	Cedar Cr to MP 2	0.0	0.0
	25682 Seg 1	King Mt to Jones Cr	1.8	0.9
	25685 Seg 1	Wilson NF to WF	1.5	0.0

n.a. = No survey completed this year.

On the Trask River, the highest densities of fish were found in two adjacent surveys; Peninsula Park to Loren's Drift (2005) and Loren's Drift to Long Prairie Bridge (2006). Peak densities of 41.8 fish/mile in 2005 and 25.4 fish/mile in 2006 were recorded for these surveys. As noted earlier, two of the four surveys in which no fish were present were on the Trask during both seasons. The East Fork of the South Fork Trask and the North Fork of the North Fork Trask accounted for two of the zero counts.

The Wilson River produced the lowest peak counts of the three basins monitored. A high peak density of 11.5 fish/mile in 2005 on the Siskeyville to Hughey Creek survey and a peak density of 12.5 in 2006 on the Jones to Jordan Creek survey in 2006. Cedar Creek in 2005 and 2006 as well as the West Fork of the North Fork Wilson in 2006 produced a peak count of zero.

Table 3. Adult spring chinook observed and recovered on spawning surveys during the 2005 and 2006 seasons.

	Live Fish		Carcasses Recovered	
Basin	**2005**	**2006**	**2005**	**2006**
Nestucca	244	297	140	171
Trask	928	454	451	221
Wilson	143	220	82	48
Total:	**1,315**	**971**	**673**	**440**

During the 2005 season, two sections of stream were surveyed on the Kilchis River in an attempt to continue exploration of spawner distribution. A total of six miles were surveyed and one marked chinook was found. Future plans are to continue to explore reaches outside of the current monitoring area, especially during seasons of higher stream flows.

Average peak density was similar among years for the Nestucca and Wilson rivers (Figure 2). The Trask River showed a 50% reduction in average peak density from 2005 to 2006. The Nestucca decreased slightly from 8.3 fish/mile in 2005 to 6.8 fish/mile in 2006. The Wilson increased slightly from 4.5 fish/mile in 2005 to 4.8 fish/mile in 2006. Figure 3 shows peak density for each survey reach sampled during the two seasons. The downward trend in peak density (fish/mile) as we survey further upstream is evident in all three basins. In both 2005 and 2006 the Trask River basin produced the highest count of fish. This result is directly related to having the greatest number of hatchery fish released in the Trask basin, and can be seen from peak densities (Figure 2) and total fish recovered (Table 3). In 2006, all basins were surveyed at an almost equivalent rate, with the Trask producing 50% of total carcasses recovered and 47% of total live fish seen.

Occurrence of Hatchery Fish in Spawner Surveys

All three of the monitoring basins have had hatchery spring chinook salmon influence since the early 1900's. Recently, there have been annual releases of over 450,000 smolts into these basins. Cedar Creek hatchery on the Nestucca releases 110,000 annually, Trask Hatchery releases 245,000 annually, and Whiskey Creek Hatchery releases approximately 100,000 annually. All live and dead fish recorded during these spawning seasons were checked for the presence of an adipose fin showing wild origin. Generally, higher densities of hatchery fish were found in surveys furthest downstream (Table 4). See Appendix A for maps showing hatchery/wild ratios in 2005 and 2006.

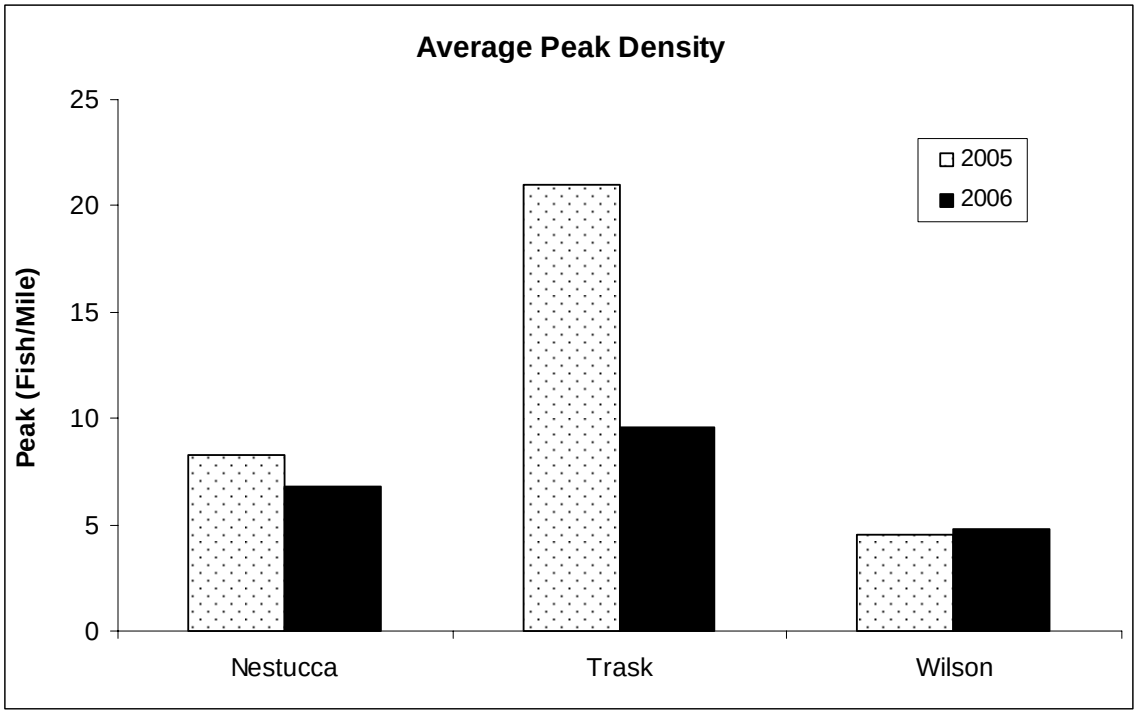
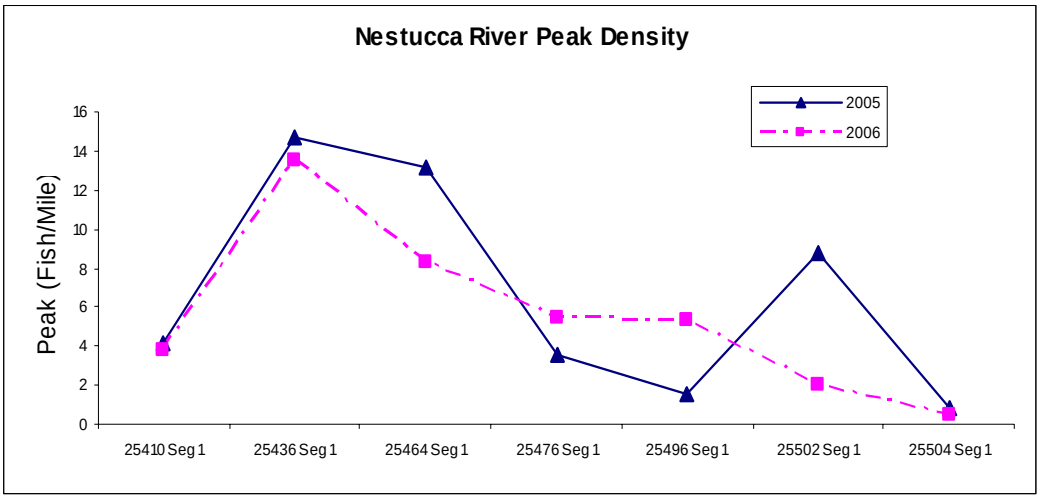


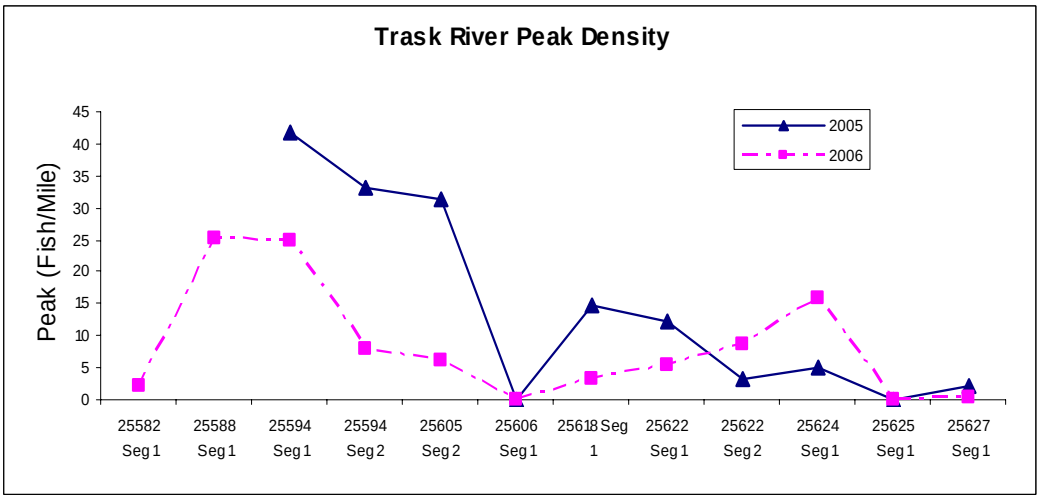
Figure 2. Average peak densities in the Nestucca, Trask, and Wilson rivers during the 2005 and 2006 survey seasons.

Percentage of wild fish in a survey ranged from 14.3% in the lowest Trask River reach to 100% in the Trask and Nestucca upper reaches (Table 4). The largest inter-annual variation in percent wild for a basin occurred in the Nestucca, ranging from 33% to 52% wild. The Trask and Wilson showed less inter-annual variation. The Trask averaged 38% wild in 2005 and 34% wild in 2006. Across all surveys, the Wilson averaged 49% wild in 2005 and 33% wild in 2006. Overall, the 2005 season had a higher percentage of wild fish in all surveys monitored. The higher percentage of wild fish in 2005 may have been partially due to the three lower river surveys that weren't completed that season (Table 1). In 2006, 31% of all hatchery fish in the Trask and Wilson basins were found in these three surveys.

Snouts were recovered from all adipose fin clipped fish, and these snouts were sent to the ODFW head lab in Clackamas to check for coded wire tags (CWT's). A portion of all hatchery spring chinook are coded wire tagged prior to release. Table 5 summarizes all carcasses recovered during the 2005 and 2006 season that had a coded wire tag. A total of 14 fish were recovered from the Nestucca and Trask Rivers that had CWT's in 2005. In the Nestucca recoveries, one fish was released from the Trask River in 2002 and the others were released from Cedar Creek hatchery on the Nestucca.

Of the eight CWT chinook recovered on the Trask, all were originally from Trask hatchery stock. Five of these eight fish were releases from the Wilson River and the others were released from the Trask River. All of these fished were released in 2000.





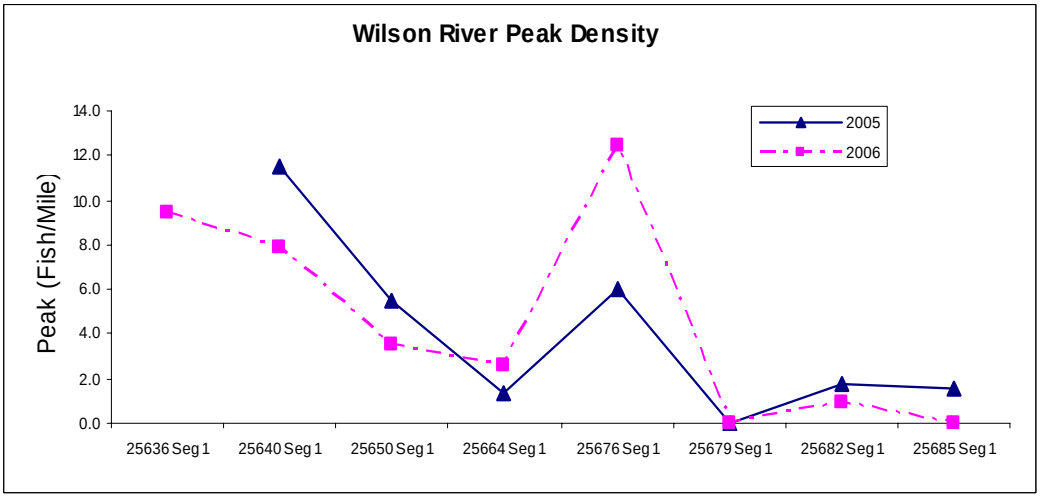


Figure 3. Summary of peak densities in all survey reach's during the 2005 and 2006 spawning seasons. A lower numbered reach ID designates surveys lower in the basin.

Table 4. Summary of wild spring chinook found on spawning surveys in 2005 and 2006. Percentages are based on carcasses unless noted.

Basin	Reach	Survey Description	Percent wild Spring Chinook	
Nestucca:			**2005**	**2006**
	25410 Seg 1	Cloverdale to Farmer Cr	25	26.7
	25436 Seg 1	Farmer Cr to Tony Cr	51.4	28.7
	25464 Seg 1	Tony Cr to Moon Cr	57.1	37.5
	25476 Seg 1	Moon Cr to Powder Cr	88[a]	75[a]
	25496 Seg 1	Nestucca Bridge to Rocky Bend	N/A[b]	50
	25502 Seg 1	Rocky Bend to Alder Glen	100	67[a]
	25504 Seg 1	Alder Glen to Hogg Pass	100[a]	100[a]
		Total Percent Wild:	**52**	**33**
Trask:				
	25582 Seg 1	Long Prairie Bridge to Hwy 101	N/A[d]	14.3
	25588 Seg 1	Loren's Drift to Long Prairie Bridge	N/A[d]	30
	25594 Seg 1	Peninsula Park to Loren's Drift	22	30.3
	25594 Seg 2	Trask Park to Peninsula Park	45.7	31
	25605 Seg 2	Trask SF Bridge to Bill Cr	67[a]	33.3
	25606 Seg 1	Trask East Fork of South Fork	N/A[c]	N/A[c]
	25618 Seg 1	Trask NF, Confluence to Bark Shanty	47.9	40
	25622 Seg 1	Trask NF, Bark Shanty to Bridge Timbers	84.6	80
	25622 Seg 2	Trask NF, Bridge Timbers to Clear Cr	100[a]	31[a]
	25624 Seg 1	Trask NF, Clear Cr to NF of NF	67[a]	52[a]
	25625 Seg 1	Trask NF, NF of NF to Schetky Rd	N/A[c]	N/A[c]
	25627 Seg 1	Trask, MF of NF (upstream 2 miles)	100[a]	N/A[b]
		Total Percent Wild:	**38**	**34**
Wilson:				
	25636 Seg 1	Hughey Cr to Sollie Smith	N/A[d]	30
	25640 Seg 1	Siskeyville to Hughey Cr	37.9	36.4
	25650 Seg 1	Sprague Wayside to Siskeyville	54.5	33.3
	25664 Seg 1	Jordan Cr to Sprague Wayside	60	0[a]
	25676 Seg 1	Jones Cr to Jordan Cr	55.6	62.5
	25679 Seg 1	Cedar Cr to MP 2	N/A[c]	N/A[c]
	25682 Seg 1	King Mt to Jones Cr	80[a]	50[a]
	25685 Seg 1	Wilson NF to WF	N/A[b]	N/A[c]
		Total Percent Wild:	**49**	**33**

[a] Percent wild based on live fish counts.
[b] Adipose clip could not be determined on live fish.
[c] No fish observed
[d] No survey completed

In the 2005 spawning season there were 14 CWT fish recovered on spawning surveys, six in the Nestucca basin, and eight in the Trask basin. The eight Trask recoveries were all from fish released in the Tillamook System, three in the Trask and five in the Wilson. In the Nestucca, five were fish released in the Nestucca River and one was released in the Trask River. During the 2006 season, a total of 40 fish possessing a CWT were recovered in all three basins. In the Nestucca basin there were 21 CWT recoveries, with 16 (76.2%) from fish released into the Nestucca Basin and 5 (23.8%) from fish released into the Trask basin. Fourteen CWT fish were recovered in the Trask with 14.3% released from the Nestucca, 35.7% from the Wilson, and 50%

from the Trask basins, respectively. The remaining five chinook were recovered in the Wilson basin. One of these five fish was released in the Trask, the other four were released in the Wilson. Of the total of 54 CWT chinook recovered in the two spawning seasons, all were from fish released in one of the three sample basins, Nestucca, Trask, or Wilson.

Straying between basins was examined with two methods. Of the CWT fish released in the Nestucca River, 91.3% (21 of 23) were recovered in the Nestucca basin. The hatchery spring chinook released in the Nestucca River were all reared and released on site. In contrast, 22.2% (6 of 27) of the CWT fish recovered in the Nestucca were fish released in the Trask River. The hatchery spring chinook program in the Tillamook is much more complex, and involves substantial movement of fish for rearing and release at multiple facilities. Of the CWT fish released in the Trask River, 58.8% (10 of 17) were recovered in the Trask River. Of the CWT fish released in the Wilson River, 28.6% (4 of 14) were recovered in the Wilson River. Most of the out of basin recoveries of CWT fish released in the Trask and Wilson Rivers, were within the Tillamook Basin (Trask to Wilson, and Wilson to Trask). Only 7.4% (2 of 27) of the CWT fish recovered in the Tillamook Basin were released in the Nestucca River.

Table 5. Spring chinook carcasses, recovered during the 2005 and 2006 spawning survey season, which possessed coded wire tags.

Recovery				Release			
Basin	**Reach**	**Recovery Date**	**N**	**Hatchery**	**Brood Year**	**Stock**	**Release site**
			2005				
Nestucca:							
	25410 Seg 1	09/26/05	1	Cedar Cr	2001	Nestucca	Cedar Cr
	25436 Seg 1	09/22/05	3	Cedar Cr	2000	Nestucca	Cedar Cr
	25436 Seg 1	09/22/05	1	Trask	2002	Trask	Trask
	25476 Seg 1	09/20/05	1	Cedar Cr	2000	Nestucca	Cedar Cr
Trask:							
	25594 Seg 1	09/23/05	3	Trask	2000	Trask	Trask
	25594 Seg 1	09/21/05	5	Tuffy Cr	2000	Trask	Wilson
			2006				
Nestucca:							
	25436 Seg 1	09/20/06	13	Cedar	2002	Nestucca	Cedar
	25436 Seg 1	09/24/06	4	Trask	2002	Trask	Trask
	25410 Seg 1	10/09/06	1	Cedar	2002	Nestucca	Cedar
	25464 Seg 1	09/22/06	2	Cedar	2002	Nestucca	Cedar
	25464 Seg 1	10/01/06	1	Trask	2000	Trask	Trask
Trask:							
	25582 Seg 1	09/05/06	1	Tuffy Cr	2002	Trask	Wilson
	25588 Seg 1	09/15/06	2	Tuffy Cr	2003	Trask	Wilson
	25594 Seg 1	09/25/06	2	Cedar	2002	Nestucca	Cedar
	25594 Seg 1	09/25/06	2	Trask	2002	Trask	Trask
	25594 Seg 1	09/25/06	1	Tuffy Cr	2002	Trask	Wilson
	25594 Seg 2	09/20/06	4	Trask	2002	Trask	Trask
	25605 Seg 2	08/29/06	1	Tuffy Cr	2002	Trask	Wilson
	25618 Seg 1	09/27/06	1	Trask	2000	Trask	Trask
Wilson:							
	25636 Seg 1	10/02/06	1	Trask	2002	Trask	Trask
	25640 Seg 1	10/02/06	3	Tuffy Cr	2002	Trask	Wilson
	25676 Seg 1	09/13/06	1	Tuffy Cr	2002	Trask	Wilson

Population Demographics

A summary of the age structure for the 2005 and 2006 seasons is presented in Table 6. These are based on analysis of 513 scales samples for the 2005 season and 435 scales samples for the 2006 season. Age structure was very similar across basins within each year, but varied between years in all three basins. In 2005, there was a higher proportion of age-5 fish compared to 2006 which had a higher proportion of age-4 fish. In 2006, a small percentage of age-2 fish were observed (3.9% average for all basins), but no age-2 fish were observed in 2005. The majority of chinook were age-5 fish in 2005 and age-4 fish in 2006. The tendency towards younger fish in 2006 was seen mainly in the age-2 and age-4 year classes. With the exception of the Nestucca, age-3 fish were a similar percent of the sample in 2005 and 2006. No age-6 fish were recovered in the Wilson in 2005 or 2006.

Table 6. Summary of age structure for the 2005 and 2006 spring chinook spawning season.

Basin		Age Structure (Percent of Total)				
		2-year	3-year	4-year	5-year	6-year
Nestucca River	2005	0.0%	9.7%	36.6%	52.7%	1.1%
	2006	3.5%	1.2%	64.9%	24.6%	5.8%
Trask River	2005	0.0%	2.1%	37.9%	59.6%	0.3%
	2006	1.8%	1.8%	72.9%	22.0%	1.4%
Wilson River	2005	0.0%	3.4%	29.3%	67.2%	0.0%
	2006	6.5%	2.2%	73.9%	17.4%	0.0%

Table 7 shows the average length in mm MEPS (Mid-Eye to Posterior Scale), and sex ratio for each age class in all basins surveyed during the 2005 and 2006 seasons. Spring chinook during the 2006 season were larger on average in every age class with the exception of age-6 fish. There was a larger difference in size between years in age-3 and age-5 fish, than in age-4 and age-6 fish. There were no age-2 fish in the 2005 sample. The percentage of male fish in 2006 was higher for every age class compared to 2005. The largest difference between years in each age class where we sampled fish was in the age-3 fish. The percent of age-3 fish that were male was 25% in 2005 and 71.4% in 2006.

Spring chinook abundance from August through October are shown in Figure 4 for the Nestucca, Trask, and Wilson Rivers for the 2005 and 2006 seasons. Spawner timing in 2005 and 2006 were very similar for all basins, with peak spawning usually occurring during the second or third week of September. Overall the Nestucca seems to have a more contracted spawning season than either of the other basins with 73% (third week) and 45% (second week) of the total live fish spawning in 2005 and 2006, respectively. The Trask River had 38% of total fish spawning during the second week of September in 2005 and 35% of total fish spawning during the first week of September in 2006.

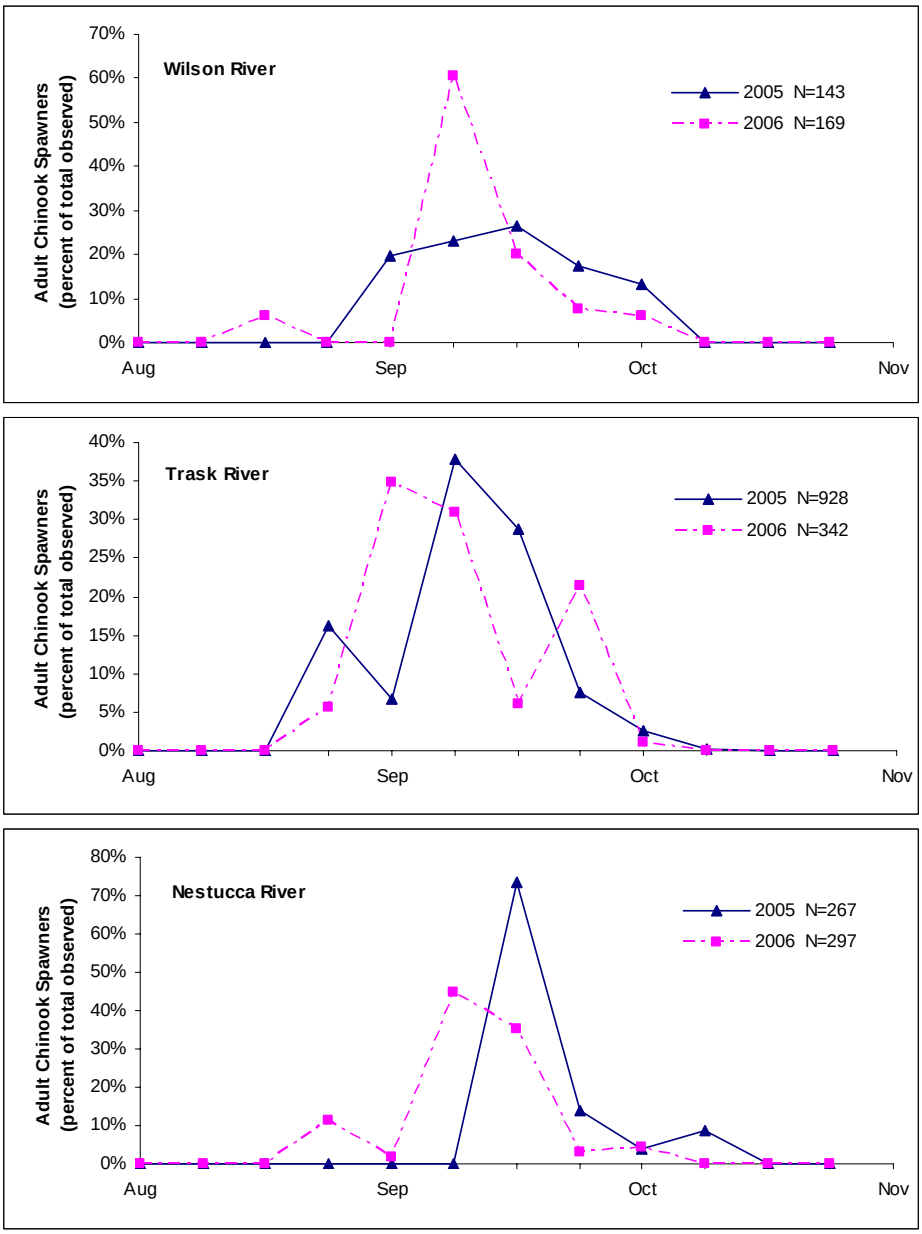


Figure 4. Temporal distribution of spawning adult spring chinook in the Wilson, Trask, and Nestucca River surveys during the 2005 and 2006 spawning seasons. Distributions in all areas based on counts of live fish.

The Wilson River showed the biggest difference in timing between the two seasons. The 2005 season was much more protracted than 2006 with a peak of only 27% of total fish spawning during the third week of September. The 2006 spawning timing was more similar to the other basins with 60% spawning during the second week of September. The earliest timing in which fish were seen was during the third week of August 2006 in the Wilson. The latest timing of fish was during the second week of October 2005 in both the Trask and Nestucca Rivers. With the exception of the Wilson River, inter-annual variation was very low for this two year period of monitoring.

Table 7. Summary of the average length (MEPS) and sex ratio for spring chinook carcasses sampled in the Nestucca, Trask, and Wilson Rivers combined for the 2005 and 2006.

		Age				
		2-year	**3-year**	**4-year**	**5-year**	**6-year**
2005	Average Length (mm)	N/A	587	702	747	814
	Percent Male	N/A	25.0%	33.9%	37.6%	0.0%
2006	Average Length (mm)	408	615	713	773	812
	Percent Male	100.0%	71.4%	47.9%	40.7%	33.3%

Hatchery Recycling

The fourth objective was to monitor the distribution and abundance of spring chinook recycled from local hatcheries. In 2006, district staff began marking spring chinook returning to the Trask Hatchery, for later release back into the mainstem (recycling). Three locations were designated for release; 1) Memaloose Ramp, 2) 5th Street Ramp, and 3) Upper Peninsula (wild fish only). A total of 1,067 hatchery and 47 wild fish were recycled in 2006. Of these 1,067 hatchery fish, 12 that were recycled once and one that had returned to the hatchery and been recycled twice, were recovered on spawning surveys. Table 8 summarizes the recycling effort in 2006. Slightly more than one percent of the tagged and recycled hatchery fish were later observed on the spawning surveys. Of the 12 fish recovered on surveys, 10 were released from the 5th Street Ramp and 2 were released originally from Memaloose Ramp. All 10 of the 5th Street recycled fish were recovered downstream of Trask Park. One of the Memaloose recycled fish was recovered on Loren's Drift to Long Prairie Bridge and the other was recovered on the Wilson between Sprague Wayside and Siskeyville. The only fish recovered that had been recycled twice was recovered on Loren's Drift to Long Prairie Bridge survey.

Table 8. Summary of spring chinook that returned to the Trask Hatchery, were recycled downstream, and recovered later on spawner surveys in 2006.

Hatchery Marking				**Spawning Survey Recovery**			
Tagging Date	**Hatchery Fish Tagged**	**Tag Color**	**Release Location**	**Recovered on Surveys**	**Percent Recovered**	**Recovery Location**	**Recovery Date**
06/13/06	57	black	5th street ramp	0	0.0%	N/A	N/A
06/27/06	266	red	5th street ramp	6	2.3%	25588 Seg 1	09/05/06
						25588 Seg 1	09/05/06
						25594 Seg 1	09/25/06
						25594 Seg 2	09/20/06
						25594 Seg 2	09/20/06
						25594 Seg 2	09/20/06
07/06/06	136	orange	Memaloose ramp	1	0.7%	25588 Seg 1	09/26/06
07/11/06	125	yellow	5th street ramp	1	0.8%	25594 Seg 2	09/20/06
07/18/06	206	blue	Memaloose ramp	1	0.5%	25650 Seg 1	10/03/06
07/24/06	277	green	5th street ramp	4	1.4%	25588 Seg 1[a]	09/26/06
						25588 Seg 1	09/05/06
						25588 Seg 1	09/26/06
Total:	**1,067**						

[a] One chinook was recycled twice (Green and Orange tag)

Future Plans

Data generated from two complete field seasons have given a much more accurate view of spring chinook spawning in the Tillamook area. The original objectives were met in 2005 and 2006. In 2007, we plan on accomplishing all of the same objectives highlighted in this report, and to obtain more precise estimates in our survey methodology and analysis.

In order to obtain Area Under the Curve (AUC) estimates of spring chinook abundance in these basins, sampling effort needs to meet fish residency parameters. A review of published data established a residence time (average numbers of day a fish is alive on the spawning grounds) for chinook salmon of 12.1 days (Perrin and Irvine 1990). Therefore, in 2007 we will attempt to survey all streams within a 10 day rotation. If this objective is met, we will also be meeting a second objective of completing an equal survey effort for all reaches in our monitoring area. We also plan to continue exploring areas outside of these 27 surveys in our monitoring area. This will be especially important during higher stream flows. At the current level of two survey crews, it may be difficult to meet these new objectives for 2007. This may be possible with extra survey help from district and research staff. Staff from ODFW will need to determine if the current level of monitoring is sufficient for meeting project objectives.

ACKNOWLEDGEMENTS

We wish to thank the NW Steelheaders and ODFW seasonal field biologists who worked on the spring chinook project. In particular, Ethan Guzman and Tim Plawman who have worked on this project since the first season. Their hard work has allowed us to obtain two years of excellent data. We would like to thank Robert Bradley and Keith Braun from the ODFW North Coast Watershed District office, for their help with project design, logistics, field sampling, and review of this manuscript. We would also like to thank Mark Lewis and Kelly Moore from the ODFW Corvallis Research Office for their support and assistance with project design, management, logistics, data analysis, and editorial review.

Finally, we wish to thank the ODFW Fisheries Restoration and Enhancement Board for funding this work and for continuing funding for the 2007 and 2008 spawning seasons.

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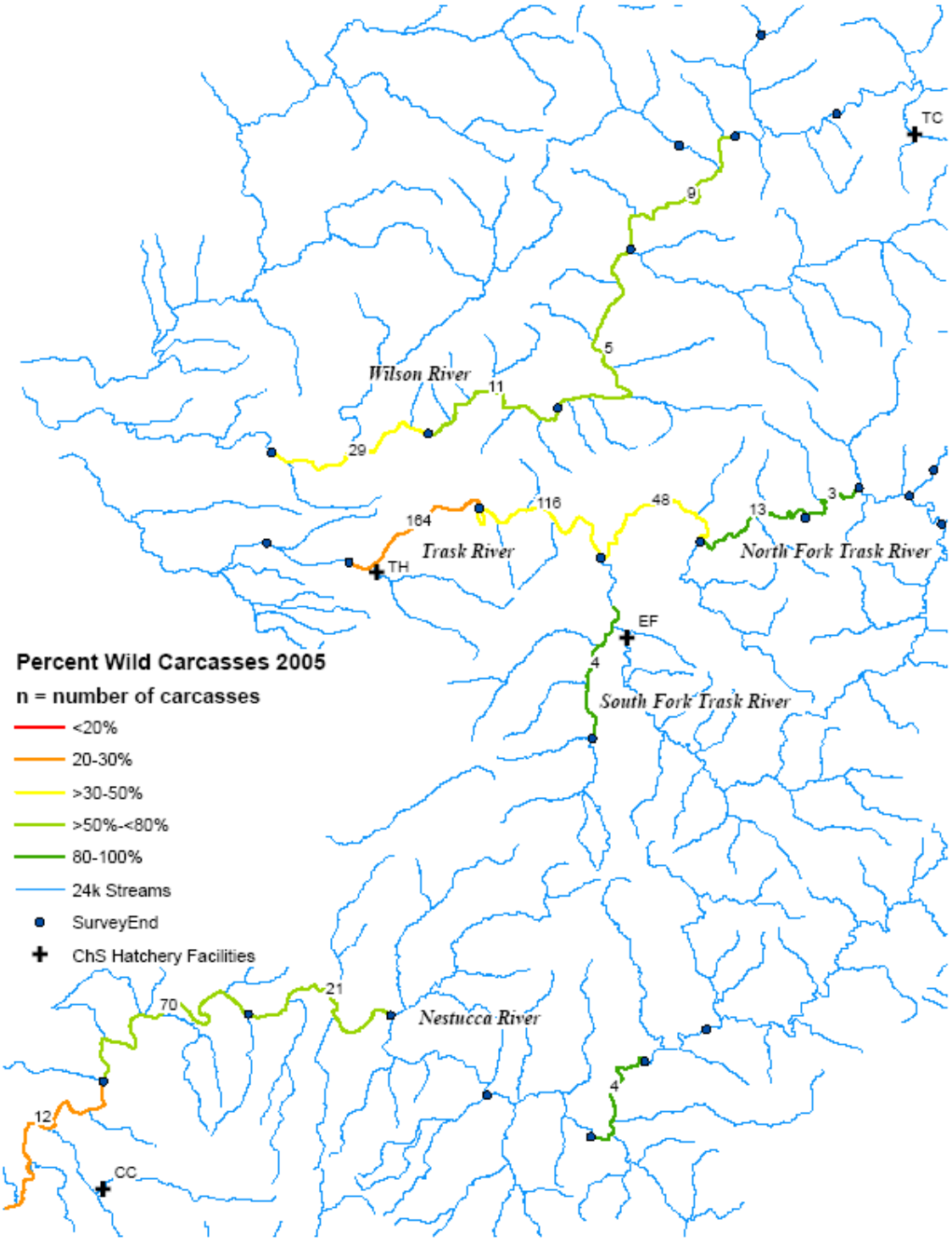
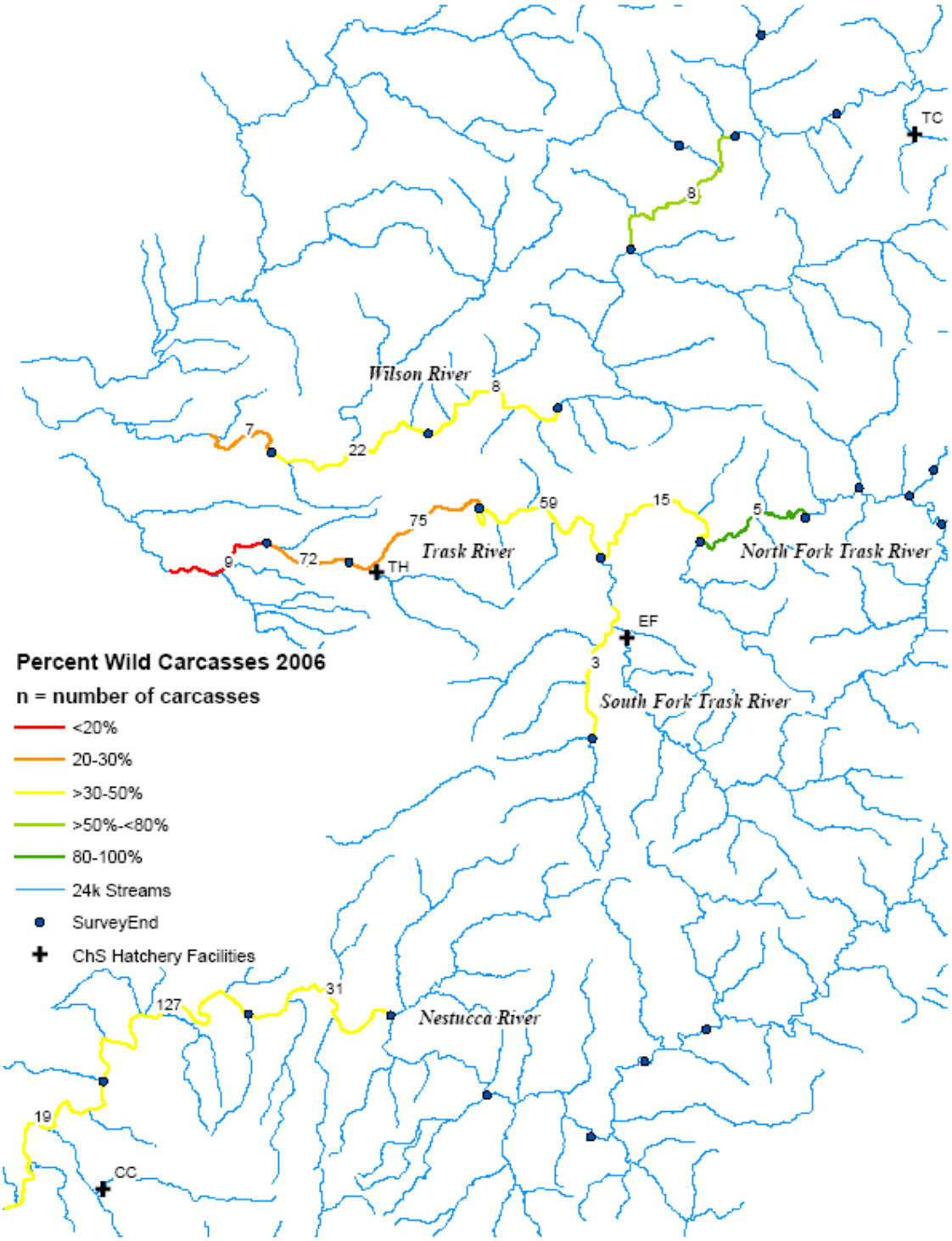
Appendix (Maps)

APPENDIX A – HATCHERY FRACTION MAPS

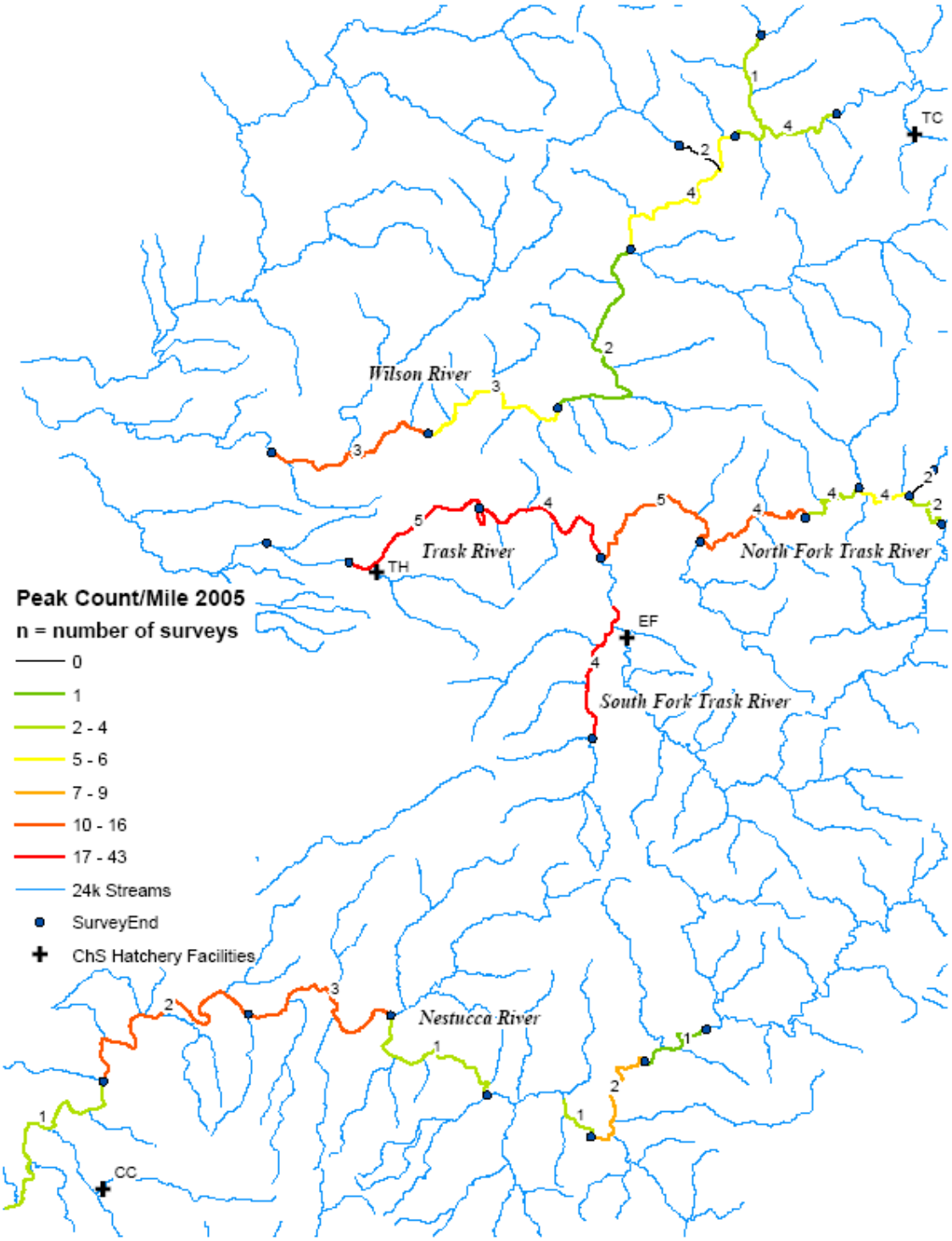


Appendix Figure A1. Map of 2005 Tillamook spring chinook hatchery/wild ratios.

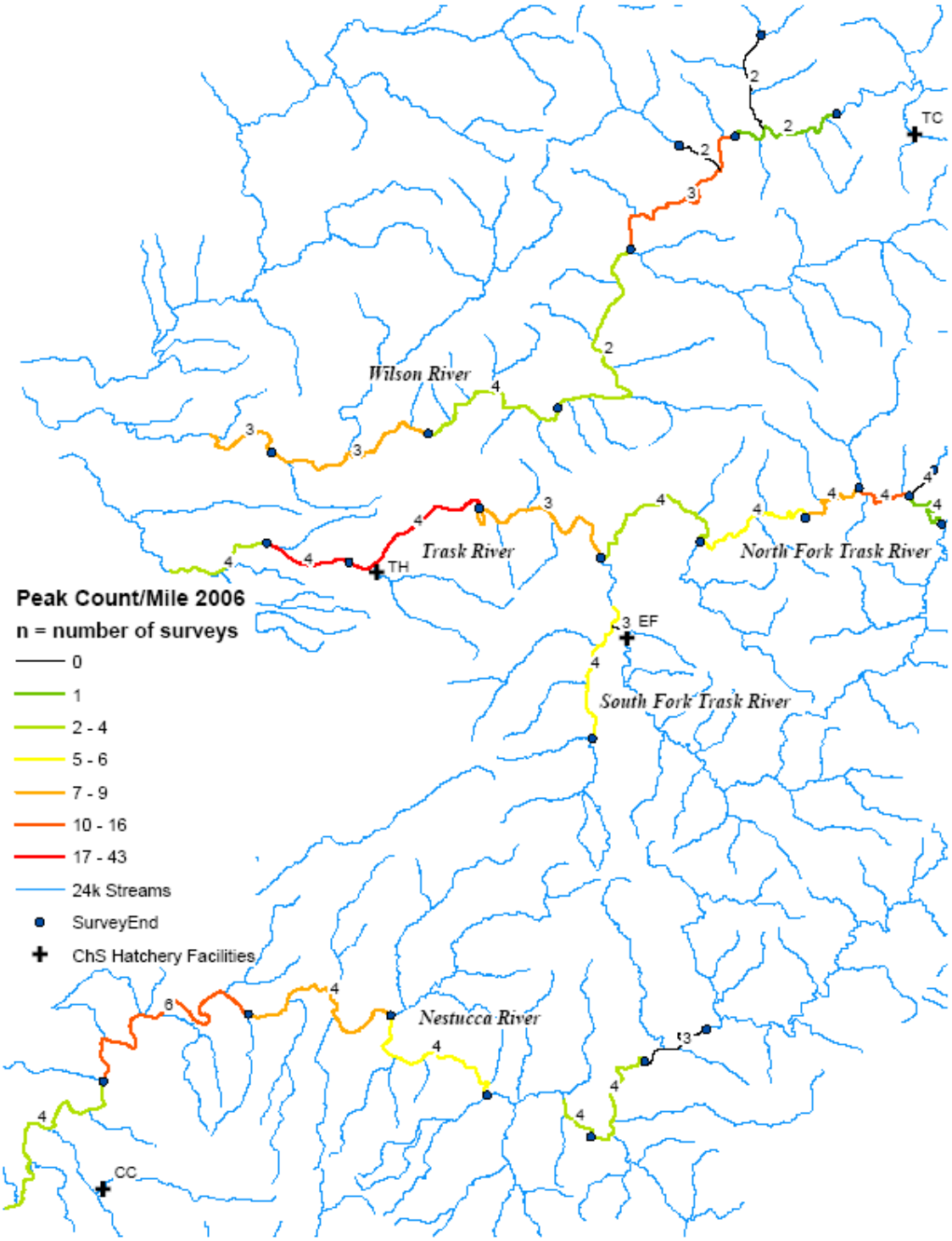


Appendix Figure A2. Map of 2006 Tillamook spring chinook hatchery/wild ratios.

APPENDIX B – DENSITY AND DISTRIBUTION MAPS



Appendix Figure B1. Map of 2005 Tillamook spring chinook peak density and distribution.



Appendix Figure B2. Map of 2006 Tillamook spring chinook peak density and distribution.

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