# Memorandum

To: City of Edmonds
Attn: Jerry Shuster
121 5th Ave N
Edmonds, WA 98020

File no. 1-915-17169-0.02

From: Tad Schwager and Cleve Steward
AMEC Environment & Infrastructure
3500 188th St SW, Suite 601
Lynnwood, WA 98037

Date: 7/13/2012

Subject: Perrinville Creek Fish Removal and Exclusion

## Introduction

This memorandum summarizes fish removal and exclusion work on Perrinville Creek that AMEC performed for the City of Edmonds in conjunction with routine stream maintenance activities at a City easement at 8229 Talbot Road, Edmonds, Washington. This is the third consecutive summer AMEC has provided fish removal and exclusion services to the City to support our maintenance effort. (Note: This routine fish removal and exclusion work is NOT part of the City's proposed Talbot Road Drainage Improvement Project).

Perrinville Creek is a small (less than 10 ft wide) stream that drains a 900 acre catchment in the City of Edmonds and City of Lynnwood, and enters Puget Sound approximately 350 feet downstream of the City easement. Resident fish include cutthroat trout (*Oncorhynchus clarkii))* and sculpins (*Cottus spp.*). Fish were removed from a 260 ft long section of the creek extending from just upstream of the City easement through two adjacent privately owned residential properties[1], to the eastern edge of the Burlington Northern Santa FE railway track right-of-way. Perrinville Creek flows beneath the railroad bed and thence into Puget Sound.

This maintenance work and associated fish removal and exclusion activities are permitted under the Washington Department of Fish and Wildlife Hydraulic Project Approval #117901-4. With regard to fish, the HPA stipulates that before in-water work commences, fish must be safely relocated from the project site to an area downstream:

> 11. Fish Removal and Screening: If fish are present in the watercourse, the City of Edmonds shall screen the project reach to prevent fish access during the maintenance activity, then a qualified biologist shall capture and safely move food fish, game fish, and other fish life from the job site. The permittee shall have appropriate fish capture and transportation equipment ready and on the job site. Captured fish shall be immediately and safely transferred to free-flowing water downstream of the project site.

[1] Permission was secured from the private property owners to access the stream on their land.

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The fish removal and exclusion work described below was completed on July 9, 2012; this date falls within the in-water work window established by WDFW (July 1 to September 30). Visibility was excellent and, with the exception of the presence of two local residents who observed the fish removal activities, no unusual conditions were encountered. The fish work was performed by a qualified fisheries biologist and two additional crew members. The lead biologist (Tad Schwager) has received formal training and certification in backpack electrofishing and fish handling, and has over 100 hours of electrofishing experience in the Pacific Northwest.

**Methods**

On the morning of July 9, 2012, fish exclusion (block) nets were installed at the upper and lower ends of the project area to isolate and prevent fish from re-entering the reach while fish removal and maintenance activities were underway. Once block nets were secure, a backpack electroshocker (Smith-Root, Model 12 P.O.W.) was used to immobilize fish so that they could be removed from the project area. The sampled reach of stream was divided into three contiguous sections (lower, middle, and upper) by fences that prevented the fish removal crew from sampling without interruption. For reporting purposes, therefore, each section is treated as its own sampling unit.

Three complete passes were performed by the fish removal crew. Each pass started at the downstream block net and proceeded upstream through the three sections to the upstream block net. Dip nets composed of non-abrasive nylon material were used to collect and transfer fish to 5-gallon plastic buckets filled with ambient-temperature stream water. After each pass, captured fish were identified to species, measured to the nearest five millimeters (fork length), and released upstream of the work area in a large pool below the Talbot Road culvert. The fish were released upstream of the project area because suitable downstream release sites were not available.

Standard electrofishing and fish capture techniques were used to safely remove fish from a short section of Perrinville Creek that included the reach that was dewatered to facilitate maintenance activities. The fish removal methods were based on guidelines developed by the National Marine Fisheries Service (NMFS 2000) for use in waters where there is the potential to encounter species listed under the Endangered Species Act (ESA). The electrofishing guidelines are intended to minimize the risk of harm to fish as a result of the electrofishing.

A backpack electroshocker (Smith-Root, Model 12 P.O.W.) was used to briefly immobilize fish so that they could be netted, transferred to a water-filled bucket, and transported and released unharmed downstream of the project area. The electroshocker settings used for each pass are listed here:

| Pass | Frequency | Pulse Width | Voltage | Rationale |
|---|---|---|---|---|
| 1 | 30 Hz | 500 µs | 400 V | Initial settings recommended by NMFS (2000) |
| 2 | 40 Hz | 1 ms | 400 V | Incremental increase to improve capture efficiency |
| 3 | 60 Hz | 2 ms | 700-800 V | Settings used successfully in previous years to maximize capture efficiency |

In fish removal operations, as opposed to other types of population sampling, the risk of harm due to electrofishing needs to be balanced with the risk of harm due to dewatering. Therefore, after the majority of fish present were removed in the first two passes, electroshocker settings were increased in the third pass to ensure that all fish were removed from the project area. This approach minimized the risk of harming fish, while at the same time ensured that all fish were removed from the project areas prior to its dewatering.

**Results and Discussion**

A total of 50 fish comprising cutthroat trout and sculpins were captured and released (Table 1 and 2). Most fish recovered quickly and exhibited normal behavior prior to being released; however, three cutthroat trout captured in Reach 1 during the final pass (at the higher power settings) were unresponsive when released and thus considered mortalities. Voltage was lowered immediately after observing the lack of recovery and no further mortalities were incurred. The mortality rate incurred (7.7% of cutthroat; 6% overall) was within the range typical for electrofishing (Habera et al. 1996).

Cutthroat trout ranged from 40 mm to approximately 140 mm, with an average of 81 mm (this is an underestimate due to the 6 largest trout having been recorded as 130 mm). Sculpins ranged from 45 to 110 mm, with an average of 66 mm (Table 3).

Cutthroat trout populations in the Puget Sound region exhibit a wide range of life history strategies, including anadromous ("sea-run"), adfluvial ("lake-run"), and resident forms. Based on the observed lengths of fish captured in the project area, at least three age classes of cutthroat trout are present in Perrinville Creek. Although the observed sizes and age structure are typical of resident cutthroat trout populations in local streams, it cannot be stated conclusively that these fish are not the progeny of fish that spent time in Puget Sound before returning to Perrinville Creek to spawn. The presence of potential barriers to upstream fish migration downstream of the project area raises doubt as to whether the existing population exhibits this life history characteristic, even if it seems likely that the cutthroat trout population may have been anadromous in the past. Further study would be needed to determine whether anadromy persists in the extant population.

Table 1. Cutthroat trout removed from the project area.

| | Reach 1 (Lower) | Reach 2 (Middle) | Reach 3 (Upper) | Subtotal |
|---|---|---|---|---|
| Pass 1 | 4 | 7 | 4 | 15 |
| Pass 2 | 4 | 9 | 1 | 14 |
| Pass 3 | 3* | 4 | 3 | 10 |
| **Total** | | | | **39** |

Table 2. Sculpins removed from the project area.

| | Reach 1 (Lower) | Reach 2 (Middle) | Reach 3 (Upper) | Subtotal |
|---|---|---|---|---|
| Pass 1 | 2 | 1 | 6 | 9 |
| Pass 2 | 1 | 0 | 0 | 1 |
| Pass 3 | 1 | 0 | 0 | 1 |
| **Total** | | | | **11** |

Table 3. Length distribution of captured fish

| **Fork Length (mm)** | **No. Cutthroat** | **No. Sculpin** |
|---|---|---|
| 40 | 1 | |
| 45 | | 1 |
| 50 | 1 | |
| 55 | 1 | 4 |
| 60 | | 1 |
| 65 | 4 | 1 |
| 70 | 14 | 2 |
| 75 | 8 | |
| 80 | 2 | |
| 85 | | |
| 90 | | 1 |
| 95 | | |
| 100 | | |
| 105 | | |
| 110 | 1 | 1 |
| 115 | | |
| 120 | 1 | |
| 125 | | |
| >130 | 6 | |
| **Total** | **39** | **11** |

**References**

National Marine Fisheries Service. 2000. Guidelines for electrofishing waters containing salmonids listed under the Endangered Species Act. 5 pp. Available online at: http://swr.nmfs.noaa.gov/sr/Electrofishing_Guidelines.pdf

Habera, J.W., R.J. Strange, B.D. Carter, and S.E. Moore. 1996. Short-term mortality and injury of rainbow trout caused by three-pass AC electrofishing in a southern Appalachian stream. North American Journal of Fisheries Management 16:192-200. Available online at: http://www.gcmrc.gov/library/reports/other/FishStudies/Habera1996.pdf

# Memorandum

To **City of Edmonds**
**Attn: Jerry Shuster**
**121 5th Ave N**
**Edmonds, WA 98020**

File no **[391517169B]**

From **AMEC Environment & Infrastructure**cc
**3500 188th St SW, Suite 601**
**Lynnwood, WA 98037**

Date **9/25/2013**

**Subject** **Addendum to Perrinville Creek Fish Salvage Memorandum (7/15/2013)**

Mr. Shuster,

This memorandum serves as an addendum to a previous memo, dated July 15, 2013, which described methods and results for fish exclusion work that AMEC performed for the City of Edmonds on June 3, 2013, in conjunction with its annual stream maintenance activities on Perrinville Creek at 8229 Talbot Road, Edmonds, Washington. Additional maintenance was required by the City in September 2013; thus, AMEC was again asked to provide fish exclusion prior to dewatering. Fish exclusion was conducted on September 23. The methods used to isolate the reach and capture fish were the same as those described in the July memo. Provided here is a summary of capture results from the September effort.

A total of 4 cutthroat trout (*Oncorhynchus clarki clarki*) were captured and released, all approximately 90-100 mm in length (Table 1). Fish recovered quickly and exhibited normal behavior prior to being released.

Table 1. Cutthroat trout removed from the project area.

| | Reach 1 (Lower) | Reach 2 (Middle) | Reach 3 (Upper) | Subtotal |
|---|---|---|---|---|
| Pass 1 | 0 | 0 | 2 | 2 |
| Pass 2 | 0 | 1 | 1 | 2 |
| Pass 3 | 0 | 0 | 0 | 0 |
| **Total** | | | | **4** |

Regards,

Tad Schwager
Fisheries Biologist
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# Memorandum

**To:** **City of Edmonds**
**Attn: Jerry Shuster**
**121 5th Ave N**
**Edmonds, WA 98020**

**File no[491517169C]**

**From:** **AMEC Environment & Infrastructure**
**3500 188th St SW, Suite 601**
**Lynnwood, WA 98037**

**Cc:**

**Date:** **9/30/2014**

**Subject:** **Perrinville Creek Fish Salvage**

Mr. Shuster,

This memorandum summarizes the fish exclusion work that AMEC performed for the City of Edmonds in conjunction with its annual stream maintenance activities on Perrinville Creek at 8229 Talbot Road, Edmonds, Washington, and where the creek flows across the two adjacent parcels to the southwest before flowing beneath the railroad bed and into Puget Sound. This maintenance is permitted under the Washington Department of Fish and Wildlife Hydraulic Project Approval #117901-4, which requires fish removal prior to any in-water work.

The fish exclusion work described below was completed on July 15, 2014 and was performed by a qualified fisheries biologist and two additional crew members. The lead biologist has received formal training and certification in backpack electrofishing and fish handling, and has over 100 hours of electrofishing experience in the Pacific Northwest.

**Methods:**

First, block nets were installed upstream and downstream of the project area to isolate it and to prevent fish from re-entering this reach of the creek while fish removal and stream maintenance activities were underway. Once block nets were secure, a backpack electroshocker (Smith-Root, Model 12 P.O.W.) was used to capture fish within three short sub-reaches. Sub-reaches corresponded with the property and fence lines which prevented continuous travel up the creek. Three passes with the electroshocker were made within each sub-reach with progressively higher power outputs. This approach was developed to be consistent with the multiple objectives of fish exclusion, which include minimizing risk of harm to fish, but also ensuring that all fish were ultimately removed prior to dewatering.

The settings used for each pass are listed here:

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| Pass | Frequency | Pulse Width | Voltage | Rationale |
|---|---|---|---|---|
| 1 | 30 Hz | 500 µs | 400 V | Initial settings recommended by NMFS (2000) |
| 2 | 40 Hz | 1 ms | 600 V | Incremental increase to improve capture efficiency |
| 3 | 60 Hz | 2 ms | 800 V | Settings used successfully in previous years to maximize capture efficiency |

Electrofishing methods and settings were based on guidelines developed by the National Marine Fisheries Service (NMFS 2000) for use in waters where there is the potential to encounter species listed under the Endangered Species Act (ESA). These guidelines represent a conservative, cautious approach to minimize the risk of harm to fish as a result of the electrofishing. In fish exclusion, as opposed to other types of population sampling, the risk of harm due to electrofishing needs to be balanced with the risk of harm due to dewatering. Similar guidelines are available from US Fish and Wildlife Service (USFWS), WDFW, and Washington State Department of Transportation (WSDOT 2009)

Captured fish were held in plastic buckets with ambient stream water until recovered and then released upstream of the work area in a large pool below the Talbot Road culvert. During release, fish were counted and identified to species. Captured fish were observed continually and care was taken to release fish promptly.

**Results:**

A total of 49 fish were captured and released, consisting of cutthroat trout (*Oncorhynchus clarki clarki*) (Table 1), and sculpin (*Cottidae*) (Table 2). Most fish recovered quickly and exhibited normal behavior prior to being released; however, four small cutthroat trout captured in Reach 3 during the final pass (at the higher power settings) were unresponsive when released and thus considered mortalities.

Lengths of cutthroat trout fell into two size classes and probably represented two year classes: small (young-of-the-year) cutthroat ranged from approximately 50 to 65 mm total length; large (yearling) cutthroat ranged from approximately 120 to 150 mm. Sculpin ranged from approximately 30 to 100 mm total length.

Table 1. Cutthroat trout removed from the project area.

| | Reach 1 (Lower) | Reach 2 (Middle) | Reach 3 (Upper) | Subtotal |
|---|---|---|---|---|
| Pass 1 | 3 | 5 | 7 | 15 |
| Pass 2 | 2 | 7 | 5 | 14 |
| Pass 3 | 0 | 4 | 6 | 10 |
| **Total** | | | | **39** |

Table 2. Sculpin removed from the project area.

| | Reach 1 (Lower) | Reach 2 (Middle) | Reach 3 (Upper) | Subtotal |
|---|---|---|---|---|
| Pass 1 | 0 | 4 | 2 | 6 |
| Pass 2 | 1 | 1 | 1 | 3 |
| Pass 3 | 1 | 0 | 0 | 1 |
| **Total** | | | | **10** |

The number of fish captured this year was similar to 2012, and was higher than either of the two fish exclusion events in 2013 (10 on June 3, and 4 on September 23). We observed greater depths in Perrinville Creek this year, due either to less sediment in the channel, higher stream flows, or a combination of the two. We speculate that the stream offered somewhat improved habitat quality compared to the conditions in 2013, which may explain why more fish were captured.

Regards,

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Direct Tel 425-921-4005
Direct Fax 425-921-4040
E-mail tad.schwager@amec.com

**Memo**

| | | | |
|---|---|---|---|
| To: | City of Edmonds<br>Attn: Jerry Shuster<br>121 5th Ave N<br>Edmonds, WA 98020 | Project No.: | 591517169D |
| From: | Tad Schwager<br>Amec Foster Wheeler Environment & Infrastructure. Inc. | | |
| Tel: | (425) 921-4005 | | |
| Fax: | (425) 921-4040 | | |
| Date: | September 15, 2015 | | |

**Subject: Perrinville Creek Fish Salvage – August 25, 2015**

Mr. Shuster,

This memorandum summarizes the fish exclusion work that Amec Foster Wheeler performed for the City of Edmonds in conjunction with its annual stream maintenance activities on Perrinville Creek at 8229 Talbot Road, Edmonds, Washington. This maintenance is permitted under the Washington Department of Fish and Wildlife Hydraulic Project Approval (#117901-4), which requires fish removal prior to any in-water work.

The fish exclusion work described below was completed on August 25, 2015 and was performed by a qualified fisheries biologist and two additional crew members. The lead biologist has received formal training and certification in backpack electrofishing and fish handling, and has over 100 hours of electrofishing experience in the Pacific Northwest.

**Methods:**

Block nets were installed upstream and downstream of the project area to isolate it and to prevent fish from re-entering this reach of the creek while fish removal and stream maintenance activities were underway. Once block nets were secure, a backpack electroshocker (Smith-Root, Model 12 P.O.W.) was used to capture fish within three short sub-reaches. Sub-reaches corresponded with the property and fence lines which prevented continuous travel up the creek. Three passes with the electroshocker were made within each sub-reach with progressively higher power outputs. This approach was developed to be consistent with the multiple objectives of fish exclusion, which include minimizing risk of harm to fish, but also ensuring that all fish were ultimately removed prior to dewatering.

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The settings used for each pass are listed here:

| Pass | Frequency | Pulse Width | Voltage | Rationale |
|---|---|---|---|---|
| 1 | 30 Hz | 500 µs | 400 V | Initial settings recommended by NMFS (2000) |
| 2 | 40 Hz | 1 ms | 600 V | Incremental increase to improve capture efficiency |
| 3 | 60 Hz | 2 ms | 800 V | Settings used successfully in previous years to maximize capture efficiency. These settings were never exceeded, even if additional passes were made |

Electrofishing methods and settings were based on guidelines developed by the National Marine Fisheries Service (NMFS 2000) for use in waters where there is the potential to encounter species listed under the Endangered Species Act (ESA). These guidelines represent a conservative, cautious approach to minimize the risk of harm to fish as a result of the electrofishing. In fish exclusion, as opposed to other types of population sampling, the risk of harm due to electrofishing needs to be balanced with the risk of harm due to dewatering. Similar guidelines are available from US Fish and Wildlife Service (USFWS), WDFW, and Washington State Department of Transportation (WSDOT 2009)

Captured fish were held in plastic buckets with ambient stream water until recovered and then released upstream of the work area in a large pool below the Talbot Road culvert. During release, fish were counted and identified to species. Captured fish were observed continually and care was taken to release fish promptly.

**Results:**

A total of 56 fish were captured and released, consisting of cutthroat trout (*Oncorhynchus clarki clarki*) (Table 1), coho salmon (*Oncorhynchus kisutch*) (Table 2), sculpin (*Cottidae spp*) (Table 3), and one salmonid that could not be identified to species because of its small size (42 mm total length). Most fish recovered quickly and exhibited normal behavior prior to being released; however, one coho salmon captured in Reach 2 during the second pass was unresponsive when released and thus considered a mortality.

Lengths of cutthroat trout fell into two size classes and probably represented two year classes: small (young-of-the-year) cutthroat ranged from approximately 50 to 65 mm total length; large (yearling) cutthroat ranged from approximately 120 to 155 mm. Coho salmon were all approximately 90 mm total length, and sculpin ranged from approximately 30 to 100 mm total length.

Table 1. Cutthroat trout removed from the project area.

| | Reach 1 (Lower) | Reach 2 (Middle) | Reach 3 (Upper) | Subtotal |
|---|---|---|---|---|
| Pass 1 | 2 | 4 | 1 | 7 |
| Pass 2 | 0 | 2 | 1 | 3 |
| Pass 3 | 1 | 0 | 0 | 1 |
| **Total** | | | | **11** |

Table 2. Coho salmon removed from the project area.

| | Reach 1 (Lower) | Reach 2 (Middle) | Reach 3 (Upper) | Subtotal |
|---|---|---|---|---|
| Pass 1 | 4 | 4 | 3 | 11 |
| Pass 2 | 0 | 4 | 1 | 5 |
| Pass 3 | 1 | 1 | 0 | 2 |
| **Total** | | | | **18** |

Table 3. Sculpin removed from the project area.

| | Reach 1 (Lower) | Reach 2 (Middle) | Reach 3 (Upper) | Subtotal |
|---|---|---|---|---|
| Pass 1 | 10 | 4 | 1 | 15 |
| Pass 2 | 4 | 3 | 1 | 8 |
| Pass 3 | 2 | 1 | 0 | 3 |
| **Total** | | | | **26** |

The total number of fish captured this year was similar to prior years (2012 and 2014), although juvenile coho salmon were observed for the first time and cutthroat trout were less abundant.

**References**

NMFS (National Marine Fisheries Service). 2000. Guidelines for electrofishing waters containing salmonids listed under the Endangered Species Act. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Portland, Oregon.

Sincerely yours,

Tad Schwager
Senior Fisheries Scientist

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Direct Fax: (425) 921-4040
E-mail: tad.schwager@amecfw.com

**Memo**

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|---|---|---|---|
| To: | City of Edmonds<br>Attn: Michael Cawrse<br>121 5th Ave N<br>Edmonds, WA 98020 | Project No.: | 691517169E |
| From: | Tad Schwager, FP-C<br>Amec Foster Wheeler Environment & Infrastructure. Inc. | | |
| Tel: | (425) 921-4005 | | |
| Fax: | (425) 921-4040 | | |
| Date: | August 24, 2016 | | |

**Subject: Perrinville Creek Fish Salvage – July 12, 2016**

Mr. Cawrse,

This memorandum summarizes the fish exclusion work that Amec Foster Wheeler performed for the City of Edmonds in conjunction with its annual stream maintenance activities on Perrinville Creek at 8229 Talbot Road, Edmonds, Washington. This maintenance is permitted under the Washington Department of Fish and Wildlife (WDFW) Hydraulic Project Approval (#117901-4), which requires fish removal prior to any in-water work.

The fish exclusion work described below was completed on July 12, 2016 and was performed by a qualified fisheries biologist and two additional crew members. The lead biologist, Tad Schwager, has received formal training and certification in backpack electrofishing and fish handling, and has over 100 hours of electrofishing experience in the Pacific Northwest.

**Methods:**

Block nets were installed upstream and downstream of the work area to isolate it and to prevent fish from re-entering this reach of the creek while fish removal and stream maintenance activities were underway. Once block nets were secure, a backpack electroshocker (Smith-Root, Model 12 P.O.W.) was used to capture fish within three short sub-reaches. Sub-reaches corresponded with the property and fence lines which prevented continuous travel up the creek. Three passes with the electroshocker were made within each sub-reach with progressively higher power outputs. This approach was developed to be consistent with the multiple objectives of fish exclusion, which include minimizing risk of harm to fish, but also ensuring that all fish were ultimately removed prior to dewatering.

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The settings used for each pass are listed here:

| Pass | Frequency | Pulse Width | Voltage | Rationale |
|---|---|---|---|---|
| 1 | 30 Hz | 500 µs | 400 V | Initial settings recommended by NMFS (2000) |
| 2 | 40 Hz | 1 ms | 600 V | Incremental increase to improve capture efficiency |
| 3 | 60 Hz | 2 ms | 800 V | Settings used successfully in previous years to maximize capture efficiency. These settings were never exceeded, even if additional passes were made |

Electrofishing methods and settings were based on guidelines developed by the National Marine Fisheries Service (NMFS 2000) for use in waters where there is the potential to encounter species listed under the Endangered Species Act (ESA). These guidelines represent a conservative, cautious approach to minimize the risk of harm to fish as a result of the electrofishing. In fish exclusion, as opposed to other types of population sampling, the risk of harm due to electrofishing needs to be balanced with the risk of harm due to dewatering. Similar guidelines are available from U.S. Fish and Wildlife Service, WDFW, and Washington State Department of Transportation.

Captured fish were held in plastic buckets with ambient stream water until recovered and then released upstream of the work area in a large pool below the Talbot Road culvert. During release, fish were counted and identified to species. Captured fish were observed continually and care was taken to release fish promptly.

**Results:**

A total of 23 fish were captured and released, consisting of cutthroat trout (*Oncorhynchus clarki clarki*) and sculpin (*Cottidae spp*) (Table 1). Fish recovered quickly and exhibited normal behavior prior to being released; except for one cutthroat trout, captured during the third pass, that was unresponsive when released and thus considered a mortality. Lengths of cutthroat trout ranged from 55 to 145 mm total length, and sculpin ranged from 40 to 110 mm total length.

Flow during the fish exclusion was moderate, and the in-stream and riparian condition of reaches 1 and 3 were similar to years past. Landscaping work had much reduced the vegetation along the banks of Reach 2, which increased the accessibility of the stream but also reduced the amount of overhead cover. The total number of fish captured this year was less than in prior years, but not the lowest that has been recorded – only 4 fish were captured in September 2013.

Table 1. Fish removed from the project area.

| | Cutthroat | Sculpin | Subtotal |
|---|---|---|---|
| Pass 1 | 2 | 7 | 9 |
| Pass 2 | 4 | 2 | 6 |
| Pass 3 | 6 | 2 | 8 |
| **Total** | 12 | 11 | **23** |

## References

NMFS (National Marine Fisheries Service). 2000. Guidelines for electrofishing waters containing salmonids listed under the Endangered Species Act. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Portland, Oregon.

Sincerely yours,

Tad Schwager, FP-C
Senior Fisheries Scientist

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Direct Fax: (425) 921-4040
E-mail: tad.schwager@amecfw.com

**Memo**

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|---|---|---|---|
| To: | City of Edmonds<br>Attn: Michael Cawrse<br>121 5th Ave N<br>Edmonds, WA 98020 | Project No.: | PS1717169F |
| From: | Tad Schwager, FP-C<br>Amec Foster Wheeler Environment & Infrastructure. Inc. | | |
| Tel: | (425) 921-4005 | | |
| Fax: | (425) 921-4040 | | |
| Date: | July 27, 2017 | | |

**Subject: Perrinville Creek Fish Salvage – July 18, 2017**

Mr. Cawrse,

This memorandum summarizes the fish exclusion work that Amec Foster Wheeler performed for the City of Edmonds in conjunction with its annual stream maintenance activities on Perrinville Creek at 8229 Talbot Road, Edmonds, Washington. This maintenance is permitted under the Washington Department of Fish and Wildlife (WDFW) Hydraulic Project Approval (#117901-4), which requires fish removal prior to any in-water work.

The fish exclusion work described below was completed on July 18, 2017 and was performed by a qualified fisheries biologist and three additional crew members – one from Amec Foster Wheeler, and two from the City of Edmonds. The lead biologist, Tad Schwager, has extensive training and experience with backpack electrofishing and fish handling, and is qualified as a Lead Fish Moving Biologist by the Washington State Department of Transportation.

**Methods:**

Block nets were installed upstream and downstream of the work area to isolate it and to prevent fish from re-entering this reach of the creek while fish removal and stream maintenance activities were underway. Once block nets were secure, a backpack electroshocker (Smith-Root, Model 12 P.O.W.) was used to capture fish within three short sub-reaches. Sub-reaches corresponded with the property and fence lines which prevented continuous travel up the creek. Three passes with the electroshocker were made within each sub-reach with progressively higher power outputs. This approach was developed to be consistent with the multiple

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objectives of fish exclusion, which include minimizing risk of harm to fish, but also ensuring that all fish were ultimately removed prior to dewatering.

The settings used for each pass are listed here:

| Pass | Frequency | Pulse Width | Voltage | Rationale |
|---|---|---|---|---|
| 1 | 30 Hz | 500 µs | 400 V | Initial settings recommended by NMFS (2000) |
| 2 | 40 Hz | 1 ms | 600 V | Incremental increase to improve capture efficiency |
| 3 | 60 Hz | 2 ms | 800 V | Settings used successfully in previous years to maximize capture efficiency. These settings were never exceeded, even if additional passes were made |

Electrofishing methods and settings were based on guidelines developed by the National Marine Fisheries Service (NMFS 2000) for use in waters where there is the potential to encounter species listed under the Endangered Species Act (ESA). These guidelines represent a conservative, cautious approach to minimize the risk of harm to fish as a result of the electrofishing. In fish exclusion, as opposed to other types of population sampling, the risk of harm due to electrofishing needs to be balanced with the risk of harm due to dewatering. Similar guidelines are available from U.S. Fish and Wildlife Service, WDFW, and Washington State Department of Transportation.

Captured fish were held in plastic buckets with ambient stream water until recovered and then released upstream of the work area in a large pool below the Talbot Road culvert. During release, fish were counted and identified to species. Captured fish were observed continually and care was taken to release fish promptly.

**Results:**

A total of 49 fish were captured and released, consisting of cutthroat trout (*Oncorhynchus clarki clarki*), sculpin (*Cottidae spp*), and coho salmon (*O. kisutch*) (Table 1). All fish recovered quickly and exhibited normal behavior prior to being released, except for two small cutthroat trout and one sculpin that were captured during the latter passes. These individuals were unresponsive when released and thus considered mortalities. Lengths of cutthroat trout ranged from approximately 50 to 170 mm total length, sculpin ranged from 40 to 110 mm total length.

Flow during the fish exclusion was moderate, and the in-stream and riparian conditions of each reach were similar to last year. The total number of fish captured this year was comparable to prior years (50 fish in 2012, 49 fish in 2014, 56 fish in 2015), but greater than last year (23 fish in 2016).

Table 1. Fish removed from the project area.

| | Cutthroat | Sculpin | Coho | Subtotal |
|---|---|---|---|---|
| Pass 1 | 6 | 15 | 0 | 21 |
| Pass 2 | 9 | 5 | 2 | 16 |
| Pass 3 | 4 | 8 | 0 | 12 |
| **Total** | 19 | 28 | 2 | **49** |

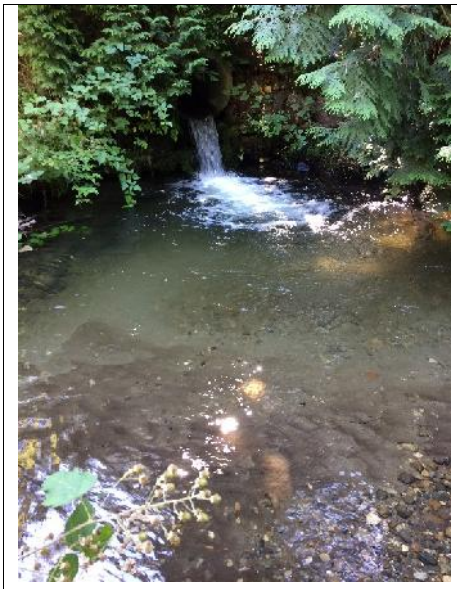

Photo 1. Plunge pool below the culvert at Talbot Road where all fish were released.

Photo 2. The largest cutthroat trout encountered during fish exclusion.

Sincerely yours,

Tad Schwager, FP-C
Senior Fisheries Scientist

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E-mail: tad.schwager@amecfw.com

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3500 188th Street SW
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USA
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August 10, 2018

# Memo

To: Patrick Johnson, Stormwater Technician
City of Edmonds
121 Fifth Avenue N
Edmonds, WA 98020

Project No.: PS1817169F

From: Robert E. Stuart, Senior Fisheries Scientist

Tel: (425) 921-4000

Fax: (425) 921-4040

Subject: **Perrinville Creek Fish Exclusion – 2018**

**Dear Mr. Johnson,**

I am pleased to present this memorandum summarizing the results of the fish exclusion work conducted by Wood Environment & Infrastructure Solutions, Inc. (Wood), formerly Amec Foster Wheeler Environment & Infrastructure, Inc., performed for the City of Edmonds in conjunction with its annual maintenance activities on the Perrinville Creek Bypass Structure located at 8229 Talbot Road, Edmonds, Washington. This maintenance is permitted under the Washington Department of Fish and Wildlife (WDFW) Hydraulic Project Approval #117901-4, which requires fish removal from the reach of Perrinville Creek where maintenance activities are conducted prior to any in-water work.

The fish exclusion work described below was completed on August 6, 2018 and was performed by a senior fisheries biologist from Wood certified in electrofishing, another Wood senior scientist, and two City of Edmonds' employees. The lead biologist, Robert Stuart, has extensive training and experience with backpack electrofishing and fish handling.

## Methods

A 62.75-meter-long reach of Perrinville Creek was isolated using quarter-inch mesh block nets installed upstream (Attachment A, Photo 1) and downstream (Attachment A, Photo 2) of the work area to prevent fish from re-entering this reach of the creek during fish removal and maintenance activities. Once block nets were secured, fish were removed within the reach using a backpack electrofisher (Smith-Root, Model 12 P.O.W.). Stunned fish were removed from the water using a wooden-handled, quarter-inch mesh dip net and placed in a 5-gallon plastic bucket containing creek water. The field team made three passes with the electrofisher through the stream reach, using progressively higher power outputs, as recommended by the National Marine Fisheries Service (NMFS, 2000). This approach was developed to be consistent with the multiple objectives of fish exclusion, which included minimizing risk of harm to fish, but also ensuring that all fish were ultimately removed prior to dewatering.

The pulse width, frequency, and voltage settings used for each pass are summarized in Table 1.

**Table 1 – Electrofisher Settings for Each Exclusion Pass**

| Pass | Frequency (Hertz) | Pulse Width (milliseconds) | Voltage | Rationale |
|---|---|---|---|---|
| 1 | 30 | 0.5 | 400 | Settings recommended by NMFS (2000). Incremental increase to maximize capture efficiency. These settings were used successfully in previous years and were never exceeded. |
| 2 | 40 | 1.0 | 600 | |
| 3 | 60 | 2.0 | 800 | |

Electrofishing methods and settings were based on guidelines developed by NMFS (2000) for use in waters where there is the potential to encounter species listed under the Endangered Species Act. These guidelines represent a conservative, cautious approach to minimize the risk of harm to fish as a result of the electrofishing. In fish exclusion, as opposed to other types of population sampling, the risk of harm due to electrofishing needs to be balanced with the risk of harm due to dewatering. Similar guidelines are available from the U.S. Fish and Wildlife Service, WDFW, and the Washington State Department of Transportation.

Captured fish were held in plastic buckets with ambient stream water. Fish captured during a single pass were processed before beginning the next pass. Captured fish were anesthetized using a solution of tricaine methanesulfonate (MS-222) at a concentration recommended by the manufacturer. This was done to reduce stress to the fish during handling. The MS-222 solution was aerated using a battery-operated aerator and air stone while fish were held in the anaesthetic solution. Once anesthetized, fish were enumerated, identified to species, if possible, and measured (length recorded in millimeters [mm]). Processed fish were placed in an ice chest containing ambient creek water until recovered and then released upstream of the work area in a large pool below the Talbot Road culvert. Fish processing was conducted as quickly as possible to reduce stress to the fish.

Temperature, conductivity, and dissolved oxygen were measured and recorded at the top and bottom of the reach prior to and after electrofishing using a YSI 85 Handheld Oxygen, Conductivity, Salinity, and Temperature System (Yellow Springs Instruments, Yellow Springs, Ohio).

## Results

A total of 61 fish were captured and released, consisting of cutthroat trout (*Oncorhynchus clarki clarki*) (Attachment A, Photo 3), coho salmon (*O. kisutch*) (no photos), rainbow trout / steelhead trout (*O. mykiss*) (Attachment A, Photo 4), unidentified salmonid species (*Oncorhynchus* spp.) (no photos), and unidentified sculpin species (*Cottus* spp.) (Attachment A, Photo 5; Table 2). Fork length ranges (in mm) for each fish species captured were:

- Cutthroat trout – 42 to 170;
- Coho salmon – 55 to 61;
- Rainbow / steelhead trout – 75;
- Unidentified salmonids – 39 and 40; and
- Unidentified sculpin species – ranged from 41 to 107.

Flow during the fish exclusion was moderate, and the in-stream and riparian conditions of each reach were similar to previous years. The total number of fish captured this year was greater when compared to previous years: 49 in 2017, 23 in 2016, 56 in 2015, 49 in 2014, and 50 fish in 2012.

**Table 2 – Fish Species, Length Ranges (in millimeters), and Number of Fish by Species**

| Pass (begin – end time) | Cutthroat Trout | Coho Salmon | Rainbow / Steelhead Trout | Unidentified Salmonids | Sculpins | Subtotal |
|---|---|---|---|---|---|---|
| 1 (1100-1142) | 9 (42-170) | 4 (55-61) | 0 | 0 | 12 (48-74) | 25 |
| 2 (1215-1308) | 15 (44-160) | 0 | 1 (75) | 1 (40) | 12 (41-107) | 29 |
| 3 (1345-1420) | 5 (50-60) | 0 | 0 | 1 (39) | 1 (96) | 7 |
| **Total** | **29** | **4** | **1** | **2** | **25** | **61** |

The conventional water quality parameters of temperature (degrees Celsius [°C]), conductivity (microSimens per centimeter [µS/cm]), and dissolved oxygen (milligrams per liter [mg/L]) were measured and recorded prior to and after completion of electrofishing activities. These are summarized in Table 3.

**Table 3 – Summary of Conventional Water Quality Parameters Recorded in Perrinville Creek Before and After Electrofishing**

| Temperature (°C) | Conductivity (µS/cm) | Dissolved Oxygen (mg/L) |
|---|---|---|
| **Morning - Upstream** | | |
| 13.50 | 207.1 | 10.00 |
| **Morning - Downstream** | | |
| 13.20 | 210.8 | 10.00 |
| **Afternoon - Upstream** | | |
| 15.80 | 203.2 | 15.80 |
| **Afternoon - Downstream** | | |
| 15.50 | 203.4 | 9.57 |

Abbreviation(s)
°C = degrees Celsius
mg/L = milligrams per liter
µS/cm = microSimens per centimeter

Should you have any questions or comments regarding the above information, please do not hesitate to contact me. I very much enjoyed working with you and your colleagues on this project and hope that we may have the opportunity together again.

Sincerely,

**Wood Environment & Infrastructure Solutions, Inc.**

Robert E. Stuart, FP-C
Senior Fisheries Scientist
Cell: (425) 923-8588
E-mail: bob.stuart@woodplc.com

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Attachments: Attachment A – Project Photographs

## Reference

National Marine Fisheries Service (NMFS). 2000. Guidelines for electrofishing waters containing salmonids listed under the Endangered Species Act. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Portland, Oregon, http:/ www.westcoast.fisheries.noaa.gov/publications/reference_documents/esa_refs/section4d/electro2000.pdf (accessed August 1, 2018).

# ATTACHMENT A
# PROJECT PHOTOGRAPHS

Perrinville Creek Fish Exclusion Project
Edmonds, Washington

Photo 1 Upstream block net (looking downstream)

Photo 2 Downstream block net (looking downstream)

# ATTACHMENT A
# PROJECT PHOTOGRAPHS

Perrinville Creek Fish Exclusion Project
Edmonds, Washington

Photo 3 Cutthroat trout

Photo 4 Rainbow / steelhead trout

# ATTACHMENT A
# PROJECT PHOTOGRAPHS

Perrinville Creek Fish Exclusion Project
Edmonds, Washington

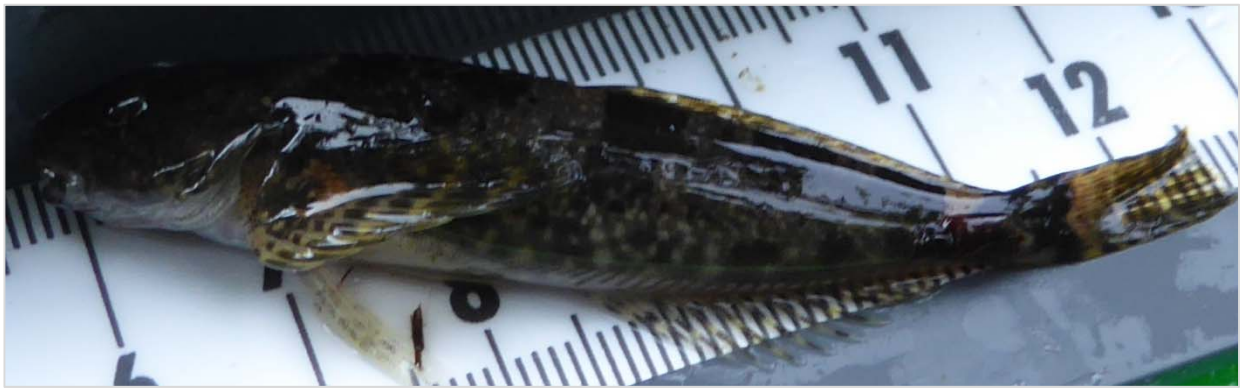


Photo 5 Unidentified sculpin species

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Engineering Division

DAVE EARLING
MAYOR

September 4, 2019

## Memo

**Subject: Perrinville Creek Fish Exclusion – August 6, 2019**

All,

This memorandum summarizes the results of the fish exclusion work conducted by the City of Edmonds and *Students Saving Salmon* in conjunction with its annual maintenance activities on the Perrinville Creek Bypass Structure located at 8229 Talbot Road, Edmonds, Washington. This maintenance is permitted under the Washington Department of Fish and Wildlife (WDFW) Hydraulic Project Permit Number #15905, which requires fish removal from the reach of Perrinville Creek where maintenance activities are conducted prior to any in-water work.

## Introduction

Perrinville Creek is a small (less than 10ft wide) stream that drains a 900-acre catchment in the City of Edmonds and City of Lynnwood. It enters Puget Sound approximately 350 feet downstream of a City easement that contains an overflow diversion structure. Resident fish in Perrinville Creek include cutthroat trout (*Oncorhynchus clarkii*), coho salmon (*Oncorhynchus kisutch*) and various species of sculpins (*Cottus spp.*). Prior to the beginning of the maintenance work and associated fish exclusion, permission is secured from the private property owners adjacent to Perrinville Creek to access the stream on their land. City of Edmonds Stormwater Engineering Technician Patrick Johnson, who has received formal training and certification in backpack electrofishing through Smith-Root, carried out the fish removal and exclusion work. Electrofishing capture assistance was given by Mike Johnson, City of Edmonds Stormwater Lead Worker, and Anthony Lingat, City of Edmonds Intern.

## Methods

An 80.75-meter-long reach of Perrinville Creek was isolated on Monday August 5th, using quarter-inch nylon block nets installed upstream (Attachment A, Photo 1) and downstream (Attachment A, Photo 2) of the work area to prevent fish from re-entering this reach of the creek during fish removal and maintenance activities. Once block nets were secured, fish were removed on Tuesday August 6th, within the isolated reach using a backpack electrofisher (Smith-Root, Model LR20B). Stunned fish were removed from the creek using two 60" fiberglass handled dip nets with quarter inch mesh and placed in 5-gallon plastic buckets containing ambient creek water (Attachment A, Photos 3 & 4). The electrofishing team, consisting of the three City of Edmonds staff, made three passes in total with the electrofisher and nets through the creek, using progressively higher power outputs, as recommended by the National Marine Fisheries Service (NMFS, 2000). This approach has been developed to be consistent with the multiple objectives

of fish exclusion, which include minimizing risk of harm to fish, as well as ensuring that every effort is made to remove fish prior to the dewatering of the creek.

The frequency, duty cycle and voltage settings used for each pass are summarized in Table 1.

| Pass | Frequency (Hertz) | Duty Cycle (%) | Voltage |
|---|---|---|---|
| 1 | 30 | 0.5 | 400 |
| 2 | 40 | 1.0 | 500 |
| 3 | 60 | 2.0 | 700 |

**Table 1. – Electrofisher Settings for Each Exclusion Pass**

Electrofishing methods and settings were based on guidelines developed by NMFS (2000) for use in waters where there is the potential to encounter species listed under the Endangered Species Act. These guidelines represent a conservative, cautious approach to minimize the risk of harm to fish as a result of the electrofishing. In fish exclusion, as opposed to other types of population sampling, the risk of harm due to electrofishing needs to be balanced with the risk of harm due to dewatering. Similar guidelines are available from the U.S. Fish and Wildlife Service, WDFW, and the Washington State Department of Transportation.

Captured fish were held in plastic buckets with ambient stream water. Fish captured during a single pass were processed before beginning the next pass. Members of the Edmonds-Woodway High School *Students Saving Salmon* club and two fisheries biologists were on hand to observe, help classify and process these fish quickly in order to reduce stress (Attachment A, Photos 5 & 6). Once captured, the fish were enumerated, identified to species, if possible, and measured (length recorded in millimeters [mm]). Smaller captured fish were measured using a Plexiglas observation box (Attachment A, Photos 7 & 8), and larger fish were handled briefly and measured using a clear ruler. The processed fish were then photographed, placed back into buckets with ambient creek water, and then released upstream of the work area in a medium sized pool below the Talbot Road culvert (Attachment A, Photo 9). Fish recovered quickly and exhibited normal behavior prior to being released.

## Results

A total of 30 fish were captured and released on August 6th by way of electrofishing. These fish consisted of cutthroat trout (*Oncorhynchus clarkii)*, coho salmon (*Oncorhynchus kisutch*) unidentified salmonid species (*Onchorhynchus spp*.), and unidentified sculpin species (*Cottus spp.*).

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Fork length ranges (in mm) for each fish species captured were (See Attachment B for photos):

- Cutthroat trout – 55 to 155
- Coho Salmon - 75 to 95
- Unidentified Salmonid – 75 to 95
- Unidentified Sculpin – 60 to 105

Flow during the fish exclusion was moderate, and the in-stream and riparian conditions of each reach were similar to previous years. The total number of fish captured this year was fewer (*with 2013 as the exception) when compared to previous years:

- **30 in 2019**
- 61 in 2018
- 49 in 2017
- 56 in 2015
- 49 in 2014
- *4 in 2013
- 50 in 2012

| Pass (begin – end time) | Cutthroat Trout | Coho Salmon | Unidentified Salmonids | Unidentified Sculpins | Subtotal |
|---|---|---|---|---|---|
| 1 (10:25-11:06) | 6 | 2 | 0 | 5 | 13 |
| 2 (11:14-11:55) | 5 | 2 | 1 | 5 | 13 |
| 3 (12:05-12:35) | 2 | 0 | 0 | 2 | 4 |
| Total | 13 | 4 | 1 | 12 | 30 |

**Table 2. – Fish Species and Number of Fish by Species**

Photographs of salmonids that were not able to be correctly identified in the field by *Students Saving Salmon*, were directed to a biologist who has considerable experience with juvenile salmonids. Todd Zackey, Marine and Nearshore Program Manager at Tulalip Tribes, identified all but one of the unidentified salmonids as coho salmon. The remaining unidentified salmonid is also suspected as a coho salmon, but cannot definitively be confirmed with the given photograph.

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## Notes

*On the following morning, August 7th, as the Perrinville Creek Sediment removal project was beginning and the creek was being dewatered, three City of Edmonds staff collected 6 additional fish that remained within the limits of the work site. 5 unidentified salmonids and 1 unidentified sculpin. **This brought the grand total of fish excluded to 36 prior to the beginning of the sediment removal process.**

*1 dead cutthroat trout was found in the creek during the exclusion process but was determined to have died prior to electrofishing.

*In 2018, two sediment removal projects took place, one scheduled in August (per HPA #117901-4) and one unscheduled sediment removal project conducted in November due to heavy rains and erosion that caused Perrinville Creek to become obstructed at the weir (8229 Talbot Rd.). The latter event stopped the natural watercourse of the creek and instead bypassed it into the overflow structures. This lower reach of Perrinville creek from the diversion structure to the Puget Sound outlet was dry for up to a week. The November 2018 event has also led this stretch of creek to shallow significantly with rock and sediment.

*The Edmonds-Woodway High School *Students Saving Salmon* club members that participated were Grace Yockey, Alyssa Barnett, Aimee Fuji, Matthew Jack, Tomoe Millette, and Nikolas Faulkner, assisted by adult advisors Joe Scordino, David Millette, Jim Ogren and Jim Faulkner.

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# Attachment A - Project Photographs

## Perrinville Creek Fish Exclusion Project

## 2019

**Photo 1. (Installed block netting upstream of project)**

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**Photo 2. (Downstream block netting near Puget Sound outfall)**

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**Photo 3. (Staff using electrofisher and dip nets near diversion structure)**

**Photo 4. (Staff electrofishing in lower reach of Perrinville Creek)**

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**Photo 5. (Two captured salmonids from Perrinville Creek)**


**Photo 6. (Students measuring and classifying captured fish from Perrinville Creek)**

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**Photo 7. (Retired fisheries biologist and Students Saving Salmon club advisor, Joe Scordino, assists with the classification of captured fish)**


**Photo 8. (Plexiglas measuring and viewing box to reduce handling and the stress on captured fish)**

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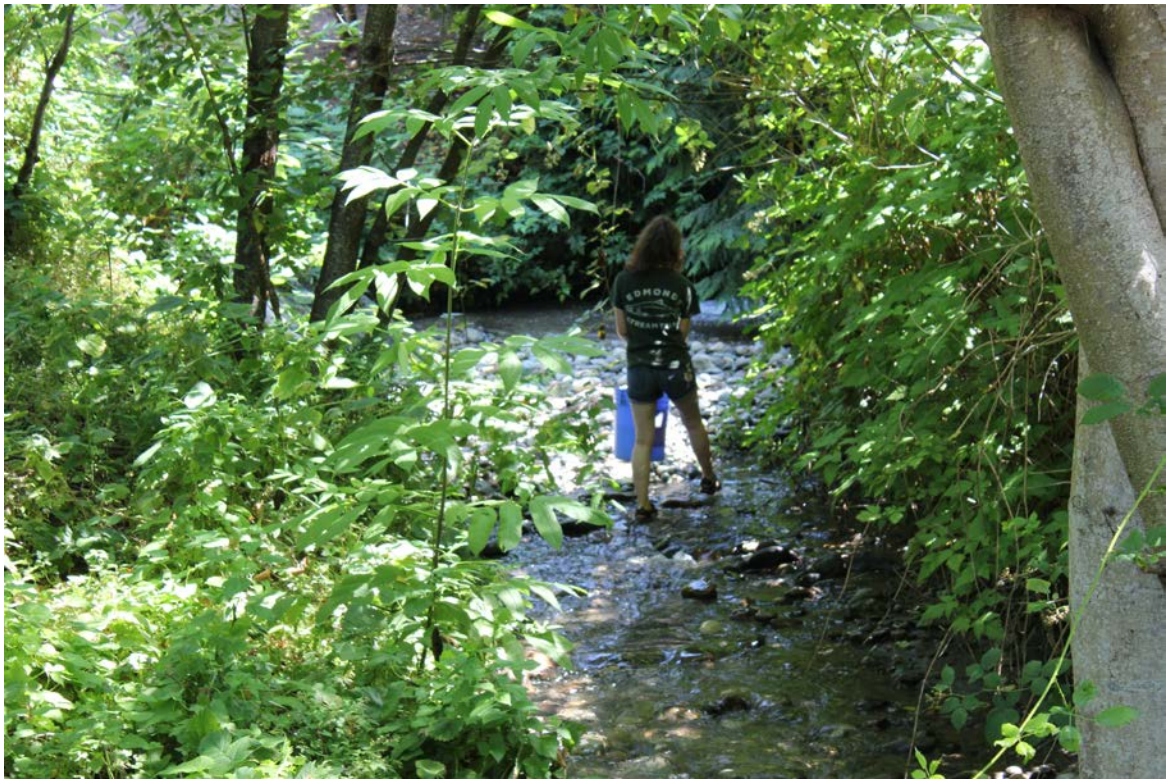

**Photo 9. (Student releasing captured fish in Perrinville Creek upstream of block netting)**

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# Attachment B – Project Photographs

## Perrinville Creek Fish Species

**Photo 1. – Cutthroat trout**

**Photo 2. – Cutthroat trout**

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**Photo 3. – Cutthroat trout**

**Photo 4. – Unidentified sculpin**

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**Photo 5. – Coho salmon**

**Photo 6. – Coho salmon**

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# Attachment C – Project Photos

## Site Location

**Photo 1. – Project Location: 8229 Talbot Road, Edmonds, WA 98020**


**Photo 2. – Fish exclusion from properties 8307, 8235 and 8229 Talbot Road.**