

**2014 Monitoring Report**  
**Helmet Creek Restoration**  
**Adak Petroleum Diesel Spill**



**December 18, 2014**

**Prepared by:**

**U.S. Department of  
Commerce - National Oceanic and Atmospheric Administration**

*and*

**Polaris Applied Sciences: on behalf of Adak Petroleum LLC**

*In cooperation with:*

**The Adak Petroleum Diesel Spill Natural Resource Trustees:**

**State of Alaska  
Department of Environmental Conservation,  
Department of Fish and Game, Department  
of Natural Resources,**

*and*

**Department of Law**

**U.S. Department of  
Interior – Fish and  
Wildlife Service**

This Compliance Inspection Report is timely submitted to the Trustee Council for approval in accordance with paragraph 9 of the Consent Decree, No.3:13-cv-00121-HRH.

**Administrative Record:** Documents comprising the Administrative Record are available at <http://www.darrp.noaa.gov/>

**Copies:** Copies are available at <http://www.darrp.noaa.gov/>

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## A. Executive Summary

Diesel fuel spilled into Helmet Creek on Adak Island, Alaska on January 11, 2010 injuring natural resources in the creek and the nearby estuary, intertidal and nearshore marine habitats. Investigations performed by the Responsible Party (RP) and the federal and state natural resource trustees (Trustees) during October 2010 and September 2011 identified restoration opportunities on Helmet Creek. A detailed description of proposed restoration activities (Work Plan or HCRMP) was prepared<sup>1</sup>. The restoration work was completed between July 7 -11, 2013 by RP and Trustee staff and a compliance report was prepared<sup>2</sup>. This report includes a complete description of all work that was completed along with baseline (compliance) monitoring results which form the basis for post-monitoring comparisons. Restoration included improvements to fish passage, water quality, stream and stream bank functions, main channel flow, and riparian vegetation. Figures 1 and 2 identify specific locations in Helmet Creek where restoration took place.

The first year of post-restoration monitoring occurred August 28-30, 2014. Work was conducted by RP and Trustee staff (Table 1). This Compliance Inspection Report was submitted to the Trustee Council for approval in accordance with paragraph 9 of the Consent Decree. The 2014 Monitoring will also be posted to the NOAA website which can be found at: <http://www.darrp.noaa.gov/>

**Table 1: Monitoring Team Personnel**

<b>Name</b>	<b>Position</b>	<b>Organization</b>
Erika Ammann	Fish Biologist	NOAA Restoration Center
Carl Hadley	Sr. Fisheries Biologist	Polaris Applied Sciences

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<sup>1</sup> Helmet Creek Restoration & Monitoring Work Plan, Adak Petroleum Diesel Spill. April 13, 2013.

<sup>2</sup> Compliance Inspection Report, Helmet Creek Restoration, Adak Petroleum Diesel Spill. September 12, 2013.



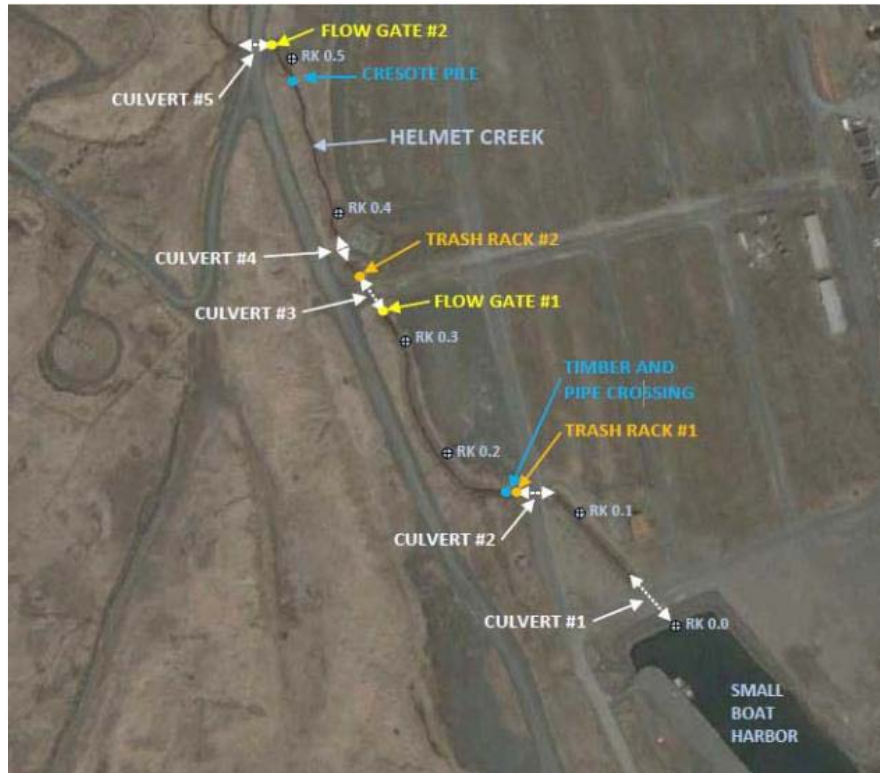


Figure 1: Lower Helmet Creek showing work areas



Figure 2: Upper Helmet Creek showing work areas

## B. Monitoring

**Purpose:** The objective of monitoring is to verify that all restoration goals, as described in the Work Plan, are being met, and that any changes that need to be made to help achieve those goals are identified and carried out in a timely manner. Monitoring staff returned to the site a year post restoration to ensure that restoration is still intact and that revegetation in the restored areas has taken hold. The main concern for this monitoring was to ensure that fish passage has been accomplished and that the restoration did not have any unforeseen effects that would cause damage to the health of the creek.

**Date:** Monitoring was carried out August 28-30, 2014.

**Staff:** The monitoring was conducted by Trustee Staff from NOAA Fisheries, and one RP representative (Table 1).

### 1. Fish Passage:

#### i. *Trash Racks*

Trash racks at Culvert #2 (Figure 3) and Culvert #3 (Figure 4) were removed to facilitate upstream fish movement. The bed upstream of Culvert #2 was also regraded to reduce a steep grade caused by an accumulation of material against the trash rack.



Figure 3: Culvert #2 after restoration 2013 (L); 2014 (R).



**Figure 4: Culvert #3 after trash rack removal 2013 (L); 2014 (R).**

***ii. Streambed Regrading Following Trash Rack Removal***

- Transect measurements of in-stream parameters including stream width, depth, and grade were collected (See Figure 5 for Culvert #2 and Figure 6 for Culvert #3).
- Monitoring confirmed that the streambed upstream of both culverts was still in stable condition with no jump heights in excess of 10-inches. While the beds had changed somewhat, the change was within expected natural variability and did not cause an adverse effect on fish passage.
- The largest change was observed about 30-feet upstream of Culvert #2 where a 2-foot deep hole had formed in the streambed (Figure 5). This may have been a result of removing the old wood stave pipe just downstream. In any case, the new pool was seen as a benefit in this area where deep holding habitat for fish is relatively scarce.



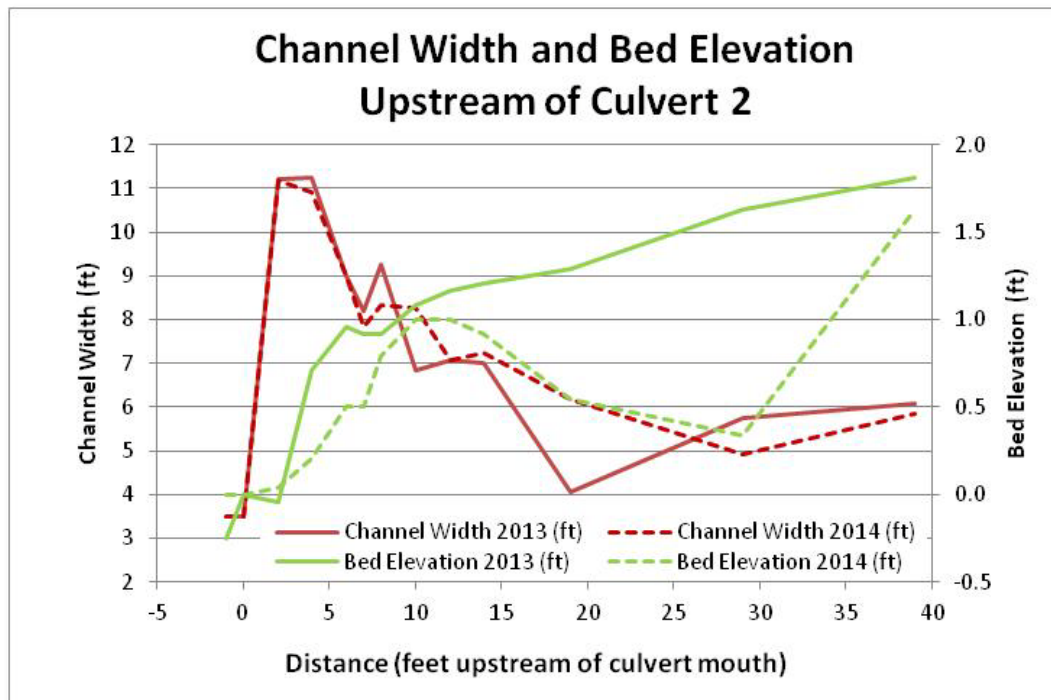


Figure 5: Post-Construction channel measurements (Culvert #2)

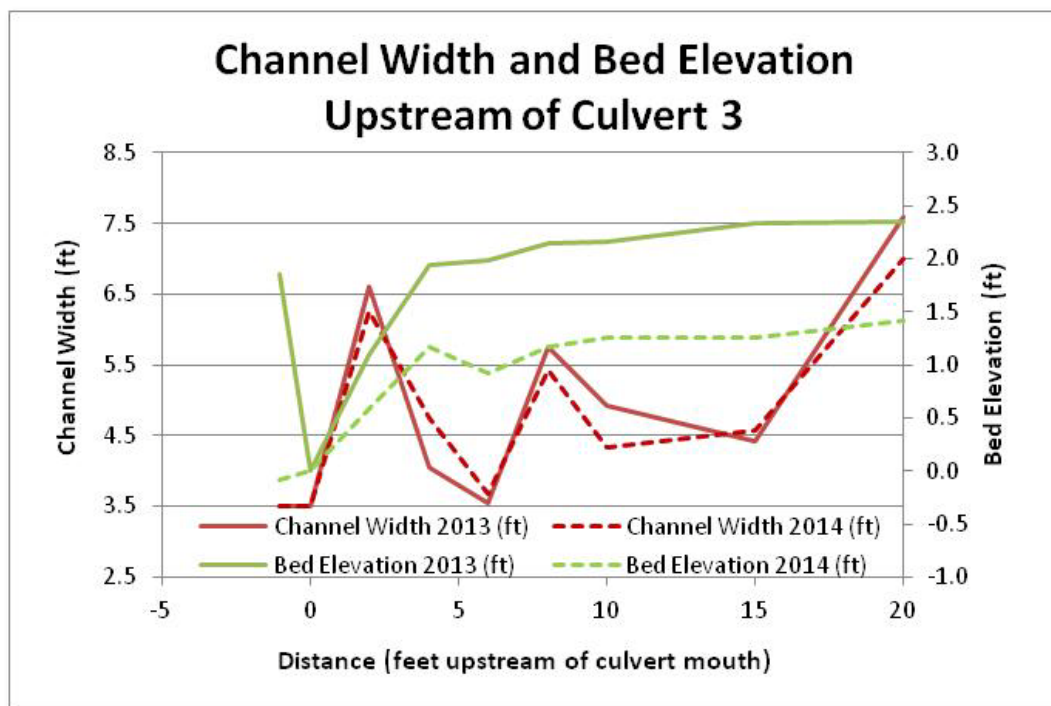


Figure 6: Post-Construction channel measurements (Culvert #3)

### iii. *Spill Control Structures*

- Three spill control gates are located on Helmet Creek: one on the downstream end of Culvert #3 and one each on the upstream and downstream ends of Culvert #5. The gates were opened at least 6-inches during the restoration work in 2013. A mark showing the adequate level of opening was added for future reference by monitoring personnel and Adak Petroleum staff (Figure 7).
- In 2014 the spill control structure on the downstream end of Culvert #3 was approximately 6 inches above the current water level (Figure 7). The upstream end of Culvert #5 was still approximately 6 inches above the current flow level on Aug 30, 2014 (Figure 8). The spill control structure on the downstream end of culvert #5 was still approximately 4 inches above the current water level. The original marks set last year were not visible and were replaced (Figure 8).
- All three gates allowed light to enter the culverts and adult pink salmon were observed upstream. Fish passage is not a problem.



**Figure 7: Spill control gate on Culvert #3 and new reference mark 2014.**



**Figure 8: Spill control gate on Culvert #5 (lower and upper) 2014.**



#### *iv. Salmon Use Observation*

- On the August 2014 monitoring trip Pink and Chum salmon were seen throughout Helmet Creek up to the location of a natural fish passage barrier west of the tank farm at RK 2.1 (Figure 9). A count was conducted by the two field personnel walking the entire creek from the mouth to the barrier. The count was approximate as a secondary focus of the work, but roughly 1,626 salmon were seen. This was a mix of mainly pink salmon and some chum. The count of fish above Culvert #5 was 141 salmon indicating all barriers to fish passage have been removed.



**Figure 9: Group of about a dozen pink salmon observed between Culverts #4 and #5 (2014)**

## **2. Creosote Piling Removal**

- Seven piles creosote treated pile in and near the creek were removed in 2013, the resulting holes filled, and suitable revegetation measures applied.
- In 2014 all piling areas were observed for revegetation. It was difficult to locate the original instream pile location, but the approximate areas were surveyed using past photos. It was determined that an inability to find the removal areas indicated that the removal process

had not left a footprint and that adequate revegetation had occurred at each removal site. Figure 10 shows the locations of the pilings that were instream near RK 0.5, and upstream of Culvert #5. These areas also no longer showed removal activity and the bank area had good vegetation growth.



**Figure 10: Location of instream (L) and upper bank pilings (R) in 2014.**

### **3. Floodplain Barrel Removal**

- Restoration included removal of all barrels that could be removed without significant disturbance to the channel, and revegetation of all disturbed areas on the banks. Photo points were established in 2013 (Figure 11) and a visual assessment of stream bed and stream bank integrity looking downstream and upstream over the area of removal was completed. Stream width was measured through the restoration area.
- Monitoring in 2014 found banks were stable with no signs of unusual erosion. Even though the area was heavily trampled during the 2013 restoration work, no evidence of this activity was seen in 2014 (Figures 12 and 13). Revegetation showed root formation and stable banks (Figure 13). There were some differences in the creek flow due to shifts of some large rocks and the removal of constrictions, but none of these changes were determined to be detrimental but rather indication of the creek adjusting to a more natural substrate and bank than what was previously provided by the drums (Figure 14). One pink salmon was seen in the area.





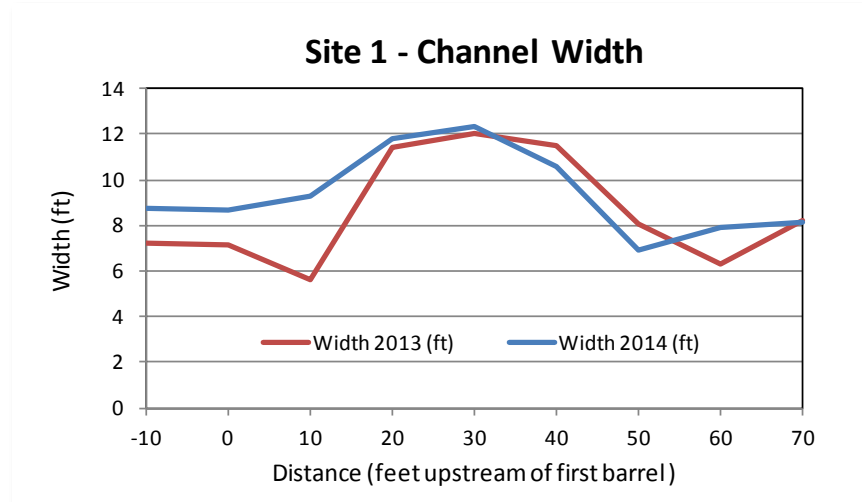
Figure 11: Site #1 – Post Construction 2013 looking upstream (L) and downstream (R)



Figure 12: Site #1 – Post Construction 2014 looking upstream (L) and downstream (R)



Figure 13: Site #1 – Barrel removal location 2013 (L) and 2014 (R)



**Figure 14: Site #1 – Post Construction channel width measurements (2013 and 2014)**

#### 4. In-Stream Barrel Removal

- In 2013, numerous instream barrels were removed at Site #2 (Figure 15) and a single barrel was removed at Site #3 (Figure 17). A large rock present in the middle of the stream at Site #2 created a small jump but did not create a fish passage barrier. All disturbed areas on the banks were revegetated and photo points were established. A visual assessment of stream bed and stream bank integrity looking downstream and upstream over the area of removal was completed. Transect measurements of in-stream parameters including stream width, depth, and grade were completed at Site #2. Only minimal channel disturbance occurred at Site #3 and no physical channel measurements were deemed necessary.
- 2014 Monitoring - Site #2: Observation of the stream channel at Site #2 showed that the stream substrate had less fine sediment than previously observed. It is thought that the stream was able to move through areas where the drums had previously been thereby carrying away some of the fines. It was also noted that the large boulder was not seen and may have dropped into one of the holes created by removal of the barrels, perhaps during spring high flows. The stream seemed to be adjusting to the absence of the barrels and other debris and the banks are stable (Figure 16). The stream depth and width changed a little but not in any significant or harmful way (Figure 19). The largest change was due to movement of the large rock.
- 2014 Monitoring - Site 3: At this site a barrel was removed and the vegetation mat that had been growing over the barrel was laid over the bare bank post removal. Monitoring revealed that the vegetation had taken root and no major shifts had taken place in the channel (Figures 18 and 19).





Figure 15: Site #2 – Post Construction 2013 looking upstream (L) and downstream (R)



Figure 16: Site #2 – Post Construction 2014 looking upstream (L) and downstream (R)



Figure 17: Site #3 – Post Construction 2013 looking upstream (L) and downstream (R)





Figure 18: Site #3 – Post Construction 2014 looking upstream (L) and downstream (R)

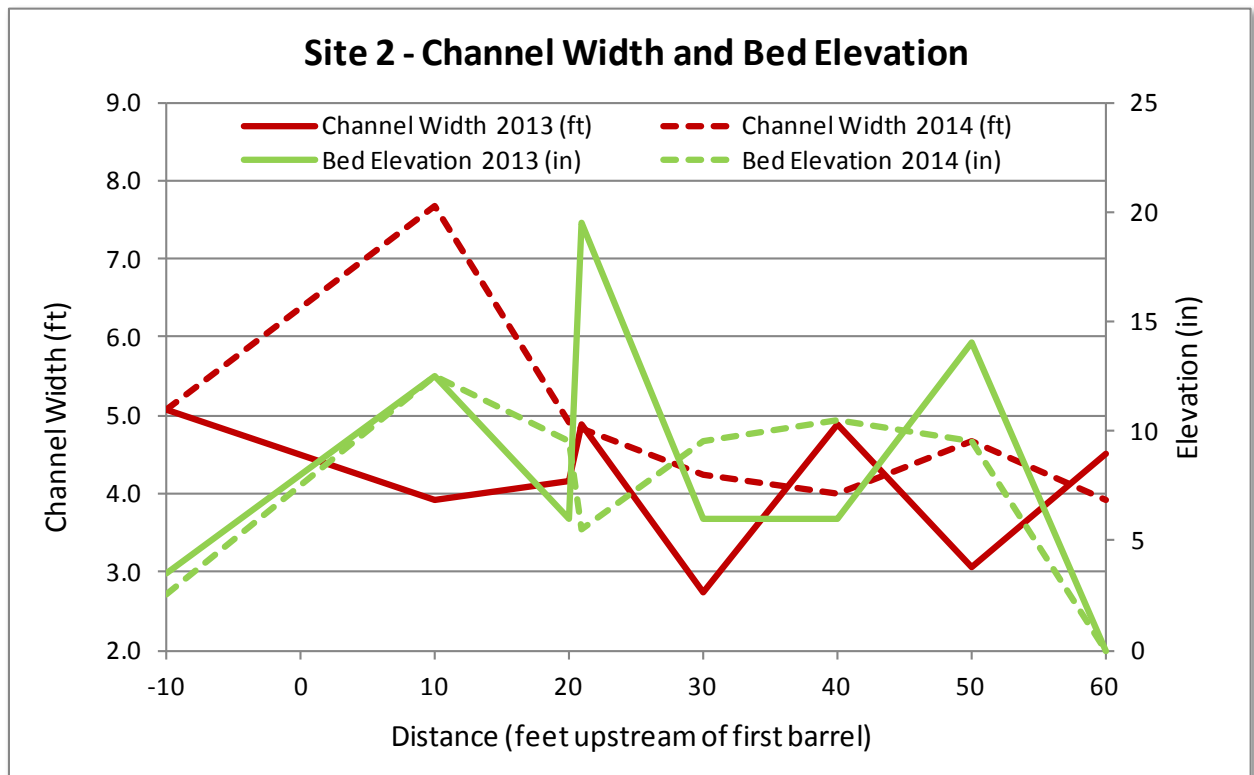


Figure 19: Site #2 – Post Construction channel measurements (2013 and 2014)

## 5. Capping of Upstream Culvert Barrel Complex

- The mouth of the culvert complex was plugged in 2013 and covered with a vegetation mat (Figure 20). All disturbed areas on the banks were revegetated. A photo point and visual assessment of stream bed and stream bank integrity was made.



- 2014 Monitoring: The cap site was functioning and seemed to be diverting almost all of the flow to the main channel. Revegetation over the top of the capped culvert was taking root (Figure 21).



**Figure 20: Site #4 – Post Construction (2013) looking upstream (L) and downstream (R)**



**Figure 21: Site #4 – 2014 Monitoring looking directly at cap site (L) and downstream (R)**

## **6. Erosion /Revegetation**

Representative photos including detailed photo quadrats are taken at each area where streambanks were disturbed. The photos are for use in addressing stated performance measures during monitoring. Percent cover and vegetation makeup are compared to post-restoration pictures or to undisturbed areas. Percent Cover is defined as the amount of living vegetation measured as if the vegetation was upright. During the initial data collection, flagging was used and notes were taken on location to enable the Trustees to identify the areas that would be resampled. On return, monitoring and reassessment occurs as close as possible to the original data collection areas using the

2013 flagging, photos, and notes.

**i. Trash Rack Removal Areas**

Bank disturbance that occurred during removal of the wooden timber and pipe near Trash Rack #1 was revegetated using vegetation plugs and seed mix. Photo quadrats for 2013 are provided in Figure 22. Photo quadrats for 2014 are provided in Figure 23.

No bank disturbance occurred near Trash Rack #2 and no restoration or monitoring was required.

**Vegetation makeup:** In 2013 and 2014 dominant grasses are most likely ‘Norcoast’ Bering Hairgrass<sup>3</sup> (both years).

**Percent cover by photo:** Percent cover estimates are provided in Table 2 for 2013 and 2014.

**Table 2: Vegetation Cover Measurements – Trash Rack #1**

Bank Location	Percent Cover Estimate	
	2013	2014
a	30	80
b	90	85
c	85	90
d	55*	90
e	5*	85
f	90	90
g	10*	80
h	5*	90
Average -	46	86

\* Dead material was present and placed on mats at this location to keep the underlying soil moist.

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<sup>3</sup> Information on Bearing Hairgrass can be found online at <http://plants.alaska.gov/publications/pdf/plant-flyers/NorcoastBeringHairgrass.pdf>



Trash rack 1 photo-quadrat post restoration data



Figure 22: 2013 Photo Quadrats for Trash Rack #1

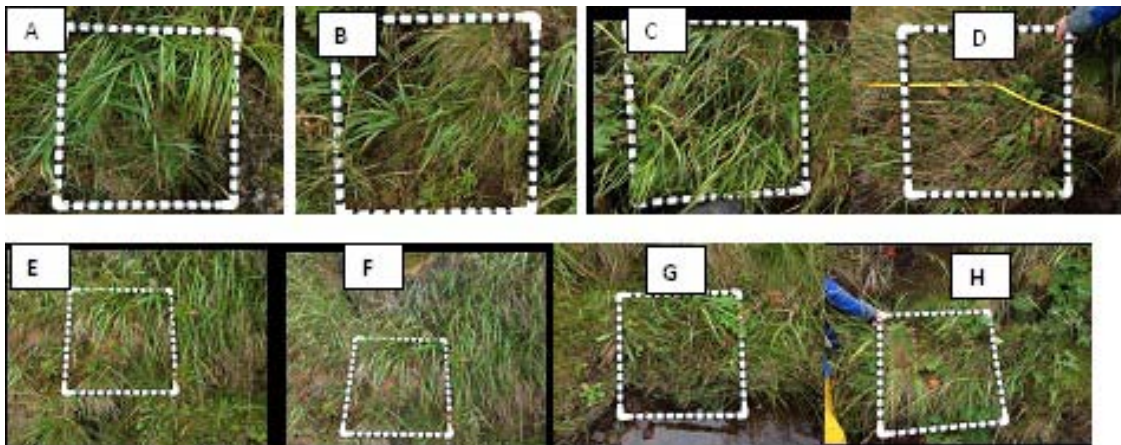


Figure 23: 2014 Photo Quadrats for Trash Rack #1

## ii. *Streambank Barrel Removal (Site #1)*

Photo quadrat and visual assessment of stream bank integrity was conducted. Post-construction bank condition for areas of bank disturbance that occurred during removal of the barrels was recorded for Site #1. In addition to recording percent cover, the photos were taken so that visual comparisons of the bank could be made. Some of the bank instability is natural and pre-existing as noted (Figure 24). Photo quadrats for 2014 are provided in Figure 25.

**Vegetation makeup:** Grasses dominant most likely 'Norcoast' Bering Hairgrass, geranium, fireweed (both years).

*Percent cover by photo*: Percent cover estimates are provided in Table 3 for 2013 and 2014.

**Table 3: Vegetation Cover Measurements – Barrel Removal Site #1**

Bank Location	Percent Cover Estimate	
	2013	2014
a	6	75
b	4 <sup>a</sup>	70
c	20 <sup>b</sup>	90
d	5 <sup>a, b</sup>	80
e	10 <sup>a</sup>	80
f	2 <sup>c</sup>	90
g	6 <sup>d</sup>	90
h	5 <sup>a, c</sup>	70 <sup>c</sup>
i	15 <sup>d</sup>	70 <sup>c</sup>
j	7 <sup>a, b</sup>	80
k	7 <sup>b, c</sup>	80
l	7 <sup>b, c</sup>	80 <sup>c</sup>
Average -	8	80

<sup>a</sup> Dead material was present; <sup>b</sup> Photo includes open space; <sup>c</sup> goal is for growth at base of steep slope; <sup>d</sup> photo includes stream.



Site 1 photo quadrat post restoration data

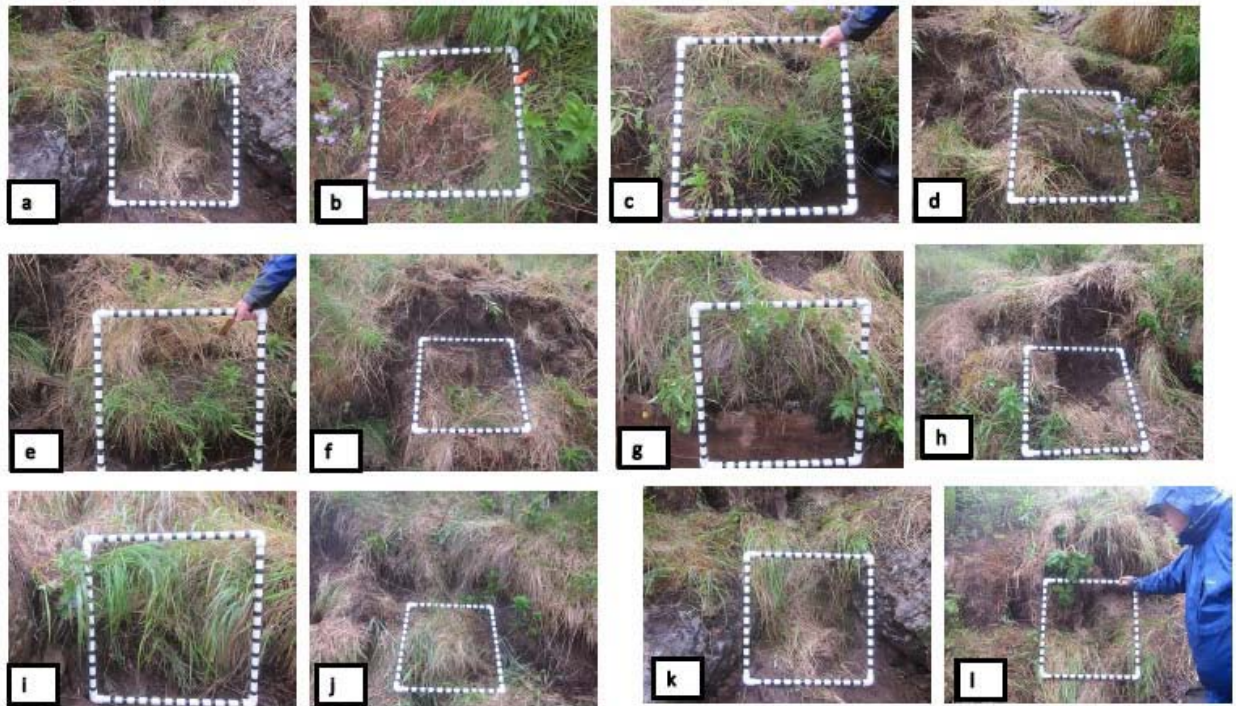


Figure 24: 2013 Photo Quadrats for Barrel Removal Site #1

-Monitoring Photo quadrats Barrel Removal Site 1

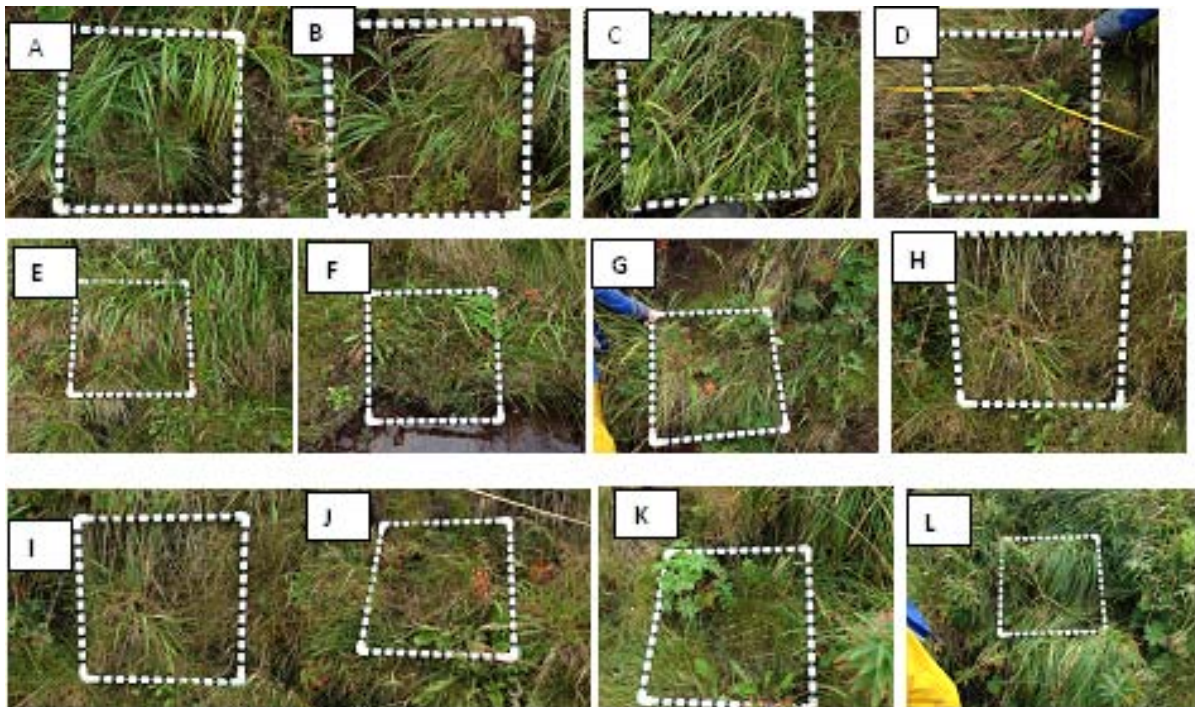


Figure 25: 2014 Photo Quadrats for Barrel Removal Site #1

**iii. In-Stream Barrel Removal (Site #2 and Site #3)**

Photo quadrat and visual assessment of stream bank integrity was conducted. Post-construction bank condition for areas of bank disturbance that occurred during removal of the barrels was recorded for Site #2 (Figure 26) and Site #3 (Figure 28). Photo quadrats for 2014 are provided in Figure 27 (Site #2) and Figure 29 (Site #3).

**Vegetation makeup (Site #2):** (2013 and 2014) Dominant: Grasses, most likely 'Norcoast' Bering Hairgrass. Non dominant: devils club, wild geranium, Sitka Burnett, Chocolate lily, Cinquefoil, fireweed, lupine, twisted stalk.

**Percent cover by photo:** 2013 and 2014 Percent cover estimates are provided for Site #2 in Table 4.

**Table 4: Vegetation Cover Measurements – Barrel Removal Site #2**

Bank Location	Percent Cover Estimate	
	2013	2014
a	10	80
b	40	75
c	3	75
d	40	80
e	25	75
f	30	75
g	25	80
h	40	75
i	35	75
j	15	70
Average -	26	76



Site 2 photo-quadrat post restoration data

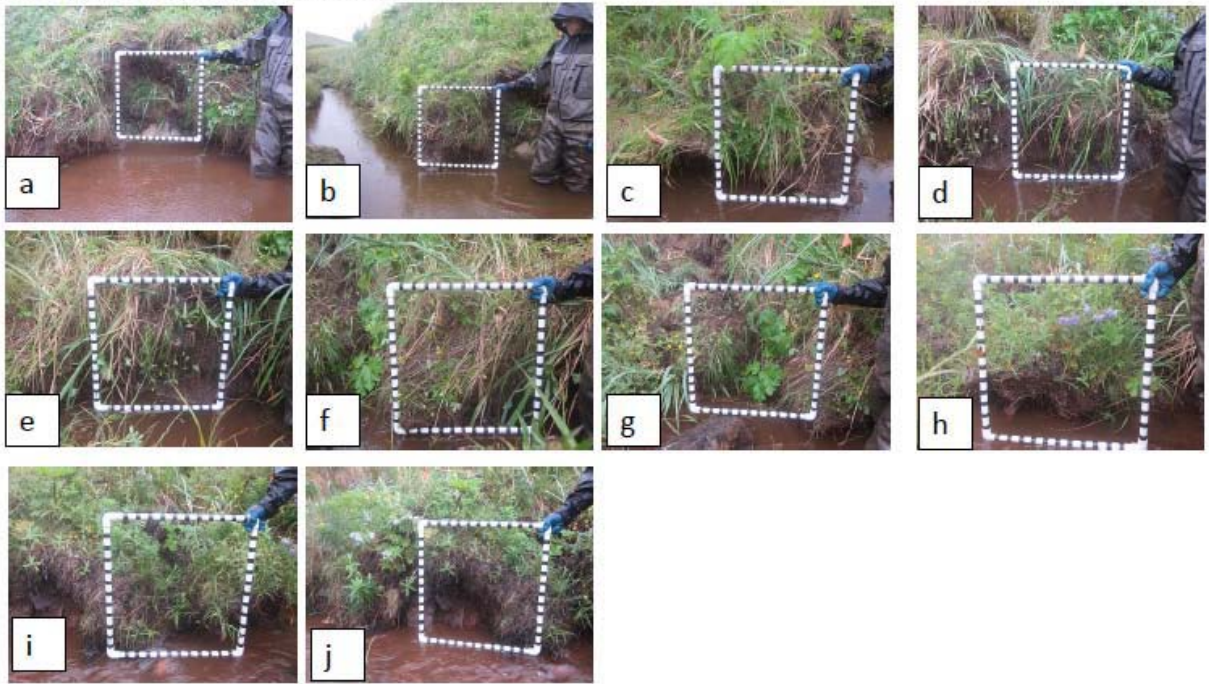


Figure 26: 2013 Photo Quadrats for Barrel Removal Site #2

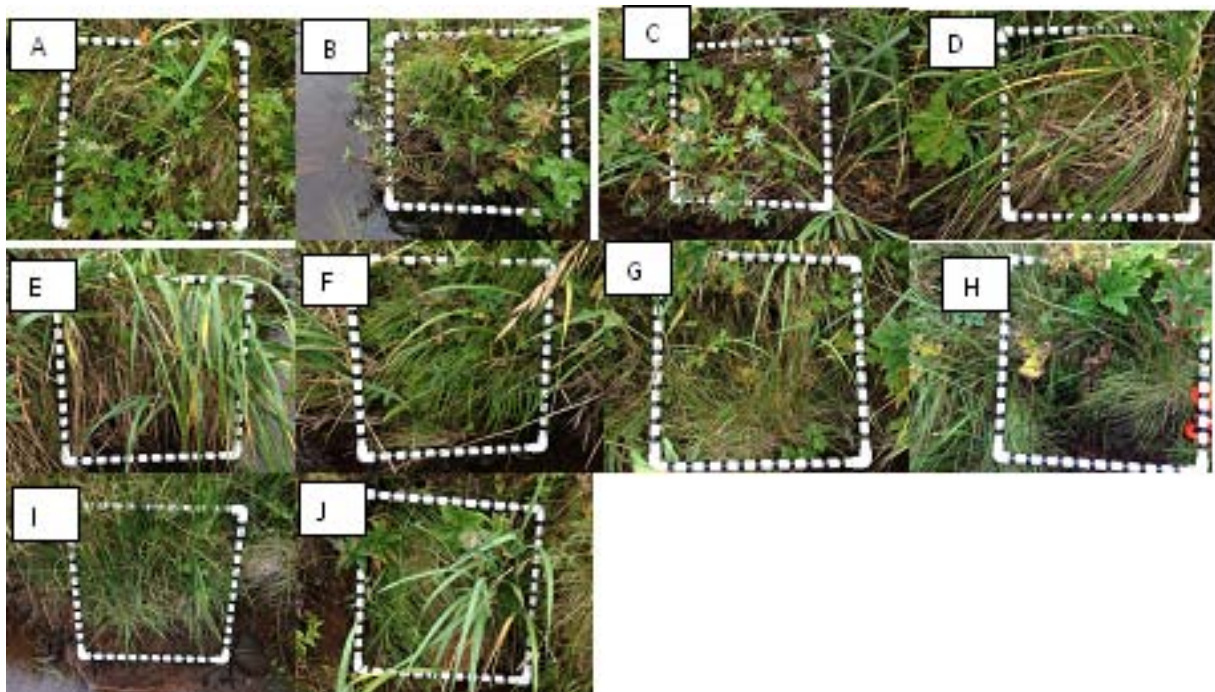


Figure 27: 2014 Photo Quadrats for Barrel Removal Site #2

*Vegetation Makeup (Site #3):* (2013 and 2014): Dominant: Grasses, most likely 'Norcoast' Bering Hairgrass. Non dominant: devils club, wild geranium, Sitka Burnett.



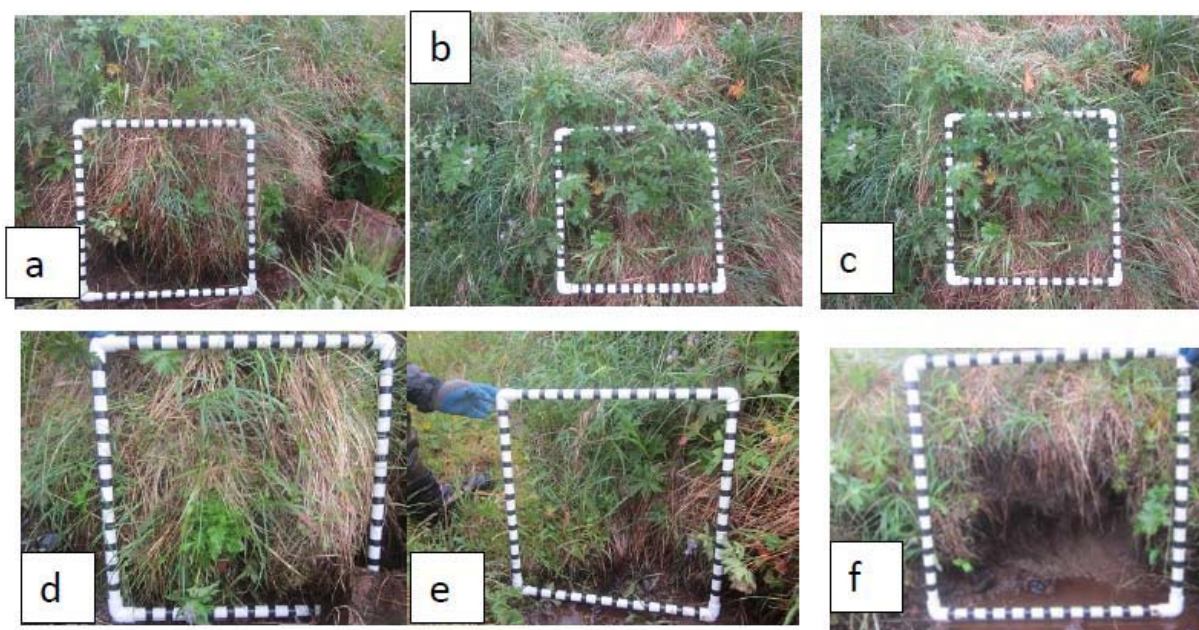
*Percent cover by photo*: 2013 and 2014 Percent cover estimates are provided for Site #3 in Table 5.

**Table 5: Vegetation Cover Measurements – Barrel Removal Site #3**

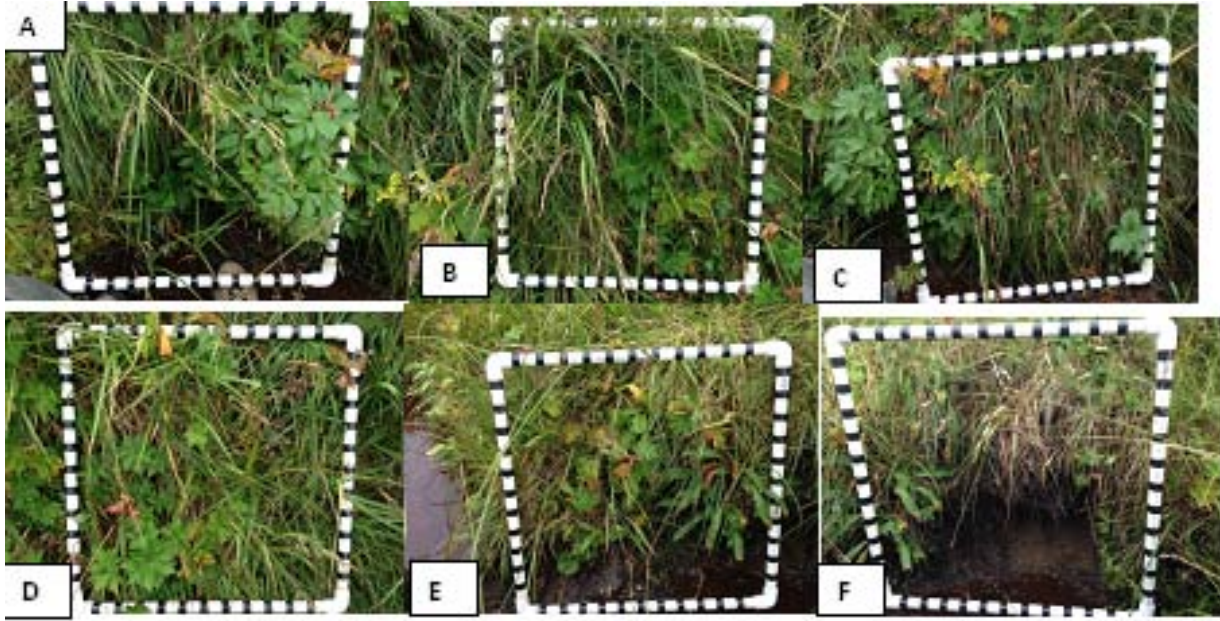
Bank Location	Percent Cover Estimate	
	2013	2014
a	25	75
b	30	80
c	40	70
d	20	75
e	35	65
f	15	50*
Average -	27	69

\* photo taken to show bank open area, should not affect compliance with success criteria.

#### Site 3 photo-quadrat post restoration data



**Figure 28: 2013 Photo Quadrats for Barrel Removal Site #3**



**Figure 29: 2014 Photo Quadrats for Barrel Removal Site #3**

**iv. Culvert Plug (Site #4)**

Photo quadrat and visual assessment of stream bank integrity was conducted. Post-construction bank condition for areas of bank disturbance that occurred during plugging of the barrel complex was recorded in 2013 for Site #4 (Figure 30). 2014 monitoring photos are provided in Figure 31.

**Vegetation Makeup:** (2013 and 2014) Dominant: Grasses, most likely 'Norcoast' Bering Hairgrass. Non dominant: devils club, wild geranium, Sitka Burnett, equisetum, twisted stalk, non-native veg dandelion.

**Percent cover by photo:** 2013 and 2014 Percent cover estimates are provided for Site #4 in Table 6.

**Table 6: Vegetation Cover Measurements – Barrel Removal Site #4**

Bank Location	Percent Cover Estimate	
	2013	2014
a	25	80
b	30	80
c	25	65*
Average -	27	75

\* some open space because of quadrat placement.

#### Site 4: photo-quadrat post restoration data

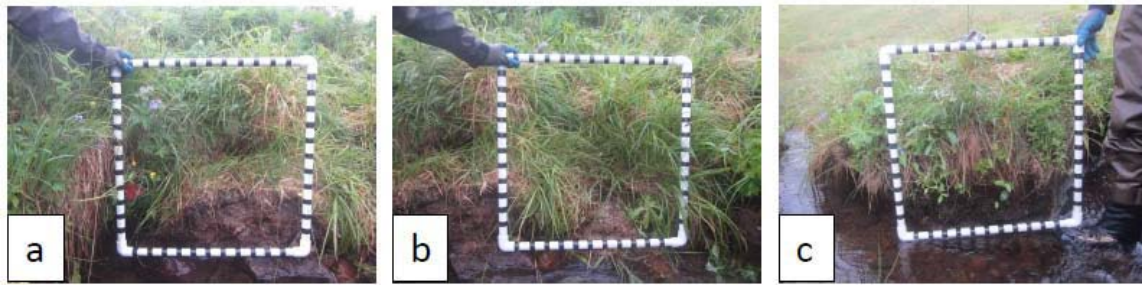


Figure 30: 2013 Photo Quadrats for Barrel Plug Site #4

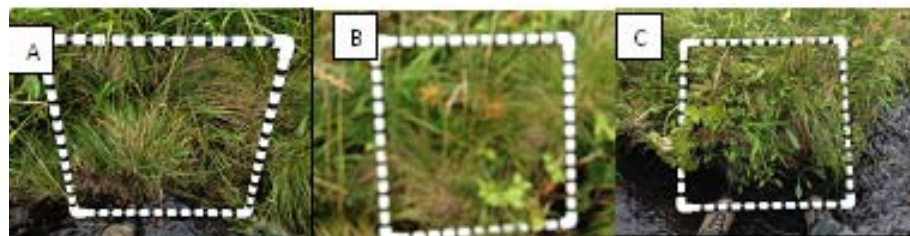


Figure 31: 2014 Photo Quadrats for Barrel Plug Site #4

### C. Performance Standard Evaluation

All performance standards described in Section E of the HCRMP are listed here. Data collected during the 2014 monitoring survey are summarized along with an evaluation of whether or not the performance standards were met.

#### 1. Fish Passage

Upstream fish migration access shall be considered unblocked if the following conditions are met:

- **No accumulation of debris that blocks greater than 10 percent of the opening (upstream or downstream) or interior of any culvert or spill control gate.**
- **No accumulation of debris at either opening or in the interior of any culvert that creates a vertical drop in-water surface elevation of greater than four inches.**

Both ends and the interiors of all five culverts were examined. No accumulation of debris was noted anywhere. No drops were observed within any of the culverts. These performance standards were met.

- **No changes in streambed configuration between Culverts #3 and #4 or at in-stream barrel removal locations that result in a significant increase in the slope of the stream, or the creation of jump heights in excess of 10-inches which can be barriers for the passage of weak swimming fish species.**

All streambed configurations within and adjacent to previous work areas were examined in detail. No jump heights exceeding 10-inches are present. This performance standard was met.



- **The spill control gates are maintained in a position no less than six inches above the peak water surface elevation.**

All three spill control gates were examined. Two were found to be open 6-inches above the peak water surface elevation. The gate on the downstream end of Culvert #5 was open about 4-inches above the water surface. This gate was examined last year by Adak Petroleum staff and found to be at its uppermost limit of travel. Because adult pink salmon were observed swimming into the culvert, and over one hundred adult salmon were observed upstream of this culvert, the 4-inch level is deemed to meet the fish passage standard. This performance standard was met.

- **Following removal of the barrels, in-stream hydrology of the creek must still allow for fish passage.**

Water depths within and adjacent to previous work areas were examined. No extreme velocities, shallow areas, or other configurations were observed that might block fish passage. This performance standard was met.

## 2. Erosion/ Revegetation

Shoreline areas disturbed during the restoration process were revegetated. Restoration shall be considered stable if the following conditions are met.

- **Year 2014 – There is no more than minor erosion in or directly adjacent to locations where barrels were removed after bank settles. There is no erosion where equipment was located.**

Very little to no new erosion was observed near or adjacent to any of the work areas. Areas of existing erosion had not increased significantly if at all. Nothing was observed that could be considered more than minor erosion. This performance standard was met.

- **Percent Cover (seeded areas): 2014 – greater than 50%**

Average percent vegetation coverage for previously disturbed work locations where seed was placed ranged from 69% to 80%. No single monitoring location had less than 50% vegetation coverage. This performance standard was met.

- **Percent Cover for Vegetation Mats: Year 2014 – greater than 95% coverage of mat with live vegetation.**

Areas previously covered with mats had recovered so well that it was difficult to identify specific locations where mats were used. We took this as an indication of high success in using the mats and assumed that mats were sufficiently alive that this performance standard was met.

- **Native species dominance: Areas revegetated should be dominated by native species with non-natives not exceeding 5% of the total plot.**

Vegetation species makeup at each site appeared to be identical to post-construction conditions. There was no evidence that new or exotic species had been introduced. This performance standard was met.

### 3. Cap of Upstream Barrels

The culvert vegetation plugs are to be considered successful if the following conditions are met:

- **Plugs should be present and stable, and effectively diverting the vast majority of the flow into the natural channel.**

Rocks and vegetation mats used to create the plugs were still present and relatively unchanged. No signs of instability or potential failure were noted. The amount of water coming out of the culvert at the downstream end was insignificant (estimated at around 1-2 gallons per minute). And much of this could have been leakage into the pipe at locations other than the plug. This performance standard was met.

- **No unexpected repercussions from diverting the water should occur.**

The channel was walked from the plug downstream to the culvert return. This was the reach that has experienced higher instream flows since the culvert was plugged in 2013. No signs of new erosion, bank stability, or other potential problems were noted. This performance standard was met.

## D. Maintenance Review

The following maintenance items were reported over the last year or completed during the monitoring site visit:

- Adak Petroleum staff reported no need for any type of channel maintenance over the previous 12 months.
- Several dozen pieces of anthropogenic material were removed from the channel during the 2014 monitoring survey. These consisted primarily of pieces of sheet plastic.
- Small boulders placed inside Culvert #2 as velocity breaks had been washed out. It was decided not to replace the rocks. The chance of maintaining the boulders inside the culvert is low given the smooth concrete culvert bed, and given the presence of several hundred pink salmon observed upstream of Culvert #2, their presence is unnecessary.

## E. Conclusion

This report summarizes the restoration monitoring for 2014. Additional monitoring will be conducted in 2015 and 2017. This will be the final monitoring for the slope calculations as the next two monitoring trips will be conducted by a single trustee. If a barrier to fish passage is detected during future monitoring visits further investigation will take place.

The 2014 monitoring found that efforts to improve upstream fish passage were successful as evidenced by the amount of pink and chum salmon that were using the upper reaches of Helmet Creek. Pink salmon are not known to be strong swimmers and their presence verified the absence of barriers. Of note is a section of Helmet Creek upstream of the last culvert where there was a large jump that fish were observed having difficulty navigating. As there were many fish upstream of this area it can be deduced that this area is not a barrier. It could be that this location was the barrier noted in Palmer's 1995 report of Adak island fish. The barrier was said to be at kilometer 0.8 on Helmet Creek. Helmet creek also showed other areas where banks were falling into the creek and sloughing, redirections, changes in depth and substrate, and movement of large boulders. All of these processes are natural for a stream but were precluded in the sections of creek which were confined by the barrels and other hardened surfaces. It is anticipated that the creek will continue to shift and change as part of a natural or semi-natural process. The monitoring did not detect any drastic changes harmful to fish that were a direct response to the restoration work done with exception to the increase in fish passage and presence of salmon above previous barriers.

Overall, all required performance standards as described in the Helmet Creek Restoration & Monitoring Work Plan were met.