

## Project Summary Report

### ROV Derelict Crab Pot Removal



*Project Reporting Period: October 2024-September 2025*

*Grant number: SEANWS-2023-JeCoWS-00006*

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## 1. Abstract

It is estimated that almost 11,000 crab pots are lost in Puget Sound every year. The crab pots can continue to catch crabs for up to 2.2 years, catching approximately 140,000 harvestable crabs every year.<sup>1</sup>

The Northwest Straits Foundation has a derelict gear removal program that has removed over 8000 lost pots in high priority areas.<sup>2</sup>

The Jefferson County MRC started working with a local robotics club, the Seadragons, in 2021 to demonstrate the feasibility of community-based removal of derelict crab pots using a Remotely Operated Vehicle (ROV). In 2022 and 2023 we remove a handful of lost pots from Discovery Bay and Port Townsend Bay.

In 2025 we contracted with Coastal Sensing and Survey to work with STEM students from Port Townsend High School to remove derelict crab pots in Port Townsend Bay and Kilisut Harbor.

33 crab pots were removed from Port Townsend Bay, and 4 from Kilisut Harbor.

## 2. Project Goals

In 2025 the primary goal was to build on the success of the earlier projects and learn more about how to remove lost pots more efficiently, and what the barriers are for community base derelict gear removal.

- Evaluate the use of a more sophisticated ROV equipped with sonar and USBL.
- A second goal is educational, giving high school students the opportunity to operate an ROV to remove lost pots.
- The third goal is to remove derelict crab pots using CS

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<sup>1</sup> NRC Derelict Shellfish Pot report September 20, 2021

<sup>2</sup> NW Straits Foundation ([nwstraitsfoundation.org/derelict-gear](http://nwstraitsfoundation.org/derelict-gear))

### 3. Project Engagement

In 2025 we contracted with Coastal Sensing and Survey (CS&S) to use their research vessel and commercial Blue Robotics ROV. This was because the MRC was without staff support for the initial phase of the project and could not support a project like the 2023 ROV project with the Seadragons. Tim Behrenfeld had joined the MRC and offered to co-lead the project if we could work with Port Townsend High School students in his robotics class. The students did not have a ROV capable of operating at the required depths.

The advantage of working with CS&S was they had a more sophisticated ROV equipped with onboard multi-beam sonar, and USBL location transponders. We were able to compare the advantages of the more complex ROV and learn new techniques for locating the derelict pots.

#### 4.1 Partners/Organizations

We worked closely with the Northwest Straits Foundation this year. The Foundation was removing crab pots in Port Townsend and provided us with a target list from their side scan sonar survey, and also contracted with Fenn Enterprises to do a survey of Kilisut harbor for our project. Because there were only 4 recoverable pots in Kilisut, we agreed to remove 33 pots from the deepest areas of Port Townsend bay.

Jason Morgan of the NW Straits Foundation was able to join us on the boat for two days. This was a mutually beneficial education experience. The Foundation is considering purchasing a couple of ROV's to use in their derelict gear removal programs. We were able to learn from Jason's decades of derelict crab pot removal, and he was able to learn about ROV operations from Ben Griner of Coastal Sensing and Survey.

#### 4.2 Participants

We were on the water removing crab pots from May 29<sup>th</sup> through June 1<sup>st</sup>.

- Jefferson MRC project participants:
  - Jeff Taylor – Project Co-lead
  - Tim Behrenfeld – Project Co-lead
  - Akeyla Behrenfeld – MRC representative
  - Troy McKelvey – MRC representative
  - Jon Waggoner – MRC representative
  - Carol Hasse – MRC representative

Date	MRC, NW Straits Foundation members and community members	Students
5/29/25	Jeff Taylor, Jason Morgan, Troy McKelvey	No students
5/30/25	Jon Waggoner, Jason Morgan, Madalyn Walker	2 students
5/31/25	Jeff Taylor, Akeyla Behrenfeld	2 students
6/1/25	Tim Behrenfeld, Carol Hasse	3 students

### 4.3 Area of Operation

In 2025 we operated in Port Townsend Bay, removing 33 pots from the deepest areas, and 4 pots from Kilisut Harbor. This may be the first time Kilisut Harbor has been scanned.

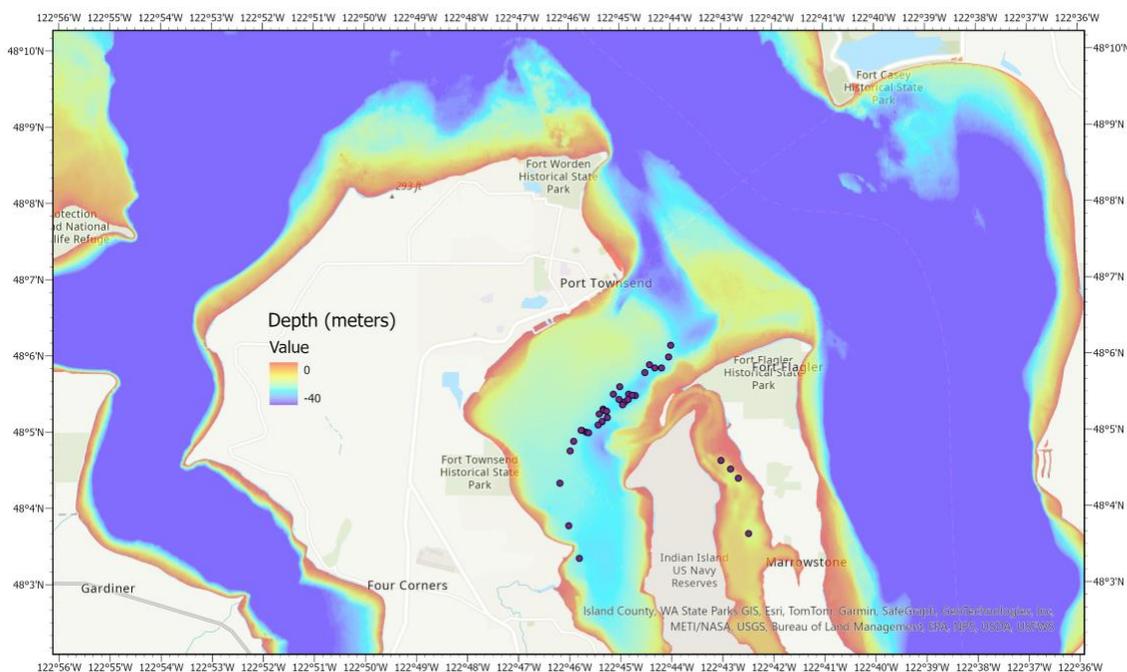


Figure 1: Location of removed crab pots in Port Townsend Bay and Kilisut Harbor

## 4. Project Methods/Actions

Removal of fishing gear requires permit from WDFW for derelict fishing gear removal and disposal, a scientific collection permit also from WDFW, and a coordination with tribes.

Before operating the ROV, a side scan sonar survey is done to locate the lost pots. This year this Northwest Straits Foundation contracted with Innerspace Exploration to survey Port Townsend Bay and Kilisut Harbor. We were given a target list with the GPS coordinates of pots to recover.

The targeted derelict crab pots are removed by a lift line hooked to the pot by the ROV. The boat is anchored near the lost pot using GPS. The ROV is equipped with an on-board multi-beam sonar, and a USBL (Ultra Short Baseline) transceiver that gives location relative to the boat. The ROV is controlled manually using a video game controller. Three monitors are used to navigate to the crab pot and attach a hook with a lift line back to the boat. The USBL shows the location of the ROV and the target crab pot. It is used to navigate directly to the crab pot. When close to the crab pot the attention is switch to the sonar screen. The sonar screen will show the distance from the ROV to the bottom and the distance and direction to the crab pot. When close enough to see the crab pot with the camera the video display is used to set a hook on the crab pot.

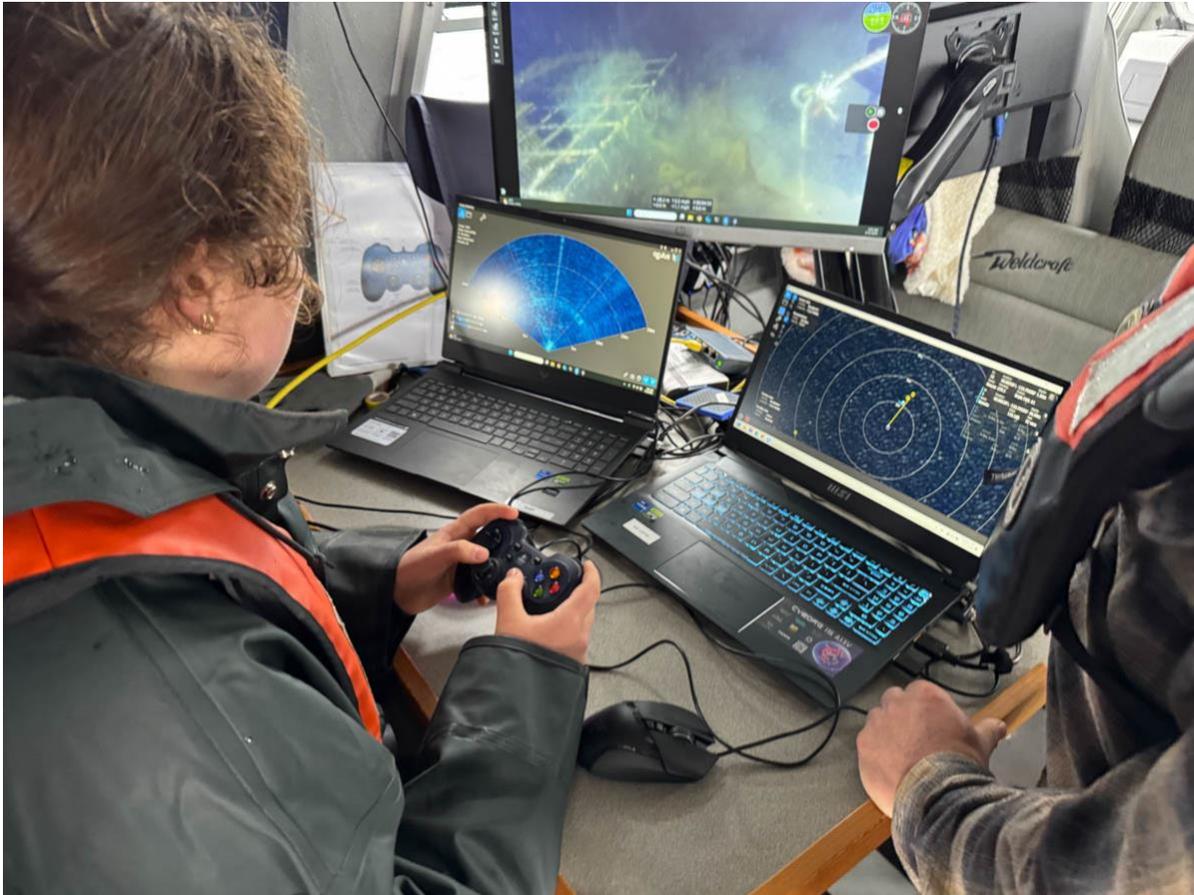
Once the line is attached tension is added to the line, the ROV releases the line and backs away while the crab pot is pulled to the surface using a winch.



*Figure 2: Mark Racine (CS&S) attaching the lift cable and getting ready to launch the ROV*



*Figure 3: Ben Griner teaching Akeyla Behrenfeld how to operate the ROV*



*Figure 4: Operating the ROV. The location of the ROV, boat, and target pot on lower right screen, sonar on lower left, and optical on upper screen*

Recovered crab pots were disposed of following a removal plan approved by Washington Department of Fish and Wildlife. If possible the recovered pots are returned to the owners, if the owner is not found the pots that are in good condition are given to Jefferson County Search and Rescue. Search and Rescue restores crab pots and sells them to fund their operation. Remaining pots are recycled, and remaining parts are taken to the land fill.



*Figure 5: Some of the recovered crab pots awaiting disposition*

## 5. Results

Between May 29<sup>th</sup> and June 1<sup>st</sup> 33 derelict crab pots were removed from Port Townsend Bay, and 4 from Kilisut Harbor, averaging just under 10 a day. This was with students operating the ROV without any previous experience. We were also operating in windy conditions with low underwater visibility. It is likely over 30 pots a day could be recovered with experience and better conditions.

None of the pots had identification and could not be returned to the owner. Seven pots were donated to Jefferson County Search and Rescue, and the rest were recycled.

### 5.1. Data Summary

- 37 derelict crab pots recovered
- 9 students operated the ROV
- 7 pots donated to Jefferson County Search and Rescue.

## 6. Lessons Learned

The use of ROV's to remove derelict fishing gear is increasing and has advantages over using divers. Community based crab pot removal is a viable option that can concentrate on local areas, but there are significant barriers.

- Using a ROV with sonar allows operation in very low visibility
- The use of onboard sonar and USBL greatly reduces the recovery time.
- A good winch is essential to clear all the pots. Some are stuck in the mud, and some are tangled together.
- We were able to operate in conditions that the divers could not.
- The equipment is expensive, and some parts are fragile.

## 7. Next Steps

Over the last four years the MRC's ROV project has demonstrated the viability of using ROVs and the community based derelict gear removal. This has grown from a feasibility experiment to a program that could be done on a large enough scale for local communities to keep their waters clear of derelict pots.

The next steps will be to try and find a group with the resources to partner with, or possibly take over the project. Minimum requirements would be access to a suitable vessel and the ability to get grants.

## Appendix A – Recovered Crab Pot Data

Gear Id	Project Name	Gear Type	Disposition	Removal Date	Technician	Vessel	Sub Location	Latitude (DD MM.MM)	Longitude (DD MM.MM)	Latitude (DD.DD)	Longitude (DD.DD)	
PT_085	Port Townsend 2025	CRAB POT	REMOVED	5/29/2025	Taylor	R/V Phoenix	Port Townsend	4805.468	12244.7583	48.091133	-122.745972	
PT_083	Port Townsend 2025	CRAB POT	REMOVED	5/29/2025	Taylor	R/V Phoenix	Port Townsend	4805.4631	12244.7017	48.091052	-122.745028	
PT_084	Port Townsend 2025	CRAB POT	REMOVED	5/29/2025	Taylor	R/V Phoenix	Port Townsend	4805.4648	12244.6982	48.09108	-122.74497	
PT_082	Port Townsend 2025	CRAB POT	REMOVED	5/29/2025	Taylor	R/V Phoenix	Port Townsend	4805.4805	12244.8276	48.091342	-122.747127	
PT_082A	Port Townsend 2025	CRAB POT	REMOVED	5/29/2025	Taylor	R/V Phoenix	Port Townsend	4805.4805	12244.8276	48.091342	-122.747127	
PT_103	Port Townsend 2025	CRAB POT	REMOVED	5/29/2025	Taylor	R/V Phoenix	Port Townsend	4805.4133	12245.019	48.090222	-122.750317	
PT_081	Port Townsend 2025	CRAB POT	REMOVED	5/29/2025	Taylor	R/V Phoenix	Port Townsend	4805.4822	12245.1279	48.09137	-122.752132	
PT_075	Port Townsend 2025	CRAB POT	REMOVED	5/29/2025	Taylor	R/V Phoenix	Port Townsend	4805.5793	12245.0005	48.092988	-122.750008	
PT_105	Port Townsend 2025	CRAB POT	REMOVED	5/29/2025	Taylor	R/V Phoenix	Port Townsend	4805.4143	12244.8398	48.090238	-122.74733	
PT_104	Port Townsend 2025	CRAB POT	REMOVED	5/29/2025	Taylor	R/V Phoenix	Port Townsend	4805.3779	12244.9097	48.089632	-122.748495	
PT_106	Port Townsend 2025	CRAB POT	REMOVED	5/30/2025	Waggoner	R/V Phoenix	Port Townsend	4805.3411	12244.9478	48.089018	-122.74913	
PT_065	Port Townsend 2025	CRAB POT	REMOVED	5/30/2025	Waggoner	R/V Phoenix	Port Townsend	4805.7642	12244.5103	48.09607	-122.741838	
PT_057	Port Townsend 2025	CRAB POT	NOT FOUND	5/30/2025	Waggoner	R/V Phoenix	Port Townsend	4805.8271	12244.3169	48.097118	-122.738615	
PT_058	Port Townsend 2025	CRAB POT	REMOVED	5/30/2025	Waggoner	R/V Phoenix	Port Townsend	4805.865	12244.4199	48.09775	-122.740332	
PT_065A	Port Townsend 2025	CRAB POT	REMOVED	5/30/2025	Waggoner	R/V Phoenix	Port Townsend	4805.7642	12244.5103	48.09607	-122.741838	
PT_056	Port Townsend 2025	CRAB POT	REMOVED	5/30/2025	Waggoner	R/V Phoenix	Port Townsend	4805.8242	12244.1846	48.09707	-122.73641	
PT_047	Port Townsend 2025	CRAB POT	REMOVED	5/30/2025	Waggoner	R/V Phoenix	Port Townsend	4805.9709	12244.0439	48.099515	-122.734065	
PT_039	Port Townsend 2025	CRAB POT	REMOVED	5/30/2025	Waggoner	R/V Phoenix	Port Townsend	4806.1235	12244.0015	48.102058	-122.733358	
PT_115	Port Townsend 2025	CRAB POT	REMOVED	5/30/2025	Waggoner	R/V Phoenix	Port Townsend	4805.2881	12245.333	48.088135	-122.75555	
PT_116	Port Townsend 2025	CRAB POT	REMOVED	5/30/2025	Waggoner	R/V Phoenix	Port Townsend	4805.2688	12245.3276	48.087813	-122.75546	
PT_120	Port Townsend 2025	CRAB POT	REMOVED	5/30/2025	Waggoner	R/V Phoenix	Port Townsend	4805.262	12245.2617	48.0877	-122.754362	
PT_121	Port Townsend 2025	CRAB POT	REMOVED	5/30/2025	Waggoner	R/V Phoenix	Port Townsend	4805.1768	12245.2476	48.08628	-122.754127	
PT_119	Port Townsend 2025	CRAB POT	REMOVED	5/31/2025	Taylor	R/V Phoenix	Port Townsend	4805.2249	12245.4106	48.087082	-122.756843	
PT_123	Port Townsend 2025	CRAB POT	REMOVED	5/31/2025	Taylor	R/V Phoenix	Port Townsend	4805.1235	12245.3525	48.085392	-122.755875	
PT_123A	Port Townsend 2025	CRAB POT	REMOVED	5/31/2025	Taylor	R/V Phoenix	Port Townsend	4805.1235	12245.3525	48.085392	-122.755875	
PT_122	Port Townsend 2025	CRAB POT	REMOVED	5/31/2025	Taylor	R/V Phoenix	Port Townsend	4805.1208	12245.355	48.085347	-122.755917	
PT_122A	Port Townsend 2025	CRAB POT	REMOVED	5/31/2025	Taylor	R/V Phoenix	Port Townsend	4805.1208	12245.355	48.085347	-122.755917	
PT_133	Port Townsend 2025	CRAB POT	REMOVED	5/31/2025	Taylor	R/V Phoenix	Port Townsend	4805.0081	12245.7632	48.083468	-122.76272	

PT_132	Port Townsend 2025	CRAB POT	REMOVED	5/31/2025	Taylor	R/V Phoenix	Port Townsend	4805.0107	12245.7505	48.083512	-122.762508	
PT_130	Port Townsend 2025	CRAB POT	REMOVED	5/31/2025	Taylor	R/V Phoenix	Port Townsend	4804.9858	12245.6685	48.083097	-122.761142	
Gear Id	Project Name	Gear Type	Disposition	Removal Date	Technician	Vessel	Sub Location	Latitude (DD MM.MM)	Longitude (DD MM.MM)	Latitude (DD.DD)	Longitude (DD.DD)	
PT_142	Port Townsend 2025	CRAB POT	REMOVED	5/31/2025	Taylor	R/V Phoenix	Port Townsend	4804.8638	12245.9077	48.081063	-122.765128	
PT_124	Port Townsend 2025	CRAB POT	REMOVED	6/1/2025	Behrenfeld	R/V Phoenix	Port Townsend	4805.0784	12245.4312	48.08464	-122.757187	
PT_143	Port Townsend 2025	CRAB POT	REMOVED	6/1/2025	Behrenfeld	R/V Phoenix	Port Townsend	4804.7417	12245.9814	48.079028	-122.766357	
PT_014	Port Townsend 2025	CRAB POT	REMOVED	6/1/2025	Behrenfeld	R/V Phoenix	Port Townsend	4804.3196	12246.1802	48.071993	-122.76967	
PT_007	Port Townsend 2025	CRAB POT	REMOVED	6/1/2025	Behrenfeld	R/V Phoenix	Port Townsend	4803.761	12246.0127	48.062683	-122.766878	
PT_150	Port Townsend 2025	CRAB POT	REMOVED	6/1/2025	Behrenfeld	R/V Phoenix	Port Townsend	4803.332	12245.8076	48.055533	-122.76346	
KIL_02	Port Townsend 2025	CRAB POT	REMOVED	6/1/2025	Behrenfeld	R/V Phoenix	Port Townsend	4804.6069	12243.0264	48.076782	-122.717107	
KIL_01	Port Townsend 2025	CRAB POT	REMOVED	6/1/2025	Behrenfeld	R/V Phoenix	Port Townsend	4804.4941	12242.8374	48.074902	-122.713957	
KIL_03	Port Townsend 2025	CRAB POT	REMOVED	6/1/2025	Behrenfeld	R/V Phoenix	Port Townsend	4804.3726	12242.688	48.072877	-122.711467	
KIL_04	Port Townsend 2025	CRAB POT	REMOVED	6/1/2025	Behrenfeld	R/V Phoenix	Port Townsend	4803.6482	12242.4868	48.060803	-122.708113	

Gear Id	Min Depth (ft)	Habitat Type	Gear Condition	How Found	Investigated Desc	Owner Id	Fishery	Escape Cord Used	Escape Cord Intact	Weight
PT_085	95	Sand	GOOD	SS	INTACT-STUFFED	NONE	TRIBAL	Y	N	Y
PT_083	95	Sand	FAIR	SS	INTACT	NONE	SPORT	Y	N	Y
PT_084	95	Sand	FAIR	SS	INTACT	NONE	SPORT	Y	N	Y
PT_082	95	Mud/Sand	POOR	SS		NONE	SPORT	Y	Y	Y
PT_082A	95	Mud/Sand	POOR	ROV		NONE	SPORT	Y	N	Y
PT_103	82	Mud	Dilapidated	SS	No Bottom	NONE	SPORT			NA
PT_081	88	Mud	Dilapidated	SS		NONE	SPORT			NA
PT_075	91	Mud	POOR	SS		NONE	COMM	Y	Y	N
PT_105	82	Mud	GOOD	SS		NONE	SPORT	Y	Y	Y
PT_104	88	Mud	POOR	SS		NONE	SPORT	Y	N	Y
PT_106	90	Sand	BAD	SS		NONE	SPORT	Y	N	N
PT_065	88	Sand	Dilapidated	SS		NONE	SPORT	NA	NA	UK
PT_057										
PT_058	75	Sand	Dilapidated	SS		NONE	COMM	Y	N	UK
PT_065A	82	Sand	Dilapidated	SS	broken up	NONE	SPORT	Y	N	UK
PT_056	78	Sand	FAIR	SS		NONE	COMM	Y	N	Y
PT_047	72	Sand/Silt	FAIR	SS		NONE	COMM	Y	N	UK
PT_039	70	Sand/Silt	FAIR	SS		NONE	SPORT	Y	N	Y
PT_115	75	Sand	Dilapidated	SS	bent	NONE	SPORT	Y	N	UK
PT_116	75	Sand/Silt	Dilapidated	SS		NONE	SPORT	Y	N	Y
PT_120	78	Sand/Silt	POOR	SS		NONE	SPORT	Y	N	UK
PT_121	78	Sand/Silt	FAIR	SS		NONE	SPORT	Y	N	UK
PT_119	85	Sand	NEW	SS		NONE	COMM	Y	Y	Y
PT_123	88	Sand	GOOD	SS	string of 4	NONE	COMM	Y	Y	Y
PT_123A	88	Sand	GOOD	Attached	string of 4	NONE	COMM	Y	N	Y
PT_122	88	Sand	GOOD	SS	string of 4	NONE	COMM	Y	N	Y
PT_122A	88	Sand	GOOD	Attached	string of 4	NONE	COMM	Y	N	Y
PT_133	88	Sand	FAIR	SS		NONE	COMM	Y	N	Y

PT_132	88	Sand	FAIR	SS	Escape stuck ½ open	NONE	SPORT	Y	N	Y
PT_130	88	Sand	POOR	SS		NONE	SPORT	Y	N	Y
<b>Gear Id</b>	<b>Min Depth (ft)</b>	<b>Habitat Type</b>	<b>Gear Condition</b>	<b>How Found</b>	<b>Investigated Desc</b>	<b>Owner Id</b>	<b>Fishery</b>	<b>Escape Cord Used</b>	<b>Escape Cord Intact</b>	<b>Weight</b>
PT_142	72	Sand	FAIR	SS	Escape stuck ½ open	NONE	SPORT	Y	N	Y
PT_124	80	Silt/Mud	POOR	SS		NONE	SPORT	Y	N	N
PT_143	80	Silt/Mud	FAIR	SS		NONE	SPORT	Y	N	N
PT_014	80	Silt/Mud	GOOD	SS		NONE	SPORT	Y	N	Y
PT_007	80	Silt/Mud	POOR	SS		NONE	COMM	Y	N	Y
PT_150	80	Silt/Mud	Dilapidated	SS	broken up	NONE	COMM	Y	N	Y
KIL_02	22	Silt/Mud	GOOD	SS		NONE	SPORT	Y		Y
KIL_01	22	Silt/Mud	POOR	SS		NONE	SPORT	Y		Y
KIL_03	22	Silt/Mud	POOR	SS		NONE	SPORT	Y		N
KIL_04	22	Silt/Mud	FAIR	SS		NONE	SPORT	Y		N