THE OREGON PLAN *for Salmon and Watersheds*

Assessment of Oregon Coastal Adult Winter Steelhead – Redd Surveys 2007

Report Number: OPSW-ODFW-2007-09

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SUMMARY

This report provides a summary of results from winter steelhead spawning ground surveys conducted along the Oregon coast in 2007. Sufficient surveys were conducted to meet precision estimates at the monitoring area level within the Oregon Coast DPS and at the DPS level in the Klamath Mountains Province DPS. Winter steelhead redd estimates for the 2007 spawning year were comparable to prior years for the two distinct population segments of coastal Oregon winter steelhead. Regional patterns are apparent for redd density, hatchery independence, and spawn timing.

INTRODUCTION AND METHODS

As part of the Oregon Plan for Salmon and Watersheds, the Oregon Department of Fish and Wildlife (ODFW) initiated a project to monitor spawning winter steelhead (*Oncorhynchus mykiss*) in coastal Oregon streams in 2003. This project is designed to assess the yearly status and trend, presence of hatchery fish, and distribution of winter steelhead spawners in six coastal Monitoring Areas (MA) in two Distinct Population Segments (DPS) (Figure 1).

A spatially balanced probabilistic sampling design (Stevens 2002) was used to select survey sites across a stream network of winter steelhead spawning habitat. Monitoring of winter steelhead abundance is based on counts of redds instead of live or dead fish, in accordance with prior work conducted by ODFW in Oregon coastal streams (Susac and Jacobs 1999). Repeat visits to each site from February through May generated a total redd count for each survey. Redds were marked with colored rocks and flagging to prevent re-counting, during subsequent surveys. The survey interval of once every fourteen days is based on prior research (Susac and Jacobs 1999). Specific descriptions of project protocols can be found in the annual survey procedures manual (ODFW 2007). More information on methods and study background is available in Suring (In Prep.).

RESULTS AND DISCUSSION

This report contains monitoring area level summaries for each steelhead DPS. Counts of lamprey redds and adults are recorded during steelhead surveys but are not reported here. Additional data for individual sites is available by contacting the Oregon Adult Salmonid Inventory and Sampling (OASIS) project. In 2007 surveys were also conducted above Winchester Dam on the North Umpqua River and Gold Ray Dam on the Rogue River. All redd estimates in this report do not include surveys above these barriers.

The 95% confidence interval for monitoring area estimates was within the target precision of ±30% for the Oregon Coast MAs, but this goal was only met at the DPS level in the Klamath Mountains Province DPS (KMP). Sites were selected at a rate of 1/20 miles of habitat, with higher density sampling (1/8 miles) in the Nestucca basin, above Smith River Falls, above Winchester Dam (Umpqua Basin), and above Gold Ray Dam (Rogue Basin). Seventy one percent of the total number of sites selected were successfully surveyed (Table 1). Eight percent

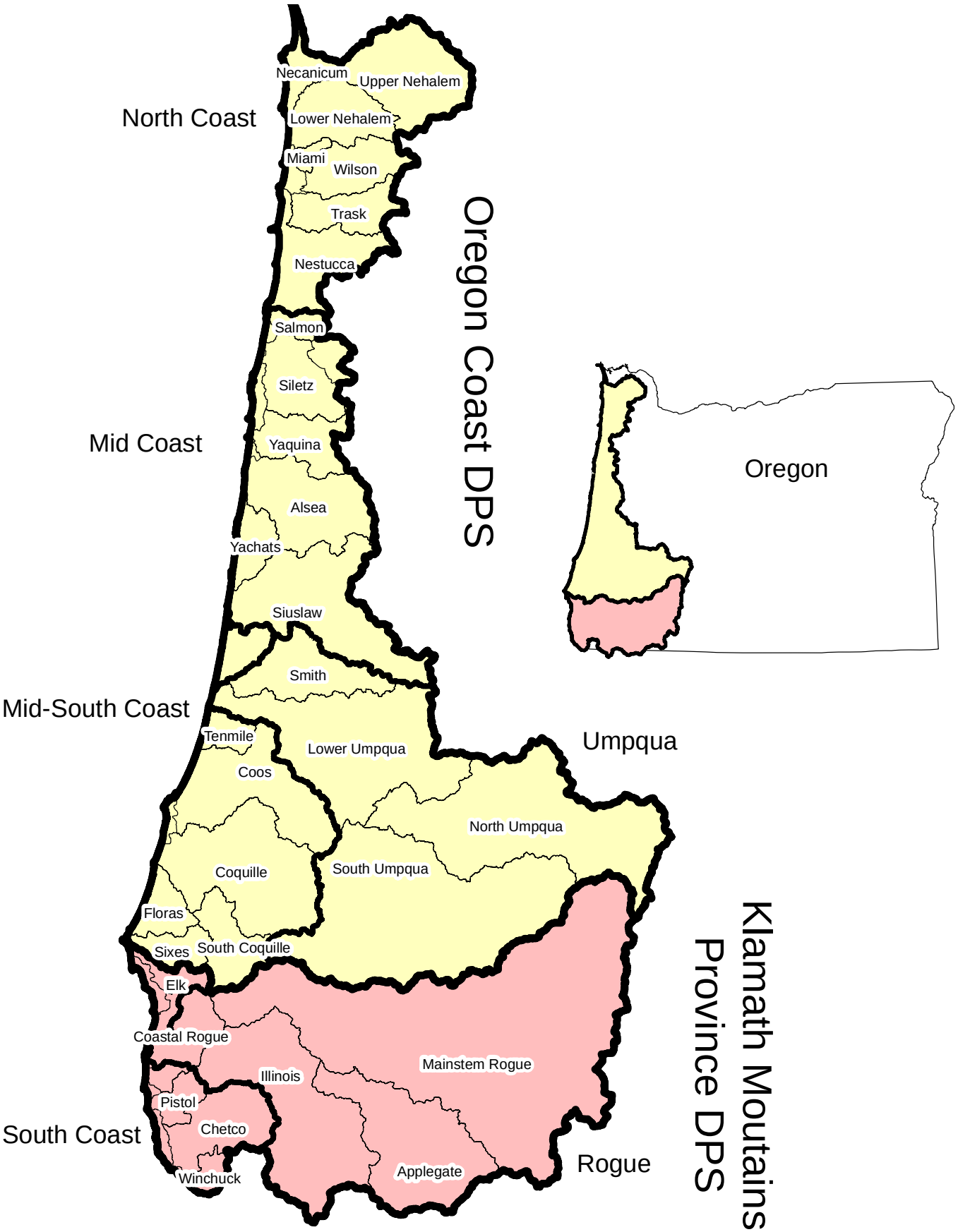

Figure 1. Steelhead monitoring study area showing the winter steelhead populations, monitoring areas and distinct population segments.

Table 1. Site status by monitoring area. Target sites fell within steelhead spawning habitat; response sites were successfully surveyed and non-response sites were not surveyed because of issues such as lack of landowner permission, site inaccessibility, or gaps in survey effort usually from stream turbidity. Non-target sites are outside of steelhead spawning habitat.

DPS	Monitoring Area	Target Response	Target Non-response	Non-target
Oregon Coast	North Coast	71	9	3
	Mid Coast	89	24	3
	Mid South Coast	34	13	2
	Umpqua	75	47	0
	Total	**269**	**93**	**8**
Klamath Mountains Province	South Coast	11	15	2
	Rogue River	24	8	0
	Total	**35**	**23**	**2**

coast-wide were not surveyed because of landowner access restrictions, with the Rogue having the highest proportion of access denials. Twenty five percent of the sites in the South Coast were too remote to survey because of their location in a road less area, and 38% of the sites in the Umpqua were not successfully surveyed because issues like high turbidity prevented successful surveys.

Oregon Coast DPS

The 2007 estimate of wild redds in the Oregon Coast DPS is similar to previous years (Figure 2). The 68,936 wild redds estimated in the Oregon Coast DPS (Table 2) were not evenly distributed across the area. The North Coast and Mid-South Coast MA had the highest wild densities of 15 and 20 redds/mile with 76% of sites with at least one redd in the North Coast and 88% in the Mid-South Coast. The Mid Coast and Umpqua MA had lower densities of 5 and 7 redds/mile, with 75% and 63% of sites with at least one redd. Finer scale spatial patterns were generally uniform within monitoring areas with the exception that the Upper Nehalem had very low densities (Figure 3).

The proportion of hatchery steelhead naturally spawning varied among the monitoring areas (Table 3), with the Mid Coast and North Coast having the highest proportions of hatchery produced fish. Patterns at the population level are confounded by low sample size but hatchery influence was not always uniform within monitoring areas (Figure 4). The average redd density among 5th field HUCs with greater than >4 identified steelhead was similar between those with >20% hatchery fish ($\bar{x}$ = 26, n = 10) and those with ≤20% hatchery fish ($\bar{x}$ = 27.6, n = 17).

Oregon coast steelhead spawn timing in 2007 was similar to previous years, with the peak of spawning in the Mid-South and Umpqua one month earlier than in the Mid Coast and North Coast (Figure 5). However, the early portion of the Mid Coast run was not as large a proportion of the total run as in other years. Stream discharge was lower than average during January (Figure 6) but did not appear to affect timing.

Table 2. 2007 Coastal Oregon winter steelhead redd abundance estimates. Estimates are derived from counts in random EMAP spawning surveys.

		Survey Effort		Winter Steelhead Redd Abundance			
				Total		Wild[a]	
DPS	Monitoring Area	Number of Surveys	Miles	Estimate	95% Confidence Interval	Estimate	95% Confidence Interval
Oregon Coast	North Coast	71	65.5	27,253	7,101	20,592	5,365
	Mid Coast	89	83.3	19,141	4,764	10,133	2,522
	Mid South Coast	34	32.7	26,048	6,575	24,312	6,136
	Umpqua	75	64.6	14,612	4,508	13,900	4,288
	Total	**269**	**246.1**	**87,054**	**11,690**	**68,936**	**9,549**
Klamath Mountains Province	South Coast	11	10.2	10,721	3,726	6,917	2,404
	Rogue River	24	26.6	7,523	2,997	6,986	2,783
	Total	**35**	**36.8**	**18,244**	**4,782**	**13,903**	**3,677**

a *Estimates of wild redds derived through application of live and carcass fin-mark recoveries in random surveys.*

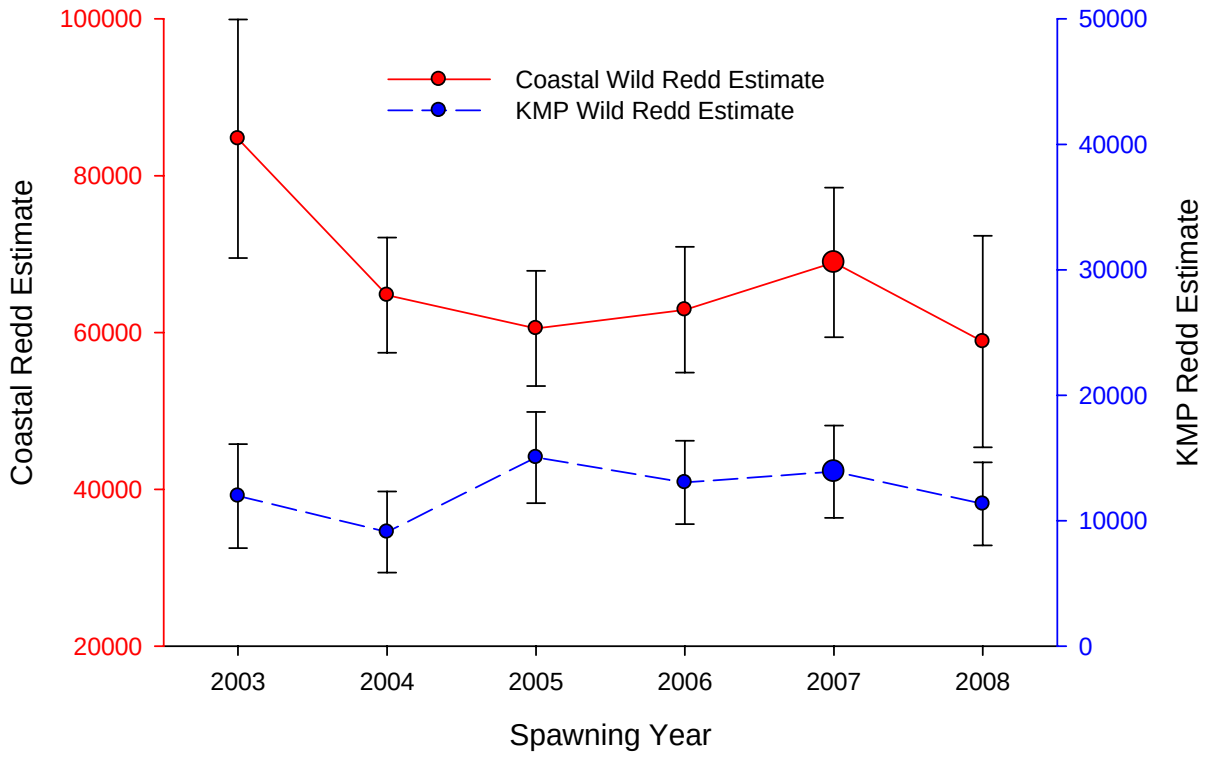

Figure 2. Winter steelhead wild redd estimates based on random surveys from 2003 to 2008. Error bars are 95% confidence intervals. 2004 KMP data does not include the Rogue.

In the North Coast 33% of steelhead with identified fin marks in 2007 were seen in February or earlier compared with 15% from 2003 – 2006. Only 3% of these early fish were wild compared to 61% wild in previous years. The standard hatchery correction method applies the mark rate of fish from throughout the season to the number of redds seen throughout the season. Doing so in this case, however, skews the results by applying the mark rate of early fish to counts of late redds. To account for this, for the North Coast in 2007 two mark rates were calculated, one February and earlier and one after February, and applied to the redds seen during those periods. Using this method would not have greatly changed results for other years or other monitoring areas.

Klamath Mountains Province DPS

In the area below Gold Ray Dam we estimate there were 13,903 wild produced redds in the Klamath Mountains Province DPS (Table 2); the redd estimate is similar to other years (Figure 2). The density of wild produced redds in the South Coast MA was higher than in the Rogue MA, at 21 redds/mile compared to 13 redds/mile. All South Coast sites had a least one redd and 92% of Rogue sites had at least one redd.

The South Coast MA had a higher proportion of hatchery steelhead (Table 3) which were distributed across the monitoring area (Figure 4). In the Rogue MA hatchery spawners were only found in the Applegate, with 10% hatchery spawners. Spawn timing was typical, with South Coast peak timing slightly earlier than the Rogue (Figure 5).

Table 3. Percentage of hatchery fish found on spawning surveys in 2007 based on adipose fin clip observations of live and dead steelhead.

DPS	Monitoring Area	Known Fish	Hatchery Percentage
Oregon Coast	North Coast	101	24%
	Mid Coast	68	47%
	Mid South Coast	105	7%
	Umpqua	82	5%
	Total	**356**	**19%**
Klamath Mountains Province	South Coast	31	35%
	Rogue River	56	7%
	Total	**87**	**17%**

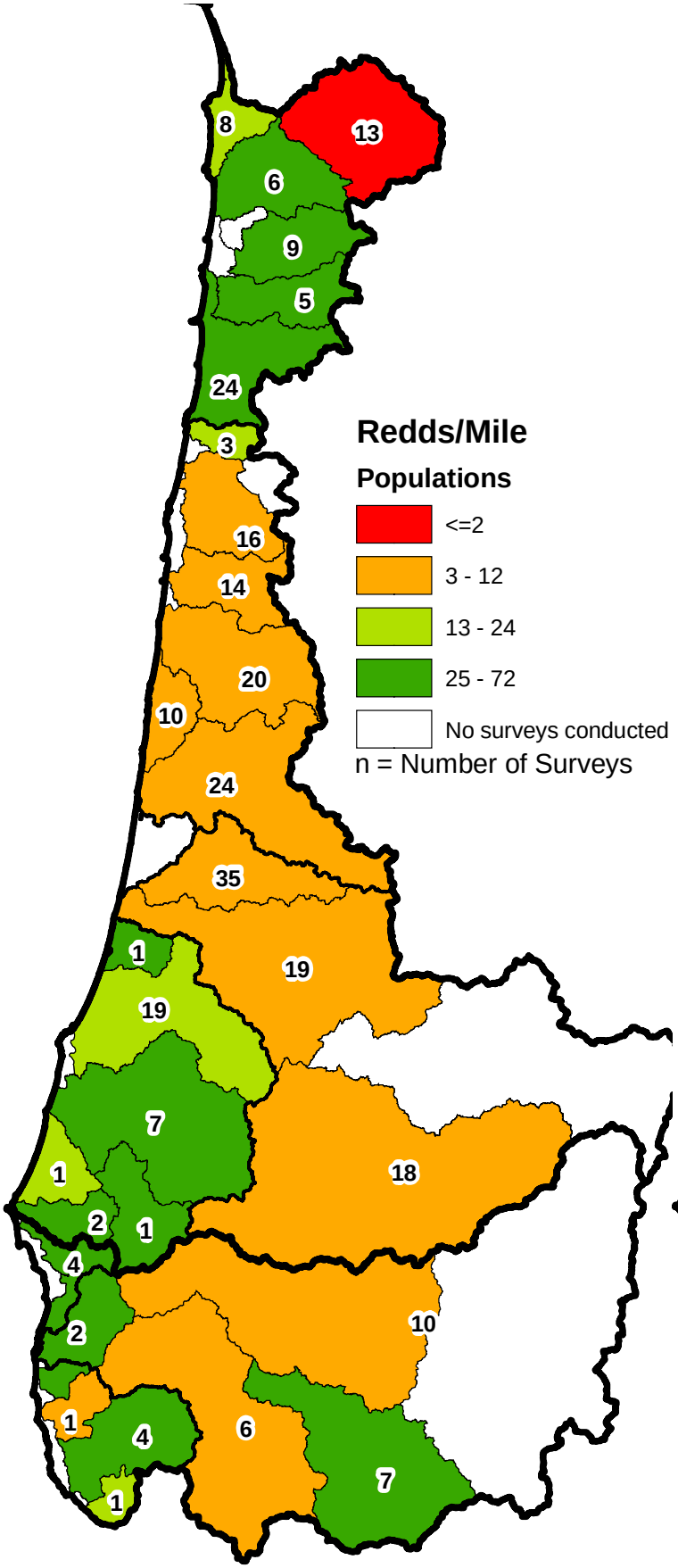

Figure 3. Total redds/mile in random surveys in 2007 by population with the number of surveys in each population.

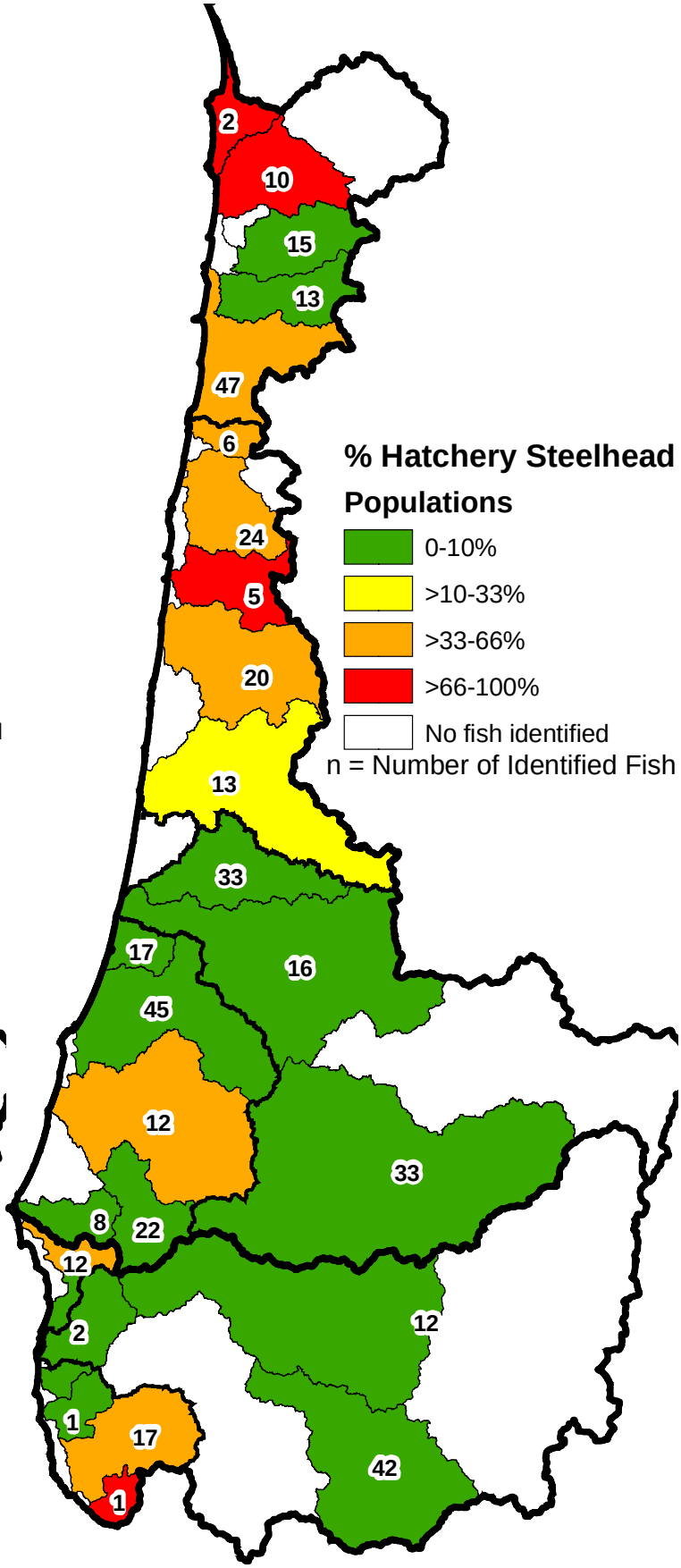

Figure 4. Percentage hatchery fish found on random surveys in 2007 based on adipose fin clip observations of live and dead steelhead. Data in each population may be based on multiple surveys.

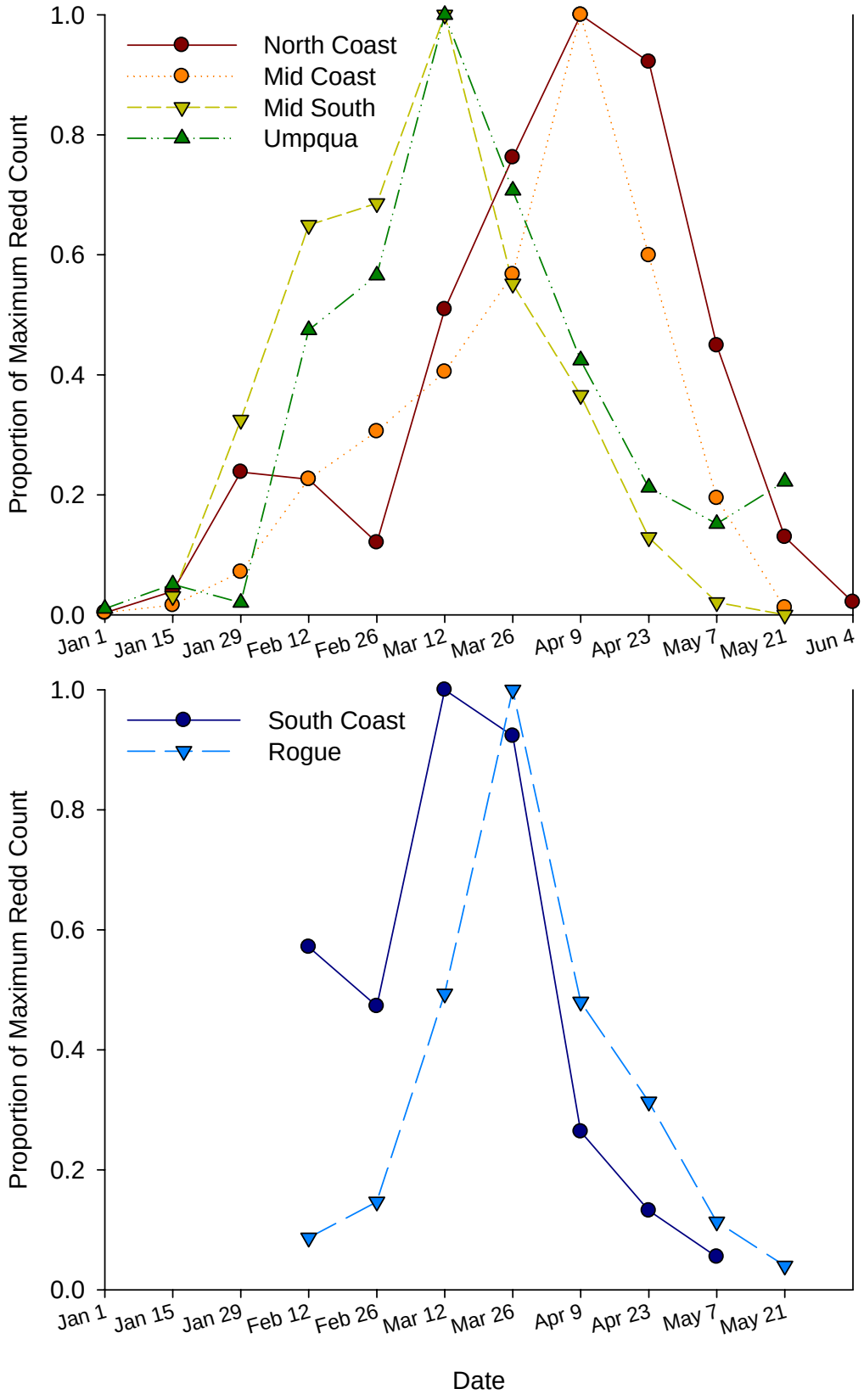

Figure 5. Proportion of the maximum winter steelhead redd count in each of the six monitoring areas by week of the year during 2007.

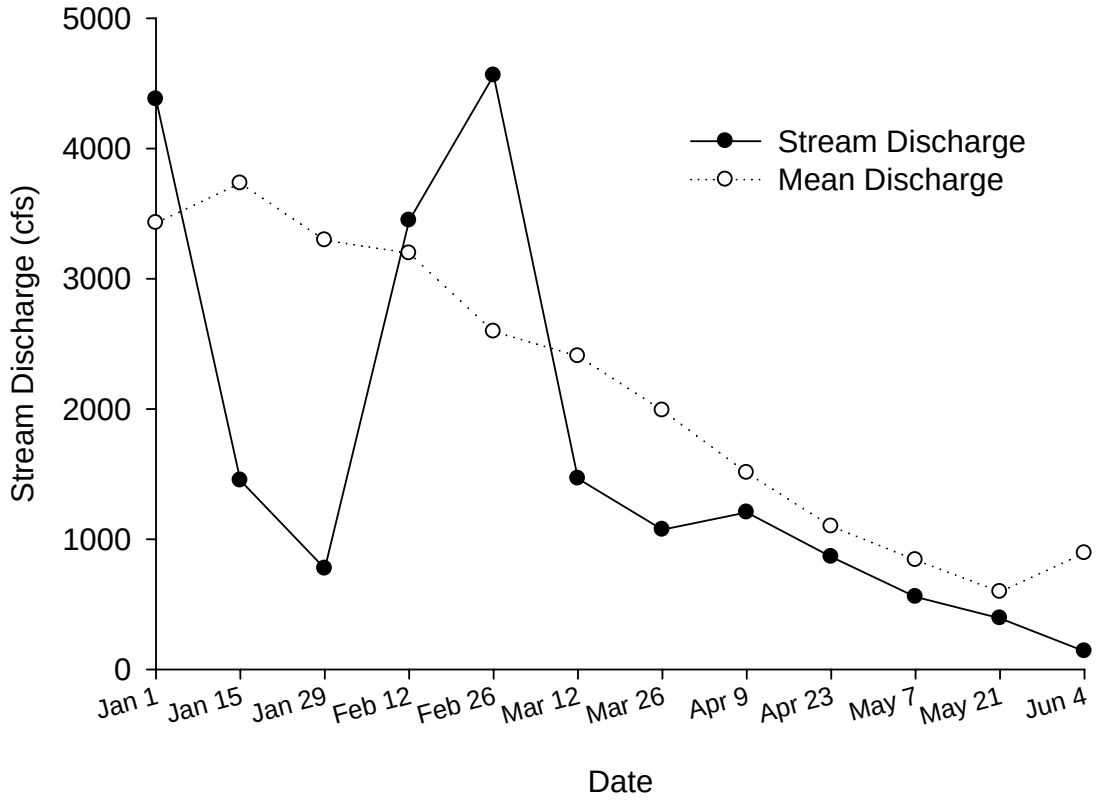

Figure 6. Stream discharge at Alsea River near Tidewater during 2007, compared to mean discharge from 1939 to 2006.

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