Examining Functional Utility of Line-Less Fishing

CRAB RAFT

6IMDC
San Diego, CA
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LOBSTER RAFT

Richard Riels
Our Organization
Issue and Contributing Causes
Solutions and Challenges
Our Current Plan
Future Steps
Sea Mammal Education Learning Technology Society

SMELETS


- Develop engineered solutions to solve environmental challenges.
- Partnering nationally with marine rescue and conservation groups.
- Educating about challenges facing our oceans and inspire a new generation of students.
- Conservation Engineering.
Interaction with vertical line

Image courtesy of WHOI
Entangled North Atlantic Right Whale
CRAB RAFT: Development of Remote, Line-Free Crustacean Fishery Systems to Reduce Marine Mammal Entanglements

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ABSTRACT

Lost line and fishing gear impacts global marine mammal populations, as commercial and recreational buoy set bottom fishing pots are easily lost and damaged. Both intact and damaged pots can result in entanglement, trap loss, marine debris and by-catch. While this is a global problem, a large amount of research has focused on the impacts of entanglement of Atlantic Right whales. Research has demonstrated that the majority of Atlantic Right whale deaths are attributed to entanglement (1).

We have developed a patent pending line-free fishing system, based on the integration of underwater telemetry, active GPS monitoring, autonomous flotation equipment and robust electronics. Combined, this gear has the potential to reduce the navigational hazards for marine life and shipping, and improve reliability of commercial and recreation fishing equipment. This reusable, and rechargeable line-free fishing system mounts directly to existing pots.

The novel integration of electronic equipment with existing fishing technology improves fishing opportunities by opening up rocky and challenging fisheries that have been previously inaccessible. Line-free fishing equipment allows for improved recovery of equipment and reduced marine debris.

Initial prototype models have provided mid-depth data and encouraging deployment of commercially available systems with improved telemetry and recovery equipment.

BACKGROUND AND RATIONALE

- Commercial and recreational fishing gear contributes to marine mammal entanglements, placing stress on susceptible populations
- Development and use of line-less gear will reduce entanglements, gear loss, by-catch, and marine debris

PRELIMINARY LINE-LESS CRAB POT DESIGN

CONCLUSIONS

CRAB RAFT technology deployment will reduce marine mammal entanglement, marine debris and gear loss.

The primary goal of this research is to determine the efficacy of line-free bottom set fishing as a means to reduce negative interactions between human industry and sea mammal habitats. Through intensive research, preliminary testing and open water development, SMELTS has come to the conclusion that utilization of line-free bottom set fishing is a technology which, not only reliable, has the potential to provide an economical alternative to traditional methods of lifting and recovering standard crustacean traps from the sea floor. Integrating the innate abilities and proven reliability of commercially available lift bags, underwater telemetry, sealed solid state electronic components, standard pneumatics and compressed (refillable) gas cylinders will provide economic options for recreational and commercial fishing in sensitive marine habitat. With no busy lines to snare and entangle marine life, this system, developed to an economy of scale, will dramatically reduce the potential for cetacean, turtle and pinniped entanglements. Additional benefits of this system include providing theft-proof, unattended crustacean fishing systems, removing navigational hazards for recreational and commercial shipping and allowing access to rocky fisheries.

Initial testing and deployment of prototype line-free crustacean fishing systems have proved successful and merit further development. Assessing pre-production and production level options will position this technology for broader development, proving recreational and commercial product lines.

REFERENCES


Acknowledgments

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Contact Information

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Figure 1. Crustaceans and pinnipeds trapped in line and marine debris. Buoy-set bottom fishing can result in trap loss and by-catch. Figures courtesy of NOAA and Cascadia Research Collective.

Figures 2. Preliminary design of CRAB-RAFT, an attached floating device for remote, line-less crustacean fishing. Prototype of preliminary line-less crab pot (right).

Figure 3. Next generation prototype: all electronic, mechanical and pneumatic components enclosed in lift bag. Enclosure of all components in the bag enables ease of attachment, handling and refilling of gas cylinders for lift.

CCS Image. Taken under Canadian research license.
Fisherman sends acoustic signal from vessel transducer to bottom set gear. Gear receiver responds and opens valve allowing pressurized air to inflate lift bag. Gear ascends from sea floor, fisherman hauls gear and removes catch. Gear module is reset and re-baited and redeployed.
Dungeness Crab Gear
Lobster Gear
Derelict Gear Litters the Oceans
Benefits of Line-Less fishing

- No Entanglement potential
- Inflation module does the work
- Reduced trap loss
- Reduced marine debris
- Reduced damage to benthic environments
- Reduced occupational hazards
- No poaching
- No vessel interaction with line & buoy
- No visual pollution
- No depth to surface/Line ratio issues
Challenges of Line-Less fishing

- Currently Illegal
- Cost of development
- Confidence of Fishermen & Regulatory Agencies
- Drift potential
- Anthropogenic sound
- Adaptation to new technology
- Additional equipment required
Our Resources

- Engineering
- Manufacturing
- Rapid Prototyping
- Project Management
- Machining Capacity
- Licensed Captain
- Research Vessel
- Experienced Team
Autumn 2017 – Testing Begins
Thank You