



CWCAP Project Study Plan for WDFW SCP Annual Summary

May 18, 2015

TO: Washington Department of Fish & Wildlife (WDFW) Scientific Collection Permit Section
FROM: Carkeek Watershed Community Action Project (CWCAP) Nancy R. Malmgren, Director
RE: SCP Renewal, SCP Amendment, and Permittee Qualifications for Permit Application

Scientific Collection Permit – Renewal Section:

Project Study Plan for Adult Salmon Return Data Collection

CWCAP is requesting a Scientific Collection Permit (SCP) Renewal to collect data from deceased Chum (*Oncorhynchus keta*) and Coho (*Oncorhynchus kisutch*) salmon in Piper's Creek (08.0020) and its tributaries, Venema Creek (08.0021) and Mohlendorph Creek (08.0022), primarily between October 2015 and January 2016.

Coho information may be shared with NOAA's pre-spawning mortality study. CWCAP will collect scales from selected chum carcasses to determine ages with the help of local volunteers and students working with University of Washington Fishery Department.

CWCAP volunteers will collect and record the following salmon data:

- Record water and air temperature.
- Record location of dead adult salmon relative to their distance in feet from the mouth of Piper's Creek.
- Record the presence or absence of adipose fin.
- Record relative number of days since death and state of deterioration.
- Measure and record length and height of each fish.
- Extract scale samples from a subset of total fish sampled.
- Make a ventral incision from the vent to the throat to expose the abdominal cavity.
- Record sex and relative spawning success.
- Return fish to the location of initial collection.
- Visual data for live salmon will be recorded as to location relative to their distance in feet from the mouth of Piper's Creek and the type of creek habitat. Sex is determined visually, if possible.

Project Study Plan for Eyed Chum Salmon Egg Rearing and Self-Release Project

CWCAP is requesting an SCP Renewal to continue rearing eyed Chum salmon eggs (*Oncorhynchus keta*) to fry stage for release into Venema Creek (08.0021) primarily between January 2016 and April 2016. Approximately 20,000 eyed Chum salmon eggs are donated by the Suquamish Tribe's Grovers Creek Salmon Hatchery. Eggs will be reared in a 3-tiered, self-releasing 55 gallon Egg Incubator tank off-channel within the Imprint Pond Compound on Venema Creek. Emergent fry will self-release into Venema Creek via outflow pipe at the surface of the Egg Incubator tank. Techniques have been developed with guidance from staff from the Suquamish Tribe's Grovers Creek Salmon Hatchery.

CWCAP volunteers will facilitate the following salmon rearing activities:

- 20,000 eyed Chum salmon eggs are donated by the Suquamish Tribe's Grovers Creek Salmon Hatchery and distributed evenly onto 3 egg incubation trays.
- Egg incubation trays are submerged and stacked into a 55 gallon in-ground Egg Incubator Tank that is in-line with existing intake pipe, drain pipe, drain valve, and self-release overflow pipe.
- Water flow will be regulated with existing valves to establish recommended flow rates.
- Water and air temperature, flow rates, dissolved oxygen, pH and other parameters will be monitored and recorded.
- Emergent fry will self-release directly to Venema Creek.
- Initial egg count, mortality and release numbers are recorded.

Project Study Plan for Salmon Fry Imprinting and Release Project

CWCAP is requesting an SCP Renewal to continue imprinting fed Chum salmon fry (*Oncorhynchus keta*) for release into Venema Creek (08.0021) primarily between January 2016 and April 2016. Two batches of approximately 35,000 fed Chum salmon fry (70,000 total) are donated by the Suquamish Tribe's Grovers Creek Salmon Hatchery. Fry are fed by volunteers in the 900 gallon Imprint Pond off-channel within the Imprint Pond Compound on Venema Creek. Feedings 3 times per day, 7 days per week provide rapid growth of salmon fry and the opportunity for the park-visiting watershed community to interact with the 25 project volunteers. Each batch of fish is imprinted/fed for approximately 1 month before release, ensuring strong imprint and robust size.

Approximately 22 elementary schools in the Piper's Creek watershed community participate in the Salmon in the Schools (SIS) program. They divide 5,000 eyed Chum salmon eggs donated by the Suquamish Tribe's Grovers Creek Salmon Hatchery and rear them January – April and add them to the Imprint Pond for imprinting and release by volunteers.

CWCAP volunteers will facilitate the following salmon imprinting and release activities:

- 2 back-to-back batches of 35,000 & 30,000 fish each are delivered to the Imprint Pond and imprinted/fed for approximately 1 month each.
- Imprint Pond is in-line with existing intake pipe, sedimentation tanks, drain pipes, drain valves, outflow pipe, overflow pipe, and emergency bypass pipe and valve.
- 21-25 volunteers feed the fish with hatchery-provided fish food 3 times per day, 7 days per week, while recording data, performing routine maintenance, and engaging park visitors with salmon and watershed education.
- Data collection includes air/water temp, amount fed, water flow (GPM), pH, dO₂, #mortalities, #visitors, remarks, #fish/lb, time in/out.
- After approximately 1 month of imprinting/feeding, the outflow pipe is removed, which exposes the drain at the bottom of the Imprint Pond. To avoid visual predators the salmon are released into Venema Creek at dusk.
- The Imprint Pond and Sedimentation Tanks are cleaned/disinfected between batch deliveries.
- Depending on delivery schedules and other variables, the approx. 5,000 Salmon in the Schools fish fry are either added to the 2nd batch of 30,000 salmon fry already in the Imprint Pond or a "3rd batch" is established from the SIS fish after the 2nd batch is released.
- After all fish are released, the Imprint Pond system is cleaned, disinfected, and shut down for the season.

Project Study Plan for Aquatic Invertebrate Education Project

CWCAP is requesting an SCP Renewal to continue the development of the Aquatic Invertebrate Study Program. This program is evolving its partnership with Seattle Public Utilities staff, Bill Malatinsky of SPU's Education & Outreach Program, the Salmon in the Schools Program, Seattle Parks, and volunteers. It is our intention that the identification and enumeration of aquatic insects, worms, mollusks, and other arthropods will enable the Carkeek Watershed community to discuss these water quality indicators towards the improvement of stream and salmon health. Collections will be sited in Piper's Creek (08.0020) and its tributaries, Venema Creek (08.0021) and Mohlendorph Creek (08.0022), primarily between May 2015 and April 2016.

Aligning identification and enumeration techniques for aquatic invertebrates with other agencies may lead to better data and an expanded community involvement through our Aquatic Invertebrate Study Program. It is our intent to develop outcomes that will improve sustainable and expanding outreach through community volunteerism and agency partnerships.

CWCAP volunteers will collect and record the following invertebrate data:

- Record water and air temperature.
- Identify and record sampling sites on Piper's and Venema Creeks
- Characterizes and record aquatic invertebrate habitats.
- Use various hand nets, kick nets, and gloved hands to collect invertebrates.
- Transfer samples to trays for identification with magnifying glasses and field guides.
- Record common names of aquatic invertebrates (insects, worms, mollusks, other arthropods).
- Relate collection results to stream health, salmon diet and adult invertebrate ecology
- Return invertebrates to the location of initial collection

Scientific Collection Permit – Amendment Section:

Project Study Plan for Salmon Egg Insemination/Rearing Project

CWCAP is requesting a Scientific Collection Permit Amendment to include the lethal taking of adult male and female Chum salmon (*Oncorhynchus keta*) in Piper's Creek (08.0020) and its tributaries, Venema Creek (08.0021) and Mohlendorph Creek (08.0022), primarily between October 2015 and January 2016. Up-to 5 adults will be stripped of eggs/sperm, fertilized and eggs incubated in a 5 Gallon Egg Incubator situated off-channel within the Imprint Pond Compound on Venema Creek. Emergent fry will be released into Venema Creek. Techniques for stripping, fertilizing, and incubating will be developed with the guidance of staff from the Suquamish Tribe's Grovers Creek Salmon Hatchery.

Procedural documentation will be developed and modified for use in applying for subsequent SCP Renewals.

CWCAP volunteers will facilitate the following salmon egg rearing activities:

- Up-to 5 adult Chum salmon will be hand-netted, recording their location relative to the distance in feet from the mouth of Piper's Creek.
- Creek habitat, water and air temperature will be recorded.
- Scale samples will be taken and length, weight, and sex determination will be recorded.
- Captured salmon will be humanely euthanized and stripped, with eggs and sperm mixed in a five gallon bucket.
- After fertilization procedures, eggs will be disinfected according to hatchery protocol.
- Eggs will be transferred to incubator trays and placed in a 5 gallon bucket sitting above ground inside the Imprint Pond compound on Venema Creek. The 5 gallon bucket is in-line with existing intake pipe, valves, and outflow pipe. Water flow will be regulated with existing valves to establish recommended flow rates.
- Water and air temperature, flow rates, dissolved oxygen, pH and other parameters will be monitored and recorded.
- Emergent fry will self-release via overflow pipe directly to Venema Creek.
- Initial egg count, mortality and release numbers will be recorded.

WDFW SCP Annual Report for 4/1/2014 – 3/31/15:

Adult Salmon Return Data Collection

This survey attempted to sample all returning salmon to Pipers Creek after they have died. No live fish were collected or sampled other than to record live sightings. For the purposes of discussion, 100% of returning salmonids is assumed to have been sampled and referenced in the table summary below. It is understood that factors such as storm wash-out, mammal predation and other factors may have prevented some salmon species from being sampled.

2014 Salmon Return Summary *					
	<i>Oncorhynchus keta</i> Chum salmon	<i>Oncorhynchus kisutch</i> Coho salmon	<i>Oncorhynchus clarki</i> Resident Cutthroat Trout (Coastal)	Unknown Salmonid	Totals
10/25/2014	6	6	1	0	13
11/1/2014	22	9	0	5	36
11/8/2014	80	8	0	1	89
11/15/2014	122	3	5	11	141
11/20/2014	171	5	0	7	183
11/29/2014	108	4	0	7	119
12/6/2014	35	0	0	2	37
Totals:	544	35	6	33	618
*All fish were sampled from dead carcasses taken from 08.0020 Pipers Creek and 08.0021 Venema Creek and returned to sample location.					

Additional data collected but not presented in this report is available from CWCAP staff and Seattle Public Utilities. This data includes, but is not limited to the following:

- Live fish sightings per sampling date.
- Stream temperatures per sampling date.
- Species, total length, width, sex, degree of spawning success of dead salmonid species per sampling date.
- Distance in feet from the railroad crossing of Piper's Creek where each sighting and each sample was taken.
- Scale samples.

Eyed Chum Salmon Egg Rearing and Self-Release Project

Jan 13-Feb 28, 2015 (about 43 days) – Arrival and eventual self-release of about 21,000 eyed Chum salmon eggs. Incubation occurred in the 55 gallon egg incubation tank next to the main imprint pond. The maturing eggs are in-line with Venema Creek water running through the incubation tank and are therefore imprinted as are the fish in the imprint pond by Venema Creek water.

Beginning Feb 18, 2015 the self-release overflow pipe became clogged and backed up the flow through the incubation tank. The ensuing work over two days to solve the backup problem resulted in the loss of all but perhaps a few thousand alevin. Surviving self-released fry into Venema Creek were estimated by observation to be perhaps 2,000.

The fry were gone from the incubator by about Feb 28, 2015. The self-released fry were about an inch in length.

Salmon Fry Imprinting and Release Project

Feb 18-Mar 17, 2015 (27 days) – Arrival and release of 1st batch of about 35,000 salmon fry.

- Feeding is 3x/day/7x/week in increasing amounts up-to 2+ cups at each feeding
- 21 different volunteers = 21 weekly feeding slots
- Fish are fed longer to increase robustness towards the goal of improving survival and return.
- Wed-Mar 4 – after about 2 weeks of feeding 3x/day – 1000 fish/lb
- Tue-Mar 17 – Release day, after about 4 weeks of feeding 3x/day – 500 fish/lb
- We did not measure the length of fish of the 1st batch.

Mar 19-Apr 18, 2015 (30 days) – Arrival and release of 2nd batch of about 30,000 salmon fry.

- Feeding is 3x/day/7x/week; same 21 volunteers.
- Thu-Mar 19 – Delivery day, fish were fed for about 1 ½ – 2 weeks at the hatchery – 1091 fish/lb
- Tue-Mar 31 – after 12 days of feeding 3x/day – 512 fish/lb (2.1 x larger after 12 days of feeding)
- Wed-Apr 15 – after 27 days of feeding 3x/day – 302 fish/lb (3.6 x larger after 27 days of feeding; skewed by markedly smaller fish from School and the Classroom fish)
- Sat-Apr 18 – after 30 days of feeding 3x/day – 269 fish/lb (4.1 x larger after 30 days of feeding)
- Length of 2 randomly selected fish were 2 13/16 in and 2 15/16 in respectively; likely not school fish.

Salmon in the Schools (SIS) program (21 local elementary schools, 22 classrooms):

- Jan 8, 2015 – Arrival of about 5,000 Chum salmon eggs evenly divided among 22 participating elementary school classroom (about 225 eggs per classroom).
- Schools each have a refrigerated 55 gallon aquarium and a lesson plan developed by Pacific Education Institute in consultation with Seattle Public Schools Instructional Services with support from Seattle Public Utilities and the Salmon Education Alliance.
- Mar 30-Apr 14, 2015 (after 81-95 days in school aquariums) – fish were delivered by each of the 22 elementary school classrooms by bus field trip and added to the Imprint Pond as a part of their lesson plan.
- This year (2015), 4142 fish are estimated to have been added to the Imprint Pond by the 22 elementary classrooms. This involved a total 939 students, teachers and chaperones.
- School fish were imprinted/fed 3x/day/7x/week by volunteer feeders.
- Apr 18, 2015 -- school fish were released with the larger original 30,000 fish in the Imprint Pond.
- School fish were imprinted a varying amount of time based on when they were delivered to the Imprint Pond, from as long as 19 days (1st schools) to 4 days (the last schools).

For this project, approximately 70,000 total Chum salmon fry were released into Venema Creek between Feb 18 and Apr 18, 2015.

Aquatic Invertebrate Education Project and Volunteer Summary

Each CWCAP Salmon Program Volunteer Feeder is encouraged to include environmental and dietary factors into their discussion with park visitors regarding salmon survival and future success.

This season's volunteer feeder log is characterized in the following table:

Volunteer Feeder Hours	Feeding Days	Hours volunteered per person	# of volunteers	Total volunteer hours
1st batch 2/18/15 to 3/17/15	27			
2nd batch 3/19/15 to 4/18/15	30			
Totals:	57	8.14	21	171.00

At selected locations near the Imprint Pond on Venema Creek, volunteers variously remove stones or use nets to obtain samples of the stream substrate to allow visitors to see and identify invertebrates using field guides. All substrate and animals are returned to the sample site and no macro invertebrates are intentionally killed or preserved.

Discussions ensue among park visitors and volunteers regarding the life cycles of the aquatic invertebrates, their roles as stream quality indicators, and as essential links in the watershed food chain.

The core season for community park visitors to the Les Malmgren Imprint Pond begins with the arrival of the first batch of salmon from Grovers Creek Salmon Hatchery and ends with the release of the second batch of fry into Venema Creek on the Saturday of the Annual Earth Day Celebration at Carkeek Park.

This season's visitor log is characterized in the following table:

PARK VISITS	Feb18-Mar17, 2015	Mar19-Apr18, 2015	Total Visits
Regular Park Visits	414	327	741
Release Visits (Mar17 & Apr18 2015)	45	71	116
*SIS Visits (Mar30-Apr4 2105)		939	939
Earth Day Visits (Apr18 2015)		97	97
Totals Visits:	459	1434	1893

* Salmon in the Schools Program

The combined volunteer effort and community park visits gives enormous exposure for salmon programs. Future reports will contain evolved procedures and developed success metrics for participation.