State of Alaska
Department of Fish and Game
Sportfish Division

Nomination Form
Anadromous Waters Catalog

Region: Southeastern

USGS Quad(s): Juneau D4

Anadromous Waters Catalog Number of Waterway: 115-20-10030

Name of Waterway: Slate Creek

☑ USGS Name ☐ Local Name

☐ Addition ☐ Deletion ☑ Correction ☐ Backup Information

For Office Use

Nomination #	10-860	Fisheries Scientist	10/29/10 Date
Revision Year:	2011	Habitat Operations Manager	11/1/10 Date
Revision to:	Atlas ___ ___ Both X	AWC Project Biologist	6 OCT 10 Date
Revision Code:	~~E-9~~, ~~E-9~~ B-5, E-9, D-1	Cartographer	9/1/10 Date

NOT ENOUGH DOCUMENT OF BARRIER

OBSERVATION INFORMATION

Species	Date(s) Observed	Spawning	Rearing	Present	Anadromous

IMPORTANT: Provide all supporting documentation that this water body is important for the spawning, rearing or migration of anadromous fish, including: number of fish and life stages observed; sampling methods, sampling duration and area sampled; copies of field notes; etc. Attach a copy of a map showing location of mouth and observed upper extent of each species, as well as other information such as: specific stream reaches observed as spawning or rearing habitat; locations, types, and heights of any barriers; etc.

Comments:

Liz Flory of Aquatic Science, Inc, a private fisheries consultant, has documented a barrier to anadromous fish migration in Slate Creek at the upper point given above. In her annual reports provided to Coeur Alaska for aquatic resource studies at the Kensington Mine, she states "Slate Creek drains an area of about 4.48 square miles and has vertical fall barriers that prevent (anadromous) fish passage on both East and West forks approximately 1000 meters from the stream mouth." Please reduce the upper extent of anadromous fish use.
Coordinates (Lat,Long): (58.79640,-135.03895)

Shorter stream, add barrier

Name of Observer (please print): Kate Kanouse

Signature: 146.63.139.97 (Web Nomination)

Date: 09/30/2010

Agency:

Address: ADF&G Habitat ADF&G Habitat
Juneau, AK 99811

This certifies that in my best professional judgment and belief the above information is evidence that this waterbody should be included in or deleted from the Anadromous Waters Catalog.

Signature of Area Biologist: _____ Date: _____ Revision 02/08

Name of Area Biologist (please print):

5.0 Resident Fish Population

5.1 Stream Reaches

Resident fish surveys were conducted on the three main stream systems around the mine site, Sherman Creek that flows into Lynn Canal and Johnson and Slate Creeks that flow into Berners Bay (Figures 6, 7). Population surveys of resident fish were conducted in 2009 in lower, middle and upper reaches of each stream. Each reach is 360m in length. Sherman and Sweeny Creek reaches were designated during aquatic resource surveys in 1998 (Aquatic Science Inc. 1998) while Johnson and Slate reaches were delineated in 2005. All middle and upper reaches are located above barrier falls and are thereby inaccessible to sea-run fish. Dolly Varden char (*Salvelinus malma*), pink salmon (*Onchorhynchus gorbuscha*), chum salmon (*O. keta*), cutthroat trout (*O. clarki*) and coastrange sculpin (*Cottus aleuticus*) inhabit reaches below falls barriers. Dolly Varden are the only fish present above barrier falls and likely first arrived there when sea levels were higher.

Lower Sherman extends from the stream mouth to the barrier falls 360m upstream. Middle Sherman extends 360m downstream from the confluence of Sherman Creek and Ophir tributary. Upper Sherman extends 360m upstream from the road bridge across Upper Sherman Creek. Permanent markers are located at the start of strata if no permanent natural features occurred there (e.g. falls, stream confluence).

Lower Johnson begins at the forest/meadow border approximately 500m upstream from the confluence with Berners Bay. Middle Johnson begins at the confluence with the tributary draining Snowslide Gulch. Upper Johnson is located upstream of the mill site pad and above a braided section of river, in the Jualin basin. Lower Slate begins 400m upstream from the mouth; Middle Slate begins 400m downstream from the proposed dam at Lower Slate Lake; Upper Slate begins at the mouth of the north inlet to Upper Slate Lake. GPS points for the start of each reach are given in Table 10.

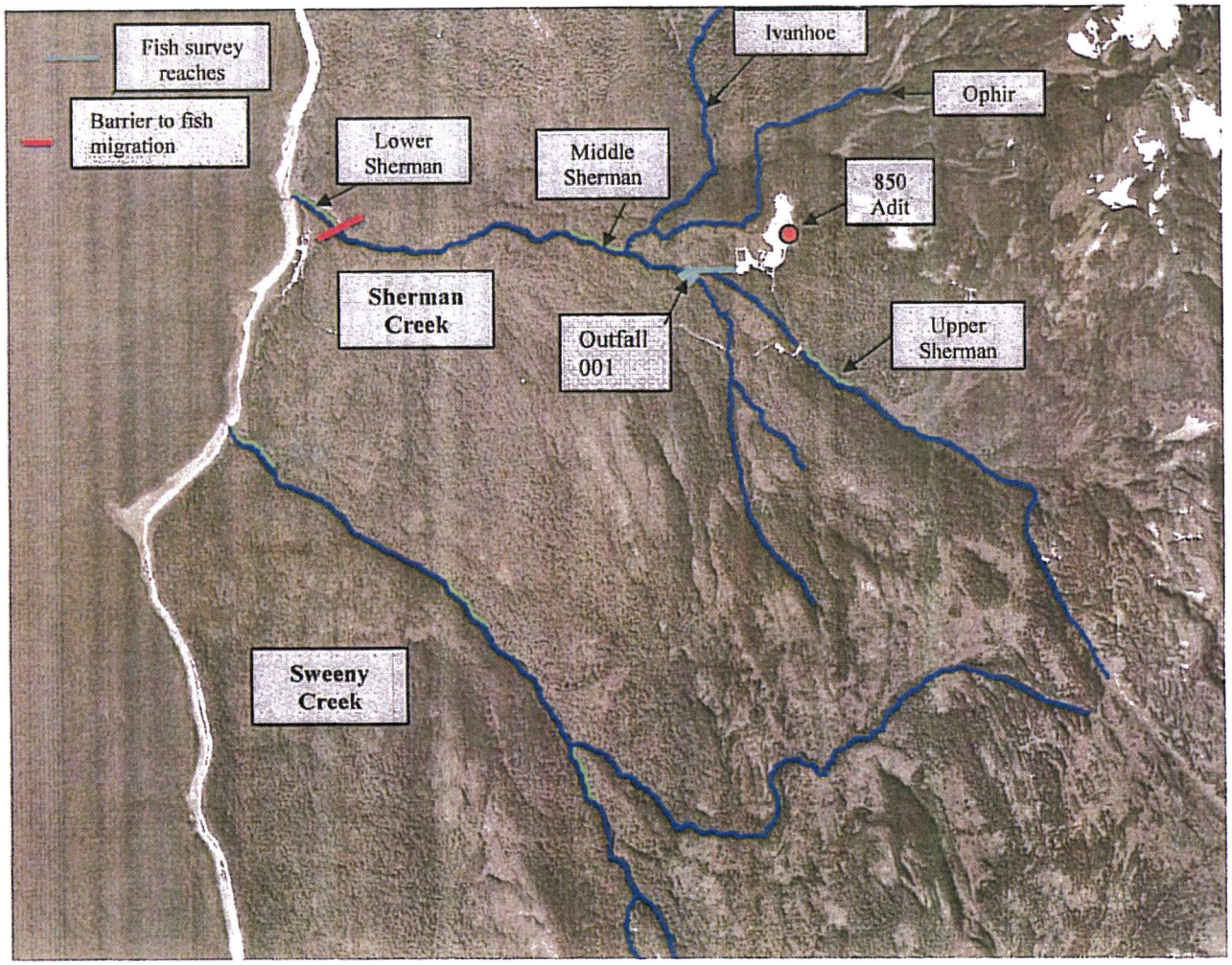


Figure 7A: Sherman Creek reaches used in 2009 Resident Fish Surveys.

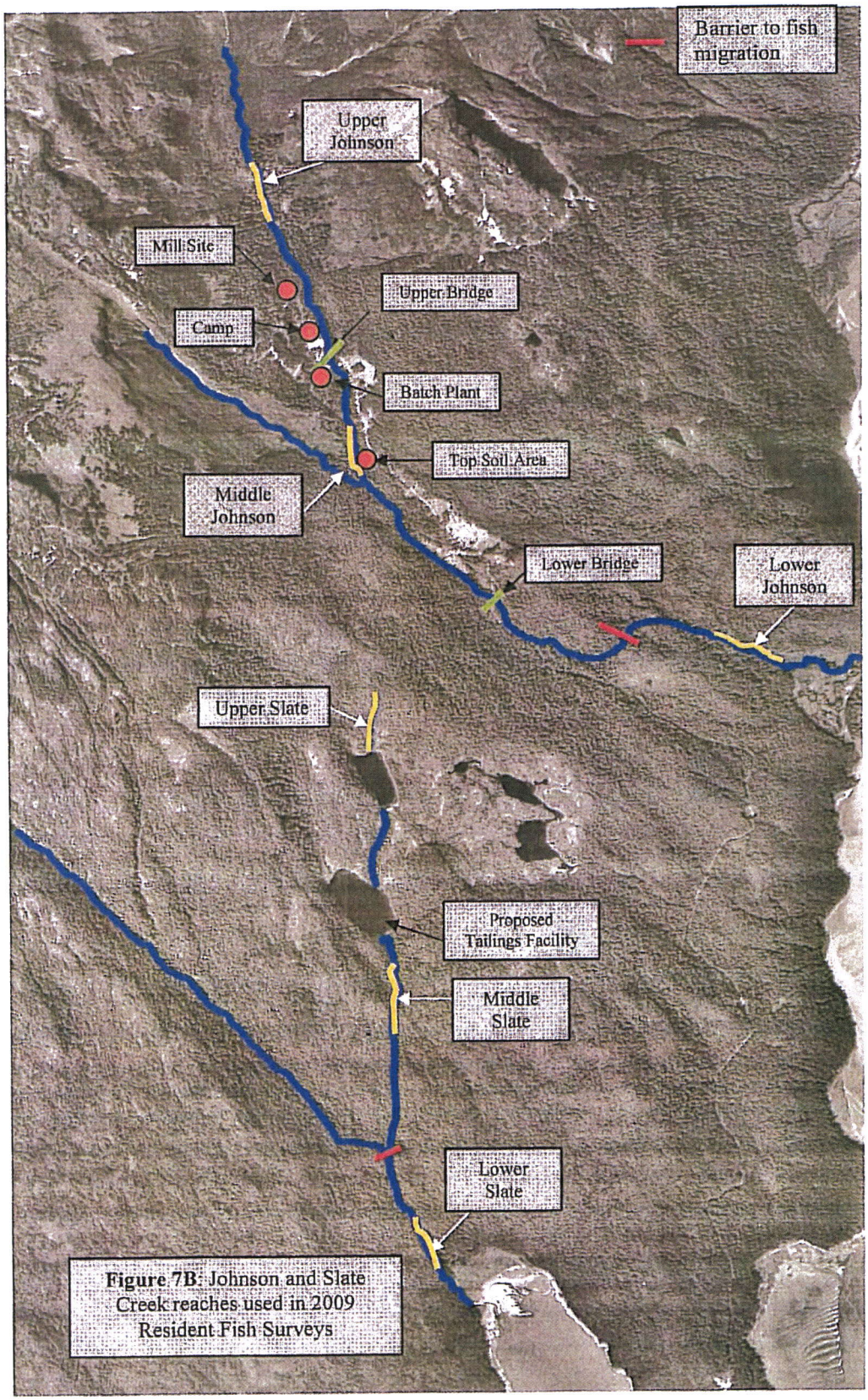


Figure 7B: Johnson and Slate Creek reaches used in 2009 Resident Fish Surveys

Table 10: GPS Coordinates (NAD 27) for resident fish strata.

	Stream Reach	Date Surveyed	Latitude	Longitude
1	Lower Sherman	7/15/2009	58.86908	-135.14005
2	Middle Sherman	8/4/2009	58.86774	-135.11430
3	Upper Sherman	8/11/2009	58.86342	-135.10025
4	Lower Johnson	7/13/2009	58.82383	-134.99936
5	Middle Johnson	8/5/2009	58.83113	-135.03711
6	Upper Johnson	8/12/2009	58.85147	-135.04892
7	Lower Slate	7/20/2009	58.79628	-135.03716
8	Middle Slate	7/28/2009	58.80370	-135.03706
9	Upper Slate	7/29/2009	58.81412	-135.04030

5.2 Resident fish population survey methods

The number of fish within each stratum was estimated using the methods of Hankin and Reeves (1988) as in previous surveys (Aquatic Science 1998-2008). Resident fish surveys were conducted between July 13 and August 12, 2009. Lower reaches were surveyed first prior to adult pink salmon entering streams to spawn in late July. Electrofishing gear is not permitted in the presence of spawning salmonids, as stipulated in the Alaska Department of Fish and Game Fish Resource Permit (Appendix 3a).

In each reach, stream habitat units were first categorized as riffle, pool, glide or cascade following the classifications of Bisson et al (1981). At least every third riffle, pool and glide was selected for snorkeling. A fisheries biologist, equipped with dry suit and snorkel, quietly entered the water at the downstream end of a selected unit and proceeded upstream observing fish underwater. Two field technicians, following behind to minimize disturbance to fish, measured the length of each habitat unit to the nearest 0.1m using a metric hip chain, and recorded the fish counts. Habitat unit width was measured using a 15m tape measure and meter stick.

The accuracy of visual counts was verified by electro-fishing at least three units (if present) of each habitat type previously snorkeled. A three-member team proceeded upstream using a Smith-Root gasoline-powered backpack electro-fishing unit with output waves designed to minimize impact on fish. All stunned fish were counted and as many as possible captured using dip nets to allow length and weight measurements to be taken. Minnow traps baited with cured salmon eggs were set in high density fish areas identified by snorkeling. This allowed

some fish to be removed and counted prior to electro-fishing, thereby minimizing effects of the electric current on the fish population. Captured fish were anesthetized in a solution of MS222 (Tricanemethane Sulphonate), weighed to the nearest 0.1g and their total length measured to the nearest 1mm. The fish were then placed in a container of fresh stream water with a battery-powered aerator to recover before being returned to the habitat unit from which they were captured.

5.3 Data analysis methods

The number of fish within a reach was estimated by first applying a correction factor to the visual counts based on electro-fishing counts. It is assumed that electro-fishing counts are more accurate than snorkel counts since fish hiding between rocks might remain undetected by a diver, but can be captured by electro-fishing. The corrected counts for sampled units were then extrapolated over the total number of habitat units within a reach to give a total population estimate. Standard deviations and 95% confidence intervals for the population estimates were determined using equations (5) through (11) in Dolloff, Hankin & Reeves (1993). The precision of population estimates was calculated by expressing the 95% confidence intervals as a percentage of the estimated population size.

Definitions for equations used:

y_i = true number of fish in each unit; $i = 1,2,\ldots,N$,

Y = total number of fish in all units, d_i = count of fish by diver in unit i,

n' = number of units for which both diver and electrofishing counts are made

n = number of units for which diver counts only are made ($n>n'$).

The number of fish present is firstly estimated by $y_i = d_i R$(for i not in n') where R is the ratio of actual numbers present to diver counts, estimated by $R = \Sigma y/\Sigma d$ (for i in n') or the total electro-fishing counts to diver counts. The estimate is then extrapolated over all units using: $Y = N/n\ (\Sigma y_i)$.

An estimation of error is then made using the equation:

$$V(yd,r) = \frac{s^2y - 2Rsxy + R^2s^2x}{n'} + \frac{2Rsxy - R^2s^2x}{n} - \frac{S^2y}{N}$$

where $s^2y = \Sigma(yi - y')^2 / n'-1$,

$s^2x = \Sigma(xi - x')^2 / n'-1$, and

$sxy = \Sigma(xi - x')(yi - y')/ n'-1$

The dimensions of each habitat unit in each reach are given in Appendix 3b. The total area of each habitat type was calculated and used in the computation of fish densities (number of fish per m^2). The minimum detectable difference (δ) in mean numbers of fish in each habitat unit or reach was calculated using the previously calculated estimation of error with the equation:

$$\delta = \sqrt{\frac{V(yd,r)}{n}} \quad (t\ \alpha(2), v + t\ \beta(1), v)$$

Where $v = n-1$

A significance level (α) of 0.05, and a statistical power β of 0.01 were specified for the analysis, to determine the smallest difference in mean numbers of fish that are detectable 90% of the time with a 95% significance level. The t values were read from tables depending on sample size.

5.4 Population estimates

Numbers of fish counted by snorkeling and captured by electro-fishing and minnow trapping are summarized in Table 11. Population estimates by habitat type and by reach are presented in Table 12 and illustrated in Figures 8A and B. Dolly Varden were found in all stream reaches, while cutthroat trout were only present in the lower stream reaches. Dolly Varden numbers were highest in Lower and Middle Johnson and Upper Sherman Creek and Upper Slate Creek, particularly in pools. Cutthroat numbers were highest in Lower Slate.

Table 11: Numbers of resident fish observed snorkeling and captured fishing.

			Snorkeling			Electrofishing/Trapping		
				Numbers Observed			Numbers Captured	
Stream Reach	Habitat Type	Total Units (N) in stratum	Number of Units (n) snorkeled	Dolly	Cutthroat	Number of Units (n') fished	Dolly	Cutthroat
Lower Sherman	Pool	46	38	10	11	21	7	7
	Riffle	17	14	1	2	6	1	2
	Glide	3	3	1	0	2	1	0
	All Units	**66**	**55**	**12**	**13**	**29**	**9**	**9**
Middle Sherman	Pool	84	76	54	0	14	10	0
	Riffle	24	15	3	0	4	1	0
	Glide	0	0	0	0	0	0	0
	All Units	**108**	**91**	**57**	**0**	**18**	**11**	**0**
Upper Sherman	Pool	64	57	84	0	23	41	0
	Riffle	9	8	9	0	3	4	0
	Glide	2	2	4	0	1	2	0
	All Units	**75**	**67**	**97**	**0**	**27**	**46**	**0**
Lower Johnson	Pool	29	22	66	1	13	36	1
	Riffle	31	18	35	0	7	6	0
	Glide	3	3	5	2	2	2	2
	All Units	**63**	**43**	**106**	**3**	**22**	**44**	**3**
Middle Johnson	Pool	66	50	165	0	19	70	0
	Riffle	20	9	2	0	4	1	0
	Glide	0	0	0	0	0	0	0
	All Units	**86**	**59**	**167**	**0**	**23**	**71**	**0**
Upper Johnson	Pool	41	36	25	0	18	15	0
	Riffle	17	11	3	0	8	3	0
	Glide	4	3	1	0	2	1	0
	All Units	**62**	**50**	**29**	**0**	**28**	**19**	**0**
Lower Slate	Pool	37	26	1	62	8	0	20
	Riffle	24	16	0	20	6	0	5
	Glide	17	14	1	24	5	1	9
	All Units	**78**	**56**	**2**	**106**	**19**	**1**	**34**
Middle Slate	Pool	34	31	9	0	25	10	0
	Riffle	21	16	3	0	11	3	0
	Glide	15	14	23	0	6	10	0
	All Units	**70**	**61**	**35**	**0**	**42**	**18**	**0**
Upper Slate	Pool	55	27	36	0	15	22	0
	Riffle	57	39	58	0	8	12	0
	Glide	6	3	9	0	2	2	0
	All Units	**118**	**69**	**103**	**0**	**25**	**36**	**0**

Table 12: Resident Fish Population Estimates, 95% Confidence and Precision of Estimate.

Sherman Creek Dolly Varden					Johnson Creek Dolly Varden				
	Habitat	Population	Confid.	Precision		Habitat	Population	Confid.	Precision
Reach	Type	Estimate	Interval	%	Reach	Type	Estimate	Interval	%
Lower	Riffles	1.2	1.12	92.3	Lower	Riffles	72.3	2.85	3.9
	Pools	72.6	6.69	9.2		Pools	93.1	19.50	21.0
	Glides	2.0	2.87	143.4		Glides	5.0	0.00	0.0
	All Units	**69.1**	**7.05**	**10.2**		**All Units**	**167.7**	**16.01**	**9.5**
Middle	Riffles	6.4	2.59	40.5	Middle	Riffles	4.4	2.74	61.8
	Pools	78.5	9.48	12.1		Pools	221.3	32.71	14.8
	Glides	-	-	-		Glides	-	-	-
	All Units	**92.6**	**14.54**	**15.7**		**All Units**	**247.2**	**32.72**	**13.2**
Upper	Riffles	10.1	3.00	29.6	Upper	Riffles	7.7	0.08	1.1
	Pools	107.1	14.88	13.9		Pools	38.0	6.17	16.3
	Glides	4.0	0.00	0.0		Glides	1.0	1.30	129.9
	All Units	**145.5**	**18.45**	**12.7**		**All Units**	**48.2**	**6.89**	**14.3**

Slate Creek Dolly Varden					Cutthroat Trout				
	Habitat	Population	Confid.	Precision		Habitat	Population	Confid.	Precision
Reach	Type	Estimate	Interval	%	Creek	Type	Estimate	Interval	%
Lower	Riffles	0.0	0.0	-	Sherman	Riffles	2.4	0.89	36.8
	Pools	1.4	1.96	137.7	Lower	Pools	18.4	3.75	20.4
	Glides	1.2	0.70	57.4		Glides	0.0	-	-
	All Units	**2.8**	**0.89**	**32.1**		**All Units**	**20.3**	**4.53**	**22.4**
Middle	Riffles	3.9	1.93	49.1	Johnson	Riffles	0.0	0.00	-
	Pools	11.0	2.60	23.7	Lower	Pools	1.3	0.82	62.4
	Glides	24.6	1.74	7.1		Glides	2.0	0.00	-
	All Units	**42.0**	**4.39**	**10.5**		**All Units**	**4.4**	**4.01**	**91.2**
Upper	Riffles	80.2	4.05	5.0	Slate	Riffles	31.5	3.75	11.9
	Pools	73.3	7.94	10.8	Lower	Pools	103.8	9.79	9.4
	Glides	18.0	7.35	40.8		Glides	31.9	2.81	8.8
	All Units	**176.6**	**5.39**	**3.1**		**All Units**	**168.9**	**7.52**	**4.5**

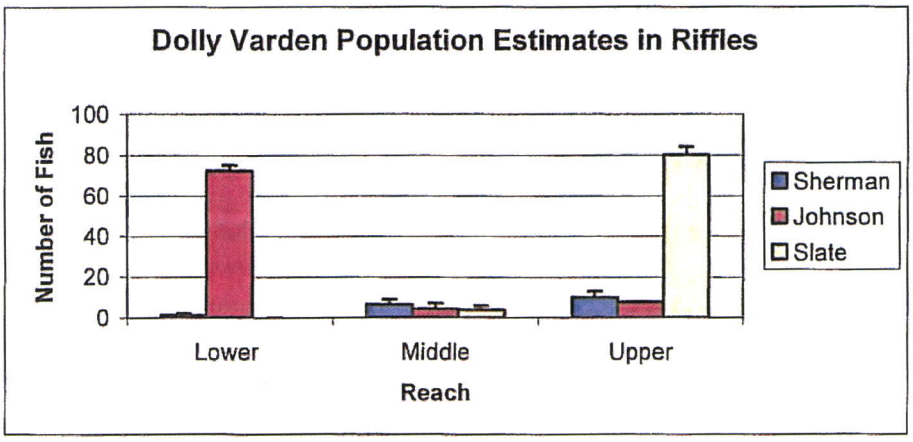
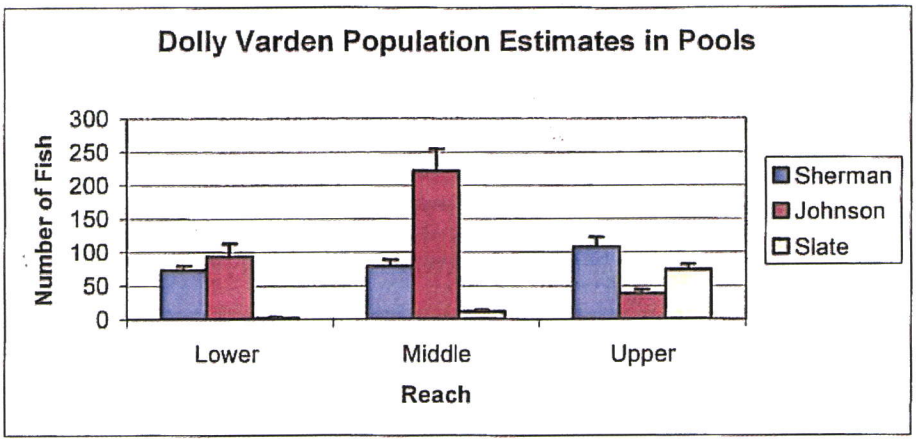
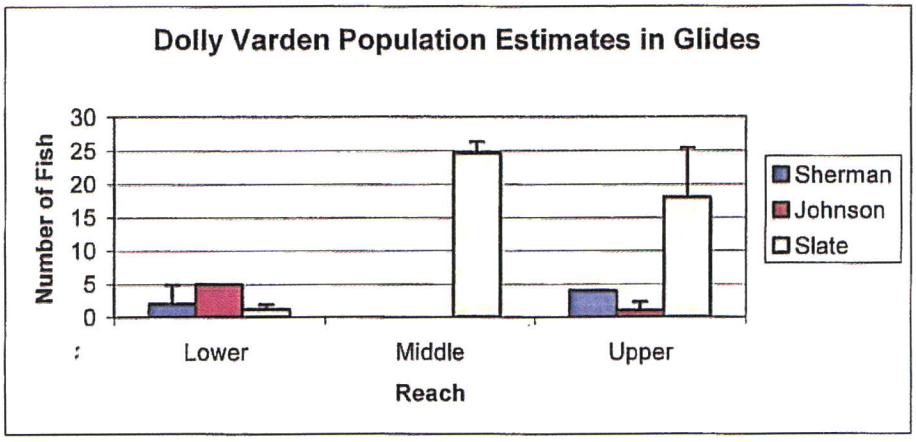


Figure 8A: Dolly Varden Population Estimates by Habitat Type.





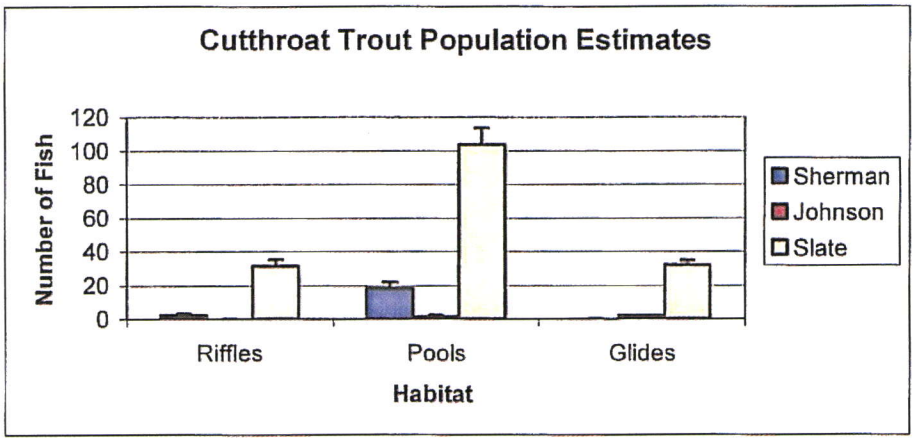


Figure 8B: Cutthroat Estimates and Resident Fish in Sweeny Creek.

Comparison of Dolly Varden numbers over time (Figures 9A, B) showed that numbers appeared to be slightly higher in 2009 in Upper Sherman Creek and in Lower and Middle Johnson than previous years. A large number of fish were observed in one large pool in Middle Johnson so there may be some over-estimate of the total reach due to this. Numbers of Dolly Varden were also higher in Middle and Upper Slate Creek in 2009. The number of cutthroats was higher in Slate Creek in 2009 than previous years though perhaps slightly lower in Sherman Creek. The number of total fish (Dolly Varden and cutthroat trout together) was higher in Johnson and Slate than previous years and similar to previous numbers in Sherman Creek. Fish are able to move in and out of lower reaches via the stream mouth, which may explain changes in numbers of Dolly Varden and cutthroats in lower reaches over time. Fish may move in and out of lower reaches in response to changing stream flows or food availability. A number of larger anadromous Dolly Varden were observed in Lower Johnson in 2009, partly explaining the increase there. A large flood event in November 2005 followed by severe winter of 2006 may also have affected numbers in lower reaches. Numbers may still be recovering from this natural event. There is also natural variability in the population from year to year as well as differences in the numbers detected by snorkeling and electro-fishing, which in turn may be affected by differences in stream flow and temperature at the time of sampling. Stream flows during 2009 surveys were relatively low allowing more fish to be detected.

The 66 Dolly Varden captured by electro-fishing and minnow trapping in the three reaches of Sherman Creek represented 21.5% of the total estimated Dolly Varden population of the three Sherman Creek reaches surveyed. The 9 cutthroat trout captured in Lower Sherman represented 45% of the estimated Sherman Creek cutthroat population. The 134 Dolly Varden captured in Johnson Creek represented 28.9% of the estimated population of Johnson Creek. Only 3 cutthroat trout was captured in Lower Johnson, representing 75% of the total estimate. The 55 Dolly Varden captured in Slate Creek comprised 24.9% of the Slate Creek population estimate and the 34 cutthroats captured represented 20.1% of the Lower Slate population. Counts of fish observed by snorkeling and captured by electro-fishing and minnow trapping in each habitat unit are presented in Appendix 3c.

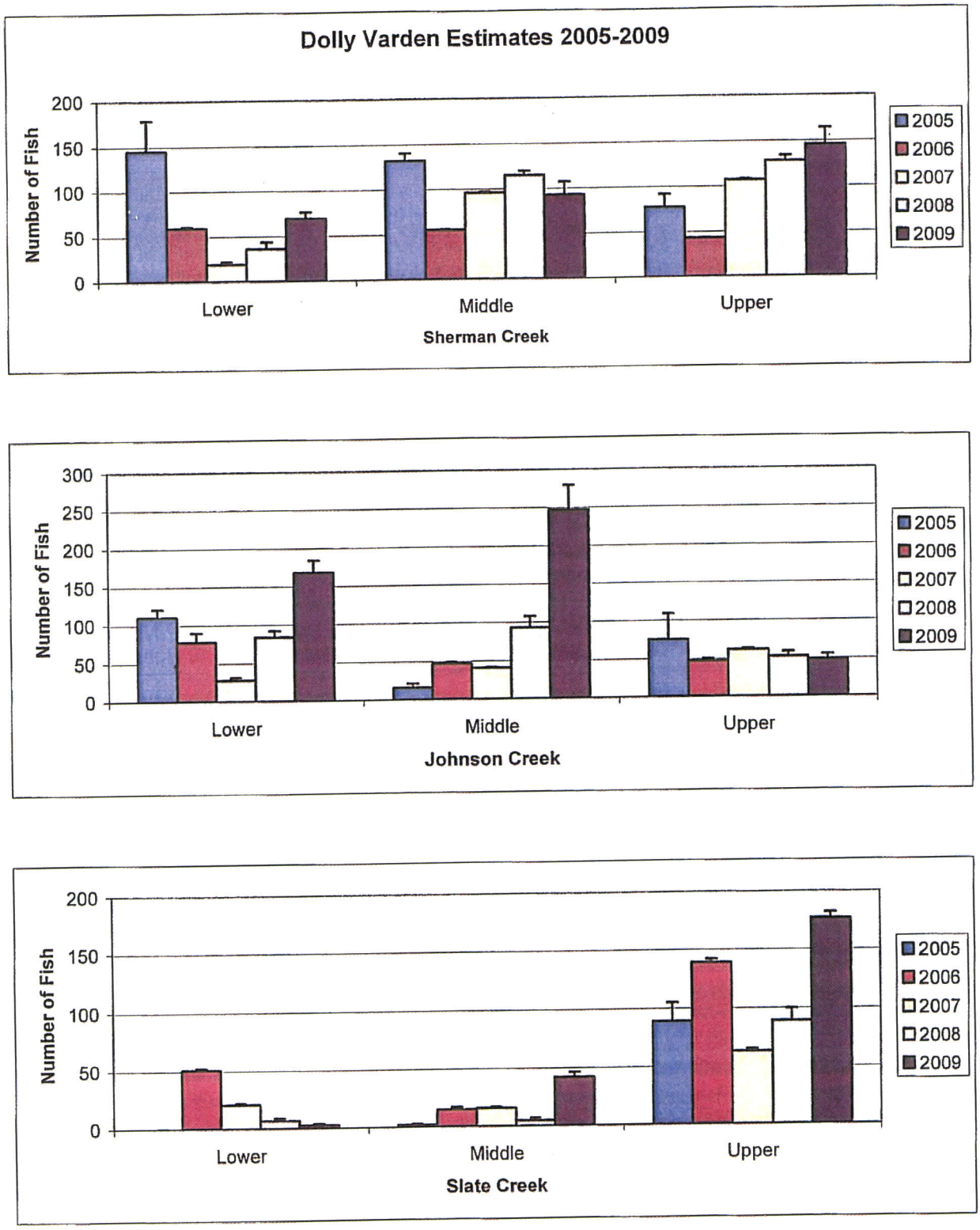
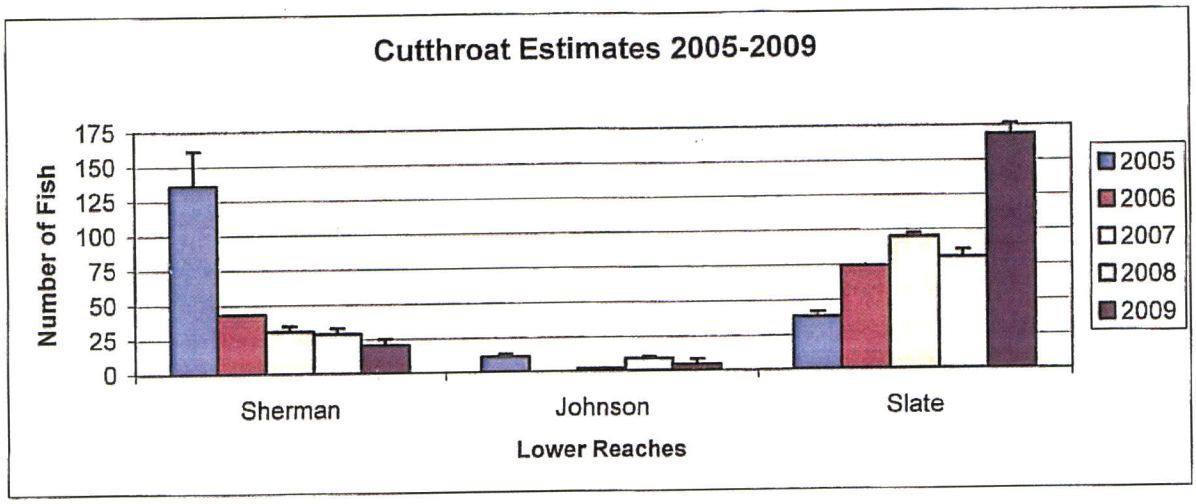


Figure 9A: Comparison of Dolly Varden numbers over time, 2005 to 2009.



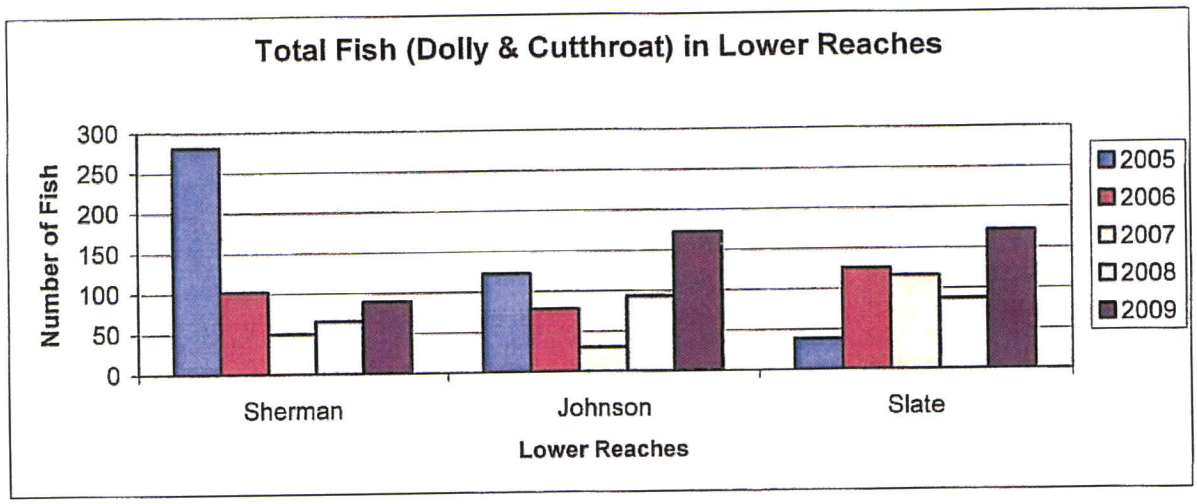


Figure 9B: Comparison of cutthroat trout and total fish numbers over time.

5.5 Minimum detectable differences in mean numbers of fish.

Mean numbers of fish in each habitat unit were used to compute hypothetical minimum detectable differences that could be detected for each mean. Table 13 gives the mean number of fish in each habitat type and the minimum detectable difference (MDD) resulting from comparing habitat types in each stream reach. A difference in means of 1 to 3 fish per habitat unit was detectable for Dolly Varden in most habitat types with the exception of Upper Sherman glides (MDD = 9 fish), Upper Slate glides (MDD = 4 fish), Lower and Middle Johnson pools and glides (MDD = 7 fish). In these reaches, a difference in mean number of fish per unit of seven or more fish would be required before the change could be detected in the data. Results were similar for cutthroat trout with Lower Johnson glides requiring a MDD of 7 fish for detection of change.

Some habitat types showed greater variability in numbers of fish with, for example, one Middle Johnson pool contained 46 fish, but other pools nearby had none. Glide habitat was limited, restricting the number of units that could be surveyed. The ability to detect small differences in numbers of fish is important in detecting changes in the population from year to year.

Figure 10: Cutthroat trout captured in Lower Slate Creek, July 2009.

Table 13: Mean number of fish per habitat unit and minimum detectable differences (MDD).

Sherman Creek Dolly Varden			
Reach	**Habitat Unit**	**Mean # Fish**	**MDD**
Lower	Riffles	0.071	0.720
	Pools	1.579	1.771
	Glides	0.667	2.382
	All Units	**1.047**	1.561
Middle	Riffles	0.267	1.013
	Pools	0.934	1.767
	Glides	-	-
	All Units	**0.857**	4.072
Upper	Riffles	1.125	1.526
	Pools	1.673	3.227
	Glides	2.000	8.750
	All Units	**1.582**	3.460

Slate Creek Dolly Varden			
Reach	**Habitat Unit**	**Mean # Fish**	**MDD**
Lower	Riffles	0.000	-
	Pools	0.038	0.642
	Glides	0.071	0.289
	All Units	**0.036**	0.195
Middle	Riffles	0.188	0.781
	Pools	0.323	0.764
	Glides	1.643	0.731
	All Units	**0.600**	0.926
Upper	Riffles	1.407	1.036
	Pools	1.333	2.363
	Glides	3.000	4.425
	All Units	**1.497**	1.035

Cutthroat Trout			
Creek	**Habitat Unit**	**Mean # Fish**	**MDD**
Sherman	Riffles	0.143	0.376
Lower	Pools	0.399	0.996
	Glides	-	-
	All Units	**0.318**	0.948
Johnson	Riffles	0.000	-
Lower	Pools	0.045	0.285
	Glides	0.667	7.000
	All Units	**0.070**	1.000
Slate	Riffles	1.313	1.476
Lower	Pools	2.805	3.069
	Glides	1.875	1.165
	All Units	**2.165**	1.640

Johnson Creek Dolly Varden			
Reach	**Habitat Unit**	**Mean # Fish**	**MDD**
Lower	Riffles	2.33	1.067
	Pools	3.21	6.746
	Glides	1.67	7.000
	All Units	**2.66**	3.993
Middle	Riffles	0.22	1.589
	Pools	3.35	7.555
	Glides	0	-
	All Units	**2.87**	6.973
Upper	Riffles	0.45	0.040
	Pools	0.93	1.678
	Glides	0.25	2.300
	All Units	**0.78**	6.973

5.6 Fish density

Due to differences in the size of habitat areas sampled, population estimates were converted to numbers of fish per unit area for comparisons between reaches and habitat types. Dolly Varden density was highest in upper reaches where there is less habitat area available so fish are more concentrated (Table 14). Upper Slate Creek had the highest fish densities, due to this being a nursery stream for Dolly Varden fry (Figure 11). Densities were similar for lower and middle reaches of all three creeks. The highest density of cutthroat trout was found at Lower Slate, where one Dolly Varden was observed. There is evidence from literature that Dolly Varden densities are suppressed when stream habitat is shared with cutthroat trout. *Oncorhynchus* (salmon and trout) tend to outcompete *Salvelinus* (char e.g. Dollys) when both are present (Hinder et al 1988, Hastings 2005).

Table 14: Densities of fish by species, reach and habitat type.

Fish Density (number of fish/m^2)									
		Dolly Varden				Cutthroat Trout			
Creek	**Strata**	**Riffles**	**Pools**	**Glides**	**All**	**Riffles**	**Pools**	**Glides**	**All**
Sherman	Lower	0.001	0.146	0.013	**0.046**	0.003	0.037	0.000	**0.014**
	Middle	0.013	0.190	0.000	**0.104**				
	Upper	0.094	0.199	0.874	**0.224**				
Johnson	Lower	0.061	0.252	0.136	**0.106**	0.000	0.014	0.054	**0.003**
	Middle	0.005	0.221	0.000	**0.139**				
	Upper	0.012	0.035	0.012	**0.026**				
Slate	Lower	0.000	0.003	0.002	**0.002**	0.016	0.211	0.032	**0.110**
	Middle	0.021	0.135	0.161	**0.100**				
	Upper	0.327	0.433	0.638	**0.399**				

Table 15: Densities of Dolly Varden and Cutthroat Combined.

Fish Density (# of fish/m^2)					
		Dolly Varden and Cutthroat			
Creek	**Strata**	**Riffles**	**Pools**	**Glides**	**All Units**
Sherman	Lower	0.004	0.183	0.013	**0.060**
	Middle	0.013	0.190	0.000	**0.104**
	Upper	0.094	0.199	0.874	**0.224**
Johnson	Lower	0.061	0.267	0.191	**0.109**
	Middle	0.005	0.221	0.000	**0.139**
	Upper	0.012	0.035	0.012	**0.026**
Slate	Lower	0.058	0.240	0.059	**0.112**
	Middle	0.021	0.135	0.161	**0.100**
	Upper	0.327	0.433	0.638	**0.399**

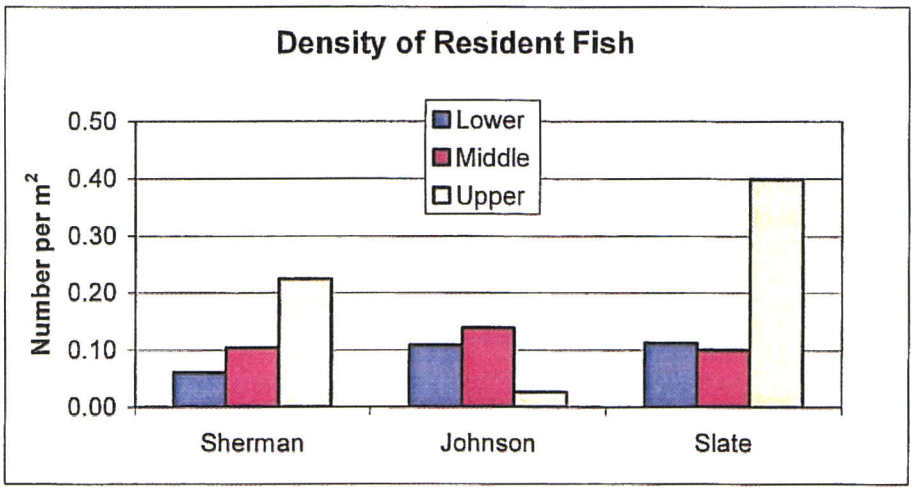


Figure 11: Densities of Resident Fish in Sherman, Johnson and Slate Creeks.

Both Dolly Varden and cutthroat density was much higher in pools and glides compared to riffles (Figure 12). Upper Sherman glides had the highest densities (0.87 fish/m^2) followed by Upper Slate glides (0.64/m^2) and pools (0.43/m^2). Densities of both fish species tended to be highest in pool habitat and increased from downstream to upstream as habitat areas are smaller in upper reaches.

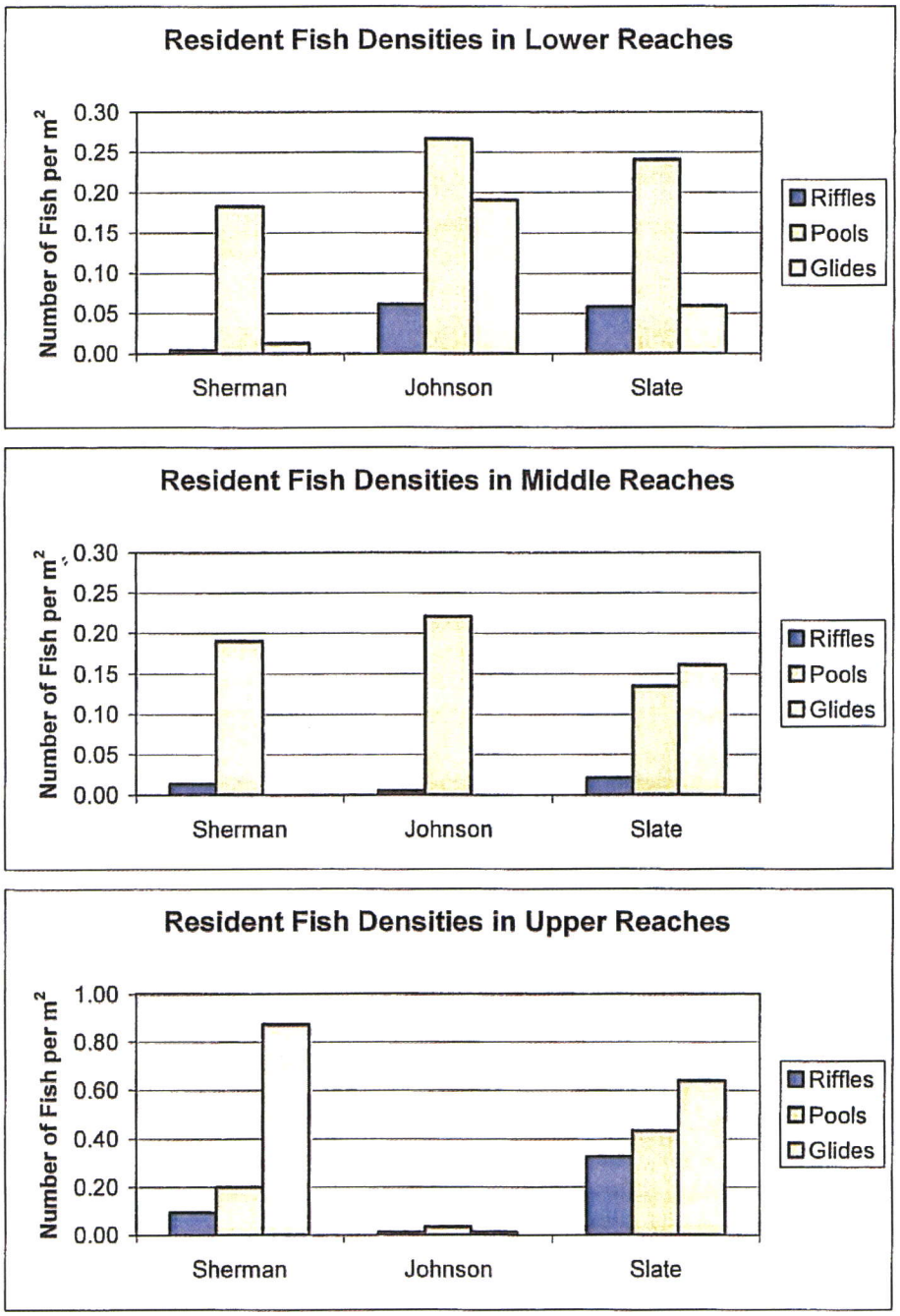


Figure 12: Resident Fish Densities by Habitat Type.

Johnson, J D (DFG)

From: Kanouse, Kate M (DFG)
Sent: Wednesday, October 27, 2010 5:44 PM
To: Daigneault, Michael J (DFG)
Cc: Clark, Robert A (DFG); Johnson, J D (DFG)
Subject: RE: barrier noms
Attachments: 13MiCkUpstm.JPG; 13MiCkDwnstm.jpg

All:

Sorry for the incomplete nomination information. Resident fish were captured upstream of two barriers each year from 2005 to 2010, following are details:

115-31-10330 (#10-859): resident Dolly Varden are present upstream of the barrier in Sherman Creek and several tributaries to about 500' elevation.

115-20-10030 (#10-860): resident Dolly Varden are present upstream of the barrier as far us Upper Slate Lake (at about 700' elevation).

Regarding 115-32-10250-2040 (#10-810): to my knowledge, fish sampling has not occurred upstream of the upper extent point I propose. It appears this stream was added during the 80s rush to nominate anadromous waterbodies as no historical data is available online to support the listing (J - do you have anything we don't know about?). If fish sampling has not occurred in the upper reaches and stream morphology is unlikely to support anadromous salmonids based on my best professional judgment in the field, shouldn't we reduce the upper extent? We have no data to support retaining the upper reach. Attached are two pictures of the upper extent point I propose (though not ideal for illustrating the habitat change). One photo is looking upstream at the proposed upper extent and the second is looking downstream standing in the same position. My two cents....

Thanks for contacting me and let me know if you have any additional questions.
Kate

From: Daigneault, Michael J (DFG)
Sent: Tue 10/26/2010 11:16 AM
To: Kanouse, Kate M (DFG)
Cc: Clark, Robert A (DFG); Johnson, J D (DFG)
Subject: RE: barrier noms

Kate,
To clarify, Bob and I had concerns about the "supporting" documentation for these barriers. Physical descriptions, conclusive photos, etc. would help and potentially preclude the need for fish sampling.
Mike

From: Johnson, J D (DFG)
Sent: Tuesday, October 26, 2010 10:50 AM
To: Kanouse, Kate M (DFG)
Cc: Clark, Robert A (DFG); Daigneault, Michael J (DFG)
Subject: barrier noms

Kate

After review by Bob Clark & Mike Daigneault, it was determined that barriers should not be added to 115-31-10330 (nom # 10-859), 115-20-10030 (nom # 10-860) or 115-32-10250-2040 (nom # 10-810) w/o fish sampling being conducted upstream. If you can provide fish sampling data to substantiate ascertain that streams should be shortened and barrier added, please provide as no fish sampling was listed on original nom forms.

J. Johnson
ADF&G
AWC Project Biologist
267-2337

CHs
Ps
COr
OUp
CHs,COr,Ps,OUp
Add barrier & shorter
115-20-10030
CHs
Ps
35
500