Gunnuk Creek Hatchery permit application
Accepted 9/8/2017
LV, PNP Hatchery Program Coordinator

APPLICATION
PRIVATE NONPROFIT SALMON HATCHERY PERMIT
STATE OF ALASKA
DEPARTMENT OF FISH AND GAME

COMMERCIAL FISHERIES DIVISION
P.O. Box 115526
JUNEAU, ALASKA 99811-5526

GENERAL INSTRUCTIONS

1. Fill in the blanks on the form provided.

2. Where necessary to fully answer a particular question, attach additional pages marked with the corresponding appendix number in the application.

3. Applications **Must Be Typed**.

4. Applications must be signed by the legally authorized representative of the corporate applicant.

5. The application should be sent to the following address:

   STATE OF ALASKA
   DEPARTMENT OF FISH AND GAME
   COMMERCIAL FISHERIES DIVISION
   P.O. Box 115526
   JUNEAU, ALASKA 99811-5526

   ATTENTION:
   PNP HATCHERY PROGRAM COORDINATOR

6. Requests for assistance in preparation of the application or related activities should be directed to the PNP Hatchery Program Coordinator. Such requests will be honored to the extent available staff time and funds permit.

7. This application must be accompanied by a **management feasibility analysis** (MFA) prepared by the department in accordance with 5 AAC 40.130.

8. The application must be accompanied by a $100 nonrefundable application fee, in accordance with AS 16.10.400.

(Rev. 10/2011)

APPLICATION
PRIVATE NONPROFIT SALMON HATCHERY PERMIT

STATE OF ALASKA
DEPARTMENT OF FISH AND GAME

I. IDENTIFICATION OF APPLICANT

A. Private Nonprofit Corporation

Name Northern Southeast Regional Aquaculture Association

Address 1308 Sawmill Creek Rd

Sitka, AK 99835

Phone 907 747-6850

(Please attach a copy of Articles of Incorporation for the above nonprofit corporation organized in accordance with Alaska Statute 10.20)

B. Individual Completing This Form

Name Scott Wagner

Address Same as above

Phone Same as above

C. Relation to Above Nonprofit Corporation

NSRAA Operations Manager

II. STATEMENT OF APPLICANT'S GOALS AND OBJECTIVES

Explain why you have decided to apply for a hatchery permit and what you generally expect to accomplish by the operation of the proposed hatchery.

NSRAA has been working to operate the Gunnuk Creek facility since its closure in 2014. By operating the facility we hope to be able to return the facility to its previous permitted operating capacity and contribution to the common property fisheries of southeast Alaska. Historically the facility had significant chum returns to the SE Cove and Gunnuk Creek SHA. Our short term goal is to re-establish those returns, and be able to initiate common property harvests in the SHA's beginning in 2020. Longer term goals are to develop the Pink salmon capacity, and potentially re-establish a coho return.

Both the short and longer term goals require NSRAA to develop a facility that can properly handle the poor water quality available in Gunnuk Creek. Water quality was a large contributing factor in the facilities closure. The water quality available to the facility can be of poor quality a large portion of the year. This is due to extreme high and low water temperature ranges, high organic loading and at times limited supply. To address these concerns NSRAA is proposing to develop its first recirculation facility.

Production goals and progression will be based upon the successful development of the recirculation technology. Incoming water will be ozonized, settled, filtered, thermally tempered and finally treated with ultra violet light disinfection prior to delivery to the incubation room. It is our belief we can significantly improve incubation survival, fry development, favorable ponding times, and water use efficiency for the facility.

Our production goals are:

Year One-2017
Refurbish facility and pipeline for installation of recirculation technology in early 2018.

2018
Initial incubation of 10 million eyed chum eggs from HFH for ponding to Gunnuk Creek SHA

2019
Incubation of up to 20 million green chum eggs from HFH for ponding to Gunnuk Creek SHA

2020
Incubation of up to 30 million green chum eggs from HFH for ponding to Gunnuk Creek SHA and SE Cove SHA

2021
Initial eggtake at facility on returning chum broodstock. Doubling of recirculation capacity for incubation of up to 65 million chum eggs.

2022
Initiate evaluation and addition of 20 million pink salmon production for release at Gunnuk Creek.

2023 and beyond
Beyond 2023 we will look at adding coho salmon for production.

III. PRODUCTION GOALS AND HATCHERY SITE INFORMATION

A. Egg Capacities by species	Millions of eggs required for hatchery at start-up	at capacity
Chum	10	65
Pink	4	20
Coho	.05	.20

B. Location Description

1. Site (stream and/or lake name, ADF&G stream number, and exact geographical coordinates)

Gunnuk Creek

109-42-10040

Lat 56.9735 Lon -133.9316

2. Site Physical Description (attach topographic map and photographs of proposed site).

a. Topography

Hatchery site is located at ~20 above sea level in a small gorge where Gunnuk Creek empties into Keku Strait. Outside of hatchery grounds there is little to no level ground. See attachments for aerial photo of hatchery and dam site.

b. Geology

Hatchery site is cut into a bedrock slope.

c. Soils

Little to no surface soil exists at the hatchery site. Soils are present on the steep slopes surrounding the facility. See attachments for soil map.

C. Current Land Use and Ownership Status

1. Have the land or usage rights been acquired?

NSRAA owns the property and facility of the hatchery and pipeline corridor

2. What is (will be) the legal form of any usage rights?

NSRAA has an easement with the City of Kake to access their property and dam intake structure where the hatchery intake is located.

3. List the additional state and federal permits needed by the applicant to build and operate the proposed hatchery. Examples may include: U.S. Army Corps of Engineers Permit; Department of Natural Resources Water Use, Land Use, and Tidelands Lease Permits; and U.S. Forest Service Land Use Permit.

Use Permits (land and water)

USACE permit to operate the dam site on behalf of the City of Kake (in process).

USACE permit to place netpens in the Gunnuk Creek SHA.

City of Kake tidelands lease for the Gunnuk Creek SHA netpens.

ADFG Fish Habitat Permit to maintain hatchery weir, hatchery stop log dam and City of Kake dam structure (in process).

D. Water Supply

The water quantity, minimum and Maxim temperatures, and the amounts of silt loading will be critical factors in the evaluation of water supply adequacy. **Care should be exercised in the evaluation of these questions.**

1. Source (e.g., lake, stream, well, spring). Have the water usage rights been acquired?

Surface stream water. NSRAA is the owner of three water rights.

LAS 11875 located at City of Kake dam and is 2.1cfs. LAS 11417 located at hatchery stop log check dam and is 2.5cfs. ADL 102406 located at City of Kake dam and is 0.4cfs.

NSRAA is developing the facility based upon a total production need of 5cfs. There is a wide temperature profile for Gunnuk Creek ranging from 0.1 C in the winter to 17 C in the summer. There is also substantial silt/organic loading in the water supply. Both of these water quality issues are being addressed in the facility design.

2. Water source characteristic (e.g., substrate, size of drainage area, gradient, ground water characteristics).

Gunnuk Creek watershed has a drainage area or 41 square kilometers and a stream length of approximately 61 kilometers. Substrate between intake and hatchery is mainly scoured bedrock with occasional deposits of boulder and cobble resting on bedrock with little gravel or sand. Gradient between the hatchery and dam intake site varies between 2% and 35% at fish barrier locations. See ADFG Division of Habitat Gunnuk Creek Trip Report appendix A.

3. Water quality characteristics (in every case, cite the qualifications of the individual making the assessment and the method(s) used).

a. Recommended parameters to measure for evaluating potential hatchery water supply. Either fill out the table below or attach a copy of the water quality analysis conducted.

See Appendix B and C

Water Qualities	Standards	Levels for the hatchery water source
Alkalinity	at least 20 mg/L as $caCO_3$	
Ammonia (unionized)	<0.0125 mg/L	
Arsenic	<0.05 mg/L	
Barium	<5.0 mg/L)	
Cadmium	<0.0005 mg/L (< 100 mg/L alkalinity <0.005 mg/L (≥ 100 mg/L alkalinity)	
Carbon dioxide	<1.0 mg/L	
Chloride	<4.0 mg/L	
Copper	<0.006 mg/L (< 100 mg/L alkalinity) <0.03 mg/L (≥ 100 mg/L alkalinity)	
Dissolved oxygen	>8.0 mg/L	
Hydrogen sulfide	<0.003 mg/L	
Iron	<0.1 mg/L	
Lead	<0.02 mg/L	
Magnesium	<15 mg/L	
Mercury	<0.0002 mg/L	
Nickel	<0.01 mg/L	
Nitrate (NO_3)	<1.0 mg/L	
Nitrate (NO_2)	<0.1 mg/L	
Nitrogen (N_2)	<110% total gas pressure (<103% nitrogen gas)	
Petroleum (oil)	<0.001 mg/L	
pH	6.5 - 8.0	
Potassium	<5.0 mg/L	
Salinity	<5.0 ppt	
Selenium	<0.01 mg/L	
Silver	<0.003 mg/L (fresh water) <0.003 mg/L (salt water)	
Sodium	<75.0) mg/L	
Sulfate SO_4^{-2}	<50.0 mg/L	
Total dissolved solids	<400.0 mg/L	
Total settleabel solids	<80.0 mg/L (25 JTU)	
Zinc	<0.005 mg/L	

Note: Synergistic and antagonistic chemical reactions must be considered when evaluating a water source against these criteria.

b. Attach a temperature profile (minimum of one year of data) of the hatchery water source. Also, provide vertical profiles if a lake water source is proposed.

See attached Appendix D.

c. List monthly levels of dissolved oxygen in the hatchery water source. If a lake source, provide seasonal oxygen profiles.

Not available but existing hatchery had adequate oxygen levels.

d. If a lake source, provide information on surface area, depth, and water storage capacity.

N/A

e. Describe the silt load (include consideration of possible seasonal high water).

Silt load can be extreme at location during high rain events. As such we do not propose to use raw unprocessed water in incubation and rearing operations at the facility during these events. Raw water may be used for adult attraction to fish ladder and spawning raceways during broodstock recruitment.

4. Water Flow Data.

This information should be based on the equivalent of long-term USGS stream gauge data (10 years or more data) or the U.S. Forest Service Water Resources Atlas synthetic hydrograph model.

a. Attach a seasonal profile, including yearly minimum and maximum flows.

See attached Appendix D.

b. List a historical range of water flow conditions, if available.

See attached Appendix D.

5. Water Distribution System

Describe the water distribution system in at least the following dimensions:

a. Type, size, elevation and locations of water intake, screening, and water use/reuse system.

See appendix D and E (USACE dam drawings).

b. Size, length, and type of pipe, insulation, and distribution system. Include elevations of water surfaces at each point in the system from intake through incubation and rearing to fishladder or other discharge.

See attached Appendix D and E.

c. If a hydroelectric generation system will be used, will effluent from this system be used in the hatchery? If so, describe plans to address possible problems with gas supersaturation.

Current plans call for hydro produced effluent to bypass hatchery.

d. Describe provisions for an emergency water system in the event of primary water system failure.

A backup water supply is part of the current facility and would be retained in new distribution system. This supply is located in the cement vault attached to the stop log check dam. See attached appendix D and F (IPEC proposed hydro facility).

6. Water Treatment System

Describe any water treatment facilities that you will employ to meet minimal water quality standards (influent or effluent).

Domestic drinking water and waste water discharge are provided the City of Kake.

7. Annual Water Budget

Attach a graph showing seasonal variation in flow required for eyeing, incubation, freshwater rearing, freshwater lens in saltwater pens, adult holding, and fishladder operations.

See attached Appendix D.

IV. HATCHERY DESIGN AND CONSTRUCTION INFORMATION

A. Biocriteria for Design and Construction

Describe the critical operational assumptions and objectives which determine the design size and capacity of the proposed hatchery. Specific reference should be made to the following (for reference, a table of CFMD assumptions for salmon survival is provided, Table I):

BROODSTOCK - SPECIES SEE APPENDIX D

1. Eggs per female spawner_____
2. Brood stock requirements at 1:1 sex ratio_____
3. Green egg requirements_____
4. Estimated holding mortality_____, _____%

HATCHERY FACILITY

5. Eyed eggs (_____% loss from green egg stage)_____
6. Eyed egg density per incubation unit_____
7. Total number of incubation units_____
8. Number of cabinets per unit_____
9. Water requirements at ____L/min/unit=_____L/min
10. Water requirements with_____% loss=_____L/min

FRESHWATER REARING UNITS

11. Number of emerging fry (_____% loss from eyed stage)_____
12. Initial fry weight at_____/kg=_____kg
13. Final Fry weight at _____/kg=_____kg
14. Initial freshwater fry rearing space required at _____kg/m^3 _____ m^3
15. Final freshwater fry rearing space required at_____kg/m^3 _____ m^3
16. Maximum number of rearing units (_____m by_____m by_____m= _____
17. Maximum water requirements at _____kg/L/min and 10% loss_____L/min
18. Number of exchanges per hour (R-value) per raceway_____

MARINE REARING UNITS

19. Number of fry/fingerling/or smolts_____
20. Initial weight at _____/kg =_____kg
21. Final weight at _____/kg =_____kg
22. Initial rearing space required at _____kg/m^3 =_____ m^3
23. Final rearing space required at _____kg/m^3 _____ m^3
24. Maximum number of rearing units (_____m by_____m by_____m=_____ m^3)

PROJECTED RETURN

See appendix D and G (NSRAA Gunnuk Creek and SE Cove Pro Forma).

25. Number of returning fish at _____% ocean survival =_____

Table 1. Salmon survival goals at various life stages and fecundities[1] to use in budget documents and hatchery planning.

	Hatchery				Lake	Marine
Species	Green to eyed egg	Eyed Egg to emergent fry	Emergent fry to fingerling	Fingerling to smolt	Fry/fingerling to smolt	Survival to adult
Chum	.90 (.90)[2] .90 (.90)	.95 (.855)[3] .95 (.855)	.90 (.770)[4]			.007 (.006) .02 (.015)
Pink	.90 (.90) .90 (.90)	.95 (.855)[3] .95 (.855)	.90 (.770)[4]			.007 (.006) .02 (.015)
Coho	.90 (.90) .90 (.90) .90 (.90)	.95 (.855)[5] .95 (.855) .95 (.855)	.90 (.770)[6] .90 (.770)	.80 (.616)[7]	.10 (.086) .20 (.154)	.10 (.009) .10 (.015) .10 (.062)
Chinook	.90 (.90) .90 (.90) .90 (.90)	.95 (.855)[5] .95 (.855) .95 (.855)	.90 (.770)[6] .90 (.770)	.80 (.616)[7]	.10 (.086) .20 (.154)	.03 (.003) .03 (.005) .03 (.018)
Sockeye	.90 (.90) .90 (.90) .90 (.90)	.95 (.855)[5] .95 (.855) .95 (.855)	.90 (.770)[6] .90 (.770)	.80 (.616)[7]	.10 (.086) .20 (.154)	.10 (.009) .10 (.015) .10 (.062)

[1] Fecundities by species (eggs per female spawner).

Chum	2,200
Pink	1,600
Coho	2,800
Chinook	6,500
Sockeye	3,000

[2] Cumulative survivals in parenthesis.
[3] Fry to ocean.
[4] Fingerling to ocean.
[5] Fry to lake/stream.
[6] Fingerling to lake/stream.
[7] Smolt to ocean.

B. General Description

See narrative in appendix D.

Attach a written description of the proposed facility. This description should represent a solid concept of the proposed hatchery design. Also include preliminary sketches and drawings of at least the following in an appendix.

1. Incubation and rearing site plan.
2. Hatchery floor plan.
3. Water supply system.
4. Incubation/operation building.
5. Facility layout.

The site plan should include a plan view of all facilities at a scale of 1:100 or larger, a USGS 1:63360 scale topographical map showing the entire watershed and all facility locations, and a NOAA marine chart of the largest scale available showing all tidewater-based facilities and local data.

See Attached Appendix H and I.

C. Proposed Construction Timetable

Prepare a timetable for the construction period that indicates the critical milestones for the project.

Year One-2017: Refurbish facility and pipeline for installation of recirculation technology in early 2018.

2018: Initial incubation recirc system complete for up to 30 million

2021: Doubling of recirculation capacity for incubation of up to 65 million chum eggs.

V. BROODSTOCK

NSRAA proposes to use the existing approved broodstock for the facility. Hidden Falls Hatchery stock (Kadashan River) chum salmon are currently scheduled to be released at Gunnuk Creek for broodstock development in spring of 2018.

A. Initial Donor Stock

1. Identification of source.

Indicate stream name, ADF&G number or geographic coordinates, and salmon species for each proposed donor stock.

a. Species: __Chum salmon_____

Stream name: Gunnuk Creek; Alternative: Pt White and Hidden Falls Hatchery

ADF&G number or geographic coordinates:_____

b. Species: __Pink salmon_____

Stream name: Gunnuk Creek; Alternative: Pt White

ADF&G number or geographic coordinates:_____

c. Species: _Coho salmon_____

Stream name: Gunnuk Creek; Alternative: Pt White

ADF&G number or geographic coordinates:_____

2. Capture techniques and holding facilities at the donor stream.

a. Capture techniques

Describe in detail the capture techniques you will use to harvest adults and take eggs. Please provide a map identifying the exact location of the holding facilities.

See next section for Broodstock Returning to Hatchery

b. Holding facilities

Describe the holding facilities to be used for donor stock spawners (include schematics). List the loading rate [kg fish/ (L/min)] and density (kg fish/mg^3).

See next section for Broodstock Returning to Hatchery

3. Transportation

Discuss method planned for transporting live fish and/or eggs
NA

4. Spawning and fertilization

Discuss the spawning, fertilization, and disinfection procedures and the procedure for estimating percent fertilization.

See next section for Broodstock Returning to Hatchery

B. <u>Broodstock Returning to Hatchery</u>

1. Capture techniques and holding facilities at the hatchery.

a. Capture Techniques

Describe in detail the techniques you will use to capture and ripen adults and take eggs.

Fish will be lead to a fish ladder at the hatchery with a fixed panel weir. Broodstock will be collected from the adult holding raceways, and eggs and sperm removed in the lower raceway spawning area. Fertilization occurs in the spawning area; eggs are transported upstairs by elevator to the incubation room. There they are rinsed and then water-hardened in bulk R-48 type incubators. Broodstock carcasses are typically sold, and will be iced and loaded on tenders. Attempts will be made to donate unsold carcasses prior to grinding.

b. Holding facilities

Describe the holding facilities to be used for hatchery brood stock spawners (include schematics) and give the loading rate [kg fish/ (L/min)] and density (kg fish/mg^3).

Spawners will be held in 3 raceways in the lower level of the facility (See appendix D for schematic). Typical loading rates are expected to be in the 3kg/(L/min) range with densities of 8kg/cubic meter.

2. Transportation

Discuss method planned for transporting live fish and/or eggs (if different from those described in Part A).

3. Spawning and fertilization

Discuss the spawning and fertilization procedures (if different from those described in Part A).

VI INCUBATION AND REARING PLAN

A. Incubators and Rearing Units

Describe the type of incubators and rearing facilities to be used.

R-48 bulk type incubators for eyeing. NOPAD stacking incubators for hatch.

B. Egg Handling

Describe the method by which you plan to handle the eggs from the spawning process through planting them in incubators.

Eggs are typically handled with 5-gal buckets at spawning and with abalone baskets thereafter for seeding into incubators.

C. Chemical Treatment

What chemicals and concentrations will be used for controlling fungus on eggs until the eyed stage?

Treatments of 37% Formaldehyde will be used for fungus control at a rate of 140/ml/minute for 15 min.

D. Enumerations

Describe the method(s) to be used in estimating numbers of green eggs, eyed eggs, and fry.

Green eggs will be estimated based upon average fecundities during spawning. Eyed/seeded eggs will be enumerated by weight. Fry at ponding will be enumerated based upon subtraction of all mortality post seeding enumeration.

E. Rearing Plans

Describe any plans to rear the salmon including type of food.

There are no current rearing plans for the fresh water portion of production. Saltwater netpen rearing will be performed in 40' x 40' net pens. Fish are initially fed a dry crumble salmon feed before switching to a pellet type feed at 2 grams.

F. Disease Control

Describe plans for preventing or controlling disease during rearing.

Fish are orally vaccinated for vibrio. All other disease control is entirely based upon good fish culture practices.

VII RELEASE PLAN

A. Release Site(s)

1. Give exact location and description of proposed release site(s), including maps.

See attachment I.

2. List proposed number and age of each species to be released at each site.

SE Cove will have a maximum release of up to 55 million chum salmon. Gunnuk Creek location will have a maximum release of up to 20 million chum salmon and up to 20 million pink salmon. The combined total of chum fry released between both sites will be the progeny of an initial 65 million green eggs.

B. Transportation

Discuss the methods planned for transporting live fish from the hatchery to the release site(s).

Fry reared at Gunnuk Creek will be loaded onto a flatbed with a transport tank for transport to the OVK work float. From here they will be gravity fed into the net pens. Fry reared at SE Cove will be loaded onto a flatbed with a transport tank for transport to the OVK work float for loading onto a transport vessel. From here they will be transported to SE Cove with recirculating SE Cove sea water. Once on site they are gravity fed into the net pens.

VIII STAFFING

A. Technical Advisors

Attach information about each technical advisor to the nonprofit corporation, indicating that person's name, address, role and responsibilities, and a brief statement of technical qualifications.

As this is a previously constructed facility NSRAA is using Don Beard of Tetra Tech in Juneau on an as needed basis for additional engineering and technical advice. Don has over 40 years of experience designing and engineering salmon hatchery facilities in Alaska. Appendix D was prepared by Tetra Tech.

B. Design and Construction

Attach a list of the names and qualifications of persons or corporations responsible for final design and construction of proposed facilities.

This is a previously constructed facility. See appendix J for final design. NSRAA is acting as the general contractor and will be sub-contracting different portions of the re-habilitation work.

Final recirculation design will be provided by Don Beard and Tetra Tech of Juneau. Initial design of facility is in Appendix D.

C. Administrative Personnel

List the administrative personnel who will support this facility when operational.

Personnel, Assigned (Titles)	**Percentage of Time**
1. Steve Reifenstuhl, General Manager	10%
2. Scott Wagner, Operations Manager	20%
3. Mike Pountney, Maintenance Manager	15%

D. Operating Personnel

List the operating personnel who will be assigned to this facility when operational.

Not known at this time.

IX FINANCIAL PLAN

An estimate of hatchery construction and operating costs should be detailed here. These estimates would provide an indication of the cost recovery requirements of the proposed facility on an annual basis. Acceptance of this application by the Department of Fish and Game in no way implies agreement by the Department of Commerce and Economic Development to commit state loan funds for this project.

See attached Appendix D.

X. BASIC MANAGEMENT PLAN

The preparation of a draft Basic Management Plan will be completed prior to the public hearing. The applicant will be expected to work closely with ADF&G staff in developing the Basic Management Plan (see 5 AAC 40.820).

XI DECLARATION AND SIGNATURE

I declare that the information given in this application is, to my knowledge, true, correct, and complete.

Scott Wagner
Name of Applicant

8/28/2017
Date Signed

Scott Wagner
Signature of Applicant

Exhibit A


Gunnuk Creek Dam location
0.9 Surface Acres
850 Linear feet of stream
lat 56.9791, lon -133.9303
206ft
esri
Source: USGS
Source: NASA, NGA, USGS
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User

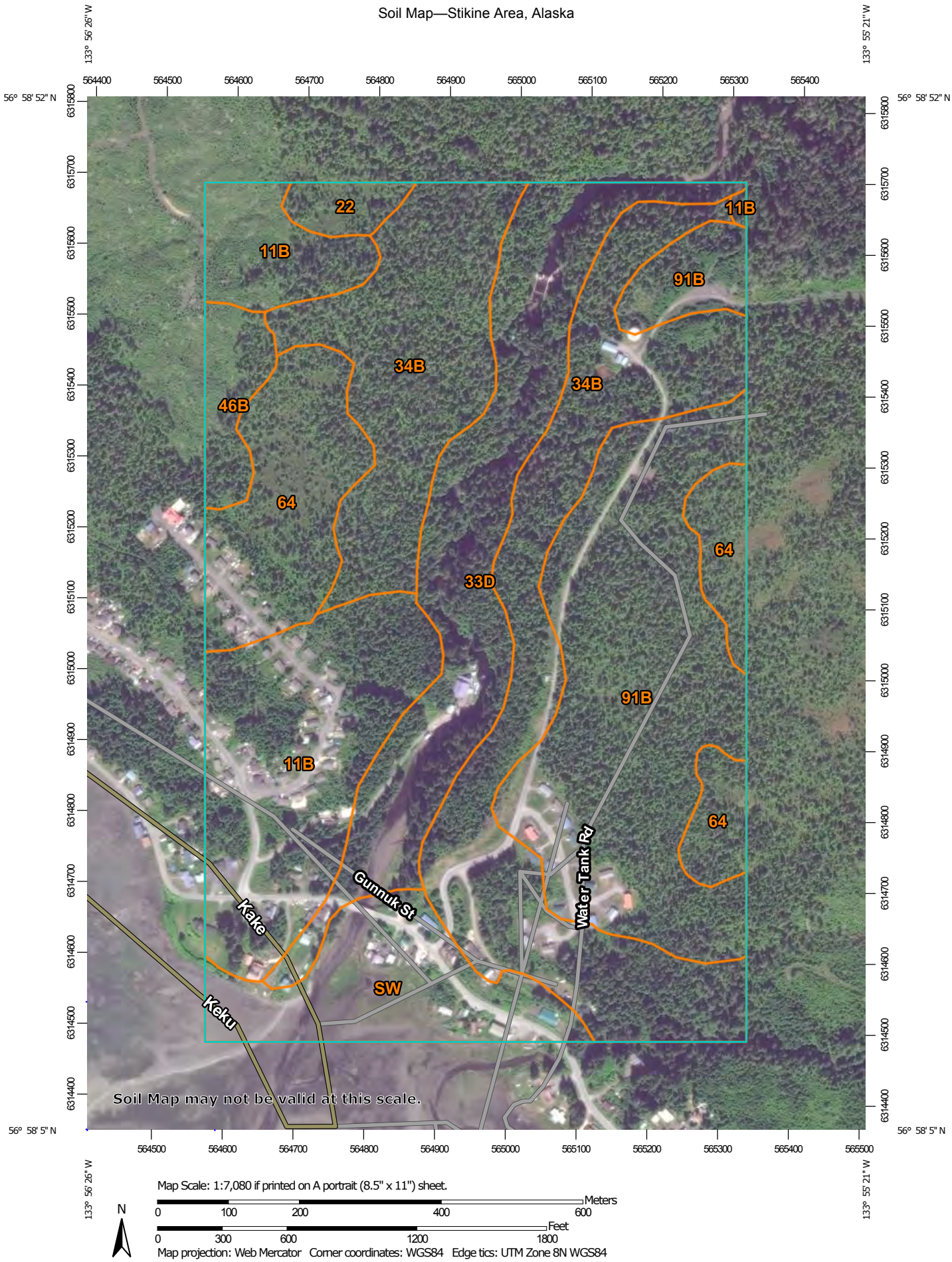
Exhibit D-Weir location, site photos

Gunnuk Creek during low flows looking upstream. Hatchery building in background.

Exhibit D-Weir location, site photos

Gunnuk Creek Hatchery weir duirng moderate flows.

Exhibit D-Weir location, site photos



Map Scale: 1:7,080 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 300 600 1200 1800

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 8N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:31,700.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Stikine Area, Alaska
Survey Area Data: Version 10, Sep 27, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Data not available.

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Stikine Area, Alaska (AK645)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
11B	Kupreanof-Tolstoi association, 5 to 35 percent slopes	36.1	15.7%
22	Kushneahin-Kina association, 3 to 35 percent slopes	2.7	1.2%
33D	Mosman very gravelly loam, 35 to 75 percent slopes	32.2	14.0%
34B	Mitkof-Mosman complex, 5 to 35 percent slopes	64.7	28.1%
46B	Mitkof sandy loam, 5 to 35 percent slopes	5.1	2.2%
64	Kushneahin-Maybeso complex, 3 to 35 percent slopes	23.8	10.3%
91B	Maybeso peat, 5 to 35 percent slopes	48.6	21.1%
SW	Salt Water	16.8	7.3%
Totals for Area of Interest		**230.0**	**100.0%**