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FINAL REPORT

SNOHOMISH COUNTY 2009 DERELICT FISHING GEAR PROJECT

PREPARED FOR:

THE STILLAGUAMISH TRIBE
AND
SNOHOMISH COUNTY MARINE RESOURCES COMMITTEE

PREPARED BY:

NATURAL RESOURCES CONSULTANTS, INC.

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Introduction

Abandoned, lost and discarded crab pots can present economic and environmental impact issues in marine waters. Every year pot gear is lost due to entanglement with debris, vessel hits and vandalism. Identification, location and safe removal of derelict crab pots can reduce these destructive impacts of derelict fishing gear, as has been demonstrated in derelict gear removal projects previously conducted in Snohomish and other counties within the Northwest Straits Initiative (NWSI) operation area.

The goals of the 2008 Snohomish County Marine Resources Committee (MRC) derelict gear project were to locate and remove derelict fishing gear from a specific study area in the commonly fished commercial, Tribal and recreational crab fishing area of Port Gardner and to use this area for crab pot loss rate measurements by conducting future surveys and removal operations. The Snohomish County MRC has recently initiated an education program designed to inform the public of the importance of using escape cord (rot cord) on crab pots, and encourage these practices. Future derelict gear surveys and removal in the area will evaluate the effectiveness of such educational programs.

Funding from the NOAA Marine Debris Program and other sources was provided by the NWSI. The MRC arranged contracting for the project through the Stillaguamish Tribe. The Stillaguamish Tribe contracted with Natural Resources Consultants, Inc. (NRC), to manage the derelict fishing gear survey and removal project. The removal operations were coordinated with the Washington Department of Fish and Wildlife (WDFW), Snohomish County, Tribal governments, NOAA, the U.S. Fish and Wildlife Service (USFWS) and the U.S. Coast Guard (USGC).

Scope of Work

Previous surveys and derelict crab pot removal projects conducted by the Snohomish County MRC and the NWSI have documented the location of derelict pots in the commonly fished commercial, Tribal and recreational crab fishing areas of Port Gardner. In 2008, derelict crab pot removal operations cleared a specific study area of nearly all derelict pots providing a baseline from which future derelict gear surveys of the same area would allow estimation of the loss rate of derelict pots in these fisheries. This information is valuable to WDFW and Tribal fishery managers in assessing the overall impact of derelict fishing gear in the area and provides additional

information for public information programs aimed to reduce fishing gear loss.

The scope of work of this project entailed re-surveying the area cleaned of crab pots in 2008 with sidescan sonar and investigating and/or removing newly lost derelict crab pots to ascertain the number of pots lost in the 2008 crab fishing season. During derelict crab pot removal, onboard biologists recorded the use and decomposition status of escape cord and the number of live and dead crab in pots. Similar data has been collected during removal projects before and after an MRC sponsored escape cord education program in Port Gardner allowing an assessment of the success of this program.

Additional crab pots found during the 2009 survey outside the 2008 cleaned area were also removed during the project. One day of removal work was conducted on sport fishing gear reportedly lost off the Kayak Point public fishing pier in Port Susan.

A total of three days of sidescan sonar fieldwork and 0.5 days of post-survey processing were conducted during the project and nine days of diver removal work.

Methodology

Sidescan Sonar Survey

Fenn Enterprises performed the sidescan sonar surveys for the project on April 24th, 25th and 30th, 2009 and 0.5 days of post-survey processing was conducted on June 2, 2009. A Marine Sonic sidescan sonar system operating at 600 kHz with a differential global positioning system (DGPS) was used during the survey to locate derelict fishing gear. The sonar system employed a heavy towfish towed off the bow of a 24-foot survey vessel. A hydraulic winch and cable controlled the depth of the towfish. The survey image was projected on a monitor onboard the vessel and recorded onto a computer hard drive for later processing.

Generally, the sidescan sonar survey was conducted at 4.63 km/hr (2.5 knots) with a path width of 50 m on either side of the boat for an approximate area swept of 90 m (295 ft). The survey path width was occasionally decreased to 10 to 20 m on either side of the boat in shallow water (less than 5 m deep) or when a more detailed image of an object was desired. Survey depths in Port Gardner generally ranged from about 3 m (10 ft) to 32 m (105 ft) in order to

identify derelict fishing gear within the dive depth capabilities of the recovery team.

The intent of the 2009 sidescan sonar survey in Port Gardner was to locate derelict crab pots to be removed from the 2008 cleaned study area and, if time allowed to further survey derelict crab pots outside the 2008 cleaned study area.

Counts and precise locations of derelict fishing gear were recorded during post-survey processing of the data that allowed greater time to examine the images. The products from the sidescan sonar survey included a trackline file of the area surveyed, calculation of the area of the fishing grounds covered and the positions (latitude and longitude) of likely derelict fishing gear targets found.

Derelict Fishing Gear Removal

Fenn Enterprises was contracted to conduct the dive recovery operations on crab pots in Port Gardner and Port Susan. Two divers equipped with surface supplied air operated off a 40-foot dive support and gear recovery vessel, the R/V *Surveyor II*. A list of the precise locations of derelict crab pots detected during the sidescan sonar survey was used by the onboard biologist and dive team to locate derelict pots using a wide area augmentation (WAAS) GPS and electronic chart software (Nobeltec®). Derelict gear target locations derived from the sidescan sonar survey were transferred into the Nobeltec charting software as waypoints and plotted over a navigation chart of Port Gardner.

Using the WASSGPS system, the dive support vessel was directed to the exact location of the potential derelict gear target identified by the sidescan sonar survey. As the vessel arrived at the target location a clump weight with a line and float were deployed as near as possible to the derelict gear location. The dive support vessel was then anchored in the vicinity of the clump weight or drifted nearby and a single diver was deployed. The other diver stood by on deck as a safety backup diver. A 30 m (100 ft) length of rope was passed through a loop on the rope near the clump weight and the diver held the other end. When poor water visibility conditions were encountered, the diver would drag the 30 m rope around the clump weight in a circle until it tangled with the derelict fishing gear and then the diver worked back along the rope to the gear.

Prior to recovery of the derelict fishing pot a variety of information was reported to the biologist on board the support vessel by the diver.

Information collected included whether the derelict pot was commercial or sport, whether it was fishing or disabled, whether it was equipped with escape cord, whether the gear was actively fishing or not, the number of live and
dead Dungeness crab, and other crab and fish entrapped. Also reported was information about the overall condition of the gear and the depth and type of seabed where the gear was located. Gear to be recovered was freed by hand by the diver, a recovery line from the vessel was attached and it was hauled aboard the recovery vessel by the aid of a hydraulic winch. The onboard biologist further inspected the gear at the surface and looked for owner identification information.

During a portion of one day the vessel removed derelict sport fishing gear (mainly crab rings and monofilament fishing line) lost off the Kayak Point public fishing pier in Port Susan. The vessel was anchored approximately 30 m off the pier and a diver swept the area removing whatever derelict fishing gear could be found.

The derelict fishing gear was stored in a locked secure waste container in the parking lot of the 11th street public boat ramp in the Port of Everett until disposal at the Snohomish County solid waste facility. If derelict fishing gear could be identified to an owner, the owner was contacted and allowed the opportunity to recover their fishing gear at no cost.

Results

Sidescan Sonar Survey

Three days of sidescan sonar surveys were conducted in Port Gardner on April 24th, 25th and 30th, 2009. The sidescan sonar survey covered 2.67 km^2 and detected 340 potential derelict crab pot targets or 127.3 targets/km^2 (Figure 1). Approximately 187 targets were located in water too deep for divers 32 m (>105 ft) and were left in place uninvestigated. Eleven of the targets were investigated by divers and found to be debris, five targets were investigated but nothing was found, eight targets could not be investigated due to navigation buoy and anchored barge obstructions and 187 targets were found to be derelict pots that were removed or disabled by divers. Eliminating the known debris items and targets not found resulted in 324 possible crab pot targets or 121.3 targets/ km^2.

2008/2009 Study Area Comparison

The 2009 sidescan sonar survey covered 1.84 km^2 within the Port Gardner study area that was cleaned of derelict crab pots in 2008 (Figure 2). The survey detected 217 targets of which nine were found by divers to be debris and no crab pots were found at four locations leaving the remaining 204 targets as probable derelict crab pots (Figure 2). Four of these targets were identified as targets that were not removed during the 2008 removal operations due to surface obstructions indicating there were 200 probable derelict crab pot targets that resulted from pot loss during the 2008 fishing season or 108.7 crab pots lost/km^2. The sidescan sonar survey conducted during 2008 in essentially the same area found a derelict pot target density of 63.6 targets/km^2.

Derelict Crab Pot Removal

Derelict fishing gear was removed from Port Gardner on May 21, 22, 25, 26, 27, 28, June 1, 2, and 5, 2009. Derelict fishing gear was removed from under the Kayak Point public fishing pier on May 27, 2009. A total of 187 crab pots and one crab ring were either removed (181 pots and one ring) or disabled and left in place (six pots) from Port Gardner (Figure 3) and 12 crab rings and monofilament fishing line were removed from Kayak Point. A total of 181 of the derelict crab pots removed from Port Gardner were identified in the April sidescan sonar surveys and six derelict pots not identified in the survey were found and removed adjacent to surveyed pots. Derelict crab pots were removed from water depths ranging from 3 m (10 ft) to 30.2 m (99 ft) and from mud and mixed sand/mud substrate.

A total of 147 derelict crab pots and one derelict crab ring were removed from the 2008 cleaned study area (Figure 4). Nine sidescan sonar targets within the study area were identified as debris or natural occurring rocks and left in place, nothing was found by divers at four target locations, 58 target locations were too deep for divers to investigate and five targets within the study area were not investigated due to surface obstructions (navigation buoys and anchored barges) (Figure 5).

Of the 187 derelict pots removed, 59 (32%) were commercial pots and 128 (68%) were sport pots (Table 1). Forty-seven (25%) pots were determined to be still actively fishing and 140 (75%) were no longer fishing. Of the 187 pots removed or disabled, 35 (19%) were not equipped with legal escape cord, 131 (70%) had legal escape cord and 21 (11%) pots were too deteriorated to determine whether escape cord was used or not. Of the 131 pots equipped

with legal escape cord, the escape cord had disintegrated on 126 (96%) and was still intact on six (4%) pots.

Ten (17%) of the 59 commercial pots recovered where not equipped with proper escape cord, 40 (68%) were equipped with escape cord and on 9 (15%) escape cord use could not be determined. Twenty-five (20%) of the 128 sport derelict pots were not equipped with legal escape cord, 91 (71%) did have legal escape cord and on 12 (9%) sport pots escape cord use could not be determined. Of the 47 crab pots found to still be fishing, 27 (57%) were not equipped with proper escape cord and 20 (43%) had legal escape cord that had yet to deteriorate (3 pots) or the pots were still fishing even after the escape cord had disintegrated (17 pots) due to lids being jammed shut or other obstructions holding the escape door closed.

Of the 187 derelict pots recovered or disabled, 49 (26%) pots contained a total of 160 Dungeness crab (*Cancer magister*), and 12 red rock crab (*Cancer productus*) (Table 1). Of the 160 Dungeness crab recovered, 141 (88%) were live and 19 (12%) were dead. Thirty-six (23%) of the Dungeness crab recovered were females (28 live and eight dead), 117 (73%) (109 live and 8 dead) and for seven (4%) Dungeness crab the sex could not be determined due to either poor shell condition or the crab was reported by divers in the pot but was lost during pot recovery. All of the red rock crab recovered were live (eight females and four males). Derelict pots determined to be still actively fishing contained 123 Dungeness crab (110 live and 13 dead), and five live red rock crab. Pots determined to be no longer actively fishing contained 37 Dungeness crab (31 live and six dead), and seven live red rock crab. Crab pots without legal escape cord contained 63 (39%) Dungeness crab (56 live and seven dead), and three (25%) of the red rock crab recovered. Crab pots with legal escape cord contained 96 (60%) Dungeness crab (84 live and 12 dead), and eight (66%) of the red rock crab recovered.

Other animals found in the crab pots removed or disabled included one live northern kelp crab (*Pugettia producta*), nine live spiny pink star (*Pisaster brevispinus*) and 20 live sunflower stars (*Pycnopodia helianthoides*).

Eleven crab pots recovered were returned to owners and the remaining crab pots, rings and other fishing gear recovered was disposed of at the Snohomish County solid waste facility. The total weight of the derelict gear and marine debris removed was 4,160 lbs.

Conclusions

In 2004 prior to any derelict gear removal activities, a total of 842 potential derelict gear targets or 136 targets/km^2 were identified during a sidescan sonar survey throughout Port Gardner. After derelict crab pot removal projects in 2004 and 2005, the same general area was again surveyed with sidescan sonar in 2008. A total of 2.61 km^2 was covered and 166 derelict gear targets or 63.6 targets/km^2 were found. The 200 probable derelict crab pot targets or 108.7 crab pots lost/km^2 found during the 2009 survey that likely resulted from pot loss during the 2008 fishing season is greater than expected given previous survey results in the area. In 2009, of the 147 derelict crab pots removed from the 2008/09 study area, 101 (69%) were sport pots and 46 (31%) commercial pots. In 2008, the number of sport (74 pot or 51%) and commercial (71 pot or 49%) pots found and removed was similar. It appears an increased loss of sport pots during the 2008 season accounts for the higher than expected density of derelict pots in the study area.

The Snohomish County MRC has been conducting an escape cord education program directed at sport crab fishers since the summer 2006 in Port Gardner. The program was a pilot program in 2006 and increased in outreach to fishers in 2007 and 2008 and will be continuing in the upcoming 2009 summer crab season. The objective of the program is to educate crab fishers on the importance of complying with the WDFW escape (rot) cord regulations. In 2004 and 2005, prior to the escape cord education program, the percentage derelict crab pots removed that were found to have not complied with escape cord regulations total 24% (2004) and 9% (2005). During the 2008 derelict crab pot removal project that occurred just prior to the summer commercial and sport crab fishing season in Port Gardner and one year after the MRC escape cord education program started, no derelict sport pots were removed that had not complied with the escape cord regulations. In 2009, 24 (19%) of the 128 derelict sport crab pots removed from the entire project area in Port Gardner had not complied with escape cord regulations. Within the 2008/09 study area where all derelict pots were presumably lost during the 2008 crab fishing season and after two years of the MRC escape cord education program, 21 (21%) of 101 derelict sport pots recovered had not complied with the WDFW escape cord regulation. The results of the 2009 removal project suggest that the percentage of sport fisher compliance with WDFW escape cord regulations during the 2008 crab fishing season, two years after the start of the MRC escape cord education program was similar to 2004, prior to the education program.

This project successfully removed the majority 182 (93%) of the 195 derelict fishing gear targets within diver depth range found during the sidescan sonar survey. Only five derelict crab pots remain in the 2008/09 study area after removal operations in 2009. The location of the remaining targets and debris is known from the sidescan sonar survey. This area can be used as a study site for future surveys and removals in the coming years to determine further loss rate of derelict crab pots and the effectiveness of ongoing local escape cord education programs in the area.

A total of 182 derelict gear items were removed in the shallow water area (3 to 105 ft) of Port Gardner and the Kayak Point area. Of the uninvestigated targets remaining, many (134) are in depths beyond diver capabilities (> 105 ft).

The 2009 sidescan sonar survey found 324 likely crab pot targets or 121.3 targets/ km^2. This is nearly twice the density of 63.6 targets/km^2 of derelict crab pot targets found during the 2008 survey in the same area and similar to the 136.0 targets/ km^2 found during a survey conducted in 2004 covering most of the pot fishing grounds in Port Gardner. Based on the results of the three surveys, crab pot loss is highly variable from year to year in Port Gardner. The factors affecting crab pot loss rates in Port Gardner are not well understood.

A study of long-term Dungeness crab mortality in simulated derelict pots recently conducted in Port Susan found that on average derelict crabs still capable of actively fishing killed between 0.06 and 0.10 Dungeness crabs per day. During the study, simulated escape cord on the pots disintegrated 134 to 148 days after simulated crab pot loss. Based on these results, estimates of total crab mortality from the derelict crab pots removed from Port Gardner during the 2009 project were calculated. Crabbing closed in the Port Gardner area on September 1, 2008, approximately 261 days prior to the start of derelict pot removal operations on May 21, 2009. Assuming the 152 derelict pots removed during the study that had legal escape cord (131 pots) or for which escape cord use could not be determined (21 pots) remained actively fishing for the first 134 days, these pots may have killed between 1,222 (134 days x 0.06 crab/day x 152 pots) and 2,037 crab (134 days x 0.10 crab/day x 152 pots). The 35 derelict pots removed that did not have legal escape may have killed an additional 548 (261 days x 0.06 crab/day x 35 pots) to 914 (261 days x 0.10 crab/day x 35 pots) Dungeness crab. Total crab mortality from the 187 derelict crab pots removed during the 2009 study is estimated to range from 1,770 to 2,951 Dungeness crab.

Recommendations

Based on the observations and results of the derelict gear removal project, the following are recommendations to further reduce the impacts of derelict fishing gear on the marine environment.

- **The use of legal escape cord on crab pots should continue to be enforced and escape cord education programs should continue in Snohomish County.**

- **The study area should be surveyed and gear removed annually for the next two to three years to determine crab pot loss rates and measure the effectiveness of crab pot fishing education programs being conducted by the Snohomish County MRC.**

- **The use of a remote operated vehicle (ROV) has been shown to be feasible for deepwater derelict crab pot removal in studies conducted in Port Susan and Dungeness Bay. ROV use should be considered for removal of the derelict crab pots detected in Port Gardner that are beyond the 32 m (105 ft) diver limit.**

Acknowledgements

The Port of Everett kindly provided free moorage for the dive support vessel during the project and allowed storage of a waste container at the 11th Street public boat ramp. Their assistance is greatly appreciated. Tulalip Tribal marine enforcement personnel assisted the dive support vessel and retrieved the Tulalip Tribal pots that were returned to owners. Their assistance is also greatly appreciated. We also wish to thank the numerous MRC members and other guests that helped the crew of the gear recovery vessel during the project. We also wish to thank the Stillaguamish Tribe and the Snohomish County MRC for their cooperation during the project.

Table 1. Number of derelict pots recovered, type of pot (commercial or sport), fishing status (actively fishing or not), rot cord use and numbers of live and dead organisms observed during the 2009 Snohomish County MRC derelict fishing gear project. Source: NRC.

Fishing/Not Fishing	Actively Fishing			Not Fishing				All Pots*			
	Rot Cord	No Rot Cord	Total	Rot Cord	No Rot Cord	Unknown	Total	Rot Cord	No Rot Cord	Unknown	Total
Commercial											
# Pots Recovered	4	8	12	36	2	9	47	40	10	9	59
# Dungeness Crab Dead	1	2	3	1	0	0	1	2	2	0	4
# Dungeness Crab Alive	13	6	19	6	0	0	6	19	6	0	25
# Red Rock Crab Dead	0	0	0	0	0	0	0	0	0	0	0
# Red Rock Crab Alive	0	1	1	3	0	1	4	3	1	1	5
# Total Crab Dead	1	2	3	1	0	0	1	2	2	0	4
# Total Crab Alive	13	7	20	9	0	1	10	22	7	1	30
Sport											
# Pots Recovered	16	19	35	75	6	12	93	91	25	12	128
# Dungeness Crab Dead	5	5	10	5	0	0	5	10	5	0	15
# Dungeness Crab Alive	41	50	91	24	0	1	25	65	50	1	116
# Red Rock Crab Dead	0	0	0	0	0	0	0	0	0	0	0
# Red Rock Crab Alive	3	1	4	2	1	0	3	5	2	0	7
# Total Crab Dead	5	5	10	5	0	0	5	10	5	0	15
# Total Crab Alive	44	51	95	26	1	1	28	70	52	1	123
All Pots											
# Pots Recovered	20	27	47	111	8	21	140	131	35	21	187
# Dungeness Crab Dead	6	7	13	6	0	0	6	12	7	0	19
# Dungeness Crab Alive	54	56	110	30	0	1	31	84	56	1	141
# Red Rock Crab Dead	0	0	0	0	0	0	0	0	0	0	0
# Red Rock Crab Alive	3	2	5	5	1	1	7	8	3	1	12
# Total Crab Dead	6	7	13	6	0	0	6	12	7	0	19
# Total Crab Alive	57	58	115	35	1	2	38	92	59	2	153
# Total Crab	63	65	128	41	1	2	44	104	66	2	172

* The status of rot cord on 9 commercial and 12 sport pots recovered could not be determined.

Figure 1. Location of sidescan sonar survey effort and derelict crab pot targets found in Port Gardner during the 2009 Snohomish County MRC derelict fishing gear project. Source: Fenn Enterprises and NRC, Inc.

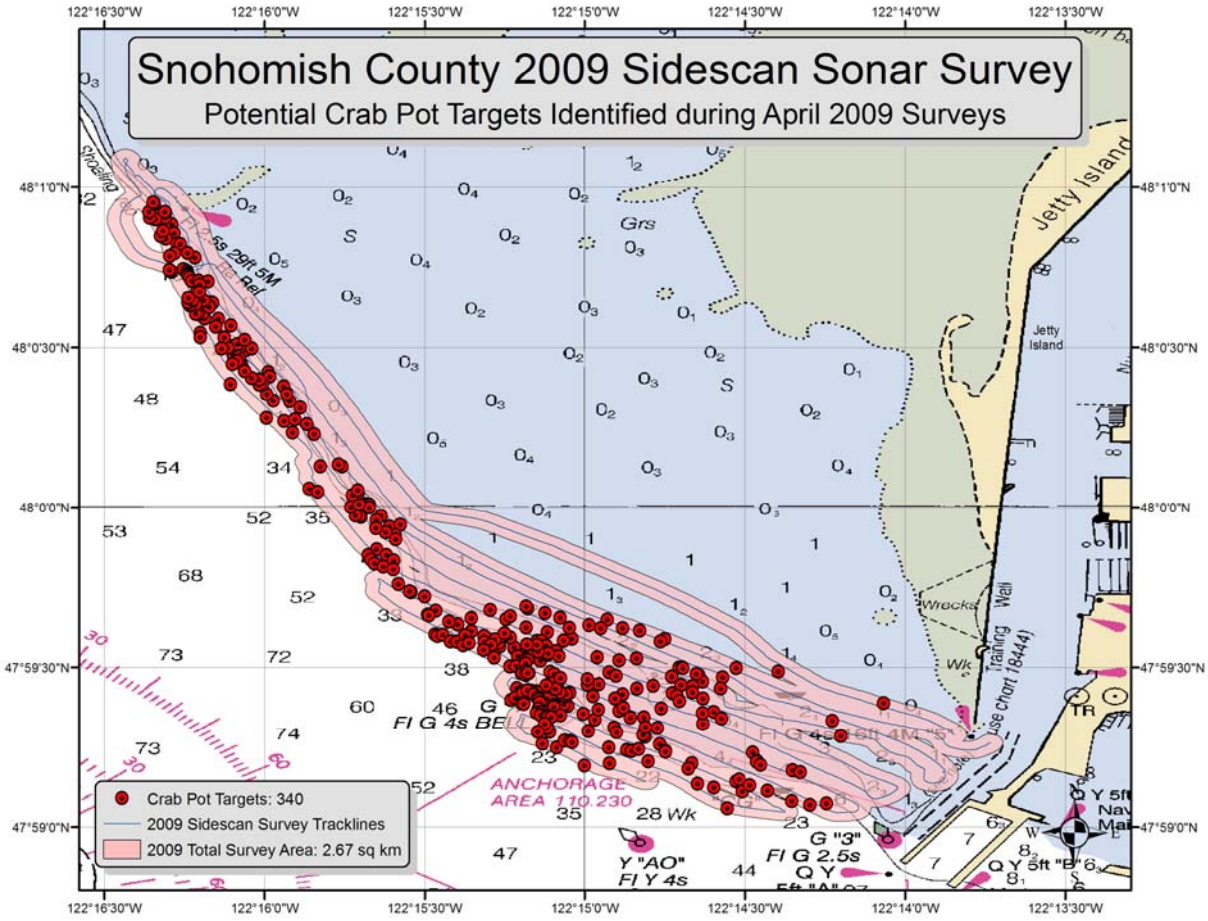

Figure 2. Location of sidescan sonar survey effort and derelict crab pot targets found in Port Gardner study area cleaned of derelict crab pots in 2008. Source: Fenn Enterprises and NRC, Inc.

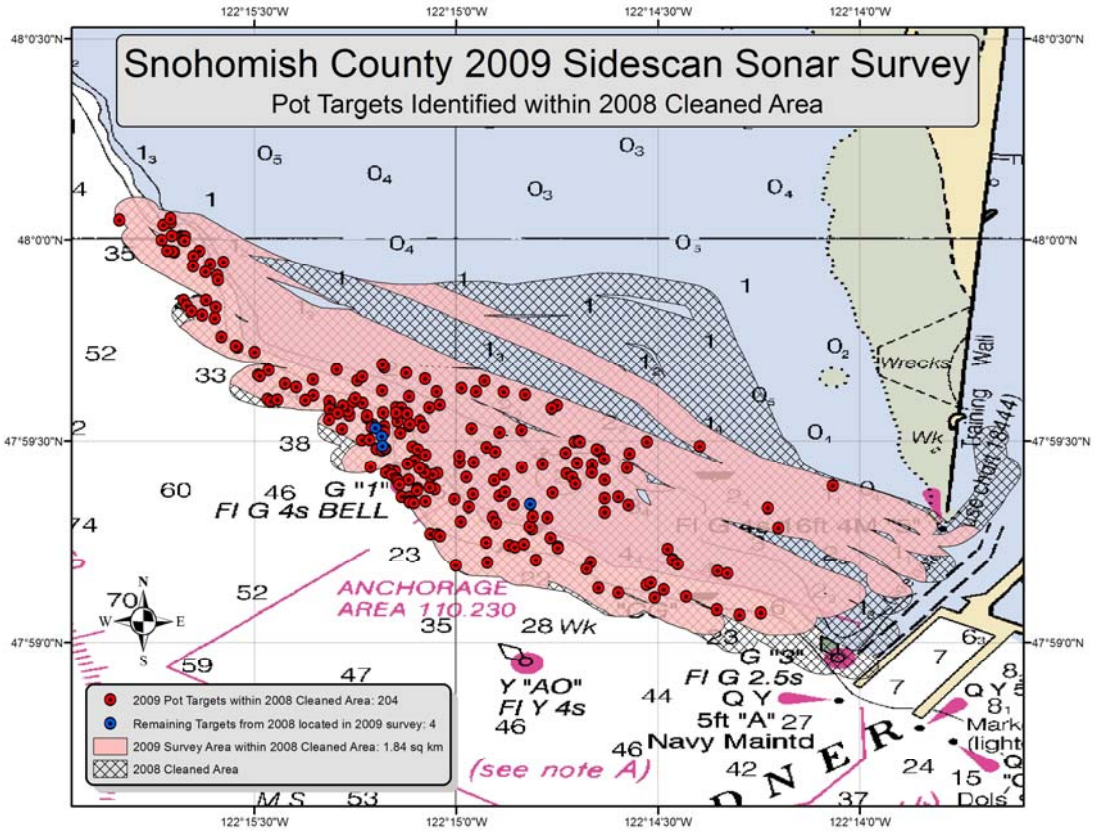

Figure 3. Sidescan sonar survey effort and the disposition of derelict crab pot targets found in Port Gardner during the 2009 Snohomish County MRC derelict fishing gear project. Source: Fenn Enterprises and NRC, Inc.

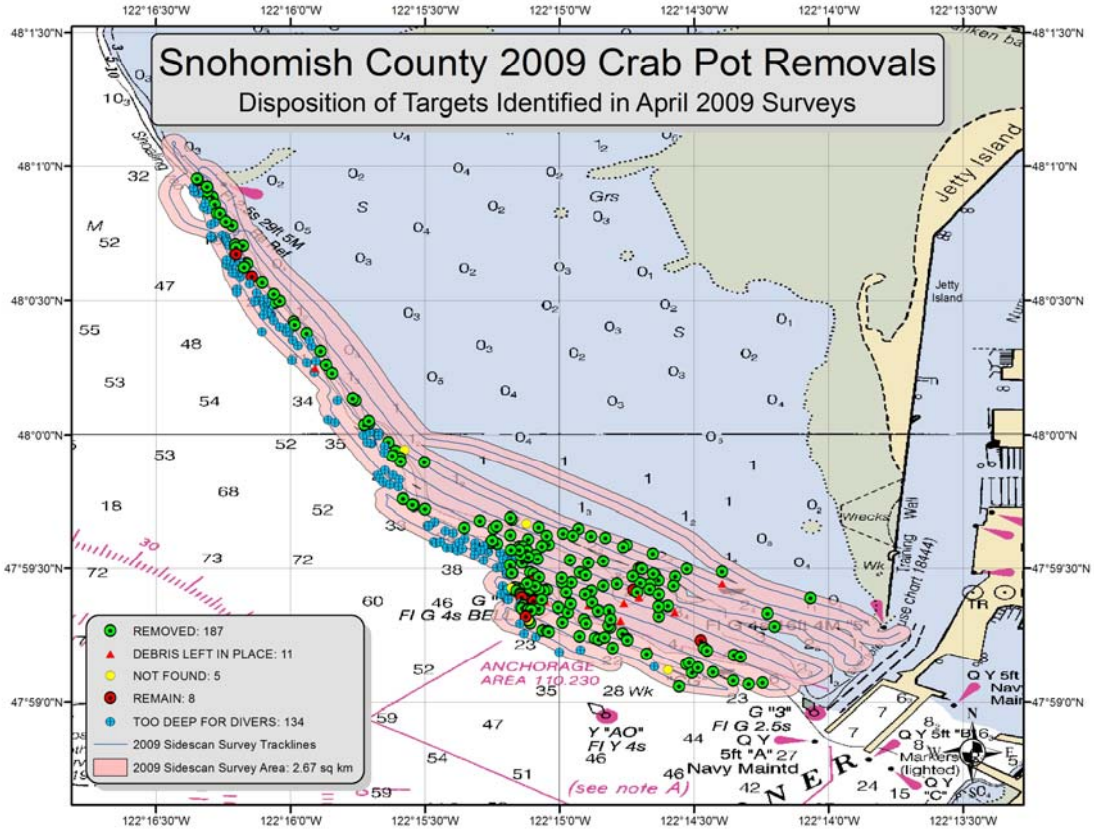

Figure 4. Location of sidescan sonar survey effort and the disposition of derelict crab pot targets found in Port Gardner study area cleaned of derelict crab pots in 2008. Source: Fenn Enterprises and NRC, Inc.

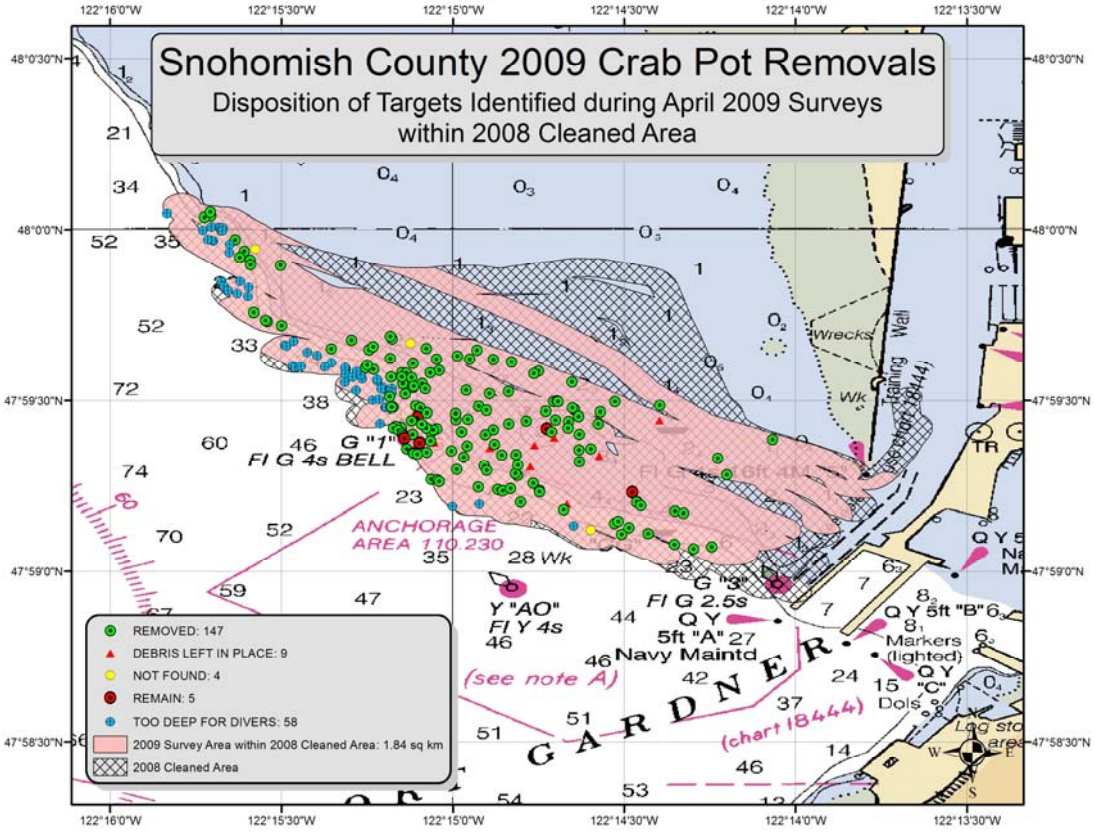

Figure 5. Location of sidescan sonar survey effort and the disposition of derelict crab pot targets remaining in Port Gardner study area cleaned of derelict crab pots in 2008 and cleaned again in 2009. Source: Fenn Enterprises and NRC, Inc.