Report on Removing Marine Debris from Beaches in Prince William Sound Alaska and from Shorelines in the Gore Point Region of the Kenai Peninsula in 2010

By

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Guiding the landing craft to the beach in South Twin Bay for loading

For
The Marine Conservation Alliance Foundation and NOAA

Introduction

Gulf of Alaska Keeper (GoAK) prepared related proposals for cleaning beaches in Prince William Sound (PWS) and in the Gore Point region of the Kenai Peninsula. MCAF partially funded a portion of the PWS project with money from the National Oceanic and Atmospheric Administration's FY 08 Grant NA08NOS4630356. NOAA funded a portion of the 2010 Gore Point region cleanup with Grant NA10NMF4630184. Thousands of hours of volunteer labor combined with to a professional cleanup effort led to another productive cleanup season. This report describes the work and results of the 2010 cleanup project.

Cleanup Methods

Prince William Sound is located in the most northerly portion of the Gulf of Alaska. The composition of the beaches is similar to that of Outer Southeast Alaska with many uneven bays and islands. The shore is rocky with sand/pebble interspersed. Some beaches within PWS are relatively protected while the beaches on the outside are subjected to high winds and cleanups may only take place during periods of calm weather.

GoAK uses a combination of volunteer and professional crews to clean beaches in PWS.

2010 Volunteer Cleanup

Gulf of Alaska Keeper's 2010 9th annual Prince William Sound volunteer marine debris (MD) cleanup was originally scheduled for May 14 through May 16, with some boats and volunteers planning to depart a day early. However, a large storm blew into PWS and the cleanup had to be cancelled at short notice and rescheduled for the following week. Up to 100 volunteers and 12 vessels were expected for the original cleanup date. Because of the rearranged schedule, most volunteers, who had arranged time off from work for the original cleanup date, and 6 vessels, could not participate the following weekend. Larger vessels from the Whittier charter fleet were unable or, understandably, unwilling to change or drop booked charters to accommodate the rescheduled volunteer cleanup so we were left with only a limited ability to transport volunteers on the alternate weekend.

GoAK Professional Cleanup

The GoAK professional cleanup is comprised of experienced laborers and crewmen who have worked MD projects previously. They work in the more remote and rugged portions of the PWS area and the outer Kenai Peninsula coast where it is prohibitively difficult to use volunteers efficiently. They also do the collection of the MD collected by the volunteers as well as sort and weigh all the debris.

Cleanup Results

Volunteer Cleanups

The first volunteer cleanup took place May 21 through 23 with only 6 vessels and 27 volunteers (Table 1). However, we compensated somewhat for losing so many cleanup volunteers by scheduling an additional volunteer cleanup later in the summer (August 5 through 8) and by the

GoAK professional crew donating 4 days in late June cleaning beaches on Evans and Elrington Island.
During the May volunteer cleanup, the 27 volunteers in 6 vessels picked up approximately 4 tons of MD in and near Shelter Bay on Evans Island in southern PWS (Table 2). The volunteers spent 810 hours during the May cleanup to remove debris from 10 miles of shoreline. All of the shoreline within Shelter Bay was cleaned as well as beaches east of Shelter Bay in a large unnamed cove. Most of the MD was staged for later pickup.

The MD collected in Shelter Bay during the May volunteer cleanup was, both by weight and volume, primarily lines and nets. As such, the debris was quite heavy, with the weight of an average full yellow MD garbage bag closer to 40 pounds than the typical 22 to 25 pounds.

In addition to the 134 bags of debris collected during the May cleanup, the volunteers also gathered nearly as much MD, such as large piles of nets and line, refrigerators, large floats, plastic pipe, buckets, tires, and rolls of heavy plastic mesh all too large or heavy to bag. Several beaches in Shelter Bay also had large amounts of Styrofoam on them, much of it clearly the remnants of dock floats.


Volunteers with a pile of Shelter Bay MD


Volunteers cleaning a Shelter Bay beach

In late June, a volunteer 6-man GoAK crew spent 240 hours over four days cleaning beaches in and near Squirrel Bay on the southwest end of Evans Island in Fox Farm Harbor on Elrington Island. Heavy rains and strong winds hindered this project. However, 87 large bags of debris along with a large amount of non-baggable MD, together weighing about 3 tons, were removed from 6 miles of beaches in the Squirrel Bay area and taken to Seward for disposal. The crew began cleaning Fox Farm Harbor after finishing Squirrel Bay. The debris they collected in Fox Farm Harbor was staged for later collection during the August volunteer cleanup.

On August 5 through 8, GoAK organized another small volunteer cleanup in the Shelter Bay and Fox Farm Harbor area. Although 19 volunteers on 5 vessels started out for the cleanup, one vessel with 5 volunteers onboard had to turn back with engine troubles. Three vessels and 13 volunteers spent 4 days cleaning beaches on northern Evans Island east of Shelter Bay, in Fox Farm Harbor and also the beach at the head of North Twin Bay across the isthmus from Fox Farm Harbor. The MD collected during this cleanup consisted of a mostly Styrofoam, bottles and other light debris in Fox Farm Harbor. North Twin Bay had a couple significant piles of line, some minor nets, a large fiberglass cleaning table possibly from a sunken commercial fishing boat, and some mid-water trawl floats. However, hundreds of beverage bottles, Styrofoam, buckets, and other general MD made up the bulk of the 52 bags of debris collected in North Twin Bay. This crew also loaded MD staged in Fox Farm Harbor and Shelter Bay from the previous two volunteer cleanups into the landing craft. Another vessel and one volunteer re-cleaned beaches on the east side of Green Island. This vessel transported one load of debris to the landing craft near Shelter Bay and another load back to Whittier. During this cleanup 6 tons of debris were collected and hauled to Whittier. About 1 ton of the MD was removed from 2 miles of new shoreline along with another 4 tons from the previous cleanups. Another ton was hauled directly back to Whittier from Green Island. Volunteers donated 610 hours to the August cleanup effort. Altogether, the 3 volunteer cleanups removed 8 tons of debris from 16 miles of southern PWS island beaches while expending 1660 volunteer hours and 42 vessel days. The beaches cleaned in these efforts were all 65 to 80 miles from port requiring transit times from port of 8 to10 hours; so many volunteer hours were spent traveling to and from cleanup project sites.

Professional Cleanup

From May 17 through May 30, a 7-man GoAK professional crew finished cleaning beaches in Rocky Bay and Zaikof Bay, the completion of 3 seasons of cleanup efforts in that area. One volunteer also joined this cleanup project, donating 140 hours to the effort.

Winter storms had deposited a considerable amount of new debris on the northwest shore of Rocky Bay, a shoreline cleaned just the previous summer, so the crew spent two days again cleaning that shore. They next spent 4 days cleaning the remainder of Rocky Bay along the southeast shore toward Middle Point and then 6 days around Middle Point into the northwest shoreline of Zaikof Bay. Two days of this project were spent transiting to and from the job site, 75 miles from Whittier.

Two loads totaling 11 tons of debris were hauled back to Whittier for disposal in dumpsters. One was a large load, 5 tons, and the last load a massive load of 6 tons. Near the end of the project, the landing craft experienced an engine failure. From that moment on it became a non-motorized barge towed by a larger crew vessel. The crew took this opportunity to load the landing craft beyond what they would normally load it if it was operating under its own power. The landing craft was then towed back to Whittier. In that way, they were able to completely finish the Zaikof and Rocky Bay cleanup without leaving any debris staged in the field.

Table 1. Date, location beach, latitude, longitude, length and width of beach, natural accumulation area, type of accumulation, number of trawl net samples and number of HSDN samples.

Date	Location	Beach	Latitude	Longitude	Length of Beach	Width of Beach	Natural Accumulation Area	Trawl Net Samples	HSDN samples
May 20-23 Volunteer	Rocky Bay	Reclean	60.20.25	147.08.49	7,920	25	Yes		
May 18-21	Rocky Bay	Southshore	60.20.45	142.03.06	4,400	30	Yes		
August 5-8 Volunteer	Southwest Evans Island	Fox Farm Harbor	59.38.52	148.10.77	1,320	20	Yes	2	1
August 5-8 Volunteer	Southwest Erlington	North Twin Bay	59.58.28	148.10.92	1,320	25	Yes	2	
May 20-23, August 5-8	North Evans Island	Shelter Bay Beaches			17,600	15	Yes	6	
June 14-17	Southwest Evans Island	Squirrel Bay	60.00.36	148.08.07	10,560	25	Yes	7	1
June 24-30	Zaikof Bay	Middle Pt	60.20.33	147.00.08	880		Yes		
			Total Yards		44,000			17	2

The amount, type, and density of debris varied by location (Table 2). The largest and densest deposit was in Zaikof Bay. By percentage, the largest amount of debris was comprised of trawl web, the majority which came from Rocky and Zaikof Bays which are situated near the outer coast on Hinchinbrook Entrance (Table 3, Figure 1). The second most numerous item was other non-vessel related debris, the majority which came from the inner PWS.

Again, as in previous years, nets and other derelict commercial gear comprised the majority of the debris collected. Large trawl nets were common in both bays. Pieces of high-seas drift net were also common but not in the large size commonly found with trawl nets. Presumably, the light-weight mesh in the HSDNs deteriorates more quickly and the nets break into smaller pieces. A couple of sizable local gill nets were also removed from Rocky and Zaikof Bay.

As in past years, GoAK followed MCAF's protocol for net sampling. Over the course of the season, from Prince William Sound to Elizabeth Island, GoAK collected samples from 109 derelict nets and sent the samples to MCAF for analysis.

Zaikof Bay trawl net (top) and HSDN with other debris (bottom)

Table 2. Type and weight of debris by location and pounds per 100 yards.

Location	Beach	Trawl net	Crab line	Domestic Gill net	HSDN	Floats	Misc other lines	Other Fishing related	Banding	Plastic Beverage Bottles	Plastic Non-Beverage Containers	Cans (all types)	Foam	Other non- vessel related	Total Weight	Pounds per 100 YaRDS
Rocky Bay	Reclean	1,050	150	150	30	150	450	30	30	150	300	30	150	330	3,000	38
Rocky Bay	Southshore	2,800	350	140	70	700	700	350	70	140	280	-	700	700	7,000	159
Southwest Evans Island	Fox Farm Harbor	40	40	8	16	40	120	40	8	40	120	16	120	192	800	61
Southwest Erlington	North Twin Bay	75	300	-	-	75	150	195	15	75	75	15	75	450	1,500	114
North Evans Island	Shelter Bay Beaches	2,400	800	400	-	240	800	400	80	160	240	80	800	1,600	8,000	45
Southwest Evans Island	Squirrel Bay	1,500	1,200	-	120	300	300	300	60	300	300	60	600	960	6,000	57
Zaikof Bay	Middle Pt	5,400	600	600	600	1,200	1,200	120	120	120	240	120	600	1,080	12,000	1,364
	Total	13,265	3,440	1,298	836	2,705	3,720	1,435	383	985	1,555	321	3,045	5,312	38,300	87

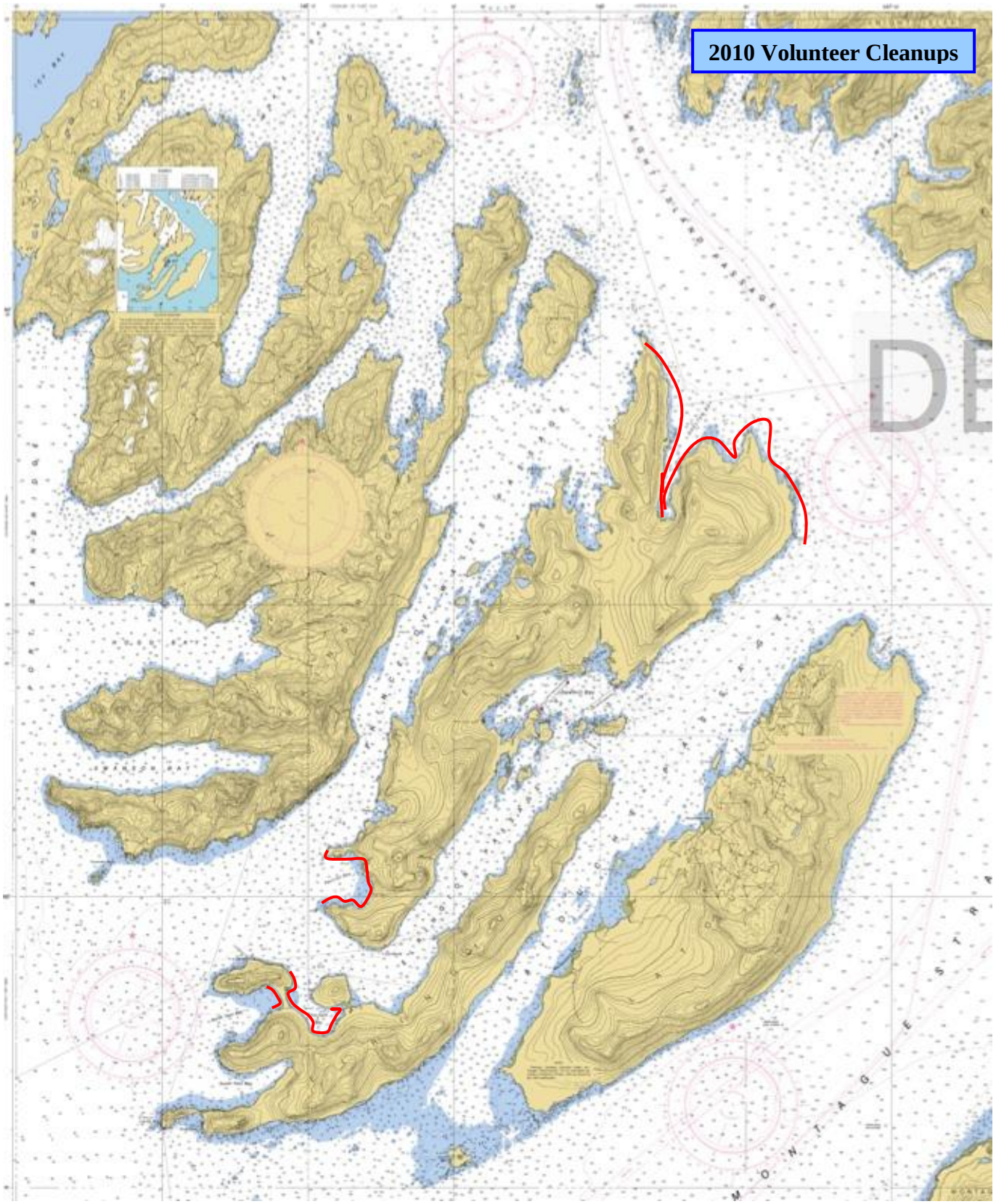
Table 3. Percentages of debris by location and overall.

Location	Beach	Trawl net	Crab line	Domestic Gill net	HSDN	Floats	Misc other lines	Other Fishing related	Banding	Plastic Beverage Bottles	Plastic Non-Beverage Containers	Cans (all types)	Foam	Other non- vessel related
Rocky Bay	Reclean	35%	5%	5%	1%	5%	15%	1%	1%	5%	10%	1%	5%	11%
Rocky Bay	Southshore	40%	5%	2%	1%	10%	10%	5%	1%	2%	4%	0%	10%	10%
Southwest Evans Island	Fox Farm Harbor	5%	5%	1%	2%	5%	15%	5%	1%	5%	15%	2%	15%	24%
Southwest Erlington	North Twin Bay	5%	20%	0%	0%	5%	10%	13%	1%	5%	5%	1%	5%	30%
North Evans Island	Shelter Bay Beaches	30%	10%	5%	0%	3%	10%	5%	1%	2%	3%	1%	10%	20%
Southwest Evans Island	Squirrel Bay	25%	20%	0%	2%	5%	5%	5%	1%	5%	5%	1%	10%	16%
Zaikof Bay	Middle Pt	45%	5%	5%	5%	10%	10%	1%	1%	1%	2%	1%	5%	9%
	Overall	35%	9%	3%	2%	7%	10%	4%	1%	3%	4%	1%	8%	14%

Some of the many bags of nets and lines removed from Shelter Bay

Volunteer with MD pile in Shelter Bay

Styrofoam blocks litter Shelter Bay beach


2010 Volunteer Cleanups

Monitoring Cleanups

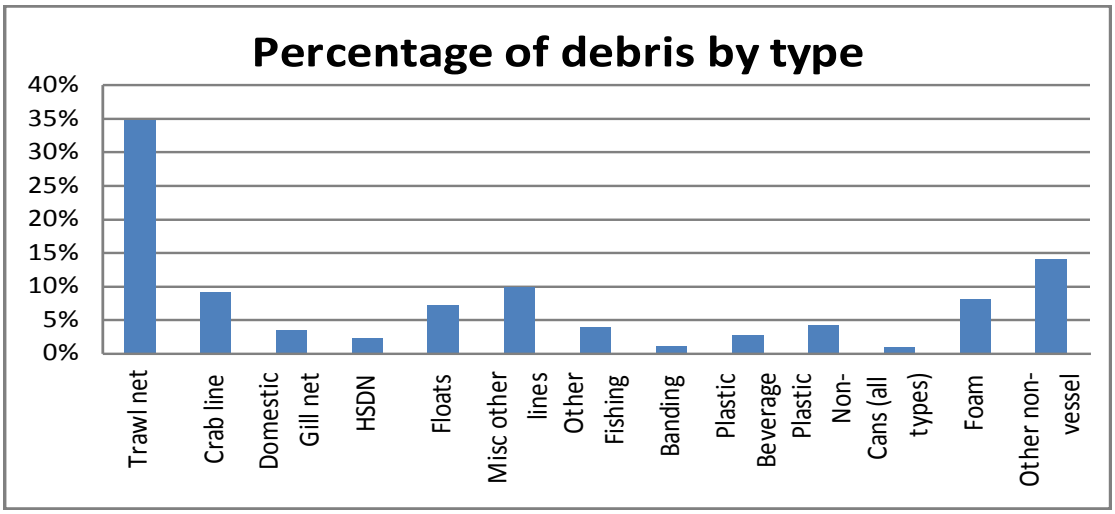
From July 9th through July 14th, 8 volunteers cleaned 10 MD monitoring sites in PWS. From September 6th through 9th, two volunteers cleaned monitoring sites on Peak Island and Axel Lind Island. 560 volunteer hours and 16 vessel days were donated to the PWS MD monitoring project.

Storms the previous winter had deposited significant amounts of new debris on east facing monitoring beaches. Western and sheltered sites were only lightly impacted.

There is still a significant amount of derelict commercial fishing gear coming ashore including nets, line, and floats. Unfortunately, one moderate-sized trawl net on a monitoring site will often outweigh all the other site debris which may largely consist of numerous chunks of Styrofoam, numerous packing bands, and over a hundred plastic bottles. This disparity illustrates one inherent difficulty in collecting useful, or even fair, monitoring data. For instance, does one grounded net cause more environmental damage than all the other debris on a site just because the net is the largest item there? That is highly doubtful, but a derelict net certainly has stronger negative public perceptions attached to it than chunks of phthalate loaded Styrofoam do. This highlights possibly the most important aspect of the MD monitoring project in that data collected from the sites clearly indicates that commercial fishing isn't anywhere close to being the sole party responsible for the marine debris problem and that much of the non-commercial fishing debris is as bad if not worse than fishing debris for the environment.

Nets from Day Care Cove and Ingot Island Monitoring Sites

Figure 2. The percentage of debris by type.



Sorting MD on Mega Byte beach monitoring site

Sorting MD on Snug Harbor monitoring site

Trawl and other floats from the Peak Island Monitoring Site

A noticeable MD trend on the monitoring sites is the increasing numbers of beverage bottles particularly from Asian countries.

Beverage bottles on Peak Island site

Asian beverage bottle, Peak Island site

Among other uses, MD data collected on the monitoring sites will be useful for calculating the total amount of debris being deposited in PWS, for tracking trends in the type of debris arriving annually, and possibly for identifying the debris source. The following spreadsheet tracks selected categories of the MD quantified annually on PWS monitoring sites. Approximately 130 categories of MD are quantified at the monitoring sites, but these eight categories were selected for further analysis because of certain characteristics and to track specific trends. Data reports for each of the 2010 MD monitoring sites will be submitted separately from this report.

Table 4. Monitoring site results for 2007 through 2010.

Site / Item	2007													2008												
	1	17	7	4	2	3	15	5	6	16	8	14	Total	1	17	7	4	2	3	15	5	6	16	8	14	Total
Buckets , 7 gallons (#)	0		2	1	0	1	1	0	4		2	0	11	0	2	0	3	1	0	0	0	3	0	1	0	10
Bottles- Plastic Beverage (#)	6		17	3	29	13	0	1	30		10	1	110	7	16	8	1	13	0	2	0	5	24	46	2	124
Bottles –Plastic Other (#)	2		23	12	25	10	0	1	39		30	1	143	15	17	14	11	7	1	3	0	3	7	104	2	184
Floats-HSDN (#)	10		11	0	4	8	0	1	17		5	0	56	4	3	9	0	7	1	0	0	0	4	5	2	35
Floats-Domestic GN (#)	4		3	0	1	10	0	1	6		0	0	25	1	1	3	1	0	0	0	0	5	1	4	2	18
Lines/ropes (lb)	30		9	20	7	0	0	2	38		23	8	137	0	0	13	52	0	1	7	0	124	16	61	19	293
Styrofoam (lb)	1		5	1	15	1	0	1	11		5	3	43	11	24	0	0	32	1	0	1	64	39	4	0	176
Bait Containers																										
Total Weight	47		94	37	138	15	32	3	130		339	23	858	25	243	102	108	692	28	21	10	948	95	811	54	3137

Site / Item	2009													2010												
	1	17	7	4	2	3	15	5	6	16	8	14	Total	1	17	7	4	2	3	15	5	6	16	8	14	Total
Buckets , 7 gallons (#)	0	0	0	1	1	0	0	0	0	1	5	0	8	1	0	0	0	2	0	0	0	3	1	4	0	
Bottles- Plastic Beverage (#)	5	9	0	5	15	1	1	1	51	19	36	3	146	1	24	12	18	21	6	2	1	108	61	67	10	331
Bottles –Plastic Other (#)	3	11	5	8	5	1	0	2	36	5	28	0	104	4	11	10	10	12	2	0	1	70	18	101	2	241
Floats-HSDN (#)	0	1	0	1	0	1	1	0	18	1	4	0	27	0	1	1	1	0	0	0	0	6	11	3	2	25
Floats-Domestic GN (#)	0	1	0	2	0	0	0	0	3	1	3	1	11	0	1	1	1	0	0	0	0	6	11	3	2	25
Lines/ropes (lb)	0	2	8	40	3	0	10	1	165	3	10	5	247	4	9	11	18	7	0	2	1	170	19	45	5	291
Styrofoam (lb)	0.1	0.1	0.1	0.1	0.5	0.2	0	0	19	10	0.1	0	30.2	1	1	1	0	16	0	0	0	14	5	4	4	46
Bait Containers																						4		5		
Total Weight	7	19	35	76	24	2	19	8	245	65	49	6	555	8	28	100	42	58	25	3	14	378	85	295	24	1060

Disabled landing craft delivering final load of Zaikof Bay MD to Whittier Harbor

Gore Point Region Cleanup

GoAK's 7-man crew spent 33 days cleaning beaches in the Gore Point region from mid-June until mid-July. A volunteer accompanied the crew and donated 140 hours to the project. Storms and surf hindered this project from start to finish limiting ability to get on and off shore. Consequently, productivity dropped somewhat from previous years. The crew again cleaned 3 Gore Point monitoring beaches and then moved to the southwest end of the Kenai Peninsula to finish cleaning from Port Chatham to Chugach Bay, Perl Island, and Elizabeth Island including a near-tidal lake full of storm-driven MD.

The Gore Point monitoring sites were extremely fouled over the winter. Five tons of debris were removed from those sites, sites that have now been cleaned 4 times over consecutive years. Because of bad weather and building surf conditions, debris collected from the North Beach monitoring site had to be quickly loaded and transferred to the protected West Beach before it could be categorized and weighed.

Sorting Gore Point North Beach MD on protecting West Beach

GoAK crew struggling to remove monitoring MD from East Beach Gore Point

Sorting MD at an East Beach Gore Point monitoring site

After the Gore Point monitoring plots were cleaned the crew moved to Port Chatham, cleaning there and in adjacent Chrome Bay. They then cleaned from Port Chatham into Chugach Passage and on to Chugach Bay. After removing another 5 tons of MD from this area they began cleaning Elizabeth Island and Perl Island.

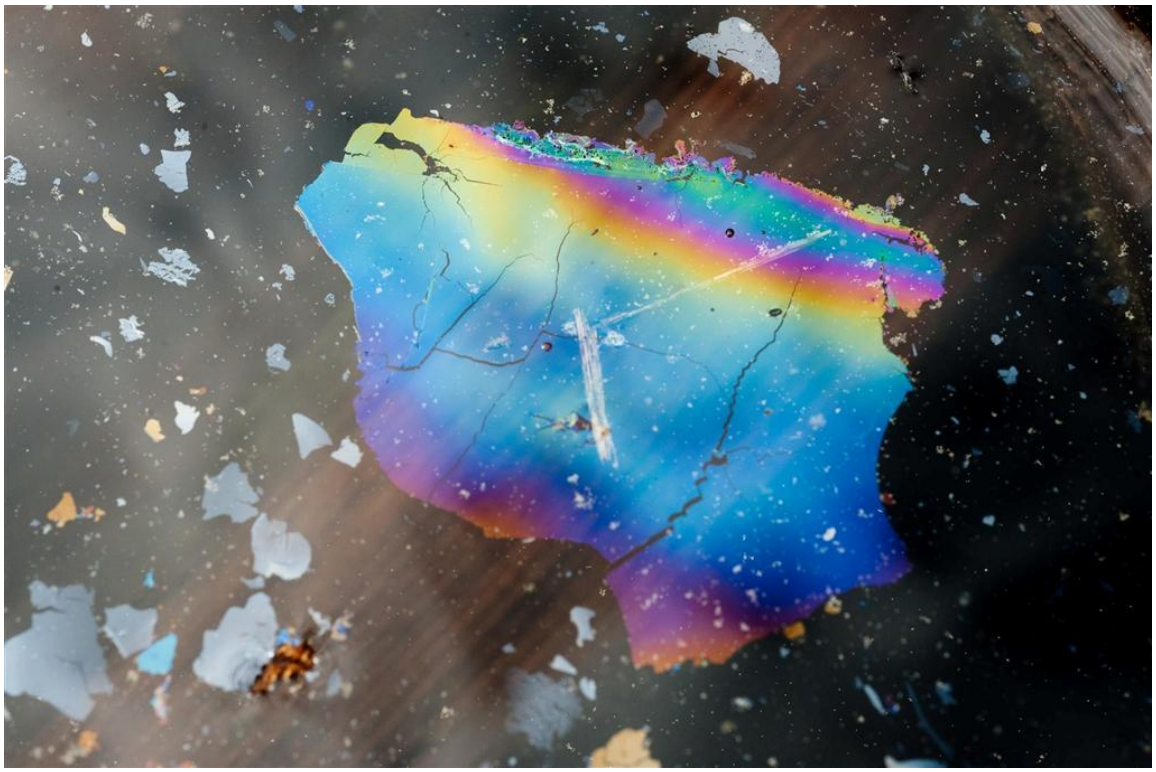
On the east side of Elizabeth Island there is a low gradual beach several hundred yards deep landward, behind which sits a freshwater lake of about ¼-mile length and width. The lake is not tidal but storms push surf over the beach berm into the lake. The beach between the lake and ocean faces prevailing winds and currents, so strong storms sweep MD and logs over the beach and into the lake. As a consequence, the lake was loaded with marine debris and contains a large driftwood floating logjam on the far side of the lake. The logjam was woven with numerous types of nets. Nets and other MD littered the bottom of the lake. The lake water itself was, and still is, full of uncountable plastic bits, including plastic pellets used for manufacturing plastic items. The water surface in places also had a heavy sheen on it from chemicals washed into the lake from containers of MD that had ruptured onshore above the lake or in the logjam. Storms are so ferocious in this area that debris is driven across the beach berm, across the lake, through the logjam, and then even as much as two hundred yards farther into the uplands beyond the lake. MD in the stream bottom above the lake is 800 yards from the ocean. Storms have tossed MD nearly ½-mile beyond the shoreline in this area.

The crew spent nearly two weeks cleaning the lake and the nearby area. They waded into the lake in chest waders to grapple nets and other debris from the lake bed. They packed an inflatable boat and outboard over the beach to the lake so they could use it to ferry collected debris to the lake side of the beach. The MD was then offloaded on the ocean side of the lake and carried or drug across the beach to the shore where it was again loaded into another inflatable to be carried to the landing craft because the shoreline here was too shallow to allow the landing craft to approach the beach. Without a doubt, this was the most physically demanding and difficult MD cleanup GoAK has ever attempted. However, 11 tons of plastic MD were successfully removed from the lake. Unfortunately, untold amounts of tiny plastic fragments and beads still litter the lake and sediment, and unknown chemicals still pollute its waters. As the large floating logjam in the lake moves back and forth in storms, more plastic debris will be released and also pulverized by the movements of the logs. Sadly, at least three species of salmon, and possibly four, spawn or rear in this lake or outlet stream.

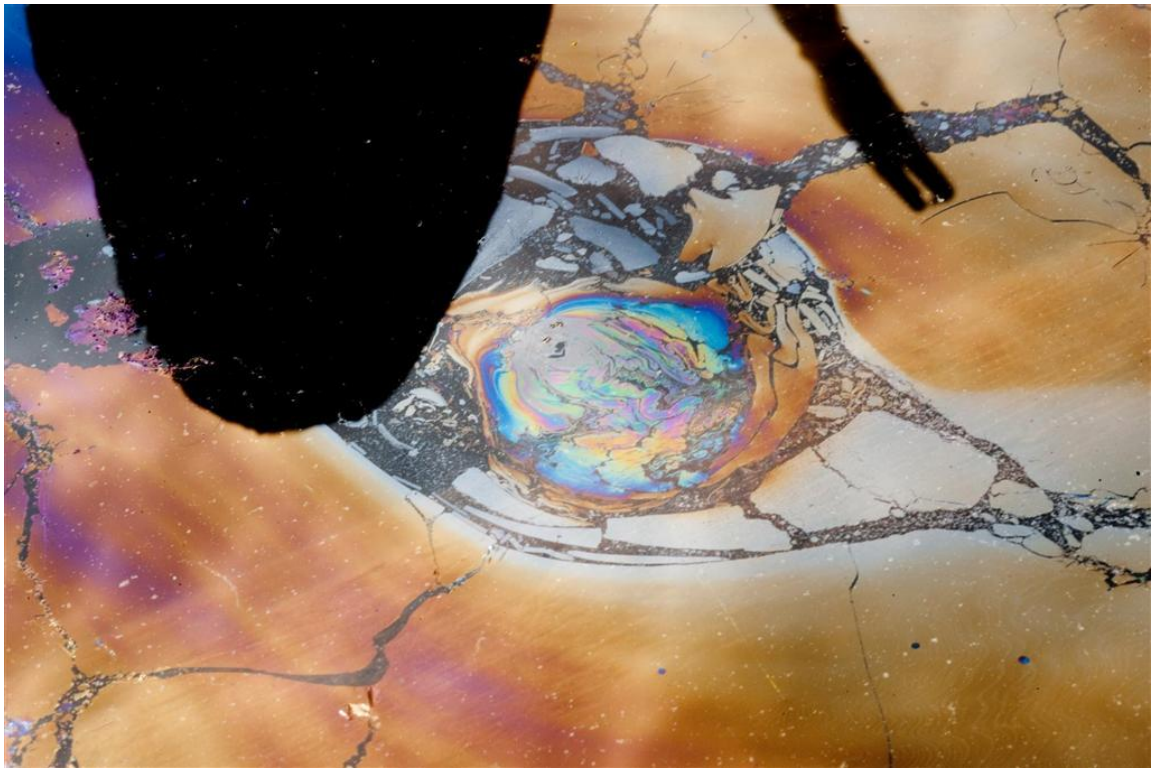
After finishing Elizabeth Island Lake, the cleanup crew moved to the west side of Perl Island and cleaned an area along the beach where now-abandoned homesteads had dumped debris and derelict equipment for years. Over the years, storms have eroded this shoreline and scattered debris along the beach. The crew did not remove any of the abandoned heavy equipment but removed the loose garbage on the beach and at the dump site to prevent more of it from directly impacting the marine environment. Approximately 1 ton of debris was removed from this site. There are many tons of heavy metal equipment at this site that will eventually end up in the tidal zone if they are not first removed.

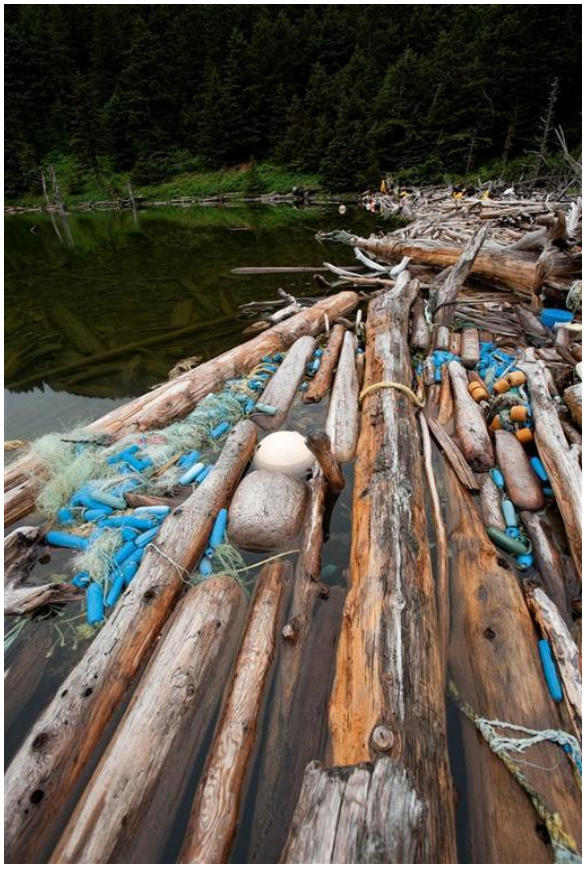
Plastic bits from Elizabeth Lake

Plastic feedstock pellets from Elizabeth Lake

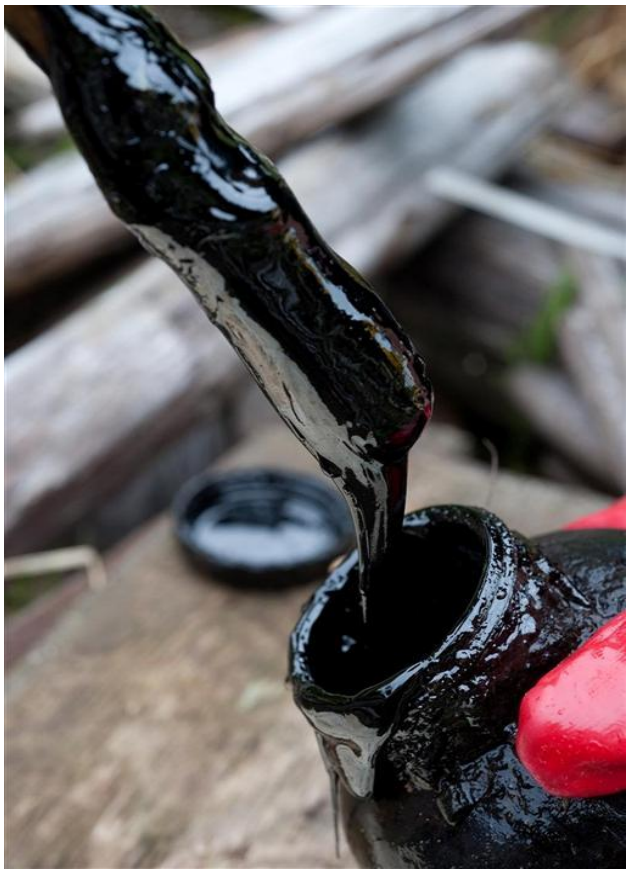


Unknown sheens color Elizabeth Lake





Nets in Elizabeth Lake log jam



Chemicals pollute Elizabeth Lake

Hauling HSDN from Elizabeth Lake


Removing Elizabeth Lake nets and other MD (above and below)

Pulling Elizabeth Lake nets across beach to ocean

One of many piles of MD from Elizabeth Lake

Perl Island Beach Dumpsite

Load of debris from Perl Island

Conclusion

Over the course of the 2010 cleanup season, volunteers donated 4210 hours removing MD and working on monitoring plots. 74 vessel days were donated to the cleanup projects. As in past seasons, the Cities of Whittier, Seward, and Homer all donated parking, wharfage fees, launch fees, and slip fees to the project. Volunteers donated food, parking and tunnel fees. The Kenai Peninsula Borough donated landfill tipping fees.

28 miles of beaches in PWS were cleaned with 21.5 tons of debris removed. Beaches cleaned in PWS averaged approximately 25 yards in width. Another 18 miles of shoreline were cleaned in the Gore Point area with 17 tons of debris removed. Gore Point region beaches cleaned averaged about 50 yards in width, however, the area cleaned at Elizabeth Island Lake extended 800 yards from the tide line. The total miles of beaches cleaned in 2010 were the lowest in years but that is because of three reasons. First, significant funding cuts from past years limited the 2010 cleanup season. Secondly, the 2010 season's cleanup was focused on heavily fouled beaches that also had very difficult working conditions associated with them. They just took more effort to clean. Thirdly, bad surf and weather hampered the cleanup projects throughout much of the season.