

Exxon Valdez Oil Spill
General Restoration Project Final Report

Kodiak Island Habitat Enhancement Project
Buskin River Watershed

Exxon Valdez Oil Spill Trustee Council Project 17170119
Final Report

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April 2023

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Abstract

Alaska Department of Fish and Game, National Oceanic and Atmospheric Administration, US Fish and Wildlife Service, and Kodiak Soil and Water Conservation District worked with landowners, US Coast Guard, Alaska Department of Transportation and Public Facilities, and Natives of Kodiak in the Buskin River watershed, Kodiak Island, to implement a watershed-scale project to restore aquatic connectivity and natural ecosystem processes to the entire watershed (26 square miles). Partners completed restoration projects at 21 undersized culverts and removed historical debris in the Buskin River watershed. These projects restored upstream access to 6.65 miles of stream habitat and 95 acres of lakes that are important to Sockeye Salmon and Dolly Varden, two EVOS-affected fish species. Increased habitat quantity and quality is expected to increase abundance of Pacific Salmon in the Buskin River and will also benefit other EVOS-affected species in the area that utilize salmon as a direct source of food and nutrients. This project also helped restore EVOS-affected services, specifically the important subsistence salmon fishery at the mouth of the Buskin River, recreation throughout the watershed, and the commercial fishery in Chiniak Bay.

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Objectives

The goal of this project was to implement a watershed-scale project to restore aquatic connectivity and natural ecosystem processes to the entire watershed (26 square miles). This restoration project focused on improving connectivity and ecological processes for injured EVOS species and services within the Buskin River watershed by removing or replacing 20 culverts identified by ADF&G as barriers to the free movement of fish including salmonids, trout and other native species. The 20 culverts included both total and partial fish passage barriers that impeded the upstream movement of adult and juvenile salmon and native fish as well as contributed to local channel degradation, scour and other impacts. Large, in channel historical structures and debris that restricted fish passage and degraded stream function were also removed. One additional culvert battery was discovered on a Buskin River Tributary during the project implementation. This culvert was completely removed to ensure that no barriers to fish passage or ecosystem function remained in the Buskin Watershed in accordance with the original project goals.

Discussion

The culverts and debris blocked adult and juvenile fish movements to quality spawning and rearing habitats and negatively impacted aquatic ecosystem processes such as water temperature and flow, sediment transport that maintains aquatic habitats, and marine-derived nutrient delivery to the freshwater ecosystem. Partners replaced 10 existing undersized culverts with bankfull channel spanning structures and removed 11 existing culverts; the creeks were restored to match the existing channel slope and dimensions at all 21 sites. At the 10 replaced sites, the new structures were designed to pass the 100-year flood flows to ensure infrastructure resiliency under the larger, more frequent flooding events expected with climate change effects. The reconstructed channels were designed to appropriately transport gravels needed to maintain downstream spawning habitat and to pass woody debris, also vital for the maintenance of salmon spawning and rearing habitat, up to the 100-year flood flow. Streambanks were revegetated with native vegetation using vegetative mat sourced near the project site.

Returning salmon make an important contribution to marine, freshwater, and forest ecosystems of Kodiak, interacting with mammals, birds, and fish. Pacific salmon (*Oncorhynchus* spp.) are a direct food source for a variety of marine, terrestrial, and avian species. Salmon also deliver large amounts of marine-derived nutrients (MDN) to freshwater ecosystems through their eggs, excretion, or carcasses, which improves the productivity of the wider Kodiak ecosystem. Species and habitats affected by EVOS have a direct reliance on the annual pulse of returning salmon and the nutrients they deliver. For example, marine mammals follow the movements and timing of migrating salmon to feed on this rich resource. Also, Dolly Varden follow salmon returning to freshwater and feed directly on salmon eggs and decaying carcasses; further, Dolly Varden benefit from the salmon-transferred MDN that improve overall aquatic ecosystem productivity. Implementing this project restored habitat connectivity and riparian function in the Buskin River watershed, benefiting the overall watershed ecological health and in turn contributing benefits to

injured and recovering species as well as subsistence fishing, sport fishing, recreation, and other services injured by the spill.

In summary, this project replaced ten and removed eleven undersized culverts to restore ecological stream functions, including passage of all aquatic organisms; woody debris transport; sediment transport; nutrient cycling; and floodplain connectivity. It also removed instream debris at five sites in the Buskin River and its tributaries. These sites included debris and other structures that blocked fish passage, were potential sources of contamination and negatively affected spawning gravels. In total, the project restored aquatic connectivity for Pacific Salmon and Dolly Varden to 6.65 upstream miles and 95 upstream lake acres; it also restored connectivity to 0.23 miles of pristine stream habitat by blocking roadside ditches that had diverted the flow away from sections of the historical channel.

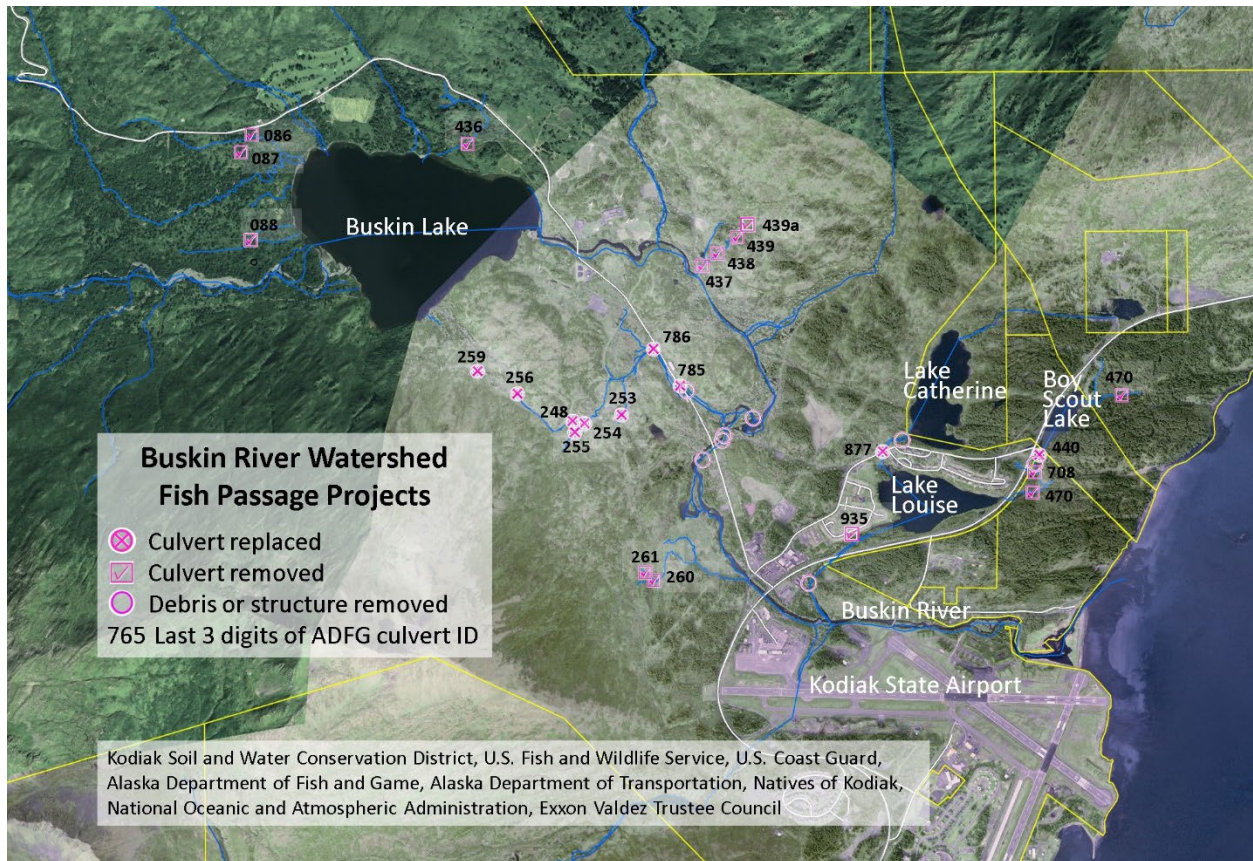
A full list of project restoration sites is available in Appendix A. Detailed information on the sites can be found on the Alaska Department of Fish and Game (ADFG) Aquatic Resources Monitor [here](#) by searching for the ADFG site number. Before and after photos of many restored sites are included in Appendix B.

Appendix A

Table 1. List of restored stream crossings.

Road-Stream Name	ADFG Site Number	Solution	Completion Year
Anton Larsen Bay Road - Battery Creek	20700785	Replace	2021
USCG Access Road - Battery Creek	20700786	Replace	2018
Tom Stiles Road - Lake Louise Tributary	20700877	Replace	2019
Old Military Road - Buskin Lake Tributary	20703436	Remove	2017
Old Military Road - Buskin Lake Tributary	20703437	Remove	2017
Old Military Road - Buskin Lake Tributary	20703438	Remove	2017
Old Military Road - Buskin Lake Tributary	20703439	Remove	2017
Old Military Road - Boy Scout Lake Outlet	20703440	Replace	2018
Abandoned - Genivieve Creek	20703470	Remove	2017
Abandoned - Boy Scout Lake Tributary	20703471	Remove	2019
Abandoned Trail	20703935	Remove	2021
USCG Battery Road - Battery Creek Tributary	10103248 20703248	Replace	2019
Gunnery Drive - Battery Creek Tributary	10103253 20703253	Replace	2019
Shooting Range - Battery Creek Tributary	10103254 20703254	Replace	2019
Gunnery Drive - Battery Creek Tributary	10103255 20703255	Replace	2019
Magazine Access Road - Battery Creek Tributary	10103256 20703256	Replace	2019
Magazine Access Road - Battery Creek Tributary	10103259 20703259	Replace	2019
Burma Road - Battery Creek Tributary	10103260 20703260	Remove	2017
Access Road - Battery Creek Tributary	10103261 20703261	Remove	2017
Old Military Road - Buskin Lake Tributary	20703439a	Remove	2017
Abandoned - Genivieve Creek Tributary	20703470a	Remove	2017
System Wide Debris Removal	NA	Remove	2020

Appendix B: Map of project locations



Appendix C: Site Photos

Figure 1. Culvert 10103254 (20703254) – Before replacement



Credit: Heather Hanson, USFWS

Figure 2. Culvert 10103254 (20703254) – After replacement



Credit: Heather Hanson, USFWS

Figure 3. Culvert 10103248 (20703248) - Before Replacement



Credit: Heather Hanson, USFWS

Figure 4. Culvert 10103248 (20703248) - After Replacement



Credit: Heather Hanson, USFWS

Figure 5. 10103255 (20703255) – Before Replacement



Credit: Heather Hanson, USFWS

Figure 6. Culvert 10103255 (20703255) – After Replacement



Credit: Heather Hanson, USFWS

Figure 7. Culvert 10103253 (20703253) - Before Replacement



Credit: Heather Hanson, USFWS

Figure 8. Culvert 10103253 (20703253) - After Replacement



Credit: Heather Hanson, USFWS

Figure 9. Culvert 20700877 Lake Louis Tributary Before



Credit: Heather Hanson, USFWS

Figure 10. Culvert 20700877 Lake Louise Tributary After



Credit: Franklin Dekker, USFWS

Figure 11. Lake Catherine Weir Before Removal



Credit: Heather Hanson, USFWS

Figure 12. Lake Catherine Weir After removal



Credit: Heather Hanson, USFWS

Figure 13. 20700786 – Before Replacement



Credit: Heather Hanson, USFWS

Figure 14. 20700786 – After Replacement



Credit: Heather Hanson, USFWS

Figure 15. 20700785 - Before Replacement



Credit: Heather Hanson, USFWS

Figure 16. 20700785 - Failed Grade Control Downstream - Before Replacement



Credit: Heather Hanson, USFWS

Figure 17. 20700785 After Replacement- Reconstructed Channel and Culvert - Downstream



Credit: Heather Hanson, USFWS

Figure 18. 20703935 - Lake Louise Outlet Culverts – Pre-Construction



Credit: Blythe Brown, KSWCD

Figure 19. 20703935 - Lake Louise Outlet Culverts – Post-Construction



Credit: Heather Hanson, USFWS

Figure 20. 20703440 – Before Replacement



Credit: Heather Hanson, USFWS

Figure 21. 20703440 – After Replacement



Credit: Heather Hanson, USFWS

Figure 22. 20703436 – Before Removal



Credit: [ADF&G](#)

Figure 23. 20703436 – After Removal



Credit: Heather Hanson, USFWS

Figure 24. 20703437 – Before Removal



Credit: Franklin Dekker, USFWS

Figure 25. 20703437 – After Removal



Credit: Heather Hanson, USFWS

Figure 26. 20703438 – Before Removal



Credit: Heather Hanson, USFWS

Figure 27. 20703438 – After Removal



Credit: Heather Hanson, USFWS

Figure 28. 20703439 – Before Removal (Culvert Buried in Gravel)



Credit: Heather Hanson, USFWS

Figure 29. 20703439 – After Removal



Credit: [ADF&G](#)

Figure 30. 10103256 (20703256) – Before Replacement



Credit: Heather Hanson, USFWS

Figure 31. 10103256 (20703256) – After Replacement



Credit: Heather Hanson, USFWS

Figure 32. 10103260 (20703260) – Before Removal



Credit: [ADF&G](#)

Figure 33. 10103260 (20703260) – After Removal



Credit: [ADF&G](#)

Figure 34. 10103261 (20703261) – Before Removal



Credit: [ADF&G](#)

Figure 35. 10103261 (20703261) – After Removal



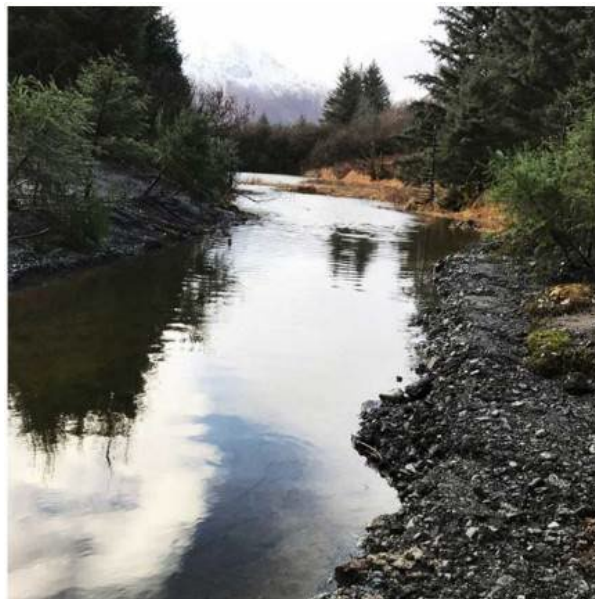
Credit: Heather Hanson, USFWS

Figure 36. 20703470 – Before Removal



Credit: Heather Hanson, USFWS

Figure 37. 20703470 – After Removal



Credit: [ADF&G](#)

Figure 38. 20703439a – After Replacement



Credit: Heather Hanson, USFWS

Figure 39. Historical Channel Reconnected Downstream of 10103248 (20703248)



Credit: Heather Hanson, USFWS

Figure 40. Derelict Bridge on Buskin River Tributary – Before Removal



Credit: Blythe Brown, KSWCD

Figure 41. Derelict Bridge on Buskin River Tributary – After Removal



Credit: Blythe Brown, KSWCD