



# Section 319 NONPOINT SOURCE PROGRAM SUCCESS STORY *Alaska*

## Salmon on the Rocks: Sediment Controls Improve Water Quality

### Waterbody Improved

Stormwater runoff from gravel mining operations within the city of Sitka contributed sediment to Granite Creek. Monitoring showed that the creek was impaired by high turbidity levels, which prompted Alaska's Department of Environmental Conservation (DEC) to place 1.5 miles of Granite Creek on the 1998 303(d) list of impaired waters. Efforts to reduce sediment loads have resulted in improved water quality. If improvements continue, DEC will remove Granite Creek from the 2010 list of impaired waters.

### Problem

Stormwater runoff from gravel lease operations, material stockpiles, and gravel roadways carried sediment into Granite Creek, resulting in high turbidity levels in the creek (Figures 1 and 2).

Water quality monitoring indicated that sediment and turbidity impairment typically occurred during high rainfall events, heavy traffic and material extraction. The high volume of sediment-laden water exceeded the capacity of settling ponds, and the ponds could not provide the optimal residence time required for treatment. Gravel operations and runoff from gravel mining were the primary sources of turbidity and total suspended solids (TSS) impairment (estimated at 65 percent of the total sediment load entering Granite Creek).

Granite Creek and its tributaries (North Fork and South Fork) are classified as anadromous, supporting Dolly Varden trout and coho and pink salmon. Excess turbidity and sediment affected the creek's aquatic life use by impairing the growth and propagation of fish and other aquatic wildlife.

Alaska's Halibut Point Recreation Area, at the mouth of Granite Creek, is heavily used for recreation between April and early September. Excess sediment and turbidity created nuisance conditions that attracted undesirable wildlife and reduced the water recreation use value.

Alaska DEC worked with the City and Borough of Sitka (CBS) to complete the Granite Creek Watershed Recovery Strategy and Total Maximum Daily Load (TMDL) for turbidity and sediment impairments. EPA approved it in 2002. The goal of the TMDL was to reduce the contributing sources of sediment, to implement the recommended actions contained in the strategy and to ensure compliance with sediment and turbidity criteria in Granite Creek.



Figure 1. The South Fork of Granite Creek (see series of arrows) is adjacent the Tisher gravel lease operation.



Figure 2. Only a small buffer existed between Granite Creek and gravel operations in Sitka before the project.

Alaska water quality standards limit allowable turbidity to 5 NTUs above natural conditions to protect Granite Creek's default designated use for drinking water. The turbidity criterion for the aquatic life use category may not exceed 25 NTUs above natural conditions. Because Alaska water quality standards include a narrative criterion for TSS rather than a numeric criterion, the numeric turbidity criterion served as an appropriate measurement indicator for the TMDL. Turbidity measurements were converted to a gravimetric (weight) indicator for purposes of TMDL sediment load calculations.

### Project Highlights

Implementing the Granite Creek Watershed Recovery Strategy and TMDL involved more than 25 different tasks, including constructing a series of settling ponds and routinely cleaning those ponds. Additional BMPs included establishing and

protecting vegetated riparian buffers along tributaries to Granite Creek; placing physical barriers to limit encroachment on stream banks; constructing road, culvert and stormwater drainage improvements (Figure 3); grading and maintaining roads; educating operators; modifying construction design; and routinely monitoring water quality. These BMPs have been instrumental in significantly improving water quality.

## Results

Since 2002 implementing BMPs as outlined in the Recovery Strategy and TMDL has significantly reduced sediment loads and turbidity and improved aquatic habitat. Pink salmon populations in the lower reaches of Granite Creek have increased from approximately 1,000 individuals reported in 1978 to more than 6,000 in 2007.

New sediment load calculations, adjusted from the original TMDL estimations, verify that TSS levels in the creek have declined. Annual in-stream sediment loads of 187.06 tons TSS/yr are below the allowable load capacity of 244.86 tons TSS/year, which were adjusted according to the 2007 five-year analysis (Table 1).

While water quality standards are being met the majority of the time, five years of monitoring data show periodic exceedances during the rainy months of September through December. Overall, the seasonal and annual sediment loading to Granite Creek is within the TMDL load allocation. Granite Creek is showing marked improvements and will be considered for delisting for sediment and turbidity in 2010 if the trend continues.

## Partners and Funding

Alaska's DEC, CBS, Redburn Regulatory and Environmental Services (project consultant), Alaska Department of Fish and Game, U.S. Geological Survey, and gravel lease operators have worked together to restore Granite Creek. Since 2002 CBS has received approximately \$200,000 in section 319 Clean Water Act grants for Granite Creek TMDL implementation and has provided matching funds to the state.



**Figure 3. Experimental retrofit for culvert discharge to improve capture of sediment before it enters Granite Creek.**

**Table 1. Monthly suspended sediment loading capacity and monthly existing (in-stream) suspended sediment loads in Granite Creek in 2007**

Month	Average Monthly Flow (cfs)	Natural Background Load (tons)	Loading Capacity for TSS (tons)	Existing Suspended Sediment (TSS) Load (tons)
Jan.	44.5	1.86	19.26	8.79
Feb.	29.0	0.56	11.33	3.51
Mar.	19.8	0.93	8.57	1.86
Apr.	9.9	1.50	4.15	0.47
May	13.4	2.17	5.80	0.87
Jun.	15.5	1.80	6.49	1.12
Jul.	9.1	1.24	3.97	0.41
Aug.	62.4	0.93	27.00	16.82
Sept.	79.5	3.00	33.29	25.95
Oct.	66.7	4.34	28.86	19.15
Nov.	138.0	1.20	57.79	75.00
Dec.	88.7	3.10	38.38	33.11
Annual Total		22.63	244.86	187.06

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