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Population Genetics of Entiat River Spring Chinook Salmon

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EXECUTIVE SUMMARY

The purpose of this study was to assess the genetic relationship between natural and hatchery-origin fish in the Entiat River watershed. The Entiat National Fish Hatchery (NFH) propagates Carson stock spring-run Chinook salmon. Carson stock originated from collections of spring Chinook salmon at Bonneville Dam in the 1950s, which presumably contained a mixture of fish migrating to various tributaries above the point of collection, and has not been considered part of the Upper Columbia River spring Chinook salmon ESU. We examined genetic variation at eight DNA microsatellite loci in population samples of hatchery and natural spring Chinook salmon from the Entiat River. Prior to this study, few genetic samples from natural-origin Entiat River spring Chinook salmon have been available. Also, the relationship between the Entiat NFH stock and the natural spawners in the Entiat River has not been well understood.

The Entiat River samples were provided by the U.S. Fish and Wildlife Service and consisted of Entiat NFH adults sampled in 1997 and 2001, spawned-out carcasses from the Entiat River sampled in 2001, and natural-origin Chinook salmon smolts sampled from the Entiat River in 2002 (brood year 2000). In addition to the Entiat River samples, we included six population samples from other parts of the Columbia River Basin in our analysis in order to provide additional context.

<u>Population</u>	<u>Run type</u>
Entiat NFH adults 1997	spring
Entiat NFH adults 2001	spring
Entiat River carcasses 2001	spring
Entiat River smolts (yearlings) 2002	spring (based on age)
Winthrop NFH adults 2001	spring
Chiwawa River juveniles 1994	spring
Carson NFH juveniles 1995	spring
John Day River juveniles 2000	spring (based on age)
Hanford Reach adults 1998	fall
Deschutes River juveniles 1998	fall (based on age)

The Chiwawa River sample is representative of the natural populations in the Upper Columbia River spring Chinook salmon ESU, and the Carson NFH and Winthrop NFH samples are (like the Entiat NFH) representative of the widely dispersed Carson spring Chinook hatchery stock.

The microsatellite loci were highly variable within each of the population samples. The largest degree of genetic differentiation among samples was between all of the spring-run samples and the two fall-run samples (Hanford Reach and John Day River). The level of differentiation among the spring-run samples alone was roughly tenfold less than the spring/fall difference. Within the spring-run groups, the samples from the John Day and Chiwawa rivers were the most genetically differentiated from all the other spring-run samples.

The Entiat River carcass samples from 2001 and the Entiat River smolt samples from 2002 were both genetically more similar to the Entiat NFH and Winthrop NFH samples than they were to the 1994 Chiwawa River sample. The Entiat and Winthrop NFH stocks are

primarily of Carson-stock origin, whereas the Chiwawa River stock is representative of the natural Upper Columbia River spring Chinook salmon natural populations.

The similarity of the Entiat River natural samples and the Entiat NFH samples suggests that Entiat NFH salmon have successfully spawned and introgressed into or replaced the natural Entiat River population. This could have occurred gradually since their introduction in 1974, or perhaps was a result of the crash of the natural population in 1995–2000. It is important to note that the 2002 smolt sample originated from a brood year (2000) in which 69% of the natural spawners were of hatchery origin. It would therefore be prudent to confirm the results presented here by obtaining additional samples of natural and hatchery-origin spawners from the Entiat River. It would also be informative to include additional contemporary samples of natural-origin spring Chinook salmon from the Wenatchee and Methow rivers.

ACKNOWLEDGMENTS

The Washington Department of Fish and Wildlife kindly provided many of the non-Entiat River samples used in this report.

This was a collaborative study with the Mid-Columbia River Fishery Resource Office of the U.S. Fish and Wildlife Service, whose staff collected the Entiat River and Entiat NFH samples and associated biological data. David Carie, Matt Cooper, Charles Hamstreet, and Don Campton, U. S. Fish and Wildlife Service; Anne Marshal, Washington Department of Fish and Wildlife; Chris Beasley; and Robin Waples, Northwest Fisheries Science Center, provided valuable comments on an earlier version of this document.

INTRODUCTION

The Entiat River drains an eastern portion of the Washington Cascades and joins the Columbia River at the town of Entiat. A natural population of typically several hundred spring Chinook salmon has spawned in the Entiat River since at least 1962 (Hamstreet and Carie 2002). The history of this population is uncertain, but it was presumably founded in large part by the Grand Coulee Fish Maintenance Project (GCFMP), which trapped all upstream migrating salmon at Rock Island Dam from 1939 to 1943 and released the adult fish or their progeny in the Wenatchee, Entiat, and Methow rivers (Chapman et al. 1995, Mullan et al. 1992, Myers et al. 1998). The Entiat National Fish Hatchery (NFH) released fish from the GCFMP for 2 years in the early 1940s, but then ceased propagating spring Chinook until 1974 (Cooper et al. 2002). From 1974 to 1981, the hatchery released spring Chinook using eggs obtained from a variety of non-local sources, primarily originating from the Carson NFH. Since 1982, the hatchery has primarily used returning adults caught in the hatchery trap for its broodstock (Cooper et al. 2002). The Carson stock originated from collections of spring Chinook salmon at Bonneville Dam in the 1950s, which presumably contained a mixture of fish migrating to various tributaries above the point of collection (primarily Snake River, Upper Columbia River tributaries, John Day River, Deschutes River, and Yakima River) (Myers et al. 1998). Leavenworth and Winthrop NFHs (on the Wenatchee and Methow rivers, respectively) also have propagated Carson stock spring Chinook since the mid-1970s (Mullan et al. 1992).

Previous population genetic studies of Upper Columbia River spring Chinook have found that some naturally spawning populations are genetically differentiated from the Carson-origin stocks propagated at Leavenworth, Entiat, and Winthrop NFHs. In particular, allozyme allele frequencies in population samples from the White, Twisp, Chiwawa, and Chewuch rivers have been detectably different from the NFH stocks, with the populations from the White and Twisp rivers the most distinct (Campton 2000, Matthews and Waples 1991, Utter et al. 1995). Samples from the three Upper Columbia River NFHs are generally more similar to samples from Carson NFH than they are to the samples from most naturally spawning populations (Campton 2000). The presumably mixed origin of the three NFH broodstocks and their genetic differentiation from most natural Upper Columbia River spring Chinook populations led the National Marine Fisheries Service (NMFS) to conclude that the hatchery broodstocks were not in the same Evolutionarily Significant Unit (ESU) as the natural populations, and should not be used for conservation purposes (NMFS 1999). As a result of this conclusion, the Winthrop NFH is phasing out propagation of its Carson-origin stock and replacing it with a stock derived in large part from natural-origin Methow River and Chewuch River spring Chinook salmon (Cooper et al. 2002).

In order to develop future conservation plans for the Entiat River, it would be useful to know the genetic relationship between the natural Entiat River population and the Entiat NFH population. Samples from the Entiat NFH and from natural Entiat spawners were included in previous datasets, but the sample size of the natural spawners was too small to draw strong conclusions. This report describes an analysis of microsatellite DNA variation in larger samples from the Entiat River and Entiat NFH collected by the U.S. Fish and Wildlife Service (USFWS) and provided to the Northwest Fisheries Science Center (NWFSC) in October 2001 and May 2002.

MATERIALS AND METHODS

Samples

The USFWS provided six groups of samples taken from adult returns to Entiat and Winthrop NFHs, carcasses from fish that spawned naturally in the Entiat River, and natural and hatchery-origin smolts from the Entiat River (Table 1). All samples were provided as fin tissue stored in ethanol. We analyzed 48 fish from each sample group, except for the Entiat NFH juveniles, which were not analyzed, and the Entiat River natural spawners, for which 96 fish were analyzed. In addition to the Entiat and Winthrop samples, samples from the Chiwawa River, Carson NFH, and the Hanford Reach, Washington; and the Deschutes River and John Day River, Oregon, were included to provide additional context for the analysis. All of the samples are part of a larger ongoing study of microsatellite variation in the Columbia River Basin.

DNA Extraction

DNA from a small piece of each fin clip was extracted using DNeasy 96 Tissue Kits (QIAGEN GmbH, Hilden, Germany) following the manufacturer's standard protocol.

PCR Amplification and Electrophoresis

Purified DNA was used as starting material for polymerase chain reaction (PCR) amplification of 8 microsatellite loci using fluorescently labeled primers (Table 2). PCR conditions are available upon request. Amplified DNA was electrophoresed through an ABI 3100 automated Genotyper and fragment sizes were estimated using ABI GeneScan software (Applied Biosystems, Foster City, California).

Genotyping

The estimated raw allele sizes for each individual at each locus were determined using ABI Genotyper software. The size distributions for each locus were also plotted. Generally, allele sizes fell into size distributions that were closely clustered either two or four base pairs apart, depending on whether the locus in question was a di- or tetra-nucleotide repeat (Figure 1). One locus, *ots 104*, had a complicated distribution that was consistent with variation at both di- and tetra-nucleotide repeats. Bins were constructed by eye, such that each distinct cluster of sizes fell into a unique bin. Bins were labeled sequentially, with the smallest observed allele cluster placed in Bin 5. Bins with no observed alleles were inferred and numbered accordingly based on the pattern of size distributions. The bins were then entered into the Genotyper to genotype all individuals. Each genotype was then checked by eye, and a genotype was only recorded for an individual at a locus if the individual has either one or two clearly defined peaks at that locus.

Statistical Analysis

All statistical analysis was performed using the Genetic Data Analysis (Lewis and Zaykin 2001) and Genepop (Raymond and Rousset 1995) software packages and is described in the results section.

Table 1. Population samples used for this study were collected from the Entiat River, Entiat and Winthrop NFHs, and other areas of the Columbia River Basin. (The short names are used in subsequent tables.)

NMFS sample group number	Description	Short name	Number analyzed^c
32857	Entiat NFH spring-run adults collected 1997	Entiat H 97	48
32861	Entiat River spring-run carcasses, summer 2001	Entiat R 01	96
32860	Entiat NFH spring-run adults collected summer 2001	Entiat H 01	48
32934	Entiat River smolts collected spring 2002 (BY 2000)	Entiat R 02	48
32859	Winthrop NFH spring-run adults collected 2001	Winthrop H 01	48
32863 (94DA) ^a	Chiwawa River juveniles collected 1994	Chiwawa R 94	48
32127	Carson NFH juveniles collected 1995	Carson H 95	48
32865 (98KH) ^a	Hanford Reach fall Chinook collected 1998	Hanford 98	48
32767 (98KN) ^b	Deschutes River fall Chinook juveniles collected 1998	Deschutes 98	48
32973,-74,-75	John Day River juveniles collected 2000	John Day 98	48

^a Samples provided by the Washington Department of Fish and Wildlife, sample group number is included.

^b Samples provided by the Columbia River Inter-Tribal Fish Commission.

^c Number of samples processed in the laboratory; genotypes were not necessarily scored for all samples.

Table 2. List of microsatellite loci used in the study.

Microsatellite loci	Source
ots-3	Banks et al. 1999
ots-2m	Banks et al. 1999
ssa-408	Cairney et al. 2000
ogo-4	Olsen et al. 1998
ots-d9	Naish unpublished data
oke-4	Buchholz et al. unpublished data
ots-10m	Banks et al. 1999
ots-104	Nelson and Beacham 1999

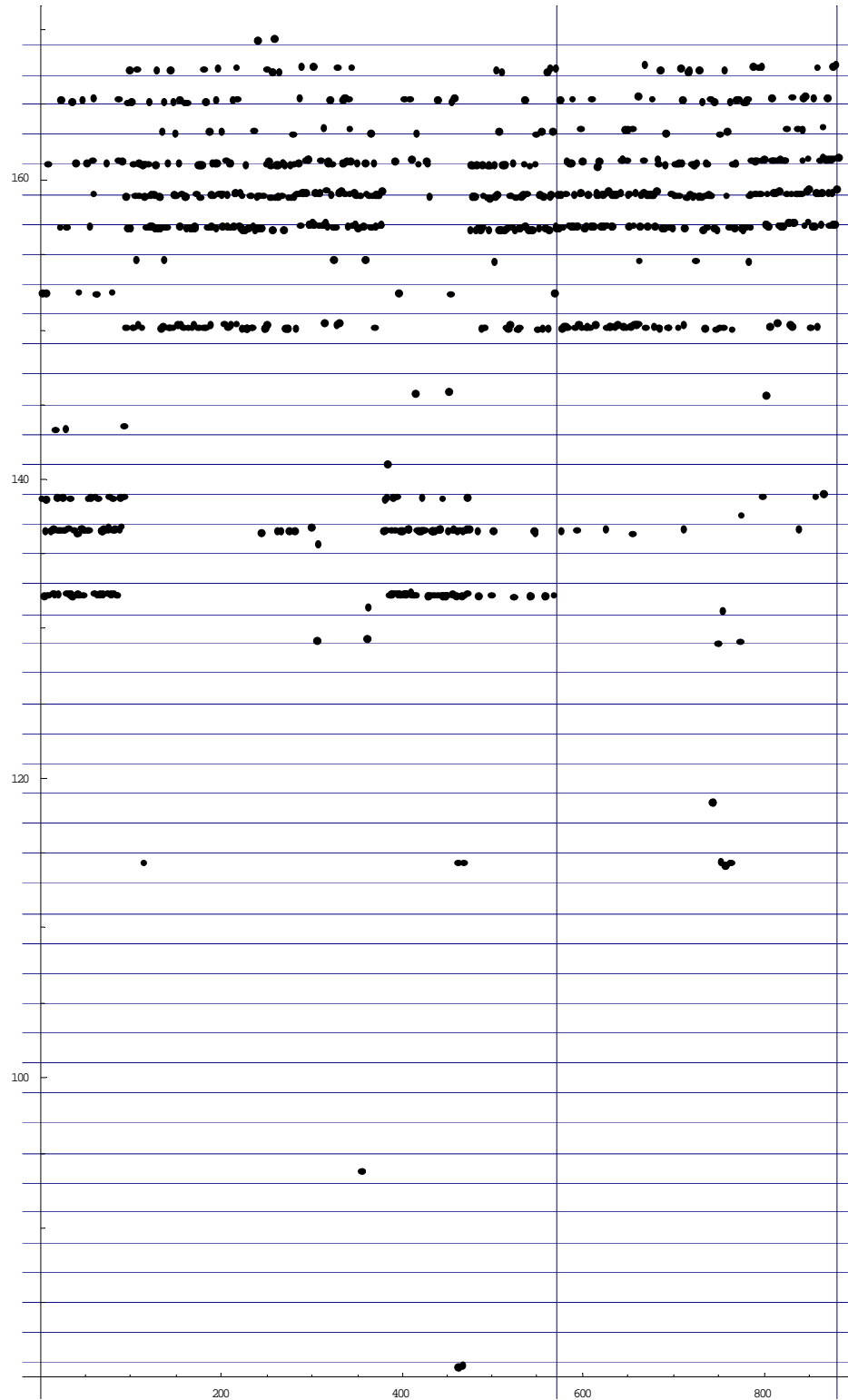


Figure 1. Raw allele size distribution at the ogo-4 locus. Each individual in the study is aligned along the x-axis, and the estimated sizes (in base pairs) of each individual's ogo-4 alleles are plotted on the y-axis.

RESULTS

The genotypes of each individual in the study, along with additional sampling information provided by the USFWS, are provided in Appendix A. In general, most samples amplified well and produced scored genotypes. One exception was the Entiat River redd survey sample. Many of the fish in this sample failed to amplify at most loci, and DNA concentrations in this sample were extremely low for many individuals. After an initial screening of 48 individuals produced only ≈ 20 with scored genotypes, DNA extractions were repeated for the original 48 samples plus an additional 48 samples in order provide a larger number of scored genotypes. The low quantity of DNA in this sample group was presumably due to degradation of many carcasses prior to sampling.

Descriptive Statistics and Tests for Hardy-Weinburg Equilibrium

The number of scored individuals in each population, number of alleles per locus, and expected and observed heterozygosity for each population averaged across loci are provided in Table 3. Averaged across loci, the Entiat River carcass sample and Entiat River wild smolt sample deviated significantly from Hardy-Weinburg expectations. In the carcass samples the deviations were not consistent among loci, and may be due to difficulties in obtaining accurate genotypes from these samples. The deviations in the Entiat River smolt sample were consistently in the direction of too few heterozygotes, and may reflect admixture between two different population groups. When averaged across populations, several loci consistently deviated significantly from the Hardy-Weinburg Equilibrium (HWE). Ssa-408 and ots-104 tended to have positive inbreeding coefficients (f) in several populations. This pattern is indicative of one or more rare null alleles segregating in the populations, and is commonly observed at highly polymorphic loci.

Population Differentiation and F-statistics

We estimated the degree of genetic differentiation among populations using Weir and Cocherhams' θ statistic (Weir 1996). Ninety-five percent confidence intervals for θ were estimated by bootstrapping over loci 1,000 times. Several subsets of the data were analyzed, focusing on the degree of differentiation between the Entiat River samples and the Entiat NFH samples. Genetic differentiation among populations was also visualized by neighbor joining trees of the population samples, using θ as a genetic distance.

The largest degree of genetic differentiation ($\theta \approx 0.10$) occurred between ocean-type fall/summer Chinook (Hanford Reach and Deschutes River fall Chinook) and stream-type spring Chinook (Table 4, Figure 2). The relatively high level of genetic divergence between those two life-history groups is consistent with previous studies (Ford 1998, Myers et al. 1998, Utter et al. 1995).

Table 3. Summary of variation in each population. Averaged across loci, the Entiat River carcass sample and Entiat River wild smolt sample deviated significantly from Hardy-Weinburg expectations.

Sample^a	<i>n</i>^b	<i>Ap</i>^c	<i>He</i>^d	<i>Ho</i>^e	<i>f</i>^f
Deschutes 98	41	12	0.80	0.82	-0.03
Winthrop H 01	43	10	0.73	0.73	-0.01
Entiat H 01	48	10	0.72	0.72	-0.01
Chiwawa R 94	46	10	0.70	0.65	0.07
Hanford 98	48	12	0.80	0.79	0.01
Entiat R 02	47	11	0.73	0.68	0.07
Carson H 95	46	10	0.71	0.71	0.00
Entiat H 97	39	10	0.72	0.75	-0.03
Entiat R 01	59	11	0.72	0.76	-0.05
John Day 98	47	10	0.71	0.67	0.06
Mean	46	10	0.73	0.73	0.01

^a See Table 1 for sample references.

^b *n* = average number of individuals in sample with scored data.

^c *Ap* = average number of alleles per locus.

^d *He* = average expected heterozygosity.

^e *Ho* = average observed heterozygosity.

^f *f* = inbreeding coefficient (proportion heterozygote deficiency or excess).

Table 4. Pairwise estimates of θ among all samples. The largest degree of genetic differentiation ($\theta \approx 0.10$) occurred between ocean-type fall/summer Chinook and stream-type spring Chinook.* The first row and the first column in the table contain the names of the population samples (see Table 1 for additional sample information).

	Deschutes 98	Winthrop H 01	Entiat H 01	Chiwawa R 94	Hanford 98	Entiat R 02	Carson H 95	Entiat H 97	Entiat R 01	John Day 00
Deschutes 98	–									
Winthrop H 01	0.099	–								
Entiat H 01	0.096	0.007	–							
Chiwawa R 94	0.104	0.025	0.021	–						
Hanford 98	0.011	0.088	0.086	0.096	–					
Entiat R 02	0.086	0.004	0.004	0.013	0.078	–				
Carson H 95	0.099	0.005	0.006	0.010	0.090	0.003	–			
Entiat H 97	0.096	0.011	0.000	0.027	0.084	0.008	0.011	–		
Entiat R 01	0.094	0.003	0.005	0.015	0.084	0.001	0.000	0.007	–	
John Day 00	0.109	0.013	0.008	0.039	0.100	0.012	0.024	0.007	0.016	–

* Estimates in bold have a 95% confidence interval, which does not include zero.

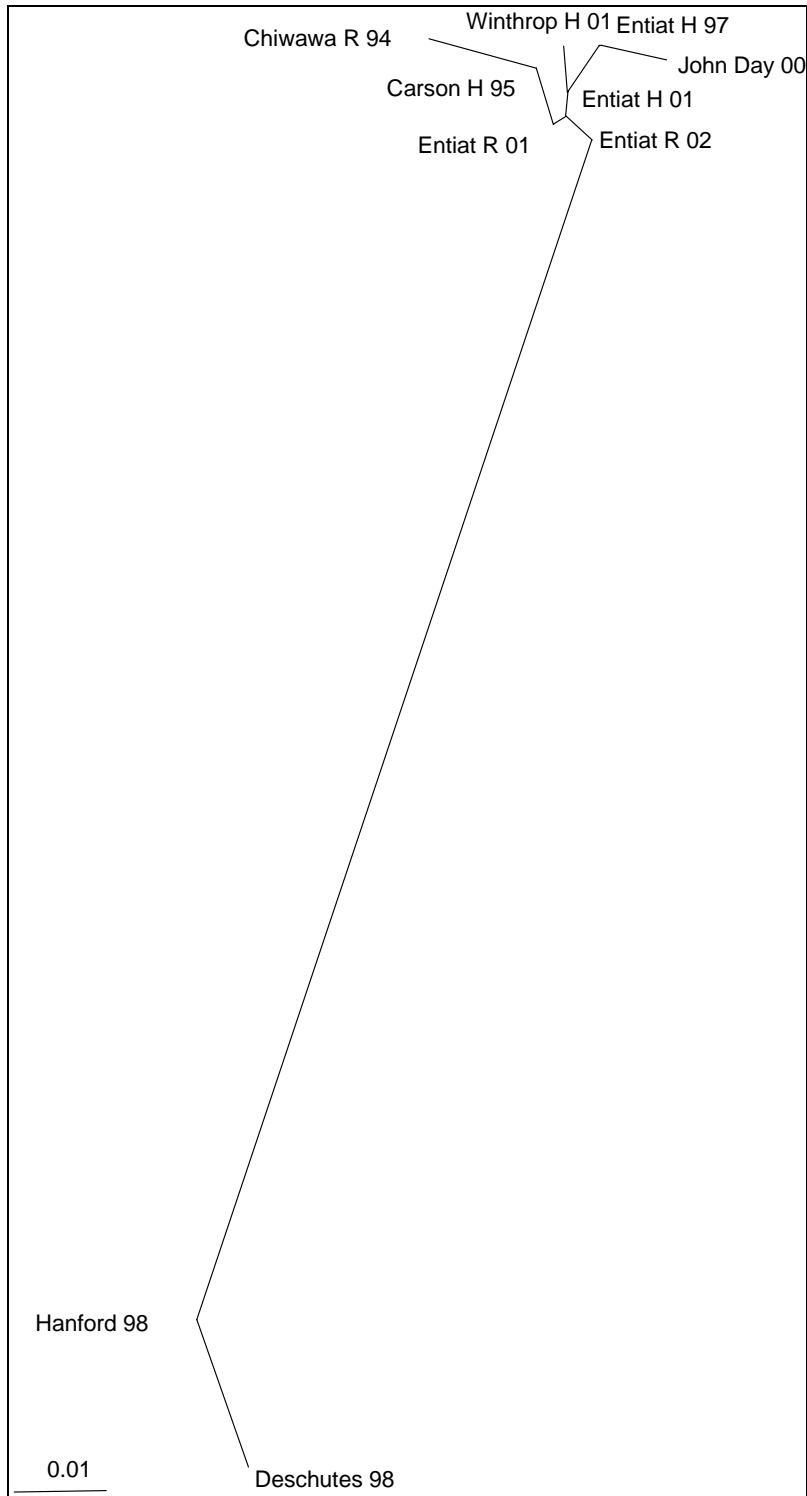


Figure 2. Unrooted neighbor joining tree illustrating the patterns of genetic relatedness among the samples based on pairwise θ estimates (scale at bottom left from statistics in Table 4).

Levels of differentiation among the stream-type populations were much lower than the ocean/stream-type divergence ($\theta = 0.01$; 95% CI 0.0055–0.018). All samples from the Entiat River, both natural and hatchery, were similar to each other and to the Winthrop and Carson NFH samples. In addition, 95% confidence intervals for pairwise θ estimates include zero for most comparisons among these groups (Table 4). Of the 96 Entiat River carcass samples included in the analysis, 22 were hatchery-origin fish based on scale or coded-wire tag (CWT) analysis (Appendix A). The removal of these fish from the carcass samples had essentially no effect on the results (data not shown). The Chiwawa and John Day River samples were the most genetically distinctive within the group of stream-type samples, with θ significantly greater than zero for all comparisons except John Day/Entiat NFH 2001 comparison (Table 4).

In addition to estimating θ , we also directly tested the hypothesis that pairs of samples were drawn from the same allele frequency distribution using the Monte Carlo permutation test implemented in the program Genepop (Raymond and Rousset 1995). Summed across loci, the hypothesis of identical allele frequency distributions was rejected (p -values vary, but are generally $\ll 0.001$) for all pairs of populations except for the two Entiat River NFH samples, indicating that even pairs of populations with very low θ values are not completely panmictic. This result is consistent with generally lower proportions of hatchery-origin fish on the spawning grounds than in the Entiat NFH broodstock. According to a preliminary USFWS analysis (M. Cooper and C. Hamstreet¹), approximately 69%, 32%, and 23% of the total Entiat River spawning population was of hatchery origin in the years 2000, 2001, and 2002, respectively. In the Entiat NFH stock for the same years, the proportions of Carson-lineage hatchery fish were estimated to be 77%, 93%, and 56%.

¹ M. Cooper and C. Hamstreet, U.S. Fish and Wildlife Service Mid-Columbia River Fishery Resource Office, 7501 Icicle Road, Leavenworth, WA 98826. Pers. commun., 14 November 2002.

DISCUSSION AND CONCLUSIONS

The Entiat River natural carcass samples from 2001 and the Entiat River smolt samples from 2002 were both genetically more similar to Entiat and Winthrop NFH samples than they were to the 1994 Chiwawa River sample. The Entiat and Winthrop NFH stocks are primarily of Carson-stock origin (see Introduction), whereas the Chiwawa River stock is presumably more representative of post-GCFMP Upper Columbia River natural populations (Utter et al. 1995).

The similarity of the Entiat River natural samples and the Entiat NFH samples suggests that Entiat NFH salmon have successfully spawned and introgressed into or replaced the natural Entiat River population. This could have occurred gradually since their introduction in 1974, or perhaps was a result of the crash of the natural population in 1995–2000 (Hamstreet and Carie 2002). Conceptually, other possible explanations for the high degree of similarity of the Entiat NFH and Entiat natural samples include either a lack of statistical power to detect genetic differentiation or the possibility that the natural Entiat River population coincidentally has allele frequencies that are essentially the same as the Carson-origin stocks. The former alternative seems unlikely, because the level of differentiation among the other samples (the ocean-type samples and the John Day River and Chiwawa River samples) is similar to what has been observed previously. The latter alternative also seems unlikely, although it cannot be ruled out entirely without collecting data at additional loci. It is also worth noting that the 2002 smolt sample originated from a brood year (2000) in which 69% of the natural spawners were of hatchery origin (see Results section) and that the 2001 carcass sample was somewhat compromised by poor sample quality. It would therefore be prudent to confirm the results presented here by obtaining additional samples of natural and hatchery-origin spawners from the Entiat River. It would also be informative to include additional contemporary samples of natural-origin spring Chinook salmon from the Wenatchee and Methow rivers.

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APPENDIX A: DATA TABLES USED IN ANALYSIS

This appendix contains the raw genetic data used in this report (Table A-1 through A-10), as well as sample information provided by the USFWS (Tables A-11 through A-13). Individual sample numbers for the 2001 Entiat National Fish Hatchery (NFH), 2001 Winthrop NFH, and 2001 Entiat River genetic samples correspond to the numbers provided by the USFWS (see Tables A-11 through A-13). A Microsoft Excel file of the data is available at <http://www.nwfsc.noaa.gov/publications/techmemos/tm60/tm60EntiatSpringChinookData.xls>

Table A-1. Data for Deschutes 1998 samples.

Population	Sample no.	Genotype															
		Ogo4	Ogo -	Oke 4 -	Oke4 -	Ots104	Ots104 -	Ots10	Ots2	Ots2	Ots3 -	Ots3	Otsd	Otsd	Ssa40	Ssa40	
		- 1	2	1	2	- 1	2	m - 1	m - 2	m - 1	m - 2	1	- 2	9-1	9-2	8-1	8-2
Deschutes 98	32767-0011	32	38	?*	?	37	43	12	12	12	17	14	15	10	14	9	19
Deschutes 98	32767-004	29	31	6	8	17	37	10	12	12	19	14	16	12	13	12	17
Deschutes 98	32767-006	32	38	6	6	17	41	10	12	10	15	14	14	10	12	19	19
Deschutes 98	32767-009	29	42	?	?	41	67	10	12	17	18	15	15	10	12	6	13
Deschutes 98	32767-017	29	31	?	?	39	39	11	12	12	25	14	16	10	14	5	19
Deschutes 98	32767-020	31	31	?	?	33	41	10	10	12	17	14	16	?	?	18	21
Deschutes 98	32767-021	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
Deschutes 98	32767-025	29	31	?	?	25	39	10	12	13	25	14	16	?	?	12	19
Deschutes 98	32767-028	29	34	5	6	31	37	12	12	12	26	15	16	14	14	6	18
Deschutes 98	32767-043	31	32	8	8	31	35	10	12	12	24	15	16	10	14	8	19
Deschutes 98	32767-045	29	31	5	6	9	43	10	11	12	16	14	16	10	14	9	12
Deschutes 98	32767-053	5	5	8	8	31	37	10	12	10	10	9	12	9	13	8	17
Deschutes 98	32767-055	31	32	?	?	29	33	10	12	10	25	12	16	?	?	15	15
Deschutes 98	32767-060	31	31	?	?	29	35	10	10	10	17	14	16	?	?	11	19
Deschutes 98	32767-068	34	40	?	?	33	37	4	12	12	18	14	15	?	?	11	19
Deschutes 98	32767-072	29	31	?	?	27	65	10	10	12	14	14	16	?	?	12	31
Deschutes 98	32767-073	29	32	6	6	29	35	11	11	17	17	12	16	11	14	14	22
Deschutes 98	32767-083	29	44	6	8	39	67	12	12	17	27	14	17	10	14	14	30
Deschutes 98	32767-085	29	29	5	9	31	33	11	12	12	20	15	16	11	13	12	31
Deschutes 98	32767-086	31	42	6	9	25	41	12	12	12	24	15	16	10	13	13	22
Deschutes 98	32767-092	31	31	?	?	37	43	12	12	25	25	14	18	?	?	12	20
Deschutes 98	32767-096	29	38	?	?	15	31	12	12	10	12	14	15	11	13	8	19
Deschutes 98	32767-100	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
Deschutes 98	32767-112	29	31	?	?	27	35	11	12	18	19	14	14	?	?	15	19
Deschutes 98	32767-117	31	44	5	8	35	45	10	12	10	18	14	16	10	14	14	19
Deschutes 98	32767-122	29	31	6	6	37	39	10	12	10	19	14	14	5	11	16	17
Deschutes 98	32767-128	31	42	6	8	37	45	12	12	17	25	15	15	12	14	6	19
Deschutes 98	32767-131	31	32	5	6	43	45	2	10	17	25	14	15	10	10	31	31
Deschutes 98	32767-134	31	40	6	8	35	37	10	12	12	19	15	17	9	14	14	16
Deschutes 98	32767-148	32	42	8	9	13	37	11	11	10	17	14	18	12	14	11	21

Table A-1 continued. Data for Deschutes 1998 samples.

Population	Sample no.	Genotype															
		Ogo4 - 1	Ogo - 2	Oke 4 - 1	Oke4 - 2	Ots104 - 1	Ots104 - 2	Ots10 m - 1	Ots10 m - 2	Ots2 m - 1	Ots2 m - 2	Ots3 1	Ots3 - 2	Otsd 9-1	Otsd 9-2	Ssa40 8-1	Ssa40 8-2
Deschutes 98	32767-149	41	44	?	?	45	53	11	11	12	25	15	15	?	?	11	14
Deschutes 98	32767-151	29	32	?	?	25	33	12	12	12	17	14	14	?	?	12	19
Deschutes 98	32767-164	38	38	5	7	33	51	10	10	12	25	14	17	9	13	8	8
Deschutes 98	32767-170	29	32	?	?	19	43	10	10	10	23	10	17	13	14	11	11
Deschutes 98	32767-174	29	31	?	?	37	43	10	11	10	25	14	14	12	14	12	13
Deschutes 98	32767-180	31	31	?	?	29	45	10	12	12	26	14	17	9	11	16	19
Deschutes 98	32767-187	29	31	6	9	17	31	10	11	7	12	14	15	12	14	9	9
Deschutes 98	32767-189	31	42	6	6	39	41	11	12	10	12	12	13	10	14	14	16
Deschutes 98	32767-193	29	31	?	?	35	37	10	12	10	10	12	13	?	?	8	17
Deschutes 98	32767-195	31	32	?	?	39	47	10	12	18	25	16	17	?	?	8	19
Deschutes 98	32767-196	29	38	6	8	33	45	10	12	12	25	14	16	12	14	9	11
Deschutes 98	32767-201	31	32	5	6	31	37	12	12	12	18	15	15	10	12	9	13
Deschutes 98	32767-205	29	31	6	8	37	39	12	12	12	18	14	16	10	12	17	19
Deschutes 98	32767-208	29	29	6	8	53	53	10	12	12	23	14	16	7	14	17	20
Deschutes 98	32767-215	?	?	?	?	45	65	10	12	10	12	16	16	9	12	19	31
Deschutes 98	32767-217	31	32	?	?	27	45	11	12	14	19	14	16	12	14	11	31
Deschutes 98	32767-219	31	42	?	?	35	39	12	12	15	26	15	17	?	?	6	31
Deschutes 98	32767-220	32	34	?	?	25	45	10	12	12	12	14	15	?	?	14	19

* Indicates missing data.

Table A-2. Data for Winthrop 2001 samples.

Population	Sample no.	Genotype															
		Ogo4 - 1	Ogo - 2	Oke 4 - 1	Oke4 - 2	Ots104 - 1	Ots104 - 2	Ots10 m - 1	Ots10 m - 2	Ots2 m - 1	Ots2 m - 2	Ots3 1	Ots3 - 2	Otsd 9-1	Otsd 9-2	Ssa40 8-1	Ssa40 8-2
Winthrop H 01	32859-001	37	41	?*	?	36	57	11	12	12	25	14	15	9	14	15	18
Winthrop H 01	32859-003	37	40	5	8	49	63	11	11	10	12	15	15	9	14	5	16
Winthrop H 01	32859-004	44	45	5	8	45	47	11	11	12	12	11	15	9	12	6	9
Winthrop H 01	32859-005	40	44	5	5	37	51	12	12	10	12	15	15	9	11	6	8
Winthrop H 01	32859-006	37	42	5	6	55	67	12	12	10	12	14	17	9	11	8	9
Winthrop H 01	32859-007	37	41	5	6	29	61	10	12	10	12	14	15	9	14	8	8
Winthrop H 01	32859-009	39	45	?	?	19	53	11	12	10	12	14	15	?	?	8	8
Winthrop H 01	32859-011	37	42	?	?	37	51	11	12	10	12	15	17	?	?	9	9
Winthrop H 01	32859-013	41	42	5	6	31	47	11	11	12	12	14	15	9	14	8	16
Winthrop H 01	32859-015	37	42	5	5	37	55	12	12	10	12	14	15	9	14	6	9
Winthrop H 01	32859-016	?	?	5	8	57	65	11	12	12	12	9	9	14	14	5	16
Winthrop H 01	32859-018	41	42	5	5	45	45	11	12	10	10	14	15	9	14	8	8
Winthrop H 01	32859-019	40	42	5	8	27	34	10	12	12	25	15	15	12	14	7	8
Winthrop H 01	32859-020	41	44	?	?	21	67	11	11	12	25	13	14	9	9	8	14
Winthrop H 01	32859-022	40	41	?	?	53	63	11	11	12	25	14	14	?	?	8	10
Winthrop H 01	32859-023	40	41	?	?	28	65	11	11	10	12	14	15	?	?	5	16
Winthrop H 01	32859-024	40	41	6	13	29	33	11	11	12	12	13	15	12	12	9	14
Winthrop H 01	32859-025	42	45	6	6	21	63	11	12	10	25	15	16	11	12	8	15
Winthrop H 01	32859-026	40	41	5	13	47	73	12	12	10	12	14	15	12	14	8	8
Winthrop H 01	32859-027	40	41	?	?	57	77	11	11	10	10	14	15	12	14	7	21
Winthrop H 01	32859-031	37	43	?	?	19	45	4	11	12	12	14	15	9	12	8	9
Winthrop H 01	32859-032	37	44	5	5	29	44	10	11	10	12	15	16	12	14	7	9
Winthrop H 01	32859-033	39	40	?	?	31	69	12	12	10	10	14	14	?	?	13	13
Winthrop H 01	32859-034	40	42	?	?	49	51	11	12	10	10	14	15	?	?	8	10
Winthrop H 01	32859-037	37	37	5	13	28	38	11	12	10	12	14	15	9	9	8	9
Winthrop H 01	32859-038	37	45	9	13	25	45	11	11	10	17	15	15	9	9	10	19
Winthrop H 01	32859-050	37	44	6	6	27	51	11	11	10	12	14	14	9	12	9	15
Winthrop H 01	32859-051	41	43	?	?	37	44	11	11	10	12	15	15	9	12	7	10
Winthrop H 01	32859-052	41	41	?	?	51	81	11	12	12	12	15	16	9	11	8	8
Winthrop H 01	32859-053	37	42	?	?	27	33	11	12	10	10	15	15	12	14	15	31
Winthrop H 01	32859-054	40	44	?	?	45	51	11	12	10	12	9	12	?	?	5	10

Table A-2 continued. Data for Winthrop 2001 samples.

Population	Sample no.	Genotype															
		Ogo4 - 1	Ogo - 2	Oke 4 - 1	Oke4 - 2	Ots104 - 1	Ots104 - 2	Ots10 m - 1	Ots10 m - 2	Ots2 m - 1	Ots2 m - 2	Ots3 - 1	Ots3 - 2	Otsd 9-1	Otsd 9-2	Ssa40 8-1	Ssa40 8-2
Winthrop H 01	32859-056	37	41	?	?	47	59	11	12	12	12	15	15	?	?	5	10
Winthrop H 01	32859-057	37	44	5	13	38	67	12	12	12	12	14	14	9	9	9	22
Winthrop H 01	32859-060	41	41	6	9	47	57	11	11	10	25	14	15	9	12	8	16
Winthrop H 01	32859-063	40	44	6	9	51	77	11	11	10	10	14	15	9	14	7	21
Winthrop H 01	32859-071	37	40	5	6	37	51	11	12	12	25	15	17	9	11	9	9
Winthrop H 01	32859-075	40	40	5	5	41	61	10	12	10	10	14	15	9	9	8	12
Winthrop H 01	32859-077	37	40	?	?	51	61	11	12	10	12	13	15	?	?	8	12
Winthrop H 01	32859-079	?	?	?	?	?	?	11	11	12	25	15	17	?	?	8	9
Winthrop H 01	32859-081	40	41	?	?	43	67	11	12	12	12	14	14	?	?	8	8
Winthrop H 01	32859-084	37	42	6	8	57	63	11	12	12	25	15	15	9	14	8	17
Winthrop H 01	32859-085	37	42	5	5	47	53	11	12	10	25	12	15	12	14	8	8
Winthrop H 01	32859-087	41	42	5	6	45	65	11	12	12	12	14	15	9	9	8	8
Winthrop H 01	32859-090	37	45	5	7	25	47	11	12	10	12	13	15	9	9	8	10
Winthrop H 01	32859-092	37	44	?	?	29	44	11	11	10	10	15	16	9	12	9	22
Winthrop H 01	32859-094	37	40	5	6	34	37	11	12	12	25	14	15	9	14	5	17
Winthrop H 01	32859-097	40	43	?	?	57	57	11	11	12	12	15	15	?	?	9	9
Winthrop H 01	32859-099	37	40	?	?	41	61	10	12	10	10	13	15	?	?	8	12

* Indicates missing data.

Table A-3. Data for Entiat NFH 2001 samples.

Population	Sample no.	Genotype															
		Ogo4	Ogo -	Oke 4 -	Oke4 -	Ots104	Ots104 -	Ots10	Ots2	Ots2	Ots3 -	Ots3	Otsd	Otsd	Ssa40	Ssa40	
		- 1	2	1	2	- 1	2	m - 1	m - 2	m - 1	m - 2	1	- 2	9-1	9-2	8-1	8-2
Entiat H 01	32860-002	41	42	5	7	21	45	??	?	12	25	12	15	9	9	?	?
Entiat H 01	32860-005	41	42	6	6	45	47	11	11	10	12	14	15	9	12	8	35
Entiat H 01	32860-007	40	44	6	8	61	65	11	12	10	10	14	15	9	9	6	12
Entiat H 01	32860-008	42	45	5	5	63	63	11	12	10	12	15	16	12	12	5	16
Entiat H 01	32860-010	41	41	5	5	51	67	11	11	10	12	14	14	9	12	8	19
Entiat H 01	32860-012	41	43	5	6	59	61	11	11	10	10	14	15	9	14	6	13
Entiat H 01	32860-013	40	41	5	6	59	85	10	11	10	10	14	14	11	12	6	9
Entiat H 01	32860-014	37	42	6	8	25	36	11	12	10	12	15	15	9	12	9	16
Entiat H 01	32860-017	40	41	6	8	59	59	11	12	10	12	14	15	12	14	8	19
Entiat H 01	32860-021	37	42	5	8	21	59	11	12	10	12	13	15	9	9	8	20
Entiat H 01	32860-031	40	42	5	6	38	65	10	10	10	12	13	14	12	12	13	14
Entiat H 01	32860-033	37	44	5	5	44	49	10	11	10	10	14	15	9	9	18	20
Entiat H 01	32860-034	40	41	5	5	51	57	10	11	10	12	13	13	12	12	8	20
Entiat H 01	32860-038	41	45	5	5	5	63	11	12	10	12	14	15	12	12	10	20
Entiat H 01	32860-040	37	44	5	5	45	51	11	11	10	12	15	15	9	9	14	20
Entiat H 01	32860-043	40	41	5	7	49	63	11	12	10	10	13	16	9	9	13	17
Entiat H 01	32860-044	40	41	8	8	25	29	11	12	10	12	14	15	12	14	8	17
Entiat H 01	32860-045	37	40	6	6	57	85	11	11	10	10	15	15	11	12	6	16
Entiat H 01	32860-048	40	42	6	8	27	39	12	12	12	12	14	15	9	11	10	18
Entiat H 01	32860-052	37	37	5	6	21	59	11	11	10	10	13	14	9	9	6	9
Entiat H 01	32860-053	37	40	5	5	?	?	12	12	10	12	14	14	9	12	7	9
Entiat H 01	32860-054	41	41	5	6	5	59	11	11	10	12	15	16	9	12	8	14
Entiat H 01	32860-055	37	37	6	8	38	61	12	12	10	12	14	15	9	12	13	19
Entiat H 01	32860-056	40	43	5	5	29	57	11	11	10	12	15	15	9	14	6	8
Entiat H 01	32860-058	40	41	5	6	29	61	11	12	10	25	5	14	9	12	8	9
Entiat H 01	32860-060	40	46	5	7	59	59	11	11	10	10	14	14	9	14	8	14
Entiat H 01	32860-062	41	41	5	6	44	63	11	11	12	25	15	16	9	12	9	10
Entiat H 01	32860-064	40	40	6	8	59	61	11	12	10	12	14	14	9	14	8	31
Entiat H 01	32860-065	31	41	6	6	27	59	10	12	10	10	15	15	9	14	6	17
Entiat H 01	32860-066	37	37	8	9	53	67	11	12	12	12	14	15	9	12	6	10

Table A-3 continued. Data for Entiat NFH 2001 samples.

Population	Sample no.	Genotype															
		Ogo4 - 1	Ogo - 2	Oke 4 - 1	Oke4 - 2	Ots104 - 1	Ots104 - 2	Ots10 m - 1	Ots10 m - 2	Ots2 m - 1	Ots2 m - 2	Ots3 - 1	Ots3 - 2	Otsd 9-1	Otsd 9-2	Ssa40 8-1	Ssa40 8-2
Entiat H 01	32860-069	42	45	6	9	61	67	10	12	12	12	15	16	9	12	5	8
Entiat H 01	32860-072	37	42	5	5	45	51	11	12	10	12	14	15	12	14	9	12
Entiat H 01	32860-073	41	42	5	5	29	37	11	12	12	25	14	15	12	14	9	9
Entiat H 01	32860-074	41	45	6	13	45	65	11	11	10	12	14	15	14	14	14	18
Entiat H 01	32860-075	40	46	5	7	59	59	11	12	10	10	13	15	12	14	8	14
Entiat H 01	32860-077	41	42	5	6	?	?	12	12	10	12	15	15	9	12	9	35
Entiat H 01	32860-079	31	41	5	8	29	69	11	12	10	12	10	15	12	14	8	17
Entiat H 01	32860-080	42	45	5	6	45	73	11	12	10	17	15	15	12	12	6	11
Entiat H 01	32860-081	31	41	6	8	51	59	12	12	10	10	15	16	12	14	5	17
Entiat H 01	32860-083	42	42	5	6	57	67	11	12	10	10	14	16	9	12	8	8
Entiat H 01	32860-085	40	42	5	5	45	47	11	11	10	12	14	15	9	9	8	17
Entiat H 01	32860-087	37	37	5	6	19	45	12	12	10	12	14	15	9	12	8	8
Entiat H 01	32860-090	37	41	6	8	47	73	11	11	12	12	13	14	9	12	9	10
Entiat H 01	32860-093	31	42	5	5	27	55	11	11	12	12	15	16	9	11	5	9
Entiat H 01	32860-094	41	43	5	5	5	45	10	12	10	10	14	15	9	12	10	14
Entiat H 01	32860-095	41	42	6	9	37	49	11	12	10	10	15	15	9	14	8	20
Entiat H 01	32860-097	31	37	5	6	29	59	11	12	10	12	15	15	9	12	13	15
Entiat H 01	32860-100	41	42	5	6	36	49	11	11	10	10	15	15	9	12	9	18

* Indicates missing data.

Table A-4. Data for Chiwawa H94DA samples.

Population	Sample no.	Genotype															
		Ogo4 - 1	Ogo - 2	Oke 4 - 1	Oke4 - 2	Ots104 - 1	Ots104 - 2	Ots10 m - 1	Ots10 m - 2	Ots2 m - 1	Ots2 m - 2	Ots3 - 1	Ots3 - 2	Ots3 9-1	Ots3 9-2	Otsd 8-1	Otsd 8-2
Chiwawa R 94	32863-009	41	44	5	6	49	61	11	11	10	12	10	14	12	12	8	13
Chiwawa R 94	32863-010	40	45	5	6	27	55	11	12	12	12	15	15	12	14	8	8
Chiwawa R 94	32863-011	41	44	?*	?	29	47	12	12	12	12	13	15	12	12	5	6
Chiwawa R 94	32863-012	41	42	6	6	59	63	11	12	12	12	15	15	12	12	6	16
Chiwawa R 94	32863-013	41	42	5	5	49	49	11	11	12	12	14	15	14	14	11	16
Chiwawa R 94	32863-014	42	42	5	6	51	67	11	12	10	15	15	15	11	12	8	8
Chiwawa R 94	32863-015	40	40	5	6	30	45	11	12	10	10	14	15	12	14	8	16
Chiwawa R 94	32863-016	31	40	5	6	24	24	11	11	12	15	13	14	9	9	11	13
Chiwawa R 94	32863-017	40	45	5	6	45	61	11	12	10	10	14	15	12	12	9	13
Chiwawa R 94	32863-018	40	41	5	5	24	71	12	12	12	12	15	15	9	12	5	8
Chiwawa R 94	32863-019	?	?	5	5	36	67	11	11	12	12	9	12	9	14	8	18
Chiwawa R 94	32863-020	40	41	5	6	49	51	10	12	10	12	10	15	14	14	8	16
Chiwawa R 94	32863-021	41	42	5	6	43	51	12	12	10	12	15	15	12	12	6	6
Chiwawa R 94	32863-022	40	43	5	6	51	67	11	12	12	12	5	14	9	11	6	18
Chiwawa R 94	32863-023	37	40	6	6	45	51	11	12	10	12	15	15	14	14	13	13
Chiwawa R 94	32863-024	40	41	5	5	51	51	11	11	12	12	15	15	12	14	10	15
Chiwawa R 94	32863-025	40	42	9	9	24	31	12	12	10	10	15	15	11	12	6	8
Chiwawa R 94	32863-026	42	44	5	5	31	65	12	12	10	10	14	15	9	14	8	15
Chiwawa R 94	32863-027	41	42	5	5	33	49	12	12	12	15	13	15	12	14	5	8
Chiwawa R 94	32863-028	40	40	5	5	45	63	12	12	12	12	13	15	9	14	6	8
Chiwawa R 94	32863-029	39	40	6	8	23	47	12	12	10	10	14	15	12	14	8	16
Chiwawa R 94	32863-030	37	45	6	6	49	51	11	12	12	12	13	15	9	14	6	17
Chiwawa R 94	32863-031	41	41	6	9	47	49	12	12	10	12	14	15	12	14	9	16
Chiwawa R 94	32863-032	37	41	6	6	51	75	10	11	12	12	14	14	12	14	15	19
Chiwawa R 94	32863-033	42	44	5	6	43	85	11	12	12	12	14	15	12	12	8	15
Chiwawa R 94	32863-034	42	44	?	?	23	39	12	13	10	12	10	15	9	14	14	16
Chiwawa R 94	32863-035	41	42	5	5	36	53	12	12	10	12	15	15	12	12	8	8
Chiwawa R 94	32863-036	40	44	5	6	45	55	12	12	10	12	14	15	12	12	8	15
Chiwawa R 94	32863-037	41	43	5	5	31	61	12	12	12	12	5	10	12	12	8	11
Chiwawa R 94	32863-038	42	45	5	5	36	57	11	12	12	12	14	15	9	12	6	8

Table A-4 continued. Data for Chiwawa H94DA samples.

Population	Sample no.	Genotype															
		Ogo4 - 1	Ogo - 2	Oke 4 - 1	Oke4 - 2	Ots104 - 1	Ots104 - 2	Ots10 m - 1	Ots10 m - 2	Ots2 m - 1	Ots2 m - 2	Ots3 - 1	Ots3 - 2	Otsd 9-1	Otsd 9-2	Ssa40 8-1	Ssa40 8-2
Chiwawa R 94	32863-039	40	41	5	6	43	45	12	12	10	10	11	15	12	14	5	15
Chiwawa R 94	32863-040	40	40	5	6	45	85	11	11	10	13	13	14	9	14	8	9
Chiwawa R 94	32863-041	41	42	5	9	49	63	11	12	15	15	5	13	12	14	15	15
Chiwawa R 94	32863-042	40	41	5	6	41	61	12	12	10	12	15	15	9	12	6	9
Chiwawa R 94	32863-043	40	41	5	6	51	61	11	11	10	10	5	13	14	14	6	14
Chiwawa R 94	32863-044	?	?	?	?	?	?	10	11	?	?	?	?	?	?	?	?
Chiwawa R 94	32863-045	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
Chiwawa R 94	32863-046	40	42	6	6	31	53	11	11	10	10	15	15	9	14	6	17
Chiwawa R 94	32863-047	39	41	5	6	31	45	12	12	10	12	14	15	12	12	5	17
Chiwawa R 94	32863-048	?	?	?	?	47	59	11	11	10	10	9	15	12	12	11	11
Chiwawa R 94	32863-049	41	43	5	5	31	61	11	12	10	10	15	15	12	12	8	14
Chiwawa R 94	32863-050	40	40	5	6	27	31	11	11	10	12	5	13	14	14	6	14
Chiwawa R 94	32863-051	41	42	5	5	36	47	11	12	10	12	15	15	9	12	6	6
Chiwawa R 94	32863-052	37	40	5	6	27	51	11	12	12	12	14	15	12	14	6	8
Chiwawa R 94	32863-053	41	41	5	5	41	79	11	12	12	12	10	14	9	12	6	15
Chiwawa R 94	32863-054	41	41	5	6	27	31	11	11	10	12	14	15	14	14	5	7
Chiwawa R 94	32863-055	40	40	5	5	27	53	11	12	10	10	14	15	9	14	6	36
Chiwawa R 94	32863-056	40	41	5	6	38	47	11	11	10	12	15	15	9	12	15	16

* Indicates missing data.

Table A-5. Data for Hanford 1998 KH samples.

Population	Sample no.	Genotype															
		Ogo4 - 1	Ogo - 2	Oke 4 - 1	Oke4 - 2	Ots104 - 1	Ots104 - 2	Ots10 m - 1	Ots10 m - 2	Ots2 m - 1	Ots2 m - 2	Ots3 1	Ots3 - 2	Otsd 9-1	Otsd 9-2	Ssa40 8-1	Ssa40 8-2
Hanford 98	32865-001	31	32	8	9	17	39	11	12	12	12	14	17	10	11	17	17
Hanford 98	32865-002	31	31	?*	?	29	55	10	12	10	20	14	16	10	14	12	16
Hanford 98	32865-003	32	33	8	9	13	33	9	10	10	12	15	17	10	14	9	10
Hanford 98	32865-004	29	29	?	?	35	53	11	12	12	12	12	13	9	12	8	13
Hanford 98	32865-005	29	31	8	9	29	41	11	11	10	10	13	14	12	14	12	15
Hanford 98	32865-006	29	32	8	8	31	43	12	12	10	23	14	15	9	10	12	17
Hanford 98	32865-007	31	42	6	8	43	51	11	11	12	17	14	14	12	15	14	17
Hanford 98	32865-008	29	32	6	6	13	21	10	12	10	12	14	14	11	14	14	16
Hanford 98	32865-009	29	38	7	7	37	37	11	12	10	23	15	16	12	12	8	19
Hanford 98	32865-010	29	31	9	9	33	35	12	12	10	12	15	18	12	14	12	16
Hanford 98	32865-011	29	31	8	8	17	35	12	12	12	18	14	15	11	12	11	31
Hanford 98	32865-012	29	44	5	8	37	51	10	11	12	12	12	17	10	11	16	16
Hanford 98	32865-013	29	29	6	8	23	29	10	11	12	23	14	14	7	12	12	32
Hanford 98	32865-014	29	31	6	6	23	35	11	12	10	17	15	17	14	14	8	13
Hanford 98	32865-015	31	44	6	8	31	47	10	10	12	12	14	15	14	14	22	22
Hanford 98	32865-016	29	42	6	8	31	45	10	10	12	12	15	16	14	14	8	13
Hanford 98	32865-017	29	29	6	8	39	41	10	11	10	15	10	15	11	14	16	18
Hanford 98	32865-018	29	35	6	6	19	27	12	12	10	12	14	15	13	14	13	18
Hanford 98	32865-019	29	43	6	8	13	33	10	11	11	12	14	16	13	14	13	13
Hanford 98	32865-020	31	42	8	9	33	51	10	12	12	20	16	17	9	10	9	16
Hanford 98	32865-021	31	31	6	8	35	41	10	12	10	25	13	15	11	14	9	12
Hanford 98	32865-022	31	32	9	9	33	37	11	12	12	25	14	17	12	13	13	16
Hanford 98	32865-023	31	31	6	8	33	47	11	12	17	19	15	17	9	11	8	8
Hanford 98	32865-024	31	42	6	7	33	35	10	11	12	23	13	14	12	13	16	26
Hanford 98	32865-025	29	42	6	6	31	55	11	12	10	12	14	17	10	14	10	14
Hanford 98	32865-026	29	41	6	8	13	65	12	12	10	10	17	18	14	14	10	16
Hanford 98	32865-027	29	31	6	6	15	31	10	12	10	10	14	16	11	13	9	14
Hanford 98	32865-028	31	31	5	6	39	69	11	12	10	10	14	18	12	14	9	14
Hanford 98	32865-029	29	31	8	9	33	37	12	12	12	12	16	17	10	14	12	17
Hanford 98	32865-030	31	44	8	9	33	37	11	12	10	23	14	17	9	14	13	15

Table A-5 continued. Data for Hanford 1998 KH samples.

Population	Sample no.	Genotype															
		Ogo4 - 1	Ogo - 2	Oke 4 - 1	Oke4 - 2	Ots104 - 1	Ots104 - 2	Ots10 m - 1	Ots10 m - 2	Ots2 m - 1	Ots2 m - 2	Ots3 1	Ots3 - 2	Otsd 9-1	Otsd 9-2	Ssa40 8-1	Ssa40 8-2
Hanford 98	32865-031	29	31	5	8	29	33	10	11	10	25	16	16	11	11	12	12
Hanford 98	32865-032	31	31	5	8	31	43	10	12	12	23	14	14	12	12	10	17
Hanford 98	32865-033	29	32	6	8	41	43	10	10	12	25	13	13	11	12	13	17
Hanford 98	32865-034	29	29	8	8	41	75	10	11	10	12	15	17	13	14	10	24
Hanford 98	32865-035	29	29	7	9	25	35	10	12	12	15	12	17	12	14	13	21
Hanford 98	32865-036	29	29	6	8	31	65	10	11	12	23	14	18	12	14	12	23
Hanford 98	32865-037	31	35	5	6	23	55	10	11	23	25	13	14	11	14	9	33
Hanford 98	32865-038	38	44	6	8	31	33	11	12	10	18	13	17	12	14	8	18
Hanford 98	32865-039	29	31	5	8	31	39	11	12	10	10	13	15	7	11	7	19
Hanford 98	32865-040	31	44	8	9	27	43	11	11	10	23	15	15	13	14	7	15
Hanford 98	32865-041	29	31	6	9	25	33	11	12	10	12	14	17	14	16	11	14
Hanford 98	32865-042	21	21	5	6	47	47	10	12	10	23	13	15	14	14	11	19
Hanford 98	32865-043	31	31	6	8	15	39	10	12	10	10	14	16	11	14	17	31
Hanford 98	32865-044	29	31	6	6	35	39	10	11	18	25	13	18	12	14	9	12
Hanford 98	32865-045	21	21	8	9	35	41	10	12	12	12	14	14	12	13	16	22
Hanford 98	32865-046	29	31	5	6	35	43	11	11	10	12	15	15	13	14	9	12
Hanford 98	32865-047	31	32	5	8	15	31	10	12	12	25	15	16	14	14	12	20
Hanford 98	32865-048	29	31	5	6	45	49	10	10	12	19	14	14	12	14	8	15

* Indicates missing data.

Table A-6. Data for Entiat River juveniles 2002 samples.

Population	Sample no.	Genotype															
		Ogo4 - 1	Ogo - 2	Oke 4 - 1	Oke4 - 2	Ots104 - 1	Ots104 - 2	Ots10 m - 1	Ots10 m - 2	Ots2 m - 1	Ots2 m - 2	Ots3 - 1	Ots3 - 2	Otsd 9-1	Otsd 9-2	Ssa40 8-1	Ssa40 8-2
Entiat R 02	32934-002	40	42	5	8	61	65	11	12	10	12	15	15	9	9	6	9
Entiat R 02	32934-004	41	42	6	13	65	67	12	12	10	12	15	15	9	14	6	8
Entiat R 02	32934-006	41	41	5	5	63	79	11	12	10	12	14	15	11	12	5	7
Entiat R 02	32934-007	40	42	5	6	59	67	12	12	12	12	14	14	14	14	8	8
Entiat R 02	32934-008	31	40	5	6	49	67	12	12	12	12	14	14	9	14	9	19
Entiat R 02	32934-010	29	40	5	5	47	49	12	12	12	12	14	15	12	14	8	8
Entiat R 02	32934-012	37	42	5	13	49	59	11	12	10	12	13	14	11	12	8	10
Entiat R 02	32934-013	40	41	6	9	49	71	12	12	10	17	14	17	12	14	6	19
Entiat R 02	32934-015	37	37	6	6	31	59	11	12	12	12	14	15	9	14	8	9
Entiat R 02	32934-019	41	42	5	5	59	63	11	12	12	12	15	15	14	14	8	8
Entiat R 02	32934-020	40	42	5	8	59	85	10	11	12	25	15	16	12	12	14	16
Entiat R 02	32934-021	41	42	??	?	63	65	11	12	12	18	15	15	?	?	?	?
Entiat R 02	32934-022	29	31	6	6	31	43	12	12	12	12	13	15	11	12	17	24
Entiat R 02	32934-023	39	42	5	5	51	63	11	12	10	10	13	15	12	14	6	10
Entiat R 02	32934-024	41	45	5	6	29	31	11	12	10	12	15	15	9	12	8	14
Entiat R 02	32934-026	41	43	5	13	27	71	11	12	10	10	15	15	?	?	8	8
Entiat R 02	32934-027	40	40	6	13	27	71	11	11	10	10	15	17	?	?	8	8
Entiat R 02	32934-030	40	45	6	9	38	59	11	11	10	25	14	15	9	14	9	13
Entiat R 02	32934-031	42	42	6	8	51	53	10	11	10	12	14	17	9	14	11	21
Entiat R 02	32934-033	40	42	5	5	21	77	11	12	12	12	15	15	12	12	10	10
Entiat R 02	32934-035	37	40	6	6	53	87	11	11	10	10	10	14	9	14	9	13
Entiat R 02	32934-036	37	41	5	7	45	45	12	12	12	12	13	15	9	12	8	8
Entiat R 02	32934-037	37	41	6	8	34	45	11	12	10	10	14	15	9	12	8	13
Entiat R 02	32934-038	40	42	5	5	32	49	11	11	12	12	15	15	9	9	6	13
Entiat R 02	32934-039	29	29	5	6	35	45	12	12	23	25	12	15	9	11	9	19
Entiat R 02	32934-041	40	41	5	5	27	59	11	12	10	10	15	15	9	9	13	13
Entiat R 02	32934-043	37	37	5	8	43	67	11	12	10	12	14	15	12	12	13	19
Entiat R 02	32934-044	37	40	5	5	27	47	11	12	10	12	15	15	9	9	8	16
Entiat R 02	32934-046	40	41	5	13	27	27	11	11	10	12	14	17	9	9	8	8
Entiat R 02	32934-048	41	42	5	5	59	63	11	11	10	10	13	15	9	11	8	9

Table A-6 continued. Data for Entiat River juveniles 2002 samples.

Population	Sample no.	Genotype															
		Ogo4 - 1	Ogo - 2	Oke 4 - 1	Oke4 - 2	Ots104 - 1	Ots104 - 2	Ots10 m - 1	Ots10 m - 2	Ots2 m - 1	Ots2 m - 2	Ots3 - 1	Ots3 - 2	Otsd 9-1	Otsd 9-2	Ssa40 8-1	Ssa40 8-2
Entiat R 02	32934-050	40	44	5	7	34	63	11	12	10	12	15	15	9	12	8	20
Entiat R 02	32934-051	40	41	5	5	59	85	11	11	10	12	15	15	9	12	11	16
Entiat R 02	32934-053	40	42	5	5	27	59	11	12	10	10	14	15	9	12	8	13
Entiat R 02	32934-054	29	29	6	6	29	65	10	12	17	23	14	14	11	11	13	17
Entiat R 02	32934-056	40	40	5	6	40	55	11	12	12	12	13	14	6	12	10	20
Entiat R 02	32934-057	31	42	5	9	59	65	11	12	10	12	15	15	9	12	16	22
Entiat R 02	32934-058	31	43	5	6	57	67	11	12	10	25	14	15	9	12	6	9
Entiat R 02	32934-060	37	37	5	5	43	47	12	12	10	12	14	15	9	12	6	8
Entiat R 02	32934-061	40	41	6	6	27	27	12	12	10	10	14	14	9	12	8	19
Entiat R 02	32934-066	41	43	5	5	27	47	11	11	10	10	14	15	9	14	13	13
Entiat R 02	32934-068	37	41	5	13	49	77	11	11	10	12	15	17	9	12	5	8
Entiat R 02	32934-069	29	29	6	8	31	43	10	12	10	25	12	17	11	12	12	24
Entiat R 02	32934-074	40	45	6	6	53	61	12	12	12	25	14	15	9	12	8	12
Entiat R 02	32934-075	37	40	5	8	41	49	10	12	10	12	15	15	9	12	12	13
Entiat R 02	32934-076	41	45	6	6	29	45	10	12	10	12	14	15	9	9	8	9
Entiat R 02	32934-077	41	43	5	5	27	47	11	12	10	12	15	15	9	9	8	16
Entiat R 02	32934-079	29	38	5	9	23	55	10	12	10	10	12	13	13	13	12	13
Entiat R 02	32934-081	40	45	5	5	51	63	12	13	12	12	14	15	9	14	6	10

* Indicates missing data.

Table A-7. Data for Carson H 1995 samples.

Population	Sample no.	Genotype															
		Ogo4	Ogo -	Oke 4 -	Oke4 -	Ots104	Ots104 -	Ots10	Ots2	Ots2	Ots3 -	Ots3	Otsd	Otsd	Ssa40	Ssa40	
		- 1	2	1	2	- 1	2	m - 1	m - 2	m - 1	m - 2	1	- 2	9-1	9-2	8-1	8-2
Carson H 95	32127-001	40	41	5	5	27	61	11	12	10	12	14	15	12	12	14	15
Carson H 95	32127-002	40	44	5	6	53	53	10	12	10	10	14	15	9	12	10	20
Carson H 95	32127-003	?*	?	?	?	?	?	5	12	?	?	5	15	?	?	?	?
Carson H 95	32127-004	31	41	5	5	61	65	11	12	12	25	5	15	12	14	8	13
Carson H 95	32127-005	37	40	?	?	49	49	11	12	10	10	15	15	12	14	7	7
Carson H 95	32127-006	37	37	6	6	51	55	11	12	12	12	15	15	12	12	8	9
Carson H 95	32127-007	41	42	5	6	38	59	12	12	10	12	14	15	9	9	8	16
Carson H 95	32127-008	37	40	5	6	59	61	12	12	10	25	15	16	9	12	8	10
Carson H 95	32127-009	?	?	5	10	21	21	11	11	12	12	15	15	9	12	8	31
Carson H 95	32127-010	42	42	5	8	49	67	12	12	10	12	15	15	9	9	8	16
Carson H 95	32127-011	40	44	5	5	29	65	12	12	12	25	14	15	12	12	8	9
Carson H 95	32127-012	40	41	6	8	55	57	10	11	10	12	14	15	12	12	11	16
Carson H 95	32127-013	37	40	5	6	31	34	11	11	12	12	13	15	9	14	8	13
Carson H 95	32127-014	31	40	6	8	59	63	11	12	12	18	14	14	11	12	9	19
Carson H 95	32127-015	37	41	6	6	51	55	11	12	10	12	14	15	12	12	8	8
Carson H 95	32127-016	41	43	5	6	39	63	11	12	10	25	14	14	9	12	7	8
Carson H 95	32127-017	37	42	5	13	31	69	10	11	10	10	15	15	9	14	9	15
Carson H 95	32127-018	40	40	5	6	43	45	11	11	12	12	15	15	11	12	7	14
Carson H 95	32127-019	37	40	5	6	57	57	11	12	10	25	14	15	12	12	11	16
Carson H 95	32127-020	37	41	6	9	28	59	11	11	10	10	14	14	9	9	7	8
Carson H 95	32127-021	37	40	5	5	34	67	11	12	12	25	15	15	9	14	8	13
Carson H 95	32127-022	40	44	5	7	31	59	11	11	10	25	14	15	9	12	8	9
Carson H 95	32127-023	37	40	8	8	25	33	11	12	12	18	15	15	?	?	8	13
Carson H 95	32127-024	37	41	5	5	37	53	11	12	10	10	14	15	12	12	8	15
Carson H 95	32127-025	41	42	5	8	25	51	11	12	10	12	14	15	9	12	8	19
Carson H 95	32127-026	41	42	5	10	63	65	11	11	12	13	13	15	9	12	8	8
Carson H 95	32127-027	40	41	5	5	49	59	11	11	10	10	14	15	9	11	9	21
Carson H 95	32127-028	40	41	5	6	47	59	11	11	10	10	14	15	9	12	7	10
Carson H 95	32127-029	40	41	5	6	27	53	12	12	10	12	14	15	9	12	10	16
Carson H 95	32127-030	31	40	6	7	44	51	10	10	12	12	5	15	12	14	10	21

Table A-7 continued. Data for Carson H 1995 samples.

Population	Sample no.	Genotype															
		Ogo4 - 1	Ogo - 2	Oke 4 - 1	Oke4 - 2	Ots104 - 1	Ots104 - 2	Ots10 m - 1	Ots10 m - 2	Ots2 m - 1	Ots2 m - 2	Ots3 1	Ots3 - 2	Otsd 9-1	Otsd 9-2	Ssa40 8-1	Ssa40 8-2
Carson H 95	32127-031	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
Carson H 95	32127-032	37	41	6	6	21	63	11	11	10	12	15	15	12	14	8	13
Carson H 95	32127-033	37	37	5	6	51	63	10	11	10	12	15	15	12	12	10	13
Carson H 95	32127-034	40	41	5	5	33	67	11	12	10	12	15	15	14	14	7	9
Carson H 95	32127-035	40	41	6	8	27	51	11	12	12	12	15	15	9	14	15	18
Carson H 95	32127-036	37	41	5	6	61	65	11	12	12	12	5	15	14	14	8	13
Carson H 95	32127-037	41	41	5	6	44	49	12	12	12	25	14	15	9	11	14	33
Carson H 95	32127-038	37	41	5	6	59	63	10	11	10	10	15	15	9	14	14	14
Carson H 95	32127-039	41	42	6	6	31	49	11	11	10	10	15	16	9	12	5	9
Carson H 95	32127-040	42	42	6	6	38	59	11	12	12	12	15	15	12	14	6	34
Carson H 95	32127-041	37	43	5	6	45	51	12	12	10	12	15	15	9	14	8	8
Carson H 95	32127-042	37	42	5	13	31	69	10	11	10	12	13	15	9	14	8	15
Carson H 95	32127-043	41	43	5	13	44	67	11	11	12	12	15	15	9	12	6	8
Carson H 95	32127-044	40	41	5	8	25	63	11	11	12	18	15	15	12	14	8	8
Carson H 95	32127-045	37	43	5	5	21	29	11	12	12	12	5	15	12	12	8	15
Carson H 95	32127-046	31	40	5	5	41	51	11	12	12	12	14	15	11	14	8	9
Carson H 95	32127-047	37	41	5	6	49	59	11	12	10	10	14	15	9	11	6	7
Carson H 95	32127-048	37	44	6	8	53	57	12	12	10	12	14	15	12	14	11	16

* Indicates missing data.

Table A-8. Data for Entiat NFH 1997 samples.

Population	Sample no.	Genotype															
		Ogo4 - 1	Ogo - 2	Oke 4 - 1	Oke4 - 2	Ots104 - 1	Ots104 - 2	Ots10 m - 1	Ots10 m - 2	Ots2 m - 1	Ots2 m - 2	Ots3 1	Ots3 - 2	Otsd 9-1	Otsd 9-2	Ssa40 8-1	Ssa40 8-2
Entiat H 97	32857-008	?*	?	?	?	?	?	?	?	?	?	14	14	?	?	?	?
Entiat H 97	32857-013	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
Entiat H 97	32857-015	?	?	?	?	?	?	11	12	10	10	?	?	?	?	9	16
Entiat H 97	32857-023	40	41	?	?	45	49	11	12	10	12	13	14	9	9	17	35
Entiat H 97	32857-028	?	?	?	?	43	61	?	?	?	?	?	?	?	?	?	?
Entiat H 97	32857-030	?	?	?	?	?	?	?	?	?	?	?	?	?	?	8	9
Entiat H 97	32857-031	41	42	5	8	59	73	12	12	10	12	14	15	12	12	6	9
Entiat H 97	32857-035	41	45	5	6	59	69	11	12	10	10	14	15	9	14	10	18
Entiat H 97	32857-036	37	41	?	?	?	?	11	12	10	12	15	15	?	?	8	20
Entiat H 97	32857-037	40	41	?	?	33	73	12	12	10	12	13	15	?	?	9	15
Entiat H 97	32857-039	?	?	?	?	55	55	11	11	10	12	?	?	?	?	8	18
Entiat H 97	32857-040	41	44	5	5	44	53	10	12	10	25	14	15	9	11	8	18
Entiat H 97	32857-041	41	41	5	9	21	67	11	12	12	12	14	15	9	9	8	8
Entiat H 97	32857-045	37	40	8	9	59	65	10	12	10	12	15	15	14	14	8	16
Entiat H 97	32857-047	?	?	?	?	?	?	11	12	10	10	?	?	?	?	?	?
Entiat H 97	32857-048	41	42	6	8	27	53	11	12	12	12	14	15	?	?	10	15
Entiat H 97	32857-049	37	42	?	?	19	19	11	12	10	12	14	15	9	12	6	13
Entiat H 97	32857-050	37	45	6	9	51	51	11	12	12	25	14	15	9	12	18	18
Entiat H 97	32857-052	40	40	6	8	67	85	11	11	10	25	15	15	9	12	6	6
Entiat H 97	32857-055	40	40	5	6	59	65	12	12	10	12	15	16	9	9	8	10
Entiat H 97	32857-056	42	43	6	7	44	47	11	11	10	12	13	15	9	12	13	16
Entiat H 97	32857-061	37	37	5	5	65	67	10	11	10	12	12	14	9	14	7	19
Entiat H 97	32857-062	37	40	5	5	49	51	11	11	10	10	15	15	9	9	8	20
Entiat H 97	32857-068	41	41	5	6	47	59	11	11	10	12	14	15	9	12	8	10
Entiat H 97	32857-072	40	41	8	8	61	83	11	11	10	10	10	14	9	14	8	31
Entiat H 97	32857-074	41	42	6	9	31	65	11	11	12	12	13	14	12	14	6	16
Entiat H 97	32857-075	41	42	?	?	57	61	10	12	12	12	15	15	?	?	8	22
Entiat H 97	32857-081	37	41	5	8	51	69	12	12	12	18	14	15	9	9	10	20
Entiat H 97	32857-082	42	45	5	6	5	59	11	12	10	12	15	15	9	12	10	18
Entiat H 97	32857-083	42	44	5	9	37	59	12	12	12	17	15	17	9	12	8	8

Table A-8 continued. Data for Entiat NFH 1997 samples.

Population	Sample no.	Genotype															
		Ogo4 - 1	Ogo - 2	Oke 4 - 1	Oke4 - 2	Ots104 - 1	Ots104 - 2	Ots10 m - 1	Ots10 m - 2	Ots2 m - 1	Ots2 m - 2	Ots3 - 1	Ots3 - 2	Otsd 9-1	Otsd 9-2	Ssa40 8-1	Ssa40 8-2
Entiat H 97	32857-086	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
Entiat H 97	32857-087	31	37	6	6	32	63	11	12	10	10	15	15	12	12	8	16
Entiat H 97	32857-091	?	?	?	?	?	?	11	12	10	12	15	15	?	?	?	?
Entiat H 97	32857-092	40	41	5	6	25	57	10	10	10	12	13	14	9	12	8	22
Entiat H 97	32857-097	41	45	5	6	57	65	11	11	10	10	13	15	9	14	14	18
Entiat H 97	32857-098	41	45	5	6	57	65	11	11	10	10	13	15	9	14	14	18
Entiat H 97	32857-101	41	42	?	?	45	59	12	12	10	12	14	15	?	?	7	15
Entiat H 97	32857-102	41	42	6	8	53	59	12	12	10	10	13	14	12	14	10	13
Entiat H 97	32857-105	41	42	6	8	57	59	11	12	10	12	15	15	9	14	5	34
Entiat H 97	32857-107	39	42	7	8	36	59	12	12	10	10	15	15	9	9	8	20
Entiat H 97	32857-111	41	45	5	6	55	57	11	11	10	12	13	15	9	14	14	18
Entiat H 97	32857-129	41	45	5	6	51	59	11	12	10	12	13	15	12	14	9	20
Entiat H 97	32857-134	41	44	5	6	44	51	11	12	10	12	15	15	12	14	6	11
Entiat H 97	32857-144	?	?	6	6	?	?	11	12	10	12	14	15	9	12	8	19
Entiat H 97	32857-149	40	41	6	8	59	65	12	12	10	10	13	14	9	14	5	6
Entiat H 97	32857-151	37	42	6	8	61	81	11	11	10	12	15	17	9	9	9	9
Entiat H 97	32857-154	40	42	7	8	21	65	11	12	10	12	15	15	9	9	5	8
Entiat H 97	32857-159	41	44	5	8	53	59	11	11	10	12	14	15	12	12	8	13

* Indicates missing data.

Table A-9. Data for Entiat River 2001 samples.

Population	Sample no.	Genotype															
		Ogo4 - 1	Ogo - 2	Oke 4 - 1	Oke4 - 2	Ots104 - 1	Ots104 - 2	Ots10 m - 1	Ots10 m - 2	Ots2 m - 1	Ots2 m - 2	Ots3 1	Ots3 - 2	Otsd 9-1	Otsd 9-2	Ssa40 8-1	Ssa40 8-2
Entiat R 01	32861-001	40	44	7	8	33	51	12	12	12	15	10	11	12	14	8	14
Entiat R 01	32861-002	42	43	5	6	59	59	11	12	10	12	15	16	12	14	6	17
Entiat R 01	32861-003	40	41	5	8	39	49	10	11	10	12	15	15	9	12	8	13
Entiat R 01	32861-004	41	41	6	6	49	77	11	12	10	10	15	15	12	12	5	20
Entiat R 01	32861-005	?*	?	?	?	?	?	11	12	?	?	?	?	9	9	6	9
Entiat R 01	32861-006	23	31	?	?	41	63	11	12	?	?	15	15	?	?	?	?
Entiat R 01	32861-007	37	41	5	8	51	55	10	11	10	12	15	15	12	12	5	16
Entiat R 01	32861-008	40	40	?	?	41	55	11	11	10	25	14	15	9	12	8	8
Entiat R 01	32861-009	40	44	5	5	51	67	11	12	12	25	15	17	9	14	6	8
Entiat R 01	32861-010	37	40	5	6	27	27	12	12	10	12	?	?	9	14	6	9
Entiat R 01	32861-011	?	?	?	?	?	?	12	12	?	?	?	?	9	12	8	16
Entiat R 01	32861-012	?	?	?	?	39	49	10	11	10	12	15	15	9	12	8	13
Entiat R 01	32861-013	37	40	?	?	27	65	11	11	12	12	14	15	9	12	8	9
Entiat R 01	32861-014	40	41	?	?	39	49	10	11	10	12	15	15	9	12	8	13
Entiat R 01	32861-015	28	28	?	?	45	49	?	?	12	12	?	?	9	9	?	?
Entiat R 01	32861-016	37	40	?	?	45	67	12	12	10	12	15	15	9	11	6	14
Entiat R 01	32861-017	37	37	?	?	?	?	10	11	12	12	14	15	9	12	?	?
Entiat R 01	32861-018	37	85	6	8	53	65	11	12	10	12	14	15	9	12	8	16
Entiat R 01	32861-019	?	?	?	?	?	?	10	11	?	?	14	15	?	?	?	?
Entiat R 01	32861-020	?	?	?	?	?	?	12	12	?	?	14	15	9	9	?	?
Entiat R 01	32861-021	37	44	?	?	57	63	11	12	10	12	14	15	?	?	?	?
Entiat R 01	32861-022	?	?	?	?	55	77	10	11	10	12	?	?	9	12	5	16
Entiat R 01	32861-023	37	45	5	5	57	67	11	11	10	25	15	15	9	12	8	10
Entiat R 01	32861-025	41	43	5	6	31	73	11	12	10	10	15	16	9	14	6	17
Entiat R 01	32861-026	40	44	?	?	49	85	11	12	10	25	14	15	12	14	8	8
Entiat R 01	32861-027	37	42	?	?	51	59	11	11	10	12	13	15	9	9	9	20
Entiat R 01	32861-028	37	42	?	?	29	63	11	12	10	12	13	15	?	?	6	8
Entiat R 01	32861-029	37	40	?	?	45	51	11	12	10	12	15	15	?	?	8	8
Entiat R 01	32861-030	?	?	?	?	47	51	11	12	?	?	14	15	?	?	8	15
Entiat R 01	32861-031	37	43	?	?	31	73	11	12	10	10	15	15	9	14	9	20

Table A-9 continued. Data for Entiat River 2001 samples.

Population	Sample no.	Genotype															
		Ogo4 - 1	Ogo - 2	Oke 4 - 1	Oke4 - 2	Ots104 - 1	Ots104 - 2	Ots10 m - 1	Ots10 m - 2	Ots2 m - 1	Ots2 m - 2	Ots3 - 1	Ots3 - 2	Otsd 9-1	Otsd 9-2	Ssa40 8-1	Ssa40 8-2
Entiat R 01	32861-032	40	41	?	?	47	61	11	11	10	12	15	15	11	12	6	14
Entiat R 01	32861-033	?	?	5	6	?	?	11	12	?	?	?	?	9	9	9	20
Entiat R 01	32861-034	41	42	6	8	29	65	12	12	10	12	14	15	9	12	6	6
Entiat R 01	32861-036	?	?	?	?	43	67	11	12	12	12	?	?	?	?	?	?
Entiat R 01	32861-038	37	37	?	?	33	49	11	12	10	10	13	15	?	?	5	6
Entiat R 01	32861-039	39	41	5	6	31	47	12	12	12	25	14	14	9	12	8	16
Entiat R 01	32861-041	31	37	?	?	53	59	10	12	10	12	14	15	?	?	?	?
Entiat R 01	32861-043	41	41	?	?	45	53	11	12	10	10	5	14	?	?	9	33
Entiat R 01	32861-044	?	?	8	8	29	47	?	?	10	10	15	15	?	?	?	?
Entiat R 01	32861-045	37	42	?	?	29	65	11	11	10	12	14	16	9	14	16	16
Entiat R 01	32861-046	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
Entiat R 01	32861-047	?	?	?	?	?	?	11	12	10	12	13	15	?	?	8	8
Entiat R 01	32861-048	?	?	?	?	85	85	11	12	10	12	?	?	?	?	?	?
Entiat R 01	32861-049	40	42	?	?	57	71	11	12	10	25	15	15	?	?	6	8
Entiat R 01	32861-051	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
Entiat R 01	32861-054	37	42	?	?	33	55	?	?	12	12	?	?	?	?	8	9
Entiat R 01	32861-055	42	44	5	7	28	63	11	12	10	12	13	15	9	9	9	14
Entiat R 01	32861-056	?	?	?	?	?	?	11	12	10	12	13	15	?	?	?	?
Entiat R 01	32861-058	31	45	6	8	49	49	11	11	12	12	10	15	12	14	8	16
Entiat R 01	32861-059	?	?	?	?	?	?	11	12	?	?	?	?	?	?	?	?
Entiat R 01	32861-060	40	40	?	?	43	83	12	12	10	25	13	15	9	12	8	9
Entiat R 01	32861-061	?	?	?	?	43	83	11	12	?	?	13	15	?	?	?	?
Entiat R 01	32861-062	?	?	?	?	33	47	11	12	?	?	15	15	?	?	?	?
Entiat R 01	32861-063	37	40	?	?	47	57	11	12	10	10	15	15	12	12	8	14
Entiat R 01	32861-064	?	?	?	?	?	?	11	12	?	?	15	15	?	?	?	?
Entiat R 01	32861-065	37	37	?	?	33	59	?	?	10	12	14	15	?	?	?	?
Entiat R 01	32861-066	44	44	5	6	25	63	11	11	12	12	14	15	12	14	8	14
Entiat R 01	32861-067	?	?	5	6	?	?	11	12	?	?	?	?	12	14	8	14
Entiat R 01	32861-068	37	41	?	?	45	49	11	12	12	25	5	15	?	?	?	?
Entiat R 01	32861-069	29	42	5	5	31	59	10	12	10	12	15	15	?	?	9	11

Table A-9 continued. Data for Entiat River 2001 samples.

Population	Sample no.	Genotype															
		Ogo4 - 1	Ogo - 2	Oke 4 - 1	Oke4 - 2	Ots104 - 1	Ots104 - 2	Ots10 m - 1	Ots10 m - 2	Ots2 m - 1	Ots2 m - 2	Ots3 - 1	Ots3 - 2	Otsd 9-1	Otsd 9-2	Ssa40 8-1	Ssa40 8-2
Entiat R 01	32861-070	41	41	5	5	27	49	11	11	10	12	15	15	6	14	8	13
Entiat R 01	32861-071	40	40	?	?	32	38	10	12	12	12	14	15	9	12	16	16
Entiat R 01	32861-072	41	44	?	?	31	83	11	12	10	25	5	13	12	14	?	?
Entiat R 01	32861-075	?	?	?	?	?	?	11	12	?	?	?	?	?	?	?	?
Entiat R 01	32861-076	?	?	?	?	45	51	11	12	?	?	10	14	?	?	9	19
Entiat R 01	32861-077	40	44	6	8	30	44	12	12	10	10	14	15	9	11	6	8
Entiat R 01	32861-078	?	?	?	?	?	?	11	12	10	12	14	15	9	11	?	?
Entiat R 01	32861-079	?	?	5	5	53	55	11	12	10	12	13	15	?	?	8	12
Entiat R 01	32861-080	40	44	6	6	47	49	11	12	10	25	13	15	9	14	7	14
Entiat R 01	32861-081	37	43	?	?	47	85	11	12	12	12	15	15	9	14	8	10
Entiat R 01	32861-082	?	?	?	?	28	51	11	12	?	?	13	14	?	?	8	9
Entiat R 01	32861-083	?	?	5	5	25	45	10	11	?	?	15	15	9	14	6	13
Entiat R 01	32861-084	37	44	5	7	79	85	11	12	10	10	13	15	9	12	8	8
Entiat R 01	32861-085	31	42	?	?	31	45	10	11	12	12	14	14	10	12	5	12
Entiat R 01	32861-086	?	?	6	8	25	30	11	11	10	12	14	15	12	12	14	20
Entiat R 01	32861-087	?	?	?	?	?	?	11	12	10	12	13	15	?	?	?	?
Entiat R 01	32861-088	37	43	?	?	63	69	11	12	12	25	10	13	9	14	8	8
Entiat R 01	32861-091	?	?	?	?	47	67	11	12	?	?	14	15	12	12	?	?
Entiat R 01	32861-092	?	?	?	?	33	45	12	12	?	?	?	?	?	?	?	?
Entiat R 01	32861-093	40	42	?	?	?	?	11	12	10	12	15	15	?	?	?	?
Entiat R 01	32861-095	21	41	5	7	39	47	11	12	12	12	15	15	9	12	13	19
Entiat R 01	32861-096	40	41	5	6	53	67	11	12	10	10	13	15	9	14	5	8
Entiat R 01	32861-097	42	42	5	6	21	45	11	12	10	12	14	15	9	12	7	7
Entiat R 01	32861-098	?	?	?	?	25	31	11	12	?	?	5	14	?	?	16	16
Entiat R 01	32861-099	?	?	?	?	?	?	11	12	?	?	?	?	?	?	?	?
Entiat R 01	32861-100	?	?	?	?	45	51	12	12	?	?	15	15	9	14	8	16

* Indicates missing data.

Table A-10. Data for John Day River 2000 samples.

Population	Sample no.	Genotype															
		Ogo4	Ogo -	Oke 4 -	Oke4 -	Ots104	Ots104 -	Ots10	Ots2	Ots2	Ots3 -	Ots3	Otsd	Otsd	Ssa40	Ssa40	
		- 1	2	1	2	- 1	2	m - 1	m - 2	m - 1	m - 2	1	- 2	9-1	9-2	8-1	8-2
John Day R 00	32973-001	42	45	5	6	47	55	10	12	10	12	14	14	9	9	8	19
John Day R 00	32973-002	41	42	5	5	47	74	12	12	10	13	13	14	9	14	6	17
John Day R 00	32973-003	41	41	5	5	49	51	11	11	10	12	15	15	12	12	12	12
John Day R 00	32973-004	42	45	5	5	27	27	11	11	10	10	15	15	9	14	17	20
John Day R 00	32973-005	41	41	5	6	55	67	?*	?	10	12	15	15	9	14	?	?
John Day R 00	32973-006	42	45	5	6	53	57	12	12	10	12	15	15	9	9	8	9
John Day R 00	32973-007	32	42	6	6	45	45	10	12	10	10	14	16	9	9	6	15
John Day R 00	32973-008	40	40	?	?	51	59	11	11	10	17	14	15	9	9	9	16
John Day R 00	32973-009	35	41	6	8	59	67	10	11	10	10	14	15	9	14	6	8
John Day R 00	32973-010	40	40	5	9	57	61	10	10	10	12	15	15	12	13	8	8
John Day R 00	32973-011	37	44	5	6	34	71	11	11	10	12	10	15	9	9	8	19
John Day R 00	32973-012	42	42	5	5	67	73	10	11	12	25	14	15	9	9	6	8
John Day R 00	32973-013	41	42	6	8	21	57	10	11	10	12	15	15	12	14	20	20
John Day R 00	32973-014	41	42	6	9	59	81	12	12	10	12	14	16	13	14	9	33
John Day R 00	32973-015	37	40	5	6	47	49	12	12	10	12	10	15	9	9	9	13
John Day R 00	32973-016	41	42	6	6	61	71	11	11	10	10	15	15	9	11	6	13
John Day R 00	32973-017	40	42	5	5	53	55	12	12	10	25	14	16	9	9	16	30
John Day R 00	32973-018	40	42	5	6	47	53	11	12	10	10	14	15	9	10	10	20
John Day R 00	32973-019	42	42	?	?	53	67	11	12	?	?	13	14	9	9	14	21
John Day R 00	32973-020	41	43	5	5	53	53	11	11	10	10	14	15	9	9	10	18
John Day R 00	32974-001	40	40	5	6	47	51	11	11	10	17	14	15	9	9	9	14
John Day R 00	32974-002	37	41	5	6	51	65	11	11	10	10	13	16	9	14	10	10
John Day R 00	32974-003	37	44	5	6	63	75	10	11	10	12	15	15	9	12	6	19
John Day R 00	32974-004	40	40	5	6	41	53	12	12	10	10	10	15	9	14	8	8
John Day R 00	32974-005	41	41	5	6	43	45	12	12	12	12	15	16	9	10	14	20
John Day R 00	32974-006	41	43	5	9	25	63	12	12	12	12	15	15	11	14	11	14
John Day R 00	32974-007	31	41	5	8	45	65	11	12	10	12	14	15	9	14	8	9
John Day R 00	32974-008	41	42	5	5	53	61	11	11	10	10	14	14	12	14	8	11
John Day R 00	32974-009	43	44	5	5	53	55	11	12	10	12	14	16	9	12	12	18
John Day R 00	32974-010	40	44	6	9	51	73	11	12	10	17	15	15	9	14	7	13
John Day R 00	32974-011	41	42	5	5	21	34	11	12	10	10	14	15	10	14	11	13

Table A-10 continued. Data for John Day River 2000 samples.

Population	Sample no.	Genotype															
		Ogo4 - 1	Ogo - 2	Oke 4 - 1	Oke4 - 2	Ots104 - 1	Ots104 - 2	Ots10 m - 1	Ots10 m - 2	Ots2 m - 1	Ots2 m - 2	Ots3 - 1	Ots3 - 2	Otsd 9-1	Otsd 9-2	Ssa40 8-1	Ssa40 8-2
John Day R 00	32974-012	40	41	5	8	59	75	11	11	10	10	14	15	9	14	9	13
John Day R 00	32974-013	37	37	9	9	23	34	11	11	10	12	10	13	12	14	7	11
John Day R 00	32974-014	40	44	5	9	53	57	11	11	10	12	15	15	9	9	9	9
John Day R 00	32974-015	40	40	?	?	43	51	11	12	10	10	15	15	9	9	8	14
John Day R 00	32974-016	32	41	5	5	53	55	10	11	10	10	14	15	9	12	8	23
John Day R 00	32974-017	37	45	5	6	23	67	10	11	10	17	15	15	9	13	13	20
John Day R 00	32974-018	41	42	8	8	27	63	11	12	10	10	13	15	9	14	5	6
John Day R 00	32974-019	40	41	8	8	47	59	10	12	10	10	15	15	9	9	8	8
John Day R 00	32974-020	42	43	5	6	63	63	11	12	10	12	15	15	9	11	6	6
John Day R 00	32975-001	32	42	6	8	27	51	10	11	10	10	14	15	9	14	10	16
John Day R 00	32975-002	42	44	5	6	27	49	11	12	10	17	14	15	9	9	6	8
John Day R 00	32975-003	41	42	5	5	38	67	11	11	12	12	15	15	9	12	8	8
John Day R 00	32975-004	40	42	6	8	51	59	11	12	10	12	15	15	9	12	9	12
John Day R 00	32975-005	41	45	5	5	5	53	11	12	10	25	14	15	9	9	8	14
John Day R 00	32975-006	40	42	5	8	27	38	11	11	12	12	14	15	9	14	6	9
John Day R 00	32975-007	40	45	5	6	45	61	11	12	10	25	15	15	14	14	8	8
John Day R 00	32975-008	41	42	7	7	34	53	10	11	10	10	14	15	9	14	8	8

* Indicates missing data.

Table A-11. Genetic collections, Entiat River redd survey, 2001.

Vial number	Sex	Fork length (cm)	Date taken	ID number	Origin (from CWT)	Age (t:f) ^a
1	F	75	8/23/2001		Wild	4.2
2	M	96	"		Hatchery	5.2
3	F	90	"		Wild	5.2
4	F	78	"		Wild	4.2
5	F	72	"		Wild	4.2
6	M	81	"	9813	No tag	R ^b
7	F	69	"		Hatchery	4.2
8	M	90	"		Wild	5.2
9	M	81	"	9814	Met SFH ^c 97 ^d	4.2
10	F	75	"		Wild	4.2
11	F	69	"		Wild	4.2
12	M	78	"		Hatchery	4.2
13	M	78	"	9815	No tag	4.2
14	M	75	"		Wild	4.2
15	F	75	9/7/2001		Wild	4.2
16	F	75	9/4/2001	Mad R.	Wild	4.2
17	F	93	9/7/2001		Wild	5.2
18	F	72	"		Hatchery	4.2
19	M	102	"		Wild	5.2
20	F	75	"		Unknown	R
21	F	78	"		Hatchery	4.2
22	F	75	"		Wild	4.2
23	F	72	9/4/2001	4732	ENFH ^e 97	4.2
24	M	78	"	4752	ENFH 97	4.2
25	F	75	"		Wild	4.2
26	F	75	"		Unknown	R
27	M	81	"		Hatchery	4.2
28	F	75	"		Hatchery	4.2
29	F	72	9/7/2001		Hatchery	4.2
30	F	72	"		Wild	4.2
31	F	75	9/6/2001		Wild	4.2
32	M	81	9/4/2001		Unknown	R
33	F	72	"		Wild	4.2
34	F	78	"		Wild	4.2
35	M	78	9/6/2001		Wild	4.2
36	M	72	"		Unknown	NS
37	M	81	"		Wild	4.2
38	M	72	"		Unknown	R
39	F	72	"	4702	WNFH ^f 97	4.2
40	M	81	"		Wild	4.2
41	M	60	"		Unknown	R
42	F	66	"		Wild	4.2
43	M	99	"		Wild	5.2
44	F	75	"		Wild	4.2
45	M	84	"		Hatchery	4.2
46	M	84	"		Wild	4.2

Table A-11 continued. Genetic collections, Entiat River redd survey, 2001.

Vial number	Sex	Fork length (cm)	Date taken	ID number	Origin (from CWT)	Age (t:f)
47	M	93	9/7/2001		Unknown	R
48	M	81	"		Wild	4.2
49	F	72	"		Wild	4.2
50	F	84	"		Wild	4.2
51	F	72	9/7/2001		Hatchery	4.2
52	M	81	"		Wild	4.2
53	F	93	"		Unknown	R
54	F	75	"		Unknown	R
55	F	90	"		Wild	5.2
56	F	72	"		Wild	4.2
57	M	84	"		Wild	4.2
58	F	75	"		Wild	4.2
59	F	96	"		Wild	5.2
60	M	78	"		Wild	4.2
61	M	72	"		Wild	4.2
62	M	81	"		Wild	4.2
63	F	78	"		Wild	4.2
64	F	78	"		Wild	4.2
65	M	78	"		Unknown	R
66	M	87	"		Wild	4.2
67	F	81	"		Hatchery	4.2
68	M	78	"		Unknown	R
69	F	90	"		Unknown	R
70	F	87	"		Wild	5.2
71	F	75	"		Wild	4.2
72	F	72	"		Wild	4.2
73	M	81	"	4733	ENFH 97	4.2
74	F	81	"		Wild	4.2
75	M	75	"		Wild	4.2
76	F	93	"		Wild	5.2
77	F	72	9/10/2001		Wild	4.2
78	M	99	"		Wild	5.2
79	M	87	"	4720	No tag	R
80	F	72	"		Wild	4.2
81	F	78	"	4715	ENFH 97	4.2
82	F	90	"		Wild	5.2
83	F	69	"		Wild	4.2
84	F	75	"		Wild	4.2
85	F	72	"	4722	WNFH 97	4.2
86	F	75	"		Wild	4.2
87	F	78	"		Unknown	R
88	F	75	9/13/2001		Wild	4.2
89	M	105	"		Wild	5.2
90	M	78	"		Wild	4.2
91	M	84	"		Wild	4.2
92	M	84	"		Wild	4.2

Table A-11 continued. Genetic collections, Entiat River redd survey, 2001.

Vial number	Sex	Fork length (cm)	Date taken	ID number	Origin (from CWT)	Age (t:f)
93	M	72	"		Wild	4.2
94	F	72	"		Wild	4.2
95	M	69	"		Hatchery	4.2
96	F	75	"		Wild	4.2
97	F	75	"		Wild	4.2
98	F	69	"		Wild	4.2
99	F	72	9/14/2001		Wild	4.2
100	M	81	"		Wild	4.2

Summary statistics

Females	59	Wild	65	74.7%	ENFH 97	4	Age 4.2	72	85%
Males	41	Hatchery	22	25.3%	WNFH 97	2	Age 5.2	13	15%
Avg. length all	78.9 cm				Met SFH 97	1	R	14	
Avg. length F	76.8 cm	Avg. length wild	79.5		No tag	3	NS ^g	1	
Avg. length M	82.0 cm	Avg. length hatchery	76.9		Unknown	13	Total H + W	87	
							Total aged	85	

^a t:f = total:freshwater.

^b R = Regenerated scale.

^c Met SFH = Methow State Fish Hatchery.

^d 97 Denotes brood year.

^e ENFH = Entiat National Fish Hatchery.

^f WNFH = Winthrop National Fish Hatchery.

^g NS = No scale. Specific hatchery origins determined by coded wire tag (CWT) recovery and analysis. Non-specific hatchery or wild origin and age (total and freshwater, t:f) determined by scale analysis.

Table A-12. Genetic collections, Entiat NFH, 2001.

Vial number	Sex	Fork length (cm)	Date taken	ID number	Origin (from CWT)
1	F	74	8/25/2001	AD Pres ^a	
2	M	82	"	AD Pres	
3	F	78	"	AD Pres	
4	M	86	"	AD Pres	
5	F	74	"	AD Pres	
6	F	70	"	AD Pres	
7	F	74	"	AD Pres	
8	M	81	"	AD Pres	
9	M	79	"	AD Pres	
10	F	76	"	AD Pres	
11	M	84	"	AD Pres	
12	F	76	"	700	ENFH ^b 97 ^c
13	F	75	"	AD Pres	
14	M	79	"	AD Pres	
15	F	68	"	AD Pres	
16	M	100	"	739	ENFH 96 ^c
17	F	78	"	AD Pres	
18	M	81	"	AD Pres	
19	F	72	"	740	ENFH 97
20	F	74	"	AD Pres	
21	F	78	"	AD Pres	
22	M	83	"	744	ENFH 97
23	M	76	"	AD Pres	
24	F	75	"	746	ENFH 97
25	M	82	"	748	ENFH 97
26	F	73	8/30/2001	750	ENFH 97
27	F	77	"	AD Pres	
28	F	71	"	AD Pres	
29	F	81	"	AD Pres	
30	M	81	"	AD Pres	
31	M	92	"	AD Pres	
32	M	95	"	AD Pres	
33	M	84	"	AD Pres	
34	F	76	"	AD Pres	
35	F	78	"	AD Pres	
36	F	80	"	AD Pres	
37	F	76	"	AD Pres	
38	M	85	"	AD Pres	
39	M	81	"	AD Pres	
40	M	60	"	AD Pres	
41	M	85	"	AD Pres	
42	F	76	"	AD Pres	
43	F	75	"	AD Pres	
44	F	72	"	AD Pres	
45	F	81	"	AD Pres	
46	M	87	"	AD Pres	

Table A-12 continued. Genetic collections, Entiat NFH, 2001.

Vial number	Sex	Fork length (cm)	Date taken	ID number	Origin (from CWT)
47	M	80	"	AD Pres	
48	M	60	"	AD Pres	
49	M	77	"	AD Pres	
50	F	75	"	AD Pres	
51	F	77	8/30/2001	AD Pres	
52	F	72	"	AD Pres	
53	F	74	"	AD Pres	
54	F	73	"	AD Pres	
55	M	57	"	AD Pres	
56	M	85	"	AD Pres	
57	M	83	"	AD Pres	
58	M	84	"	AD Pres	
59	F	72	"	AD Pres	
60	M	82	"	AD Pres	
61	F	73	"	AD Pres	
62	F	71	"	AD Pres	
63	F	68	"	771	ENFH 97
64	F	78	"	773	ENFH 97
65	M	80	"	AD Pres	
66	M	72	"	AD Pres	
67	M	88	"	774	No tag
68	M	84	"	AD Pres	
69	F	73	"	777	ENFH 97
70	F	79	"	AD Pres	
71	F	71	"	AD Pres	
72	F	74	"	AD Pres	
73	F	82	"	AD Pres	
74	M	81	"	AD Pres	
75	M	65	"	AD Pres	
76	M	78	"	780	ENFH 97
77	M	81	"	AD Pres	
78	F	76	"	AD Pres	
79	F	75	"	AD Pres	
80	F	74	"	AD Pres	
81	F	78	"	AD Pres	
82	F	71	"	AD Pres	
83	M	72	"	AD Pres	
84	M	86	"	781	ENFH 97
85	M	77	"	AD Pres	
86	M	55	"	AD Pres	
87	F	92	"	AD Pres	
88	F	71	"	783	ENFH 97
89	F	72	"	AD Pres	
90	F	72	"	AD Pres	
91	F	74	"	785	ENFH 97
92	M	92	"	AD Pres	

Table A-12 continued. Genetic collections, Entiat NFH, 2001.

Vial number	Sex	Fork length (cm)	Date taken	ID number	Origin (from CWT)
93	M	80	"	AD Pres	
94	M	89	"	AD Pres	
95	M	82	"	AD Pres	
96	M	55	"	AD Pres	
97	F	88	"	787	ENFH 96
98	F	78	"	AD Pres	
99	M	81	"	AD Pres	
100	M	80	"	AD Pres	
Summary statistics					
	Females		53	AD Pres	84
	Males		47	ENFH 97	13
	Ave length F	75.3 cm		ENFH 96	2
	Ave length M	79.8 cm		No tag	1
	Ave length all	77.4 cm			

^a AD Pres = Adipose present fish (no CWT present).

^b ENFH = Entiat National Fish Hatchery.

^c 96 and 97 denote brood year.

Table A-13. Genetic collections, Winthrop NFH, 2001.

Vial number	Sex	Fork length (cm)	Date taken	ID number	Origin (from CWT)
1	F	77	8/15/2001	2	Meth ^a 97 ^b
2	F	76	"	1	Meth 97
3	F	73	"	3	Twisp 97
4	F	75	"	4	Meth 97
5	F	75	"	5	Meth 97
6	F	74	"	6	Meth 97
7	F	74	"	7	Meth 97
8	F	75	"	8	Meth 97
9	F	72	"	9	Meth 97
10	F	74	"	10	Meth 97
11	F	79	"	11	Meth 97
12	F	77	"	12	Meth 97
13	F	76	"	13	Chewuch ^c 97
14	F	77	"	14	Meth 97
15	F	74	"	15	No tag
16	F	77	"	16	Twisp ^d 97
17	M	83	"	301	WNFH ^e 97
18	M	83	"	302	WNFH 97
19	M	81	"	304	WNFH 97
20	M	80	"	303	Meth 97
21	M	78	"	306	WNFH 97
22	M	83	"	307	WNFH 97
23	M	79	"	309	No tag
24	M	58	"	308	Metcomp ^f 98 ^b
25	M	81	"	310	Meth 97
26	M	85	"	312	WNFH 97
27	M	75	"	311	Meth 97
28	M	80	8/22/2001	Mort	Pond mort.
29	M	83	"	Mort	Pond mort.
30	F	78	"	26	Meth 97
31	F	79	"	27	No tag
32	F	77	"	28	WNFH 97
33	F	80	"	29	Meth 97
34	F	78	"	31	Meth 97
35	F	72	"	30	Meth 97
36	F	75	"	32	Meth 97
37	F	71	"	33	Meth 97
38	F	80	"	34	AD Pres ENT (H)
39	F	72	"	35	WNFH 97
40	F	75	"	36	Meth 97
41	F	82	"	37	WNFH 97
42	F	73	"	38	WNFH 97
43	F	75	"	39	Meth 97
44	F	69	"	40	Meth 97
45	F	76	"	41	Meth 97
46	F	77	"	42	WNFH 97

Table A-13 continued. Genetic collections, Winthrop NFH, 2001.

Vial number	Sex	Fork length (cm)	Date taken	ID number	Origin (from CWT)
47	F	74	"	43	WNFH 97
48	F	81	"	44	WNFH/Meth ^g 97
49	F	75	"	45	Meth 97
50	F	77	"	46	WNFH 97
51	F	77	8/22/2001	47	WNFH 97
52	F	77	"	48	WNFH 97
53	F	70	"	49	WNFH 97
54	F	73	"	50	WNFH/Meth 97
55	F	78	"	51	Meth 97
56	F	79	"	52	Meth 97
57	F	77	"	53	Meth 97
58	F	72	"	54	Meth 97
59	F	78	"	55	WNFH 97
60	F	79	"	56	WNFH 97
61	F	78	"	57	WNFH/Meth 97
62	F	77	"	58	Meth 97
63	F	68	"	59	No tag
64	F	75	"	60	WNFH 97
65	F	73	"	61	Chewuch 97
66	F	77	"	62	Meth 97
67	F	74	"	63	Meth 97
68	F	71	"	64	Meth 97
69	F	73	"	65	WNFH 97
70	F	76	"	66	Meth 97
71	F	78	"	67	Meth 97
72	F	75	"	68	WNFH 97
73	F	73	"	69	Meth 97
74	F	75	"	70	WNFH 97
75	F	76	"	71	Meth 97
76	F	72	"	72	WNFH 97
77	F	73	"	73	Meth 97
78	F	75	"	74	Meth 97
79	M	83	"	322	Meth 97
80	M	72	"	323	WNFH 97
81	M	78	"	324	Meth 97
82	M	85	"	325	Meth 97
83	M	56	"	326	WNFH/Metcomp ^g 98
84	M	79	"	327	Meth 97
85	M	54	"	328	Metcomp 98
86	M	84	"	329	Meth 97
87	M	74	"	330	WNFH 97
88	M	67	"	331	WNFH 97
89	F	69	8/29/2001	95	Meth 97
90	F	79	"	96	WNFH/Meth 97
91	F	75	"	97	WNFH 97
92	F	73	"	98	WNFH 97

Table A-13 continued. Genetic collections, Winthrop NFH, 2001.

Vial number	Sex	Fork length (cm)	Date taken	ID number	Origin (from CWT)
93	F	78	"	100	WNFH/Meth 97
94	F	68	"	101	WNFH 97
95	F	74	"	102	WNFH 97
96	M	82	"	362	WNFH/Meth 97
97	M	72	"	363	Meth 97
98	M	81	"	364	Meth 97
99	M	82	"	365	Lost tag
100	M	72	"	366	WNFH 97

Summary statistics						
Females		72	WNFH 97	31	Chewuch 97	2
Males		28	Meth 97	48	No tag	4
Ave length F	75.2 cm		Metcomp 98	2	Lost tag	1
Ave length M	76.8 cm		WNFH/Metcomp 98	1	AD Pres ENT	1
Ave length all	75.7 cm		WNFH/Meth 97	6	Pond mort.	2
			Twisp 97	2		

^a Meth = Fish of Methow River origin.

^b 97 and 98 denote brood year.

^c Chewuch = Fish of Chewuch River origin.

^d Twisp = Fish of Twisp River origin.

^e WNFH = Winthrop National Fish Hatchery (fish of Carson National Fish Hatchery origin).

^f Metcomp = Methow Composite (fish of Combined Chewuch and Methow River origin).

^g WNFH/Metcomp and WNFH/Meth = Describe fish crossed with the aforementioned origins.

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