<u>Final Report</u>

Tsunami Marine Debris Removal from Prince William Sound
CO# 18-8025-13
September 23 through October 2, 2012.

Japanese tsunami debris washed up on a southeastern Eleanor Island beach

Pursuant to Alaska Department of Conservation's (DEC) CO# 18-8025-13, Gulf of Alaska Keeper (GoAK) departed Whittier, Alaska September 23, 2012 to begin what became a 10-day marine debris cleanup project in central Prince William Sound (PWS). This project specifically targeted marine debris originating in Japan as a result of the March, 2011 Fukushima earthquake and tsunami. This so called tsunami debris, particularly light-weight items such as Styrofoam, bottles, fuel drums, and other containers, has inundated the northern Gulf of Alaska coast and penetrated far into PWS.

GoAK's cleanup proposal listed three alternative cleanup sites in order of preference. The cleanup's objective was to remove as much Styrofoam and other foam debris as possible before winter storms shredded it into unrecoverable bits and scattering throughout PWS.

The preferred Alternative 1 cleanup area, the three northern tips of Montague Island, proved to be inaccessible due to bad weather and high seas. Instead, the cleanup focused on Alternative 2, which included the shoreline of the eastern Knight Island archipelago from the northern entrance of the Bay of Isles northward to the northern tip of Eleanor Island. In addition to the beaches cleaned on Knight Island, tsunami debris was removed from Ingot, Block, Entrance, Sphinx and Eleanor islands during the Alternative 2 cleanup. All of the debris collector beaches along the **25 miles** of Alternative 2 shoreline were successfully cleaned by noon on November 1. The cleanup then moved to the Alternative 3 project site, the south to east side of Naked and Peak islands in central PWS. GoAK's crew began cleaning Alternative 3 beaches along Naked Island's southern shore just east of Bass Harbor the afternoon of October 1. Unfortunately, high winds and surf stopped the Alternative 3 cleanup early October 2 after only **two miles** of shoreline were cleaned.

To put it mildly, the weather conditions during this project were very nasty. It rained for 6 of the 10 days, with 4 days of unceasing cold downpours. The wind blew extremely hard…up to an estimated 70 knots…for 4 days. The high winds threatened the security of the work vessels and the cleanup crew's safety. Upon arriving at the Alternative 2 cleanup area late the afternoon of September 23rd, the bad weather prevented access to any beaches. The crew concentrated on securing the three work vessels in the natural harbor in the center of Disk Island. The weather was again so bad on September 24 that the crew spent most of the day protecting the vessels from the storm. However the storm abated enough in the afternoon that the crew could begin cleaning relatively protected beaches within Lower Passage at the northern end of Knight Island.

On September 25th, the storm increased in intensity and prevented any cleanup work. Despite still truly bad weather, on September 26th, the crew accessed the isthmus between Block Island and southern Eleanor Island by approaching it from the storm-protected western side. The crew walked across the isthmus and began cleaning tsunami debris from beaches on the eastern side. However, because the work vessels could not safely access the east side of the island, the cleanup area was limited to beaches accessible only to walking. After several hours of work, the crew could no longer reach un-cleaned beaches and returned to the vessels in Disk Harbor. Again, on September 27th, the storm raged, making it virtually impossible to do any cleanup work. Finally, late that evening the storm began to blow itself out.

Early on September 28th, the crew began cleaning beaches along Knight Island in the area known as Mega Byte. As true in all of the Alternative 2 project area, a significant amount of tsunami debris littered the beaches in the Mega Byte area. The crew cleaned this area from the north entrance of the Bay of Isles north around the corner to within a mile of the southeast entrance to Lower Passage. The crew returned to the Disk Island harbor at nightfall. On September 29th, the

remaining beaches southeast of Lower Passage were cleaned and then the crew proceeded to clean all of the tsunami-debris-fouled areas on Ingot, Block, Entrance and Sphinx islands, again returning to Disk Island at dark.

Ingot Island Tsunami Debris

On September 30, the crew moved the work vessels north to the southeast corner of Eleanor Island. They then first finished cleaning a severely fouled stretch of beach on the east side of Sphinx Island which they had begun cleaning the late afternoon before. After finishing Sphinx Island, they cleaned heavily fouled beaches on the southeast corner of Eleanor Island. Heavy surf hampered this work for several hours but as the storm continued to veer to the north, access to Eleanor Island beaches became much easier and excellent progress was made.

Sphinx Island Foam Tsunami Debris Deposit

Eastern Eleanor Island's topography changes as you move from the south end toward the north. Two eastern-facing bays featuring relatively large gentle gradient beaches define the southern portion of the island's eastern side. These beaches are easily approachable in good sea conditions. They collect a large amount of debris and are relatively easy to clean. However, as one progresses northward along the eastern side of Eleanor Island, the shoreline of the northern three-fifths of the island becomes progressively rockier and steeper. Debris catchment areas tend to be much narrower, steeper, and ridden with huge boulders, some as large as homes. There are countless crevices, pockets and sea caves in which debris lodges. None of this debris would be visible on photos taken during the Airborne Technology aerial tsunami debris survey. In addition, there was a nearly uninterrupted scattering of foam debris amongst all the boulder and pockets along this coast, with dense debris deposits interspersed irregularly throughout. It took very close inspection to locate the hidden pockets of debris, none of which were visible from boats passing closely along the shoreline.

Naturally, with an increasingly rugged shore, beach access became much more difficult than on the beaches further south. There was no way to haul inflatable dinghies onshore among the boulders or up cliff-like shores while the crew cleaned. Any surf at all would have stopped this portion of cleanup effort. Fortunately, during the afternoon of September 30 and through October 1, wind and surf conditions were perfectly calm allowing the cleanup crew to thoroughly scour this rugged coast. However, calm weather brought sub-freezing temperatures

and frost which glazed beach cobbles and logs with frost and ice. Footing was exceedingly treacherous, particularly in shaded areas well into the afternoon. Despite the frost, all of the eastern Eleanor Island shoreline was thoroughly cleaned by early afternoon on October 1. At least one-half of the tsunami debris collected during this entire project came from the rocky pockets of Eleanor Island's northern three-fifths.

Load of Tsunami Debris from the Northeast Eleanor Island Rocky Shoreline

Upon completion of Eleanor Island and the Alternative 2 cleanup area, the crew immediately departed for the southern end of Naked Island to begin cleaning the Alternative 3 area while calm seas prevailed. The work on Naked Island commenced on the southern shore at the tip of the east entrance to Bass Harbor. The crew cleaned east for two miles removing foam and other tsunami debris until dusk. They then moved to eastern Macpherson Passage to anchor the boats for the night. During the night, the weather again began to turn and by morning an east-southeast wind was driving substantial surf ashore. The morning of October 2, the crew attempted to land on beaches on the east and southeast side of Naked Island. Unfortunately, sea conditions were too adverse to allow safe access to those beaches.

Because the weather forecast called for worsening conditions over the next several days, a decision was made to return to Whittier. However, at that time, all three vessels were already completely filled with tsunami debris. Any additional beach cleaning would have required caching of collected debris for spring retrieval. Although, the crew had already spent 10 days on this project, a day longer than planned, they had hoped to work at least another day in the field to make up for some of the time lost to bad weather the first few days of the project. But given the weather conditions and safety considerations, they returned to Whittier October 2.

Fully Loaded Landing Craft at Naked Island

During the cleanup project, many Japanese hard plastic buoys and Styrofoam buoys were collected. Numerous hard plastic ball-shaped buoys ranging between several inches and twenty inches in diameter were gathered. These buoys weigh between 2 and 25 pounds. Ten large cylindrical hard plastic Japanese oyster culture buoys were also collected. Six of them were undamaged. These buoys are approximately 40-inches long and 20-inches in diameter, each weighing 33 pounds. In addition, 16 large intact Styrofoam Japanese oyster culture floats were recovered. These floats each weigh approximately 13 pounds. Most of the floats and buoys still in good condition were separated from the general tsunami debris while the boats were anchored in Macpherson Passage and transferred onto the deck of C~KEPR, the cleanup crew vessel. The fully loaded landing craft and the work boat then departed for Whittier with their loads.

Instead of returning directly to Whittier, the C~KEPR diverted to South Bay on the south end of Perry Island to deliver all of the salvaged floats and buoys to the South Bay oyster farm owned by John Van Hine. Prior arrangements had been made with the oyster farm to receive these items, which the farm will use for oyster culture.

Deck Load of Recovered Japanese Oyster Culture Floats and Buoys

Six of the large buoys, at least 20 of the smaller hard plastic buoys and 16 of the large Styrofoam buoys were transferred to the South Bay oyster farm. Nearly **500 pounds, or 14-cubic yards**, of buoys and floats were given to the oyster farm and, thereby, prevented from entering a landfill.

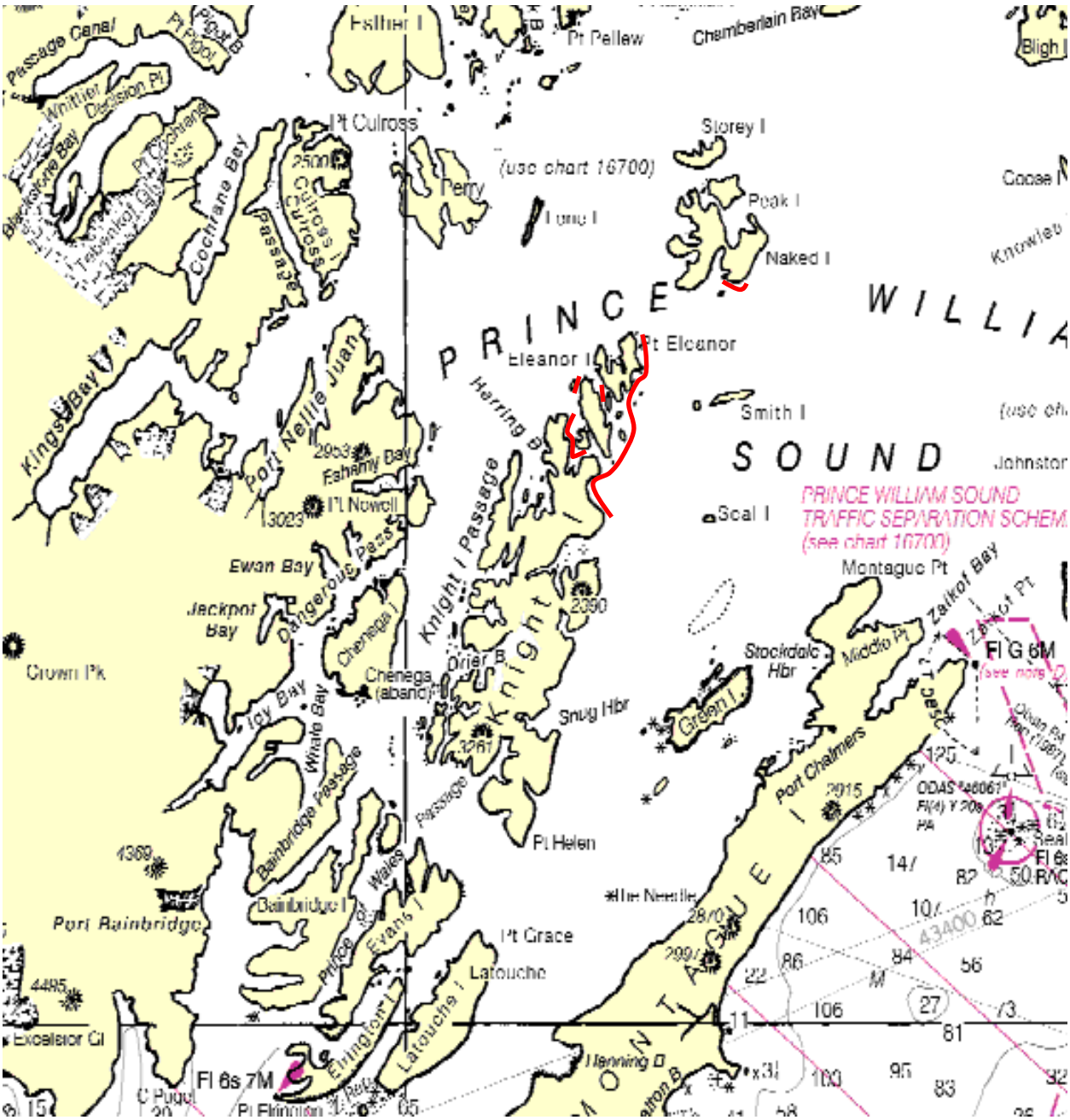
Transferring Japanese Oyster Culture Floats and Buoys to South Bay Oyster Farm

Upon reaching Whittier, the landing craft and work vessel were pulled from the water and their loads transferred to a large construction dumpster in Whittier. Approximately 45-cubic yards of tsunami debris were crammed into the dumpster. While unloading the debris, the crew sorted out remaining undamaged hard buoys, soft ship fenders, fuel drums, a large fiberglass boat fish box, and other useful items. These objects, weighing approximately **500-pounds, and about 6-cubic yards in volume**, were given to Whittier locals and businesses. The dumpster load of tsunami debris was then transferred by Alaska Waste to Central Alaska Recyclers in Anchorage. All of the tsunami debris collected in this project was either reused or recycled. The total amount of tsunami debris collected during this project was **65-cubic yards**. Because of the lightweight nature of the tsunami debris, the total weight of the collected debris was only **5,500 pounds**. **4,500 pounds** of debris were hauled by Alaska Waste to Central Alaska Recyclers in Anchorage. All of this debris was collected from just 25 miles of rugged shoreline in central PWS. Many more landing-craft loads of tsunami debris litter the thousands of miles of PWS beaches.

Unloading Landing Craft in Whittier

Keeping in mind that all of the shoreline cleaned in this project had just been thoroughly cleaned the summer of 2011, and despite the adverse weather**, the cleanup crew removed a tremendous amount of tsunami debris during this short project. The tsunami debris was comprised of about 70% foam (Styrofoam, urethane, blue board, white board and pink board), 10% hard buoys of which 10 were the large oyster culture buoys, 10% drums and other large plastic containers, 5% bottles, and 5% miscellaneous debris such as lines, crates, and etc.** We only found about 5 entangled nets and large lines which we did not remove because of time constraints. Nets and lines that were easily removed were collected, but all of them were relatively small and comprised a small portion of the total volume or weight of collected debris.

While the contract for this project was for only nine days of field work, GoAK worked an additional day in the field to make up production lost to bad weather. Four of the ten days allotted to this project were unworkable because of dangerously adverse weather. Another day the beaches were frozen and the footing exceedingly treacherous. In addition, surf was very high which made beach landings difficult and risky. Cleanup work of this nature should be done by mid-September to avoid these adverse weather factors as much as possible.

Dumpster Load of Tsunami Debris in Whittier Alaska

Prince William Sound beaches shoreward of red lines cleaned during ADEC cleanup