State of Alaska
Department of Fish and Game
Sportfish Division

Nomination Form
Anadromous Waters Catalog

Region: South-central

USGS Quad(s): Cordova D-8

Anadromous Waters Catalog Number of Waterway: 221-40-11020

Name of Waterway: Nunu Creek

☐ USGS Name ☑ Local Name

☐ Addition ☐ Deletion ☑ Correction ☐ Backup Information

For Office Use

Nomination #	12-530		
Revision Year:	2013	Fisheries Scientist	11/2/12 Date
Revision to: Atlas	X	Habitat Operations Manager	11/2/12 Date
Both		AWC Project Biologist	9/17/12 Date
Revision Code:	A-3	Cartographer	11/9/12 Date

OBSERVATION INFORMATION

Species	Date(s) Observed	Spawning	Rearing	Present	Anadromous
pink salmon	06/29/2009		✓		
chum salmon	06/29/2009		✓		
Dolly Varden	06/29/2009		✓		

?

Lagoon Creek - Coho ?

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: no documentation or rearing fish.

Nunu Creek is currently listed in the anadroumous waters catalog as Tatitlek Creek. Nunu Creek is the historical name of the creek and is still used by the local residents.

Community memebers stated that pink and chum salmon have spawned in Nunu Creek historically and salmon fry were observed in the Creek in June of 09, as well as Dolly Varden.
Coordinates (Lat,Long): Upper(60.8760,-146.6631) Lower(60.8717,-146.6618)

Name of Observer (please print): Michelle Vlasoff

Signature: 146.63.61.200 (Web Nomination) Date: 09/06/2012

Agency:

Address: 561 E 36th Ave. 561 E 36th Ave.
Anchorage, AK 99503

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: _____

Name of Area Biologist (please print):

Revision 02/08

Johnson, J D (DFG)

From: Moffitt, Steve D (DFG)
Sent: Friday, September 07, 2012 10:16 AM
To: Johnson, J D (DFG); Brenner, Richard E (DFG)
Cc: Kuntz, Angela Z (DFG)
Subject: RE: Nunu nom attached

J,

Another Tatitlek local indicated the stream is known as Nanu Creek rather than Nunu Creek.

Perhaps you ask Michelle to confirm the name spelling before any changes are made in the catalog?

Steve

From: Johnson, J D (DFG)
Sent: Friday, September 07, 2012 9:01 AM
To: Brenner, Richard E (DFG)
Cc: Moffitt, Steve D (DFG); Kuntz, Angela Z (DFG)
Subject: Nunu nom attached

Fyr -

From: Brenner, Richard E (DFG)
Sent: Friday, September 07, 2012 8:57 AM
To: Johnson, J D (DFG)
Cc: Moffitt, Steve D (DFG); Kuntz, Angela Z (DFG)
Subject: RE: AWC Web Nomination

Hi J,

I didn't actually receive the nomination.

Given the location, I think that we would defer to the Native Village of Tatitlek for naming, but I hope that the village is truly behind it. (?) I'll talk to Steve and Angela about our records for this stream. More soon.

rich

From: Johnson, J D (DFG)
Sent: Friday, September 07, 2012 7:17 AM
To: mvlasoff@tatitlek.com
Cc: Brenner, Richard E (DFG)
Subject: AWC Web Nomination

Hi Michelle

Thx for the nomination submittal to revise fish species, observed life stage documentation, and the name of PWS water body AWC # 221-40-11020. In case you haven't heard, USGS is in the process of updating USGS maps for AK, maybe there is still time to add Nunu Creek name to updated maps. I'll check it out. I have a few questions regarding the information provided on the nomination form #12-530. How many years have salmon been observed spawning in the creek? Could you provide numbers of spawning chum and pink salmon observed on average over the years in Nunu Creek. Also how many fry of each species (pink & chum salmon) were observed and how were they identified. Deadline for nomination submission is the end of September this year in case you will be making additional submissions. Let me know if ya have any questions.

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

Johnson, J D (DFG)

From: Michelle Vlasoff [mvlasoff@tatitlek.com]
Sent: Friday, September 07, 2012 11:50 AM
To: Johnson, J D (DFG)
Subject: RE: AWC Web Nomination

Hello,

How many years salmon have been observed spawning in the creek is a difficult question to answer as the elders in Tatitlek say, "they have always been there". Nunu Creek historically had a very strong pink salmon run, with the occasional chum, that was diminished when water from the creek was diverted to drinking water for Tatitlek village. In June of 2009 The Tatitlek Corporation paid for a habitat assessment and recommendations to see if anything could be done to enhance the salmon spawning area and increase the subsistence resources for the community members.

Unfortunately, I do not have any numbers of spawning salmon observed on average over the years in Nunu Creek, or the number of each fry species observed or how they were identified.

Thank you for your time!

Michelle Vlasoff
Shareholder Services Manager
The Tatitlek Corporation
561 E. 36th Ave.
Anchorage, AK 99503
907-278-4000 phone
907-278-4050 fax
mvlasoff@tatitlek.com

From: Johnson, J D (DFG) [mailto:j.johnson@alaska.gov]
Sent: Friday, September 07, 2012 7:17 AM
To: Michelle Vlasoff

Cc: Brenner, Richard E (DFG)
Subject: AWC Web Nomination

Hi Michelle

Thx for the nomination submittal to revise fish species, observed life stage documentation, and the name of PWS water body AWC # 221-40-11020. In case you haven't heard, USGS is in the process of updating USGS maps for AK, maybe there is still time to add Nunu Creek name to updated maps. I'll check it out. I have a few questions regarding the information provided on the nomination form #12-530. How many years have salmon been observed spawning in the creek? Could you provide numbers of spawning chum and pink salmon observed on average over the years in Nunu Creek. Also how many fry of each species (pink & chum salmon) were observed and how were they identified. Deadline for nomination submission is the end of September this year in case you will be making additional submissions. Let me know if ya have any questions.

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

Johnson, J D (DFG)

From: Brenner, Richard E (DFG)
Sent: Friday, September 07, 2012 2:40 PM
To: Johnson, J D (DFG)
Cc: Kuntz, Angela Z (DFG); Moffitt, Steve D (DFG)
Subject: FW: Tatitlek Creek supporting data
Attachments: Tatitlek-Nunu Creek Supporting documents.pdf

Hi J,

See attached. Angela found substantial documentation for Tatitlek Creek, dating back to 1926. Note that the stream was referred to as number 40, but this changed in ~1971 to stream number 102. Given what she found, I think that the existing status of pink (spawning) is appropriate, but I have not found and reference to chum salmon in our records.

Randall (July, 1981) also has an interesting note on an aerial survey form referring to a Tatitlek water diversion upstream and he openly wonders if they have a permit to do this.

rich

From: Kuntz, Angela Z (DFG)
Sent: Friday, September 07, 2012 12:07 PM
To: Brenner, Richard E (DFG); Moffitt, Steve D (DFG)
Subject: Nanu, nunu, Tatitlek Creek supporting data

Nunu(a?) Creek (*Tatitlek Creek*)
This document has supporting data to answer J's question:

- How many years have salmon been observed spawning in the creek?

It is all the supporting data I could find in aerial and stream scanned datasheets, from 1926-1982. I couldn't find any data from 1990-2007.

It is saved here (***O:\Habitat_CollectionPermits\Fish Distribution Database\(To submit) Nomination Forms\Nunu-Tatitlek Creek Supporting Data***) as a word and pdf document, if you wanted to change the word document... I saved it as a pdf since it was easier to scroll through the pages compared to a word document.

-Angela

From: Johnson, J D (DFG)
Sent: Friday, September 07, 2012 9:01 AM
To: Brenner, Richard E (DFG)
Cc: Moffitt, Steve D (DFG); Kuntz, Angela Z (DFG)
Subject: Nunu nom attached

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Cc: Moffitt, Steve D (DFG); Kuntz, Angela Z (DFG)
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Cc: Brenner, Richard E (DFG)
Subject: AWC Web Nomination

Hi Michelle

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

Aerial Escapement counts. Tatitlek Creek aerial creek # 40 from 1957-1967.

1958 Escapement - Prince William Sound Streams

Stream Number

31. Fidalgo Bay, east side)
) 6 streams
32. N. W. Head Fidalgo Bay
25000 chums - 6 streams

33. North side Fidalgo Bay
500 pinks

34. Head of Fish Bay
10,000 pinks, mostly at mouth 8/29

35. Fish Bay - falls at high tide line
2000 pinks

36. Fish Bay
100 pinks

37. Fish Bay - slate bottom
200 pinks

38. Landlocked Bay near Graveyard Point
50 pinks

39. Head of Landlocked Bay
8000 pinks

40. Boulder Bay, N. W. side near entrance
1000 pinks, dead

41. Gladhaugh Creek, Ellamar
500 pinks

42. Galena Bay (Turner Creek) 40' falls at high tide line.
2000 pinks

43. Millard Creek, Galena Bay
5000 pinks

44. Duck River, Galena Bay
30,000 pinks; 5000 chums

45. Indian Creek, Galena Bay
11000 pinks; 4000 chums

46. Valdez Arm
500 pinks

ACE 8695811

Prince William Sound Stream Surveys 1957:

(Page 2)

Stream No.

25 - July 15 - 5 P & 2 C*
August 23 - 850 P*
August 29 - 400 P*

26 - July 15 - 100 P & 300 C*
August 23 - 2300 P & 300 C & 4,000 P at M*
August 29 - 4,600 P & 300 C*

27 - July 31 - 0

28 - July 10 - 20 C
July 22 - 200 P
July 31 - 0
August 29 - 430 P*

29 - June 29 - few
July 15 - 2400 P & 7,425 C*
July 22 - No change
July 31 - 2,700 P & 8100 C*
July 2 - 4,000 C most dead
August 31 - 600 live & 200 dead P & 600 C* (Jumpers outside)
About 500 C at M.

30 - July 22 - 0
July 31 - 50 C*

31 - July 22 - 500 C at M. of Rt. Stre.
July 31 - 100 C*
August 2 - 200 C
August 29 - 5,800 C in Str. & 4,000 C at M* (At least 50,000 C along shore in closed area.

32 - July 22 - 300 P in Rt. Stream
July 31 - same
July 31 - 100 P & 150 C*
August 29 - 300 P & 18,500 C in Str. & 10,000 C at M. Lots of jumpers in Bay*

33 - July 22 - few P
July 31 - 0
August 29 - 300 P

34 - June 25 - few
July 14 - 850 P & 4,500 C*
July 22 - 1,000 P & 3,000 C
July 31 - 3,500 new at M (air)

Stream No.

34 - August 7 - 3765 C & 348 P*
August 31 - 800 P & 250 C in Str. & 2500 C & 500 P at M*

35 - July 22 - 0
July 31 - 0
August 31 - 0*

36 - July 22 - 0
July 31 - 0
August 31 - 100 P*

37 - July 22 - 0
July 31 - 0
August 7 - 100 P*
August 31 - 0*

38 - July 22 - 0
July 31 - 0

39 - July 22 - 0
July 31 - 0
August 31 - 700 P & 600 C in Str & 3350 C at M*

40 - July 31 - 0
July 31 - 50 P (dead)

41 - July 3 - 0

42 - July 15 - 2 C (f)
July 27 - 0
August 7 - 0
August 31 - 250 P*

43 - July 14 - 0
July 20 - 0*
July 28 - 0*
August 7 - 0*
August 31 - 0*

44 - July 14 - 2 P & 500 C*
July 18 - 2,000 live & 200 dead C*
July 22 - 5,500 C - 1/5 dead
July 31 - 10,000 C - 1/3 at M
August 2 - 9,000 C
August 8 - 6,000 live & 4,000 dead k C & 1,000 P*
August 31 - 5,000 P & 4,000 C*

ACE 8695826

45 - June 25 - few
July 10 - 6,000 mostly C
July 14 - 850 P & 3870 C*
July 20 - 550 live & 320 dead P

CHART 8519

Stream No. 40 (2 notices) Boulder Bay. N.W. side near entrance.

Is 12 feet wide and 6 inches deep and has a falls close to high tide line.

A small lagoon. Fair bottom. About 600-foot stream half tide.

September 26, 1926.....200 fish.

1927 and 1928.....no visit. Allowance made.

October 2, 1929.....nothing.

September 6, 1930.....1,500 humps.

September 29, 1931.....200 pinks.

September 15, 1940.....4,500 pinks, (700 dead). (OK)

9-8-45 -- Falls at high tide, unimportant, not examined. (OK)

1952	-- Blank. (OK)		
1953	-- No fish.		(Otto Koppen & George Kaydas)
8/15/54	-- No fish	Failure	"
1955	-- No fish	Failure	"
8/3/56	-- No fish		"
9/8/56	-- 800 dead pinks		

50 40 45 5 = 205 + 1:25 standby

ADF&G-CF-Anch. 605-01

[redacted]

AERIAL SURVEY

Date 8/19/60

Start 1340 Return 1925 Gen. Visibility Fair-Poor Remarks Broke Overcast

Airplane Cessna 180 Pilot [illegible] Observer Pete Doerendberg

Stop Sawmill 1430 TO 1445 Land Valley 1525 TO Valley 1540

Stream No.	BAY	PINKS Stream	PINKS Mouth	PINKS Bay	CHUMS Stream	CHUMS Mouth	CHUMS Bay	OTHER (Designate) Stream	OTHER (Designate) Mouth	OTHER (Designate) Bay	REMARKS
28	Irish Cove	No Survey	2500	—							
38	Landlocked Cove	200	2,000								
40	Tatitlek	0	5000								
40A	"	0	1000								
41	Ellamar	500	8000	—							
43	Boulder	500	10000								
44	Dude	14000 16000	10,000	50,000 in N. Bk.	2000						
[illegible]	Indian	7500	5000	10,000							
42	Turner Creek	500	2000	5000							
54	Sawmill	4000	500								
53	Sawmill	2500	2000		500	1000					
55	S. Sawmill	50	500			500					
47	Jack Bay	2000	5000								
48	" "	1000	500	Many dead							
49	Head Jack Bay	1500	0?		500 Chum 2700	0?	1-2000 dead chums.				
50	Jack Bay	4000	5000		1000	5000					
52C	Gold Creek				500	5000	Some dead				
52	Mineral				4000	?	? many dead.				
51	Crooked	-			1500	500					
5[illegible]	Swashy	3500			500						
51	Sunset	500		Many dead	500		Many dead				
50C	W. Daymille	100									
50D	W. Daymille	500									
50E	E Daymille	100									
45X	Johnson Cove	500	1000								

Page 17 from 1961 aerial stream survey document

Tatitlek Creek=stream 40

ADF&G-CF-Anch. 605-01

AERIAL SURVEY

Date July 31 Page 2

Depart [illegible] Page 1 Return See Page 3 Gen. Visibility Fair to Good Remarks Brother Overcast

Airplane Supe Cub Pilot Barton Observer Trevenberg

Stream No.	BAY	PINKS Stream	PINKS Mouth	PINKS Bay	CHUMS Stream	CHUMS Mouth	CHUMS Bay	OTHER (Designate) Stream	OTHER (Designate) Mouth	OTHER (Designate) Bay	REMARKS
27	Gravina R.	0	0	0	500	Many [illegible]		— Bay milky			
30	Head Fidalgo	0	0	[illegible]		[illegible]	500 ch.				
30A	" "	0	(	5000							
31	" "	0			0		Many Coho 15,000				
31A		0			0		Fresh clay Bath				prob. 2/Bch
31B		0			0						
32A	Sunny Bay	0			0		20,000 pinks also				
32	" "	0			2000 sp.		delta — Many ch. schools				
33	Outer Sunny	0	5000	[illegible]			Tatitlek Creek				
29	Whaler	1400	—	[illegible] 10,000	200	0					
29A	Hawkins Cr.	0	↑	↑							
	Fish Bay → Sunny Bay				Shore	—	Numerous schools.				
34	Fish	1100	30,000	[illegible]	500	0?					
34A		0	↑		0	↑					
35		0	1000	—	—	—	—				
36		dry	15,000								
37		0	0?								
	Fish Bay	Shore and Bell to Landlocked — Very heavy [illegible]									
38	Landlocked	0	100	—	—	—	—				
	"	1000	20,000	many on Bell	0	0	0				
40	Boulder	500	2000	Some!	0	0	0				
42	Turner	0	3000+								
43	Hillcoat	500	10,000								
44	Duck	1000	50,000	Many Bay output	4500						
45	Indian	1000	20,000	" " on beach							
41	Johnson	500	2000	There as Monday	Fresh						
41	Jack	1100	10,000					Many dead			
48	✓	1500	20,000					"	"		
49	✓	0	0	0	600	0	Milky?				

Page 26 from 1961 aerial document. Stream 40=Tatitlek Creek

ADF&G-CF-Anch, 605-01

AERIAL SURVEY

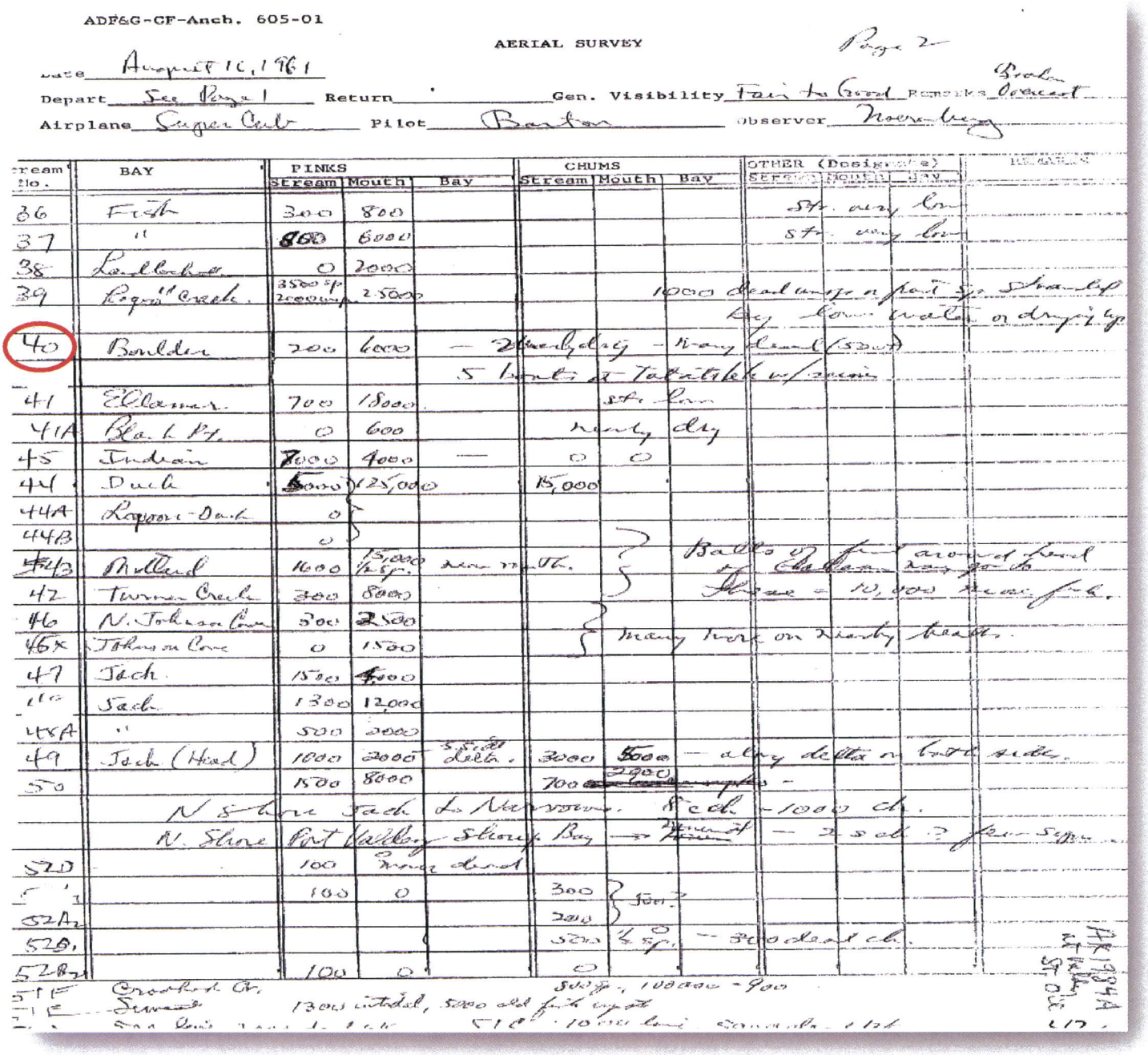
Date [illegible]

Depart [illegible] Return — Gen. Visibility [illegible] Remarks

Airplane [illegible] Pilot [illegible] Observer [illegible]

Stream No.	BAY	PINKS Stream	PINKS Mouth	PINKS Bay	CHUMS Stream	CHUMS Mouth	CHUMS Bay	OTHER (Species)			REMARKS
10		None	—	Some dead							
10a		None	—	Some dead							
	Knowles Head			3-400	— Scattered [illegible]						
6h		Few		Small school	→ To dark to see [illegible]						
6c	to 26 F				→ [illegible]						
6d		7-800		8000	(Mouth [illegible])						
	[illegible] beach to St. Matthews	St. Matthews			2150 pinks (some [illegible])						
		Few		20-30,000	(Slugged on [illegible] flat [illegible] mouth in bay)						
5			4-4000		(These were at mouth & along beach at mouth)						
24		2,000	5-6000								
23		4000		25,000	In stream to [illegible]						
20		1000		Too muddy							
21				500							
18			2000								
14				500	Few [illegible] observed along beaches						
30A		NONE									
	8/3-5/61	Ground Count ET			Cagle						
	/	185,500 in R & Label			52,610 in [illegible]			33,870	Coho	Coho & Pink	

Page 32 from 1961 aerial surveys. Stream 40=Tatitlek creek



ADF&G-CF-Anch. 605-01

AERIAL SURVEY

Page 2

Date August 16, 1961

Depart See Page 1 Return Gen. Visibility Fair to Good Remarks Broken Overcast

Airplane Super Cub Pilot Barton Observer Moenberg

Stream No.	BAY	PINKS Stream	PINKS Mouth	PINKS Bay	CHUMS Stream	CHUMS Mouth	CHUMS Bay	OTHER (Designate) Species	Mouth	Bay	REMARKS
36	Fish	300	800								st. very low
37	"	800	6000								st. very low
38	Landlocked	0	2000								
39	Rapid Creek	3500 sp 2000 imp	2500				1000				dead unsp. n. foot sp. Stranded bay low water or dripping
40	Boulder	200	6000	—							nearly dry — many dead (500)
					5 boats at Tatitlek w/ seine						
41	Ellamar	700	18000			st. low					
41A	Black Pt.	0	600			nearly dry					
45	Indian	7000	4000	—	0	0					
44	Duck	5000	125,000		15,000						
44A	Lagoon-Duck	0									
44B		0									
43	Mulland	1600	15,000 sp.	new mouth.				Balls of fish around head of Esham			
42	Turner Creek	300	8000								
46	N. Johnson Cove	300	2500								
46X	Johnson Cove	0	1500					many here on nearby beach.			
47	Jack	1500	4000								
48	Jack	1300	12,000								
48A	"	500	2000								
49	Jack (Head)	1000	2000	small delta.	3000	5000		—			along delta on both sides.
50		1500	8000		700	2900					
	N. shore Jack to Narrows.							Rcd.			-1000 ch.
	N. Shore	Port Valdez			Strong Bay			—			— 2 sal ? fresh sp.
52D		100	none dead								
52		100	0		300						
52A					200						
52B					500	6 sp.		— 300 dead ch.			
52B		100	0		0						
51E	Crooked Cr.				500 sp., 100000 - 900						
51E	Seward	1300 initial, 5000 old fish input									
	San Juan				51E - 10000 live						

- **Aerial survey count**
  - Date: 8/4/71
  - Observer: Ralph Pirtle
  - 50 adult pink salmon (*the data sheet did not specify if it was bay, stream or mouth*)

Aerial survey, page 12 from 1971 aerial survey document, stream 102=Tatitlek creek

Shrode Creek – 50 Redds – 7-8' of snow & some frozen over.
Aerial Stream Survey 7/19/71

Stream		Redds Bay	Redds M	Redds Stream	Chum Bay	Chum M	Chum Stream	Remarks
	99			0	300		0	
	100			0			0	
	101			0			0	
	102	300		0			0	
	115			0			0	Note: Paling Ba loaded with Herr
	116			0			0	
Eastern	117	10-15,000		100			500	1 Boat
	119			0		100	0	
	120			0			0	
	121	3000		0			0	
	123	3000		0			0	
	124			0			0	
	125			0			0	
	126			0			0	
	127			0			0	
	128			0			0	
	129			0			0	Lots of Herring from Sawmill Bay Gladiola Bay
	153	4-5000		0	(1 Boat)		0	
Northern	232	↑		0			0	
	233	30-40,000		0			0	
	234	↓		0			0	1 Boat
	41			0			0	
	242			0			0	
Shill	243			0			0	
	322	[illegible]		[illegible]			[illegible]	See cover on ma

Page 34 from 1976 aerial stream surveys, Tatitlek creek=stream 102

STERN

AERIAL SURVEY

Date: 9/10/76 Depart: _____ Return: _____ Gen. Vis. _____

Irplane: PA18 Pilot: Kritscher Observer: Purtle Remarks: _____

Stream No.	NAME	PINKS Stream	PINKS Mouth	PINKS Bay	CHUMS Stream	CHUMS Mouth	CHUMS Bay	OTHER Stream	OTHER Mouth	OTHER Bay	Remarks
87	Sunny River	1400	0	0	1400	0	0				
88	Short Creek	700	0	0							
89	Fish Creek	16000						1 ad. Blk. Bear			
92	Shale Creek	1500									
93	Kirkwood Creek	650									
94	Rock Creek	1300									
99	Lagoon Creek	6000	0	0	300	0	0	1 ad Blk Bear			
102	Tatitlek Cr.	500	0	0							
106	Gladhough Creek	1400	0	0							
107	Black Creek	200	0	0							
114	Turner Creek	1000	0	0							
115	Millard Creek	25000	0	0							
116	Duck River	70000	10000	0	1000	?					
117	Indian Creek	3500	0	0	0	0	0				
119	John Cove Cr.	1200	total	scope.							
120	Donaldson Creek	900	0	0							
121	Levshakoff Creek	900	0	0	0	0	0				
123	Gregorioff Cr.	700	0	0	0	0	0				
127	Naomoff River	2500	0	0	0	0	0	(muddy pools)			
129	Vlasoff Creek	1800	0	0	200	0	0				
131											
133	Sawmill Creek										
137	Lowe River										
143	Siwash Creek										
145	Crooked Creek										

7.28.1981 survey, page 22 from 1981 eastern district aerial survey document, stream 102=Tatitlek Creek

EASTERN DISTRICT AERIAL SALMON SURVEY

Date: 7-28-81 Depart _____ Return _____ Gen. Vis: _____

Airplane _____ Pilot: _____ Observer Randall Remarks _____

Stream No.	NAME	PINKS Stream	PINKS Mouth	PINKS Bay	CHUMS Stream	CHUMS Mouth	CHUMS Bay	Other	REMARKS
71	Two Moon Bay								
72	Two Moon Cr.								
73	Tundra Cr.								
76	Irish Cr.	18,000	10,000	7000					6 PS.
80	Whalen Cr.	7800	2000	1500					
83	Keta Cr.	8000	600	poor vis. 0		no definite show of			chums 5 PS TOTAL
85	Fidalgo Delta	400	0	0		most fishing		effort	all season
86	Fidalgo River	400	0	0					
87	Sunny River	1100	0	0					2 PS HEAD FIDALGO
88	Short Cr.	200	600	800					3 PS.
89	Fish Cr.	9500	4900	6000	200				
92	Shale Cr.	250	600	400					
93	Kirkwood Cr.	100	800	500					
94	Rock Cr.	50	800	800					5 PS EAST OF LANDLOC
99	Lagoon Cr.	1800	5500	500	50				2 PS BIDARKA PT. 1 PS LANDLOCKED
106	Gladhough Cr	150	0	0					3 PS NORTH - EBB
107	Black Cr-	0	0	0					2 PS NORTH - EBB
114	Turner Cr.	0	50	0					
115	Millard Cr.	200	400	600					
116	Duck River	2,000	2500	400					
105		50	200	0					
102		50	600		Tatitlek Village WATER DIVERSION ABOVE				
							PERMITS?		

8-5-1982 aerial survey, page 32 of 1982 eastern district aerial survey document

EASTERN DISTRICT AERIAL SALMON SURVEY

Date: 8-25-82 Depart _____ Return _____ Gen. Vis: _____

Airplane _____ Pilot: _____ Observer Randall Remarks _____

Stream No.	NAME	PINKS Stream	PINKS Mouth	PINKS Bay	CHUMS Stream	CHUMS Mouth	CHUMS Bay	Other	REMARKS
117	Indian Cr.	8,500	12,000	4000					4 BOATS FISHING
120	Donaldson Cr.								
121	Levshakoff Creek								
122	(No Name)								
123	Gregorioff Creek								
127	Naomoff River								
129	Vlasoff Cr.								
131	Gorge Creek								
133	Sawmill Cr.								
137	Robe Lake								
146	Seepage Strm Port Valdez								
	Mineral Cr. Flats								
152	Twin Falls Cr.								
153	Stellar Creek					AT LEAST ONE WEEK BEFORE PEAK OF SPAWNING ON PINKS			
116	DUCK R	26,000	41,000		6000	20% chums			2 BOATS JOHNSON COVE
115	MILLARD	28,000	5000						
102	TATITLER CR	200	2000	2500					

Nunu Creek

Tatitlek Village, Alaska

Habitat Assessment Report & Recommendations

Nunu Creek, Tatitlek, Alaska *Photo: A. McLaughlin 2009*

Produced by:

McLaughlin Environmental Services

Andrew T. McLaughlin, Chief Biologist
Katherine McLaughlin, Environmental Consultant

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10.Stream Reach Surveys	Tab 3
11.Stream Bottom Survey Stream Bottom Survey	Tab 4
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PROJECT OUTLINE

Andy McLaughlin arrived in Tatitlek Village on June 29, 2009 to survey Nunu Creek on behalf of Tatitlek Corporation. (see Appendix A for survey agreement). The purpose of the survey was to establish baseline data on Nunu creek and outline salmonid spawning improvement potential. Andy was met and assisted by Curtis Malcuit, the Tresspass Officer for the Tatitlek Tribal Council. The Survey was completed on July 1, 2009.

SUMMARY

While pink salmon (*Oncorhynchus gorbuscha*) are historically successful in spawning in the lower reach of Nunu Creek, salmonid spawning potential for Nunu Creek is greatly limited by the presence of a waterfall approximately 200 feet above mean high tide line. This natural obstruction could be mitigated with the implementation of a fish ladder. Permits for such a project would be needed through Alaska Department of Conservation and Alaska Department of Fish & Game for such a project. Andy McLaughin surveyed above the waterfall and gave a brief look at Tatitlek's other creek which empties into the airport lagoon.

NARRATIVE AND RECOMMENDATIONS

Upon arrival to Nunu Creek I was surprised to find such a low volume of water flow, despite time of year & recent precipitation. Within 200 feet of the mean high tide line there was a large waterfall of ~18 feet vertical elevation change in approximately 10' of stream channel. In order to best maximize the potential of the stream for salmonid spawning supplementation to the in-stream habitat with a fish ladder would be necessary. It might seem impractical, but it is not impossible if proper funding could be secured to provide for installation of such a structure. Proper permits would also need to be obtained from the State of Alaska in order to make in stream enhancements that could supplement the natural habitat to increase spawning, hatching and rearing potential of anadromous fish species.

If salmon were allowed access to the in-stream habitat above the falls, spawning opportunity would be increased. The habitat is often predominantly bedrock, boulder, and cobble larger than 10"diameter and not ideal spawning substrate. Sections of the stream however contain smaller diameter gravel and shale fragment substrate which could provide better hatching and rearing potential. Further up the reach are a few smaller falls that might limit chum (*Oncorhynchus keta*) and pink salmon from passing upstream at times of low water, however, most often during the fall silver salmon (*Oncorhynchus tshawytscha*) run, there is often higher water, allowing that species to pass upstream of these obstacles. This is likely what allows such a high success of silver salmon reproduction at the lagoon stream towards Ellamar where logs and rock obstruction prevent fish passage during lower water in summer. In Nunu, these smaller

upstream falls could also have much less elaborate fish ladders installed at these locations in order to allow fish passage to upper habitat that can serve as potential spawning grounds.

The majority of the stream channel is within the confines of a canyon. The normal sinuosity and possible meander of a stream within a flood plain is limited. There are no undercut banks and few bends that provide point bars. However dead and down woody debris, logs, and larger rock often force water flow to scour pools out in places where bedrock was not predominant substrate. Little to no erosion was observed within the survey area; some rare slides contribute organic matter to the stream waters, but no sedimentation was observed in any stretch, pool or eddy.

If no advanced structure such as a fish ladder is desired for Nunu Creek but a stream enhancement project is desired, then the lower stretch above high tide line up to the falls could be improved. Currently there is a "mono-depth" in-stream regime of cobble, gravel and riffle. This stretch can be considered healthy and apparently experiences adequate percolation and oxygenation that provides hatching success by salmonid eggs deposited in the loose substrate of the streambed. This is without a doubt what contributes to the historical success of pink salmon, and occasional chum salmon, out-migrating from that location as fry and returning to spawn years later as adults.

Traditional and historical knowledge gained through casual conversation with Tatitlek residents has repeatedly acknowledged the fact that pink salmon, and the occasional chum, experience prolific spawning success in this lower stretch of Nunu creek below the falls. That section of the stream does appear very straight and somewhat lacking in depth diversity and is generally too shallow without any meander amid the flood plain it dissects.

It would be possible to benefit this spawning area by enhancing the stream habitat with a few large natural structures such as logs or boulders. Under no circumstance should they be positioned as to become a barrier that blocks further access upstream, but rather to the sides of the stream to alter direction of in-stream flow within the flood plain. During periods of high water the gravel substrate there would experience scouring and more pools and sections of deeper water would be created to allow a higher spawning success.

Use of heavy equipment to put such natural structures in place should be limited as to not destroy surrounding vegetation or to increase compacting or more solidly armoring the loose substrate. These structures could be found readily available in the immediate vicinity of this stretch of stream, but great care should be taken to not cause erosion if acquiring logs and boulders in direct proximity to the stream. Substantial riparian vegetation exists throughout the stream corridor and contributes to a healthy and successful environment. This vegetation is nature's way of preventing erosion and unbeneficial sedimentation from covering the stream bed and robbing developing salmonid embryos of oxygen.

The vegetation also provides shade that keeps the stream water temperatures cooler. Warmer water temperatures hold less oxygen and can be a limiting factor when adult salmon are in the stream in prolific numbers, especially when warmer than usual water temperature occurs, as has been happening with global climate change, and when shade over the stream is lacking. The overhead canopy of predominantly hemlock climax forest in the mid and lower reach of Nunu provided ample shade and should not be logged in order to keep erosion at bay and to allow for highest salmon reproduction potential. Conversely the far upper stretch of the main stream (not the fork that goes to the village dam water source) winds through a stretch of muskeg meadow. This stretch did have some undercut bank and the grass and sedge of the meadow adequately shades the stream waters. The meadow vegetation also acts as a filter and no erosion was present in this area. Care should be taken to assure no disturbance occurs in this region of the watershed that would cause significant erosion, so the entire watershed can remain healthy.

If a large scale stream enhancement is desired or projected for Nunu Creek, then another potentially intensive project could be utilized to improve stream habitat for salmonid species that require freshwater rearing as smolt. Pink salmon require only 2 year life cycles and like chum salmon, out-migrate as fry to the saltwater from the freshwater environs where they hatched. Spawning king (*Oncorhynchus kirsutch*), red (*Oncorhynchus nerka*), and silver salmon typically are 3, 4 and sometimes 5 or 6 year old fish before returning to their rearing stream.

Nunu Creek does have a relatively easy potential to be enhanced with a large, very deep rearing pond or lake. Approximately 155 feet downstream from the main falls on Nunu Creek is a bottle neck in the canyon that is approximately 55 feet wide. A landing craft and heavy equipment could access this area easily from Boulder Bay shore and a substantial amount of fill, or gabion basket lined with membrane impervious to water (or other substrate such as clay) could be brought in to raise the water level of the stream to whatever height is desired. The main falls is approximately 18' tall vertically with at least 6 more vertical feet of smaller bedrock falls directly upstream from it. This dam structure would require a fish ladder below it to the tide line and would allow returning adult salmon access to this "brood pond"; similar to brood ponds that have been constructed at Prince William Sound Aquaculture Corporation' hatcheries.

These hatchery brood ponds could serve as models to aid in proper construction. These brood ponds also have fish ladders installed at the effluent outflows which allow adult salmon to access the ladders from the intertidal area of saltwater shoreline. A gate valve should be installed during construction of such a pond to allow drainage of the pond in times of need for dredging. Such a pond, if 155' long and 15-20 feet deep would allow an optimal rearing environment for smolts of whatever desired species.

Such a brood pond structure would also allow the fish within it to access upstream spawning ground habitat for maximizing potential salmonid production of the upper Nunu Creek watershed with an added benefit of being able to provide a habitat niche for a diversity of salmonid species that can supplement the subsistence harvest resources

used by Tatitlek village under a sustainable basis, in perpetuity, via natural reproduction of returning salmon. King, red, silver, and possibly chum salmon smolts would be provided a deep freshwater rearing area to thrive in during the part of their life cycle when the fish turn from fry to smolt within a year if in a fresh water rearing situation.

Like the hatcheries, this newly created freshwater rearing area could be used to harbor smolts under an artificial feeding program, which in turn would maximize production and consequent marine survival success. Feeding smolts to a large size before release increases the likely hood that more of them will survive to return years later as adults ready to spawn. It is presumed that the larger a smolt is at it's time of outmigration, higher are its chances of marine survival due to the increased capability of predator avoidance. (A substantial permitting process would be required by the State to create such a rearing situation legally.)

COMMUNITY BENEFITS/ ENVIRONMENTAL EDUCATION

Improved harvest rate of subsistence salmon for village residents would occur from an increased local stock, especially if that stock can occur naturally, sustainably, and in perpetuity. Perhaps a partnership with Alaska Fish & Game and Prince William Sound Aquaculture Corporation could be developed similar to previous net pen reared and released terminal harvest fisheries that have been established with Prince William Sound Aquaculture Corporation in the past. Future potential projects contributing to the stream enhancement of Nunu Creek can result as subsistence salmon fishery improvement evolves.

Observation areas or boardwalks for public access with interpretative signage could be created along the creek which could provide environmental education and local recreational opportunities, and be a part of economic development plans regarding tourism. The students of Tatitlek Village Community School could be involved in the design, production and development of the stream project. And upon project completion, Nunu creek could continue to contribute to the education of the students by functioning as an outdoor school room; not only earning school standard levels in many different subjects, but also developing an interest in the natural sciences and creating a sense of ownership and pride in their local resources and community.

It is recommended to avoid over harvesting returning salmon so that a naturally sustainable salmon population will exist into the future. It would be wise to designate a protected stretch of stream where harvesting of spawning adults is restricted in order to allow for undisturbed reproduction. Careful development of public access, public education, and in stream habitat improvements through enhancement of Nunu Creek habitat will increase the value of that area to the community of Tatitlek, as well as creating potential to open doors for future attributes of the resource as new possibilities present themselves.

SURVEY DESCRIPTION

Stream reach surveys were conducted in two main stretches of stream channel utilizing basic watershed inventory as described in the *Streamkeeper's Field Guide* (Adopt a Stream Foundation, Copyright 2001 ISBN: 0-9652109-0-1) (see maps). The first stream surveyed was the main stream canyon of Nunu Creek with it's confluence at Boulder Bay. (60 degrees 52.278, 146 degrees 39.678, elevation @ sea level) The stream was measured and mapped and inventoried upstream taking the larger eastern fork and into the open muskeg meadow at an elevation of 78 feet which was 1,390 feet as in stream distance from sea level. (N 60 degrees 52.520, 146 degrees 39.691) The stream was 15 inches wide at this spot and ran subsurface. The second in stream reach was surveyed starting at the Tatitlek village water source dam (N 60 degrees 52.773, W 146 degrees 39.994) then downstream until the confluence with the larger order of magnitude stream reach previously surveyed.

Flow data was recorded at the lowest section of stream possible with the highest potential gallons per minute flow volume 150 feet below the main falls and just above mean tide line in the position of N 60 degrees 52.278, W 146 degrees 39.678. Flow data was also recorded in midstream reach position of N 60 degrees 52.442, W 146 degrees 39.699 (See both Data Sheets 5 Flow- Method 1s.)

Riparian habitat vegetation was surveyed throughout both reaches and is mapped according to location. Stream substrate was logged and mapped according to location. No fish species were observed at Nunu Creek, though the nearby Tidal lagoon held many small anadromous 3-spine stickleback (*Gasterosteus aculeatus*) in apparently brackish water as there were anemones there. The subsequent observations made at the tidal lagoon between the Tatitlek Airstrip and Ellamar resulted in hand catches of sticklebacks, and silver salmon smolts (2nd year) in the lagoon and tidal pools, but the influent stream contained literally thousands of silver salmon fry (first year). Nunu Creek was devoid of any apparent fish species at the time of survey 6/29-30/09.

No sampling was conducted for macro-invertebrates or any chemical water analysis performed. Overall water quality was observed to be excellent. No obvious pollution was observed. There was no sedimentation or erosion worthy of note. Stream substrate was predominantly rock and shale with occasional logs and smaller diameter woody debris. It somewhat lacked higher levels of organic matter that may be required for higher numbers of macro-invertebrates. No significant anomalies were ascertainable from visual observation.

Land otter sign was prevalent in the lower reach of the watershed, as was black bear and coyote sign. One set of mink tracks was also seen. It is presumed that marten also frequent the watershed. Along with various bird species these are likely the predators with the highest potential to deplete adult salmon populations during spawning in shallow water. Great blue heron, eagle, sea gulls, terns, kittiwakes, mink and otter also likely will depredate the resident and out-migrating juvenile salmonids from the area.

CONCLUSIONS

The biological integrity of the Nunu Creek watershed system is strong. Water flow volume appears adequate, though stream depth diversity is very limited at present. Placement of large enhancement structures would benefit most aspects within the stream channel for improvement of salmonid spawning habitat. Creation of a brood pond rearing environment with deeper pools, or placement of in-stream woody debris or large rock habitat enhancements to create more flow diversion and meander, at periods of high water would benefit the channel in stretches that lack sinuosity (outside the natural confinement of the zones with restricted flood plain). Structural changes could dramatically improve existing conditions for both spawning and rearing success of all fish species. An increased juvenile fish survival rate would correspond to higher marine survival for improved returns and escapement. Macro-invertebrate populations would increase from these in-stream enhancements, which would in turn serve as a food source for developing fish.

Creation of more depth diversity within main portions of microhabitats that lack water would improve salmon travel corridors as well as increase viable spawning areas. Any flow impediments in general should be entirely avoided unless large scale construction of a brood pond is completely developed to increase freshwater rearing potential for species that require an extra year of growth and rearing in a freshwater environment. No changes to stream flow should be attempted without considering the paramount importance of maintaining the entire web of biotic interactions of a healthy stream ecosystem. With careful scrutiny, proper repositioning and anchoring of large natural structures, habitat can be improved to provide for a more suitable water space and flow regime optimal for salmon throughout its life cycle. Adding brush and smaller diameter woody debris to pools of deeper water would be advantageous in proposed deeper brood rearing zones in order to aid small fish in predator avoidance.

If the desired effect is to maintain status quo on Nunu Creek then the biological integrity of the system is likely to stay intact, as there are no major threats currently identifiable. However, if the idea is to improve Nunu Creek for more salmonid species diversity, or simply to increase biotic potential for production of salmon species already present, then in general, the amount of available water or access to increased amounts of available water would need to be pursued. This can be done while simultaneously maintaining the stability of the ecosystem while increasing in-stream diversity and assisting fish with capability of passage to more spawning habitat above the falls. This can most easily be done by utilizing fish ladders. In species that require smolting; development of a large in-stream deep water environment would need to be constructed ensuring certain access of returning adult salmon to that reservoir, again via fish ladder. If such a brood pond were made deep enough, then the falls would no longer be an obstacle and fish would be able to access more area to spawn upstream in the higher reaches of the watershed.

Future permitting inquiries (State and Federal), a community discussion to determine needs and support, and more in depth analysis should be made on the Nunu stream watershed habitat before any changes are made to the creek. A source for salmon stockings as either terminal harvest fisheries, as in previous agreement with the Prince William Sound Aquaculture Corporation saltwater rearing net pen in Boulder Bay, can also be pursued in partnership with PWSAC.

PHOTOGRAPHS

All photographs taken by A. McLaughlin, 2009.

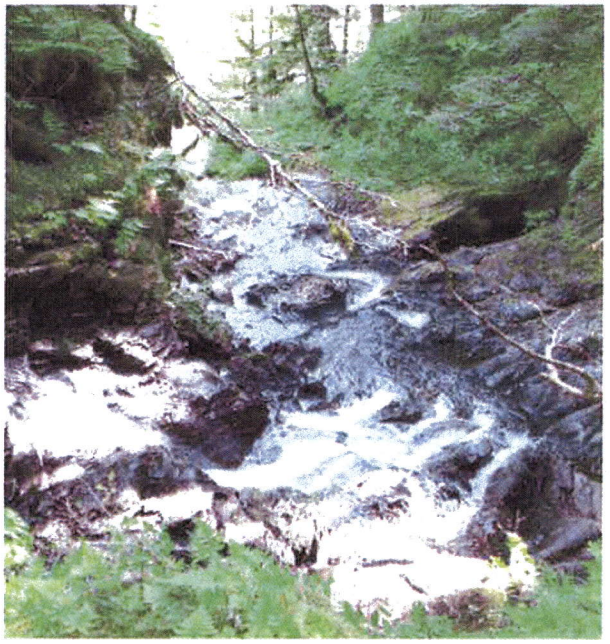
Photographs are important tools to track subtle changes over time. It is recommended that photographs of the stream be taken at least yearly, in the same location, and during the same time of year.

Mouth of Nunu Creek

Tidal delta of Nunu Creek

Area of bottle neck below the falls

Main falls at Nunu Creek



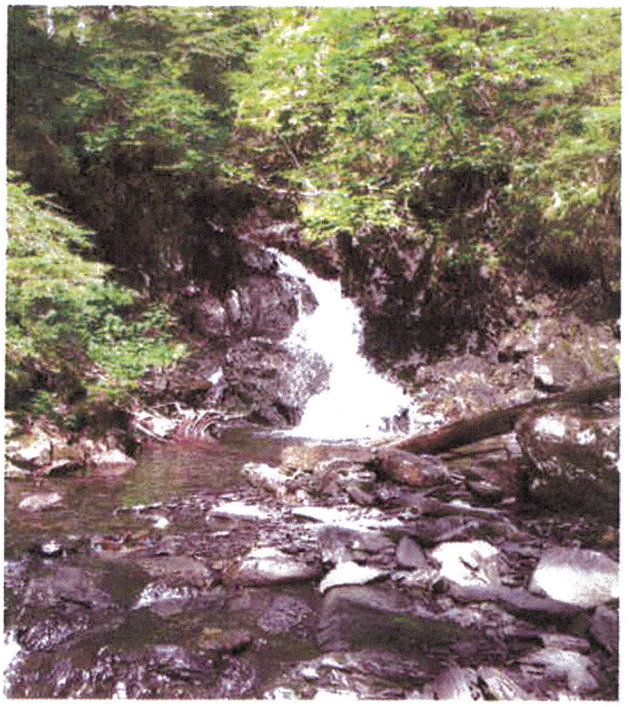
A typical canyon above the falls on Nunu Creek with bedrock & boulders.

Logs and woody debris creating a potential spawning pool.

Potential spawning area in upper Nunu creek.

Upper Nunu Creek

Confluence of dam stream with Nunu Creek.



Small waterfall in upper reach that will limit salmon from accessing potential upstream spawning habitat.

Dead & downed woody debris and logs in the stream channel.

Bedrock and shale pool in upper Nunu creek.

Confluence of Dam stream and Nunu Creek.
(photo taken from upstream angle)

Meadow in upper Nunu creek.

Gravel and fine substrate in upper Nunu creek.

Confluence of Nunu Creek at Boulder Bay

Possible site of brood pond enclosure.

Tatitlek Village Dam for drinking water source.

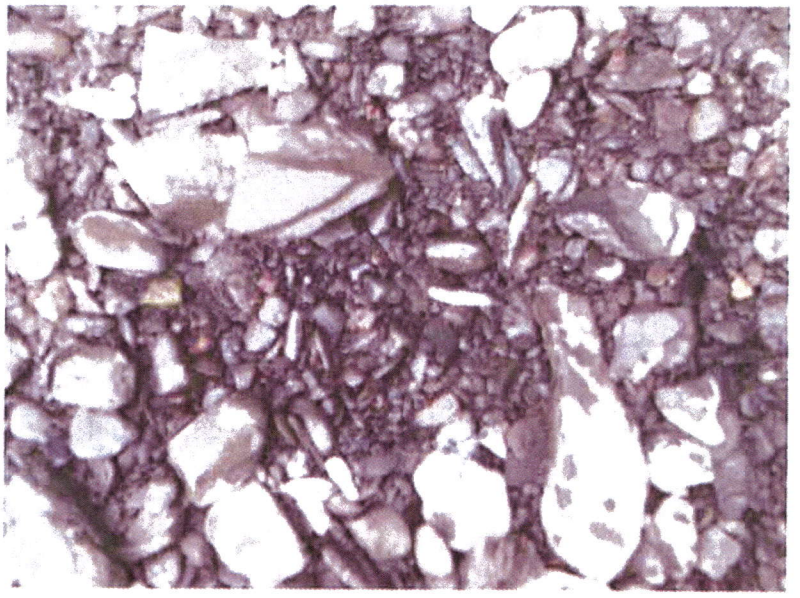
Tatitlek Village dam for drinking water source.

Silver salmon fry in Lagoon Creek.

Silver salmon fry in Lagoon Creek.

Healthy spawning gravel substrate in Lagoon Creek.

Photos above and below show silver salmon fry in Lagoon Creek.

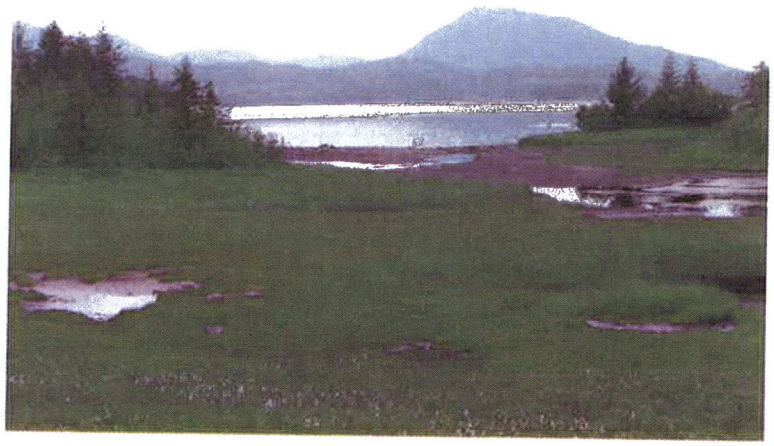


Fine and gravel substrate in Lagoon Creek.

Silver salmon fry in Lagoon Creek.

Photos above and below; Lagoon Creek

Log obstruction (preventing fish passage during low water) and pool in Lagoon Creek



Lagoon

Lagoon

3 spine stickleback from muskeg pool in proximity to Lagoon.

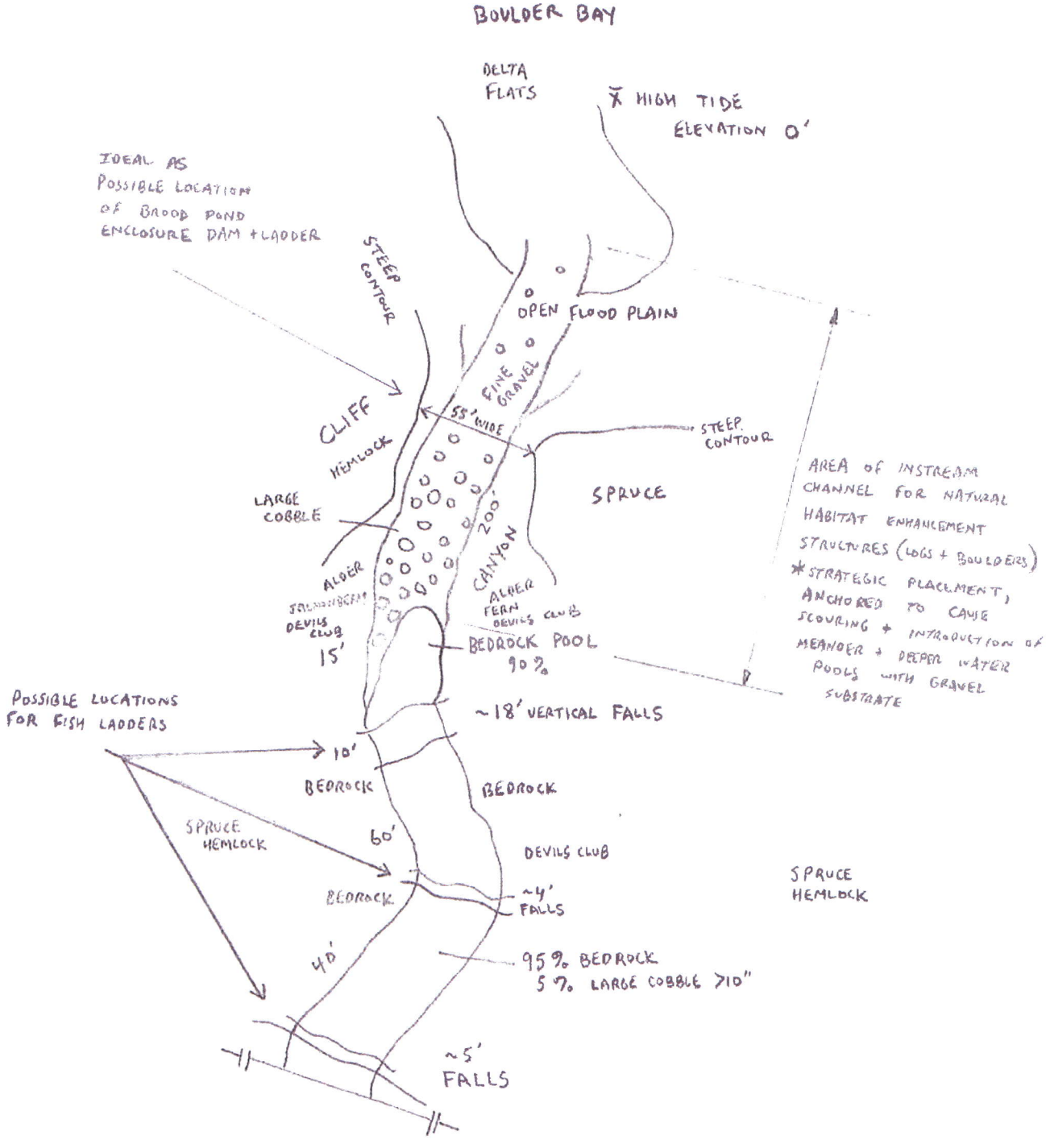
Lagoon Creek mouth and delta.

NUNU CREEK

CONFLUENCE WITH BOULDER BAY

BELOW FALLS

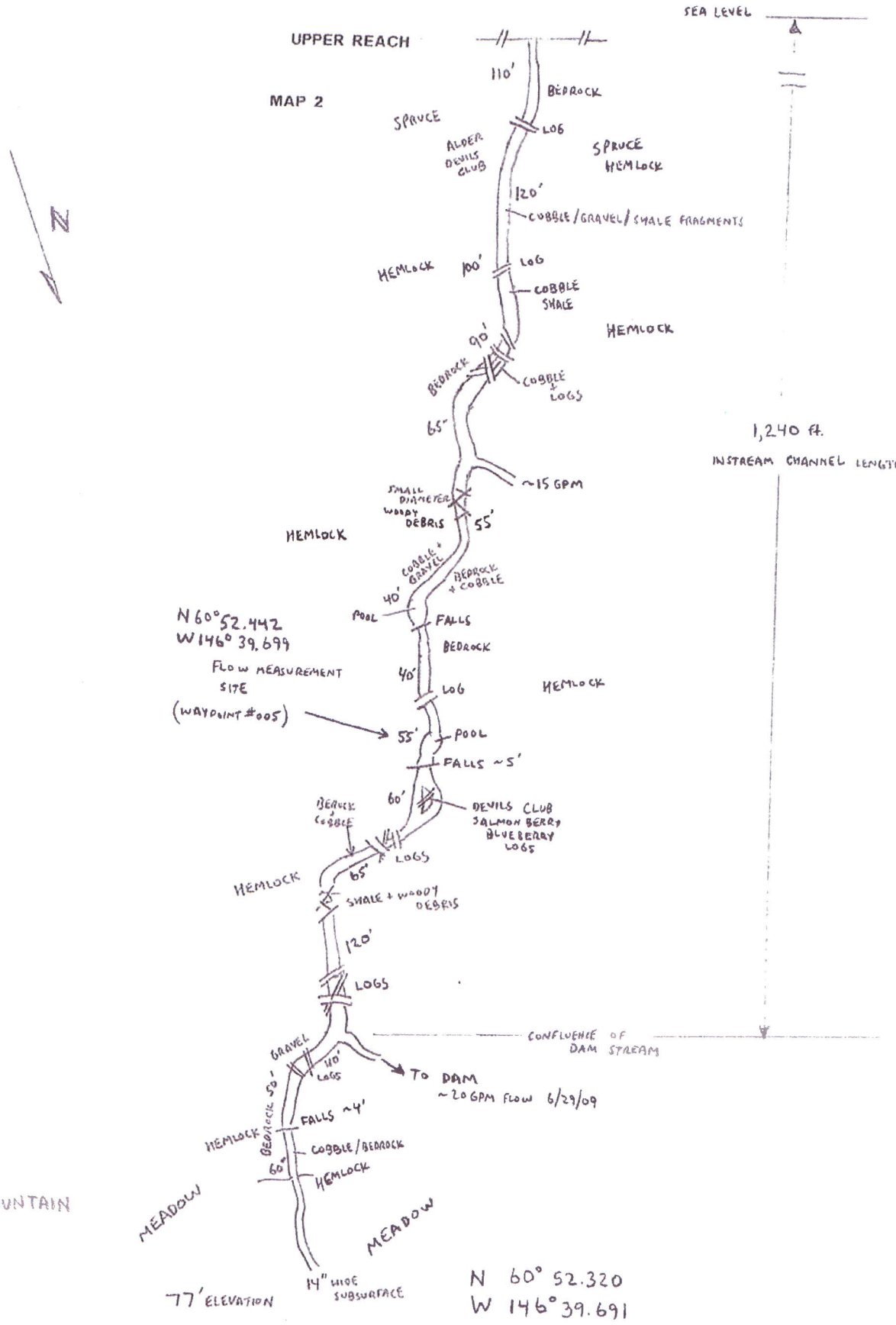
MAP 1



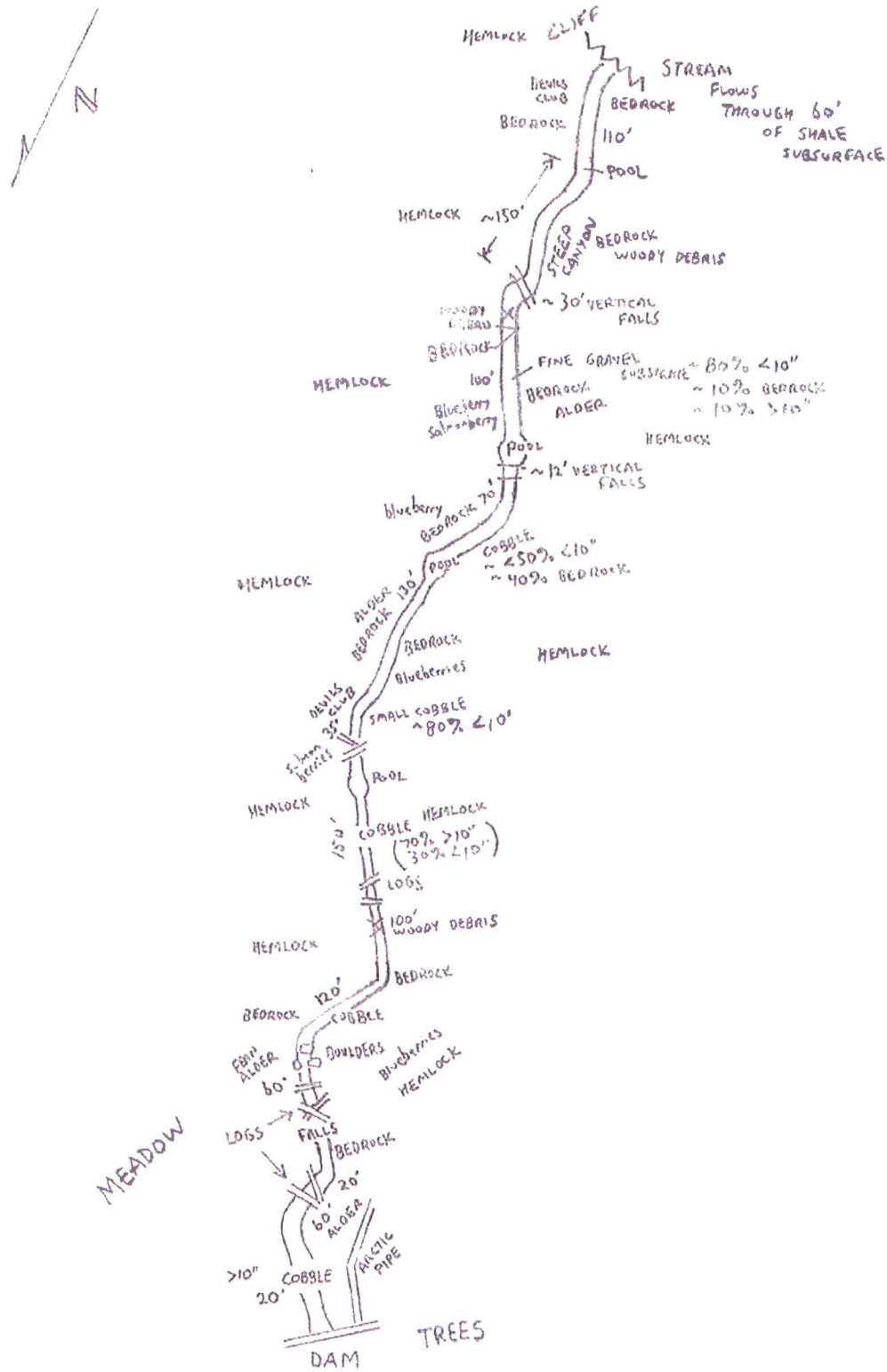
NUNU CREEK

UPPER REACH

MAP 2

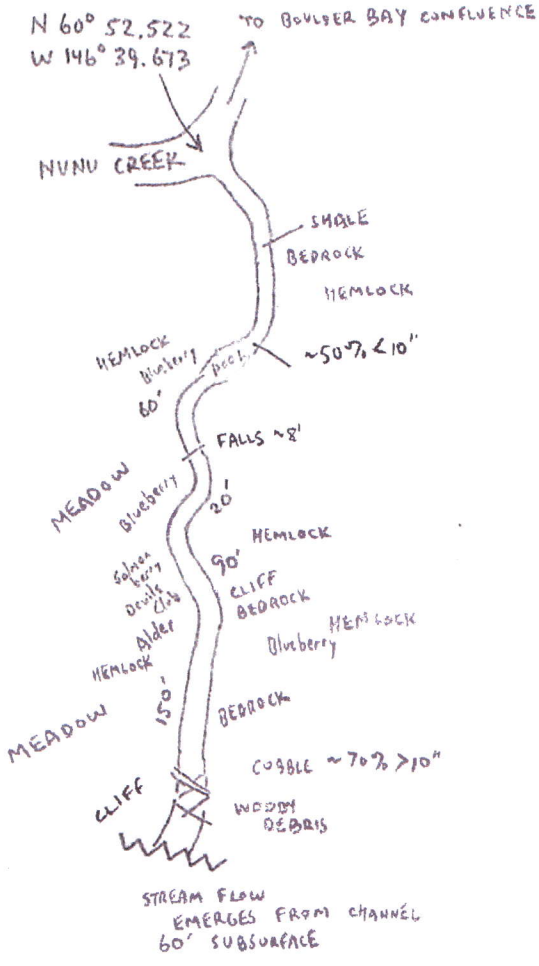


DAM STREAM MAP 1



DAM STREAM MAP 2

(CONTINUED)



DATA SHEET 1 WATERSHED INVENTORY (PAGE 1 OF 4)

Date 6/29/09 **Name** Andy McLaughlin **Group** McLES

Watershed Name Nuna Creek **USGS quad(s)** _____

Begins in _____ **Flows Through** _____

Ends in Prince William Sound, Ak **(name towns, counties, states, regions, etc.)**

Drains into Boulder Bay **(name body of water)**

Square Miles _____ **Approx. Length** _____ **Width** _____

Driving/Hiking Directions ~ 40 minute hike east of Tatitlek Village ferry dock.

CLIMATE

Average yearly precipitation < 10 in ☐ 10-50 in ☐ 50-100 in ☐ > 100 in ☑

Most of the precipitation is in the form of rain ☑ snow ☐ other ☐

Most precipitation occurs in (month(s)) Oct/Nov Floods most commonly occur in (month(s)) Oct/Nov & April (snow melt)

Droughts most commonly occur in (month(s), year(s)) Feb, July

Coldest month of year Jan Warmest month of year July Yearly temp. range ± 10°F -- 70°F

GEOLOGY / TOPOGRAPHY

Describe briefly the geologic history that shaped your watershed Bedrock, shale, sedimentary rock. Earthquake prone area.

(add separate sheets as necessary)

Describe the physical characteristics of different reaches of your watershed:

	Upper reaches	Middle Reaches	Lower Reaches
Uplands (mountains, hills, or flat)	mtn	Mt.	Mt.
Valley (broad, medium, narrow)	med	narrow	narrow
Gradient (steep, medium, gentle	straight	steep	steep
Channel (straight, meandering)	cobble/gravel	straight	straight
Bottom (boulder, cobble, gravel, fines)		bedrock/cobble	bed-rock

Predominant rock types igneous ☑ sedimentary ☑ metamorphic ☐

Specific rock types present shale + bedrock

Highest point 75' Lowest point: Sea level
(include elevation and location)

Geologic Activity: earthquakes ☐ volcanic eruptions ☐ landslides ☐ other ☐ _____

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DATA SHEET 1 WATERSHED INVENTORY (PAGE 2 OF 4)

WATER RESOURCES

Headwaters originate from glaciers ☐ snowmelt ☑ rain ☑ wetlands ☑ lakes ☐ groundwater ☐ springs ☐

Length of your stream _____

Names of tributaries not named

Order of your stream at the outlet point of your watershed 3rd

Names of lakes none

Number of wetlands N/A few (1-15) ☐ many (15-25) ☐ Abundant (>25) ☐

Areas underlain by aquifers (if any) N/A

SOILS

Predominate soil types bedrock

Areas with soil suitable for farming N/A

Areas with soil unsuitable for development N/A

Areas with potential soil erosion problems N/A

VEGETATION

List the native and introduced plant species that dominate the different plant communities of your watershed:

	Native	Introduced
Upland forest	hemlock, spruce, alder	
Riparian	salmonberry, blueberry, devil's club	
Grassland	Muskeg meadow species	

Other plant communities fern

Percent of your watershed now covered by native vegetation 100 %

Reasons for the loss of native vegetation no loss

Time period over which the loss occurred _____

Endangered or threatened plant species _____

FISH

Native species (circle if endangered or threatened) pink salmon, chum salmon & dolly varden trout

Non-native species _____

Locations of fish hatcheries and species produced Esther Island - pink, chum, silver salmon

Types and locations of barriers to fish migration Large bedrock waterfalls

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DATA SHEET 1 WATERSHED INVENTORY (PAGE 3 OF 4)

WILDLIFE

Native species (circle if endangered or threatened) deer, black bear, coyote

Non-native species

Key wildlife habitat areas

HISTORICAL (Attach extra pages as needed)

The earliest human inhabitants were Aleutiq

Describe briefly the settlement of your watershed Tatitlek village

Cultural and historical resources in your watershed Berries, Mtn. goat, blacktail deer, subsistence salmon harvest, dolly varden trout, etc

DEMOGRAPHICS

Current watershed population 75 Projected population in 10 years 100 20 years

Watershed population 10 years ago 150 50 years ago 50 100 years ago

Areas where most of the people live Tatitlek Village

List towns, cities, & counties and the percent of watershed land area that each encompasses

(attach list of elected officials for each jurisdiction)

What makes people want to live (or not) in your watershed ?

LAND & WATER USES

Estimate the percent of your watershed zoned for each land use and check the activities that apply

rural residential 100 % densities (# of houses per acre)

urban/suburban residential 0 % densities

commercial 20 % light commercial ☑ heavy commercial ☐

industrial 0 % light industry ☐ heavy industry ☐

agricultural 0 % grazing ☐ confined animal ☐ dry crops ☐ irrigated crops ☐ nursery ☐

forestry 0 % clear-cut ☐ selective cut ☐ roads ☐ tree farm ☐

mining 0 % type of mining:

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DATA SHEET 1 WATERSHED INVENTORY (PAGE 4 OF 4)

parks/open space _____% swimming ☐ boating ☑ fishing ☑ other ☐ _____

other recreation _____% ski resort ☐ golf course ☐ other ☐ _____

ercent of watershed that is public land _____% private land 100 %

ercent of watershed covered with impervious surfaces 0 %

ources of domestic water supply for watershed residents yes - reach # 2

ocation of sewage treatment plants (if any) servicing watershed residents _____

reas that rely on septic tanks _____

ltered hydrology (dams, diversions, detention systems, culverts, dikes, drained wetlands, etc.)

type of alteration	location	purpose
Dam		

(add lists as necessary)

VATER QUALITY / QUANTITY CONCERNS

Vater quality classification(s) of your stream and tributaries _____
(attach standards and regulations protecting watershed resources, include enforcing agencies)

.ist pollutants of concern and their potential sources (include locations if possible)

pollutant	point source	nonpoint source
0		

AREAS PRONE TO FLOODING/DRYING UP (Add extra pages if necessary)

Location	Circle One	Dates
	Dry Flood	
	Dry Flood	
	Dry Flood	

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DATA SHEET 2: STREAM REACH SURVEY (PAGE 1 OF 3)

Name TATITLEK Group ANDY CURTIS Date 6/29-30/09 Time

Stream Name NUNU Reach Name/# entire

Section Township Range Reach length 1,240'

Reach Begins N 60° 52.278 W 146° 39.678 Ends N 60° 52.520 W 146° 39.691 (in latitude/longitude or river miles)

Reach Landmarks subsurface flow @ open meadow

Driving/Hiking Directions

Weather Conditions ☑ Clear ☐ Cloudy ☐ Rain ☐ Other

Air temperature ~70° (C or F) Recent weather trends SUNNY x 1 week

Fish:

Type/Species (if known)	# Adults	# Juveniles	# Dead	# Redds or nests	Description & comments
INSTREAM	ϕ	ϕ	ϕ	ϕ	ϕ
NEARBY TIDAL POOL	>100				
STICKLEBACKS (3 SPINE ANADROMOUS)					

Wildlife:

Birds

type, species or track/sign	# or comments
GREAT BLUE HERON	TRACKS
CANADA GOOSE	TRACKS
STELLAR JAYS	2
BALD EAGLES	1

Herps (reptiles & amphibians)

type, species or track/sign	# or comments
n/a	

Mammals

type, species or track/sign	# or comments
LAND OTTER	TRACK
COYOTE	TRACK
BEAR	TRAIL
DEER	BROWSE + TRAK

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Vegetation:

Type	Abundant	Moderate	Sparse	% of 500 ft² area covered	Species present
Conifer trees	✓				Spruce - hemlock
Deciduous trees			✓		
Shrubs		✓			
Herbaceous		✓			
Grasses			✓		

Width of Riparian Zone: Looking downstream:

	0-50'	50-100'	100+
Left Bank	☐	☐	☑
Right Bank	☐	☐	☑

Overhead Canopy: (at least 3' above water) 0-25% ☐ 25-50% ☐ 50-75% ☐ 75-100% ☐

Channel Characteristics:

Gradient Low ☐ Moderate ☐ Steep ☑ _____%

Sinuosity Straight ☑ Meandering ☐ Braided ☐ Ranking_____

Cross section shape:

Valley Channel

Valley: ☐ ☐ ☑ Channel: ☐ ☐ ☑ ☐ ☐

Stream Banks:

Vegetation cover: Abundant ☑ Moderate ☐ Sparse ☐ _____%

Bank stability: Erosion in some areas ☐ Erosion in many areas ☐ Intact ☑
Collapsed in some areas ☐ Collapsed in many areas ☐

Artificial Protection: none ☑ < 25% ☐ 25-50% ☐ > 50% ☐

Describe and evaluate _____

Bank steepness: (What percent of the total length is represented by each?)

<45° ✓ % >45° ___% 90° ___% undercut > 90___%

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Reach Habitat:

or length of pool_____ divided by # or length of riffle_____= pool : riffle ratio _____

Large Woody debris:	Abundant ☐	Moderate ☑	Sparse ☐	None ☐
Small Organic debris:	Abundant ☐	Moderate ☐	Sparse ☑	None ☐
Overhanging debris:	Abundant ☑	Moderate ☐	Sparse ☐	None ☐
Overhanging banks:	Abundant ☐	Moderate ☐	Sparse ☑	None ☐
Overhanging vegetation: (< 3 ft. above water)	Abundant ☐	Moderate ☑	Sparse ☐	None ☐
Aquatic Vegetation:	Abundant ☐	Moderate ☐	Sparse ☐	None ☑
Boulders:	Abundant ☑	Moderate ☐	Sparse ☐	None ☐

Human Alterations:

Dredging	☐	Garbage/litter	☐	Culverts	☐
Channelization	☐	Toxic substances	☐	Pipes	☐
Diversions	☐	Sewage	☐	Detention ponds	☐
Dams	☑	Bridges	☐	Storm drains	☐
Weirs	☐	Roads	☐	Other_____	☐
Dikes	☐	Other_____	☐	Other_____	☐

Land Uses:

(Enter 1 if present, 2 if you think the land use is impacting the stream.)

residential	_____	forestry	_____	grazing	_____
commercial	_____	mining	_____	crops	_____
industrial	_____	recreation	_____	irrigation	_____

Comments On Stream Reach:

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DATA SHEET 4 STREAM BOTTOM SURVEY (PAGE 1 OF 2)

Name Andy McLaughlin Group MCES Date 6/29/09 Time

Stream Name Nunu Creek Reach Name/#

Weather Conditions: ☑ Clear ☐ Cloudy ☐ Rain ☐ Other

Air Temperature: 70F° Recent trends: sunny, last rain a week ago

Site Name/# above falls

Site Description (habitat type, landmarks etc).

Substrate Size
(percent stream bottom that each size represents)

silt, clay, mud	0
sand < 0.1"	0
gravel 0.1-2"	5
cobble 2-10 "	15
boulder > 10"	30
solid bedrock	50

Site location (lat & long, transect #, and/or river mile)

Embeddedness

(an estimate of the average percent that cobbles are embedded)

~20 %

Consolidation

☑ Loose

☐ Moderately difficult to move

☐ Tightly cemented

Site Name/#

Site Description (habitat type, landmarks etc).

Substrate Size
(percent stream bottom that each size represents)

silt, clay, mud	
sand < 0.1"	
gravel 0.1-2"	
cobble 2-10 "	
boulder > 10"	
solid bedrock	

Site location (lat & long, transect #, and/or river mile)

Embeddedness

(an estimate of the average percent that cobbles are embedded)

%

Consolidation

☐ Loose

☐ Moderately difficult to move

☐ Tightly cemented

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DATA SHEET 5 FLOW - METHOD I

(for streams greater than 3 feet wide)

Name TITTLEK Group ANDY CURTIS Date 6/29/09 Time

Stream Name NUNU Reach Name/# 1 Site Name MID CANYON

Site Location: Latitude 60 ° 52 ' 442 " N River mile: 900' UPSTREAM OF TIDE LINE ?
Longitude 146 ° 39 ' 694 " W Transect #:

Driving/Hiking directions: upstream from falls

Site Description: (e.g. transect #, landmarks, etc.)

Weather Conditions: ☑ Clear ☐ Cloudy ☐ Rain ☐ Other
Air Temperature: ~ 70 ° (F or C)
Amount of precipitation in last storm ~ 1" Time elapsed since last storm ~ 1 week
Other recent weather information SUNNY x 1 WEEK

Velocity Float Trials:

Trial #	Time
1	34 SEC.
2	61
3	36
4	29
5	14
6	41
7	32
8	50
9	48
10	30
Total	375

Distance: 10'

375 /10 = 37.5
total time/# of trials — avg. time

Cross Sectional Area:

Record depths at one-foot intervals Depth = D

Cross Section 1

#	D	#	D
1	10.5	11	
2	8.5	12	
3	5	13	
4	4	14	
5	4.5	15	
6	5	16	
7	2	17	
8		18	
9		19	
10		20	

(39.5 sum

Cross Section 2

#	D	#	D
1	7.5	11	
2	8	12	
3	9.5	13	
4	12	14	
5	10.5	15	
6	3	16	
7	2	17	
8		18	
9		19	
10		20	

+ 52.5 sum

Cross Section 3

#	D	#	D
1	8	11	
2	7	12	
3	7	13	
4	9	14	
5	8	15	
6		16	
7		17	
8		18	
9		19	
10		20	

+ 39 sum) / 3 =

Average Cross Sectional Area = 44 ft²

(Multiply sums by 2 if depths were measured in 2 ft. intervals) MEASURED @ 1' INTERVALS

Average Surface Velocity = 10' /37.5 (distance/avg. time) = 0.26 (feet/sec.) X (0.8) (velocity correction factor) = **Average Corrected Velocity** = 0.213

Flow = 0.213 (Avg. Corrected Velocity) ft./sec. X 44 (Avg. Cross Sectional Area) ft.² = 9.39 **CFS** (cubic feet/second)

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DATA SHEET 5 FLOW - METHOD I

(for streams greater than 3 feet wide)

Name TATITLEK Group ANDY CURTIS Date 6/30/09 Time

Stream Name NUNU Reach Name/# below main falls Site Name above Boulder Bay Delta

Site Location: Latitude 60 ° 52 ' 278 " N River mile: ~50' above high tide x̄
Longitude 146 ° 39 ' 678 " W Transect #:

Driving/Hiking directions: ~40 minute hike down coast from FERRY DOCK

Site Description: (e.g. transect #, landmarks, etc.) flood plain/straight channel/cobble riffle

Weather Conditions: ☐ Clear ☑ Cloudy ☐ Rain ☐ Other
Air Temperature: ° (F or C)
Amount of precipitation in last storm Time elapsed since last storm
Other recent weather information

Velocity Float Trials:

Trial #	Time
1	5
2	7
3	7
4	8
5	6
6	6.6
7	6
8	9
9	18
10	13
Total	85.6

Distance: 10'

85.6/10 = 8.56
total time/# of trials — avg. time

Cross Sectional Area:

Record depths at one-foot intervals Depth = D

Cross Section 1

#	D	#	D
1	2"	11	
2	3	12	
3	2	13	
4	3	14	
5	3	15	
6	1	16	
7		17	
8		18	
9		19	
10		20	

(14 sum

Cross Section 2

#	D	#	D
1	2	11	
2	2	12	
3	2	13	
4	4	14	
5	4	15	
6	2	16	
7		17	
8		18	
9		19	
10		20	

+ 16 sum

Cross Section 3

#	D	#	D
1	3	11	
2	5	12	
3	3.5	13	
4	3.5	14	
5	2	15	
6	4	16	
7	1	17	
8		18	
9		19	
10		20	

+ 22) / 3 = sum

Average Cross Sectional Area = 17.3 ft²

(Multiply sums by 2 if depths were measured in 2 ft. intervals) MEASURED @ 1' INTERVALS

Average Surface Velocity = 10'/8.56 = 1.2
distance/avg. time — feet/sec.

X (0.8) = Average Corrected Velocity = 0.93 ft/sec
velocity correction factor

Flow = 0.93 ft./sec. X 17.3 ft.² = 16.2 CFS
Avg. Corrected Velocity — Avg. Cross Sectional Area — (cubic feet/second)

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