# Lessons Learned - Piloting an Automatic Squid Jigging Machine in Southern New England

*Dr. N.David Bethoney*

*Mid-Atlantic Fisheries Management Council*

*February 2023 Council Meeting, February 9, 2023*

# Project Team

**Research Staff**

Thomas Heiman

Noelle Olsen

Me

**Advisory Team/co-Investigators**

Katie Almeida

Jason Didden

Mike Roderick

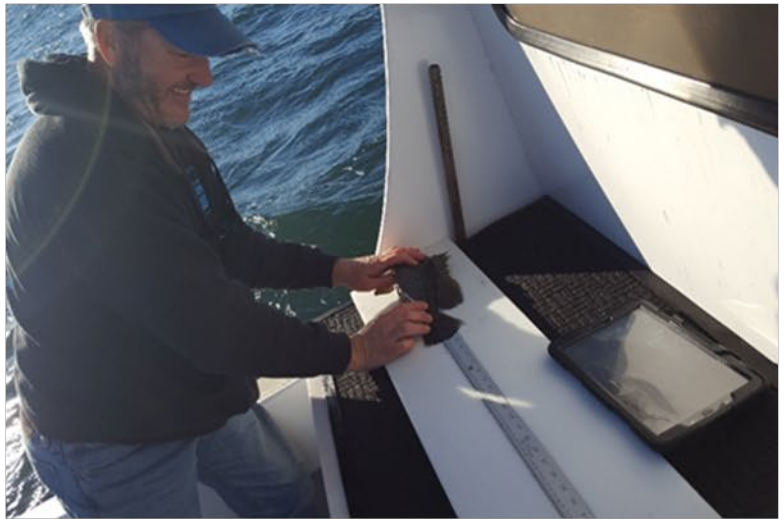
CFRF Commercial Fisheries Research Foundation

the Town Dock®

Mid-Atlantic Fishery Management Council

# What is CFRF?

***A non-profit, private foundation established by commercial fishermen that promotes sustainable fisheries through collaborative research and education.***



# Where is CFRF?


Commercial Fisheries
Research Foundation

Hotel Washington

# Vessels: Captains, Crews, Owners

## Johan Crab and American Lobster

F/V Anna Mary – Montauk, NY
F/V Barbara Ann- Point Judith, RI
F/V Catherine Ann - Newport, RI
F/V Carol Coles- Newington, NH
F/V Dilligaf, Scituate, MA
F/V Direction - Fairhaven, MA
F/V Erica Knight - Point Judith, RI
F/V Endeavour - Newport, RI
F/V Excalibur - Newport, RI
F/V Gladys Elaine - Newington, NH
F/V Karen Ann - Point Judith, RI
F/V Kristin & Michael - Portland, ME
F/V Linda and Laura - Block Island, RI
F/V Miss Julie - Sandwich, MA
F/V Nathaniel Lee - Newport, RI
F/V Rachel Leah - Newington, NH
F/V Revolution - New Bedford, MA
F/V Select - Point Judith, RI
F/V Terri-Ann - Sandwich, MA
F/V Timothy Michael - Newport, RI
F/V Virginia Marie - Sandwich, MA

## Sea Scallops

F/V Brooke C - Point Judith, RI
F/V Harvest Moon- Point Judith, RI
F/V Mister G - Point Judith, RI
F/V Karen Elizabeth - Point Judith, RI
F/V Yankee Pride - Point Judith, RI
F/V Georges Banks- New Bedford, MA
F/V Clean Sweep - Provincetown, MA
F/V Midnight Our - Harwich, MA
F/V Northern Light - Portland, ME
F/V Glutton- Provincetown, MA

## Black sea bass

F/V Sweet Misery - Newport, RI
F/V More Misery - Newport, RI
F/V Johnny B - Portsmouth, RI
F/V Laura Lynn - Point Judith, RI
F/V Matrix - Wickford, RI
F/V Lucy Rose - Wickford, RI
F/V New Hope - Point Judith, RI
F/V Nancy Beth - Point Judith, RI
F/V Virginia BAE – Newport, RI
F/V [illegible] and Kerstin – Newport, RI
F/V Johnny B - Point Judith, RI
F/V Priority Too - Point Judith, RI
F/V Ragged Edge- Point Judith, RI
F/V Debbie Sue - Point Judith, RI
F/V Harvest Moon - Point Judith, RI
F/V X-Terminator - Little Compton, RI
F/V Catherine Ann - Newport, RI
F/V Blue Label – Newport, RI
F/V Savanna Paige – Cape May, NJ
F/V Ruthless – Cape May, NJ
F/V Brooke C – Point Judith, RI

## Whelk

F/V Elisabeth Mae – Vineyard Haven, MA
F/V Ragged Edge- Point Judith, RI
F/V Yes I am – West Greenwich, RI
F/V Bad Habit – Dartmouth, MA
F/V Johnny B - Newport, RI
F/V Rock & Roll – Edgartown, MA
F/V Peggy-B II – West Dennis, MA
F/V Haul-In – Bristol, RI

## Ghost gear

F/V Catherine Ann - Newport, RI
F/V Megan & Kelsey -Newport, RI
F/V Johnny B - Newport, RI

## Shelf

F/V Brooke C - Point Judith, RI
F/V Menemsha Rose- New Bedford, MA
F/V Finast Kind II - Tiverton, RI
F/V Excalibur - Newport, RI
F/V Mister G - Point Judith, RI

## Squid

F/V Miss Edi- Point Judith, RI
F/V Hadley Ruth - Point Judith, RI

## Wind Farm Surveys

F/V Amelia Anne - Point Judith, RI
F/V Ashley Anne II - Point Judith, RI
F/V Erica Knight- Point Judith, RI
F/V Harvest Moon- Point Judith, RI
F/V Mister G - Point Judith, RI
F/V Cailyn & Maren - Little Compton, RI
F/V More Misery- Newport, RI

# Why interested: Global Picture



Japanese flying squid: 1.2 billion pounds in landings annually

Tasmanian arrow squid fishery: About 2 million pounds annually

# Why interested: Regional Picture

Stalled past efforts

Coonamessett Farm Foundation

Oceanic Squid Fishery Development

A report prepared by:

Captain Kenneth Thorsted
Captain Melvin Redfearn
K and T Fishing Corporation
2 Middle Street
Fairhaven, MA 02719

and

Coonamessett Farm Foundation, Inc

**Experimental Jigging for Squid off the Northeast United States**

DOUGLAS LONG and W. F. RATHJEN

**Introduction**

Light attraction jigging is a fishing technique specifically developed for catching squid. Jigging for squid is one of the most important methods used in coastal squid fisheries in Japan. In Japan about 95 percent of the common squid, *Todarodes pacificus*, which represents a major part of the squid catch, is caught by jigging (Yajima and Mizugi, 1976).

In North America there has been a traditional fishery for squid in Newfoundland where recent catches have approached 50,000 t annually[1]. Experimental squid fishing using jigging and light attraction has also been conducted in nearshore New England situations through the New England Fisheries Development Program (Amaral and Carr, 1980) and in the Gulf of Mexico (Rathjen et al., 1979). During 1978 and 1979 the Canadian Government sponsored commercial level demonstration fishing for squids using jigs in the waters east of Nova Scotia. Early reports of this experience suggested substantial catches could be made on a regular basis[2].

In 1973 the Japan Marine Fishery Resource Research Center sent the RV *Hoyo-Maru No. 51* followed by the RV *Hoyo-Maru No. 63* in 1974 and 1975 to conduct exploratory squid jigging from Cape Hatteras to the Grand Banks. Fishing south of Georges Bank along the edge of the continental shelf yielded 100,475 kg (227,645 pounds) of *Illex illecebrosus* in 112 days of fishing (Ishikawa and Sato, 1976). These catches were taken in July and September of 1973 and 1974, respectively.

The Polish Deep Sea Fisheries Company Odra equipped three of their vessels with Japanese squid jigging gear to conduct exploratory fishing. Their investigations began in May near the Falkland Islands in the South Atlantic. Successful catches of *Illex argentinus*, with daily catches in excess of 8,000 kg (17,600 pounds) were made. Each vessel spent about 45 days working there, after which two of the vessels proceeded to the Fishery Conservation Zone (FCZ) off the U.S. northeast coast to investigate areas along the continental slope from east of Cape Henlopen to southeast of Cape Cod. The following is a presentation of observations of their squid jigging operations made while on board these Polish vessels during August and September 1979.

**Fishing Vessels and Gear**

The *Wigry SWT-172* (Fig. 1), built in 1962, is a 61-m (200-foot) side trawler of 792 gross tons powered by a 1,375 horsepower engine. The *Mazowsze SWT-193* is a 69-m (226-foot) B-23 class

Douglas Long is at 4259 West Avenue, Ocean City, NJ 08226. W. F. Rathjen is with the Fisheries Development Division, National Marine Fisheries Service, NOAA, P.O. Box 1309, Gloucester, MA 01931.

Figure 1.—Polish research vessel *Wigry*, 61 m long. Jigging gear is on the well deck.

[1] G. V. Hurley, Department of Fisheries and Oceans, St. John's, Nfld., Canada. Personal communication, Nov. 1979. See also Hurley (1982).

[2] Steve Lenarz, Fisheries Development Branch, Department of Fisheries and Oceans, P.O. Box 550, Halifax, Nova Scotia, Canada. Personal communication.



Recreational effort

Photo: Dave Monti EastBayRI

# Why interested: A Tool for Current Challenges

Access

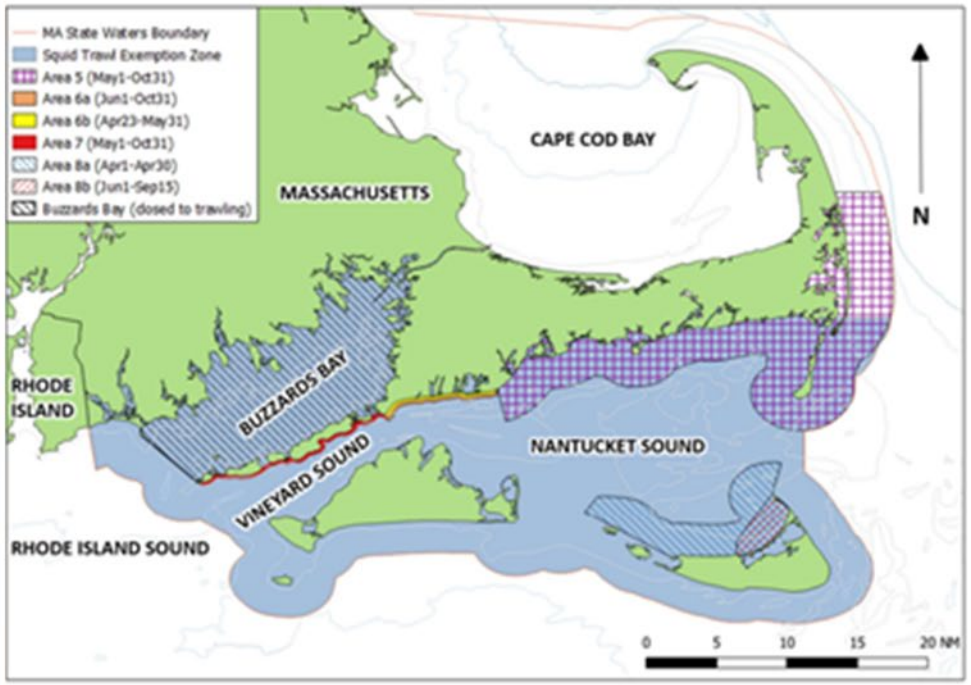




Figure 1 – Massachusetts small-mesh squid trawl exempted area
Source: *MADMF*

# Why interested: A Tool for Current Challenges

Bycatch Reduction and Utilization

Longfin squid quota reached in only 31% of trimesters

# Project Goals and Objectives

Overall goal: Pilot automatic jigging machinery
for commercially harvesting squid in U.S. Atlantic

The objectives were:

1) Use automatic squid jigging machinery aboard commercial F/Vs

2) Compare the bycatch rates, catch rates, and product output to concurrent squid trawl;

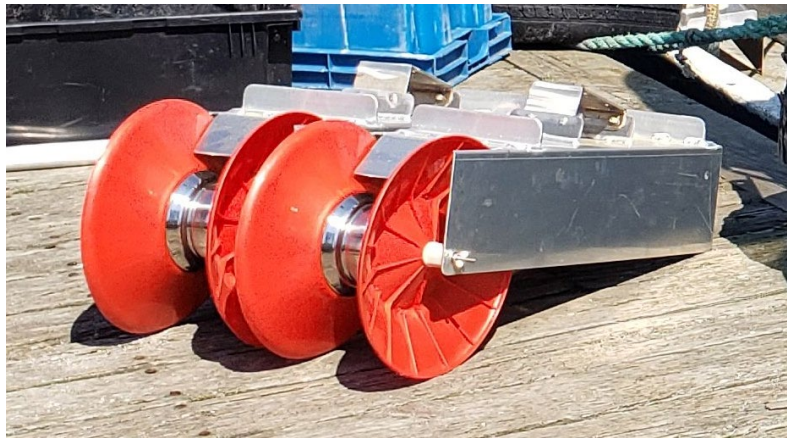
3) Estimate start-up costs;

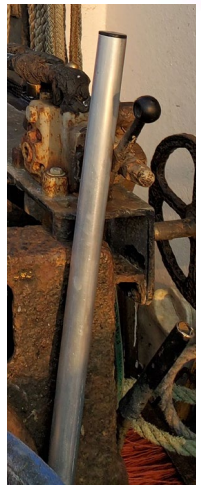
4) Communicate findings to the fishing and management communities

# Project Actions: First 6 months

## January 2021-June 2021

- Equipment Purchase
  - Belitronic BJ5000EX automatic jigging machines
    - Shipping delay
  - 150Watt LED Utility Lights
- Vessel recruitment
  - F/V Determination sinking
- Gear Installation
  - More complex than expected
- At-sea trials
  - Trawl during day, jig at night
  - Initial success then frustration



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# Project Actions: First 6 months

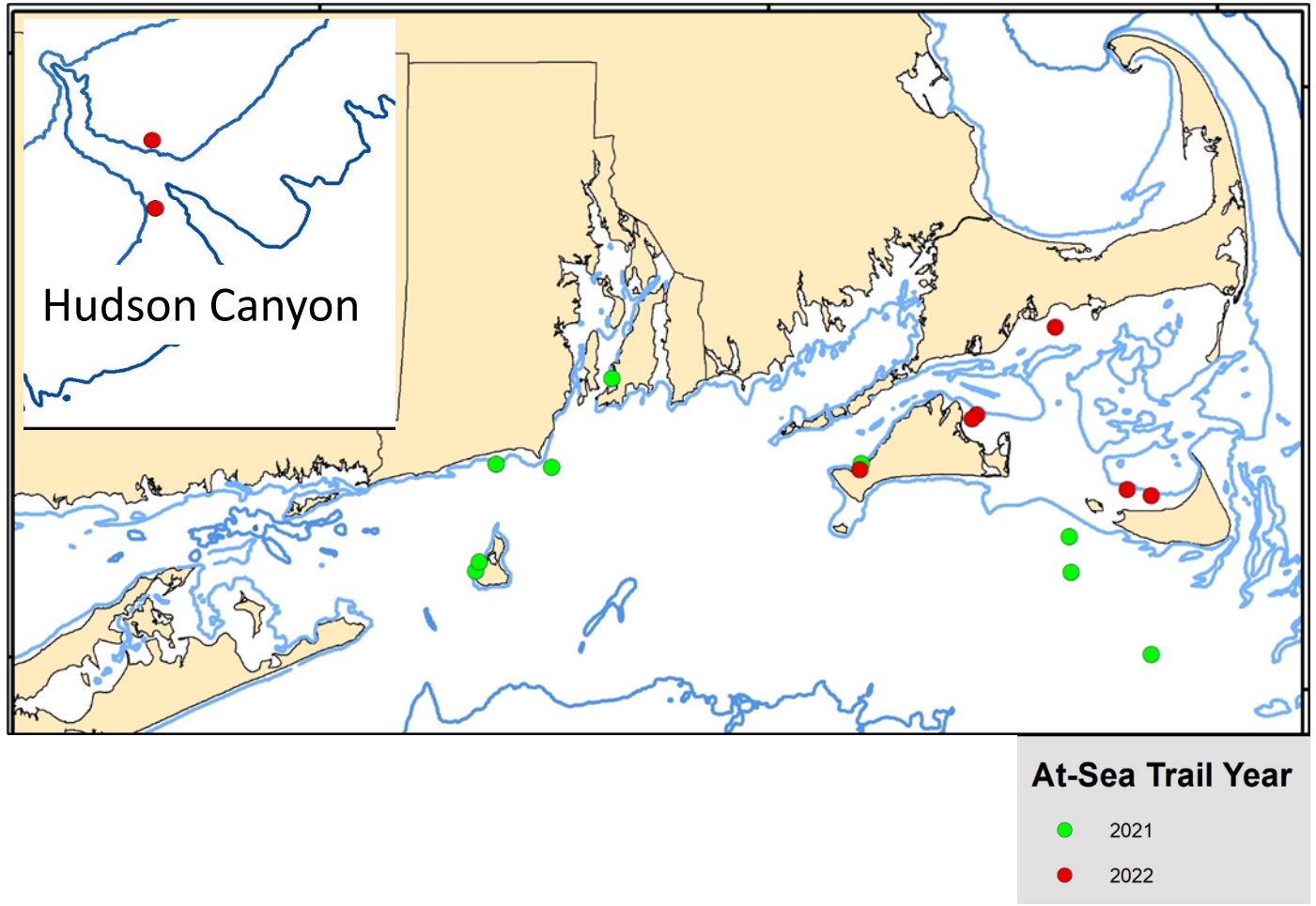
## July 2021-January 2022

- At-sea trials
  - Similar results
  - Operational improvements
  - Effort Reallocation
- Disaster
  - Sept. trip canceled - COVID
  - F/V Mattie and Maren sinks
    - Four machines lost
- Regroup
  - New Equipment
  - New Vessel

# Project Actions: Final Year

## January 2022-December 2022

- At-sea trials
  - Similar catch results
  - Little operation oversight
  - Off-shore and fall
- Gear Installation
  - Complexity reduced
- Workshop
  - 17 participants
  - RI and MA



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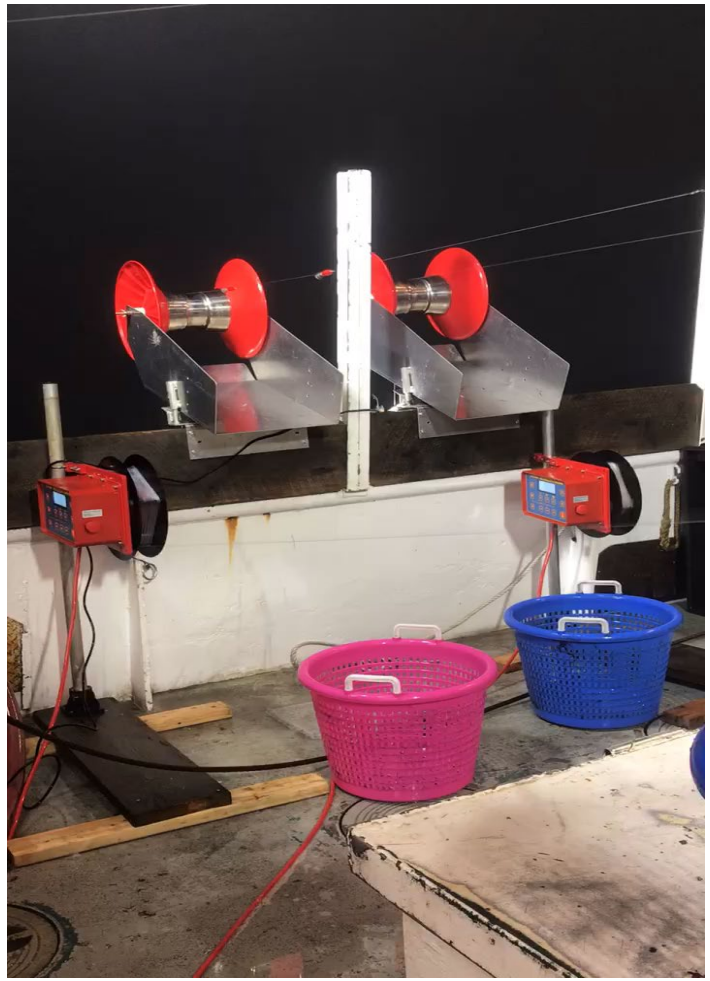

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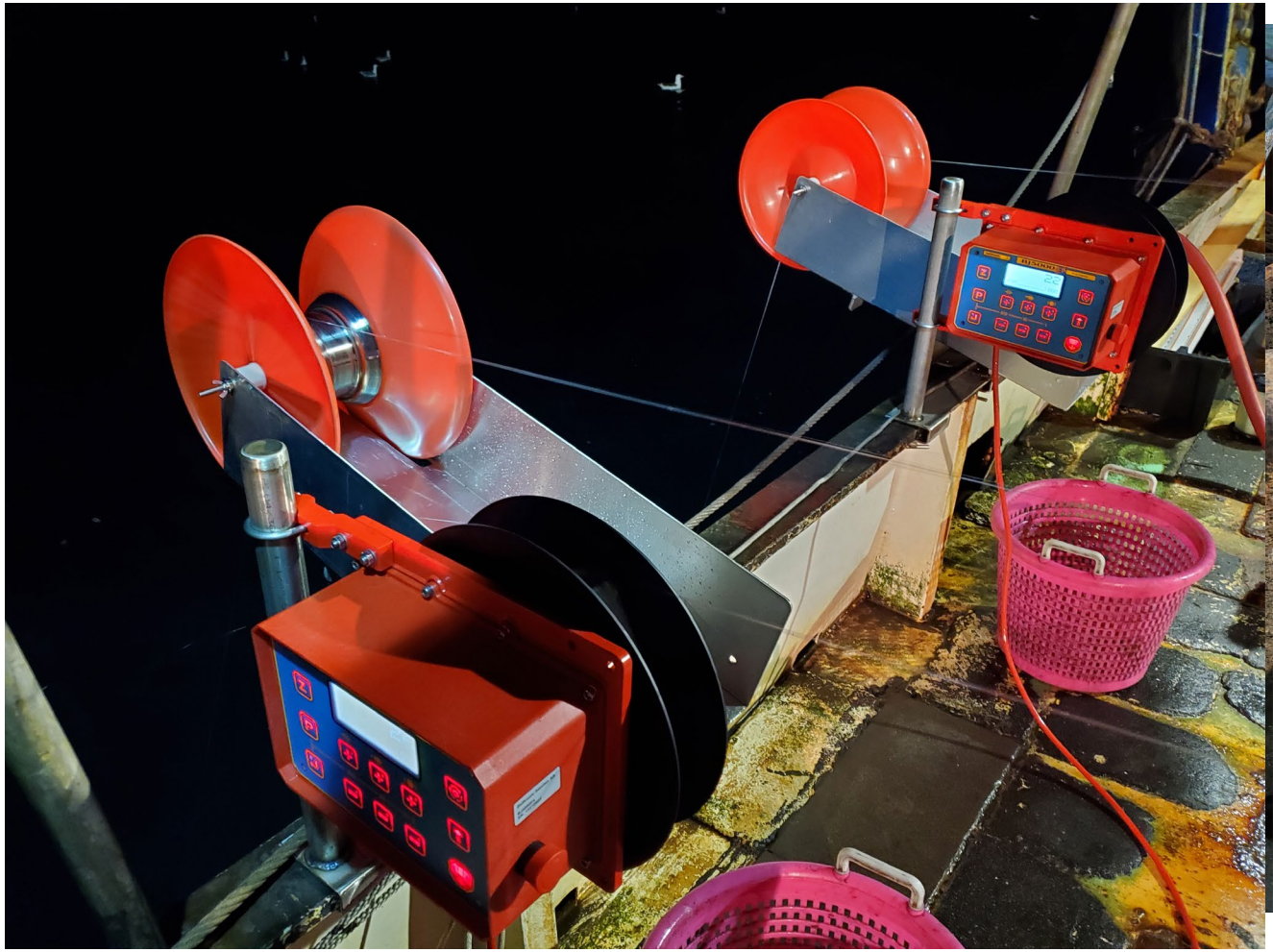
# Lessons Learned: Gear

- Cost per machine
  - Machine and kit - $3,850
  - Lights - $400
  - Mounting! -$950
  - Time
- Installation
  - Not ready to use
  - Each vessel different
  - Concepts carry over
- Operation
  - Can go awry quickly
  - Set up right – little attention needed



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  - Lights - $400
  - Mounting! **-$<50**
  - Time
- Installation
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# Lessons Learned: Catch

- Expectation
  - Squid function
    - Improving from baseline catch
  - Fine tuning
- Reality
  - Need “Squid function”
  - Operational focus
  - Lights got squid to vessel
- Lots of variables
  - Squid behavior
  - Shadow zone

First Trip/Day

| | |
|---|---|
| **Squid Caught** | 101 |
| **Weight** | 30 lbs |
| **Hours** | 3 |

# Lessons Learned: Catch

- Expectation
  - Squid function
    - Improving from baseline catch
  - Fine tuning
- Reality
  - Need “Squid function”
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  - Lights got squid to vessel
- Lots of variables
  - Squid behavior
  - Shadow zone

All other trips/days

| | |
|---|---|
| **Squid Caught** | 122 |
| **Weight** | 50 lbs |
| **Hours** | A lot more than 3 (19 DAS) |

# “Lessons Learned”: Catch

- No bycatch
  - Two lady crabs
  - Other fish around
- Squid rated “good”
  - poor, fair, good, excellent
- Rod jig “won” on a trip

# Lessons Learned: Interest

- Participating fishermen
  - Tried on own
  - See value
  - Don’t want to give up
- Regional interest
  - Local RI
  - Cape Cod
  - Gloucester
  - Nantucket

# Lessons Learned: Interest

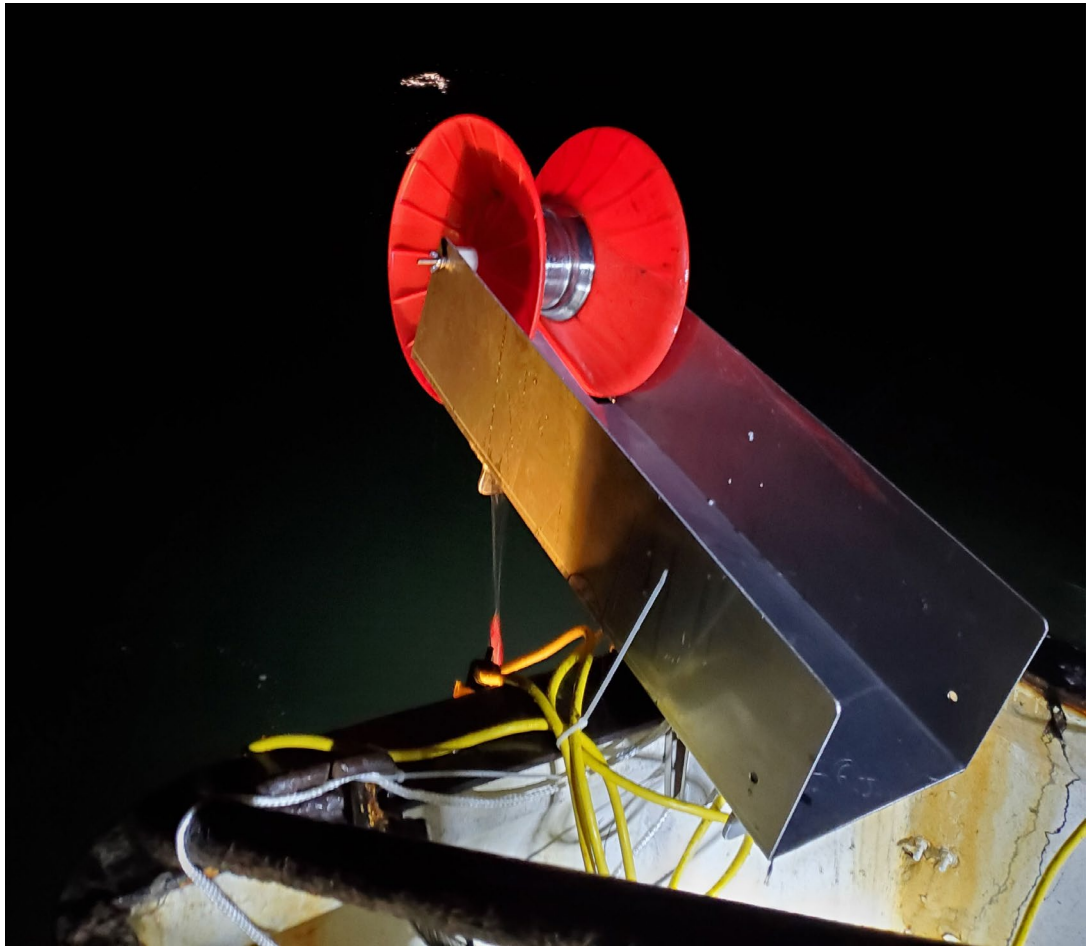






# Lessons Learned: Perseverance

- Low Morale
  - Failure: Part of research and development
- Major problems
  - Demonstrated growth



# Next Steps

- Knowledge exchange
- Seek expert industry input
  - International fishing fleets
  - Charter boats
- Japanese connections
  - Richard Yamada -> Industry connections
  - Hiro Uchida -> Fisheries Research and Education Agency
  - Lisa Hendrickson -> Japanese colleagues


**Japanese Scallop Farming in Maine**

Source: Mainebiz

# Thank you!

- Clarke and John Reposa owners/captains of the F/Vs Miss Edi, Hadley Ruth, and Mattie and Maren
- Crew of the vessels

## Funding Sources


- NOAA Fisheries Bycatch Reduction Engineer Program (BREP)
- Mid-Atlantic Fishery Management Council (MAFMC)



# Catch

- Beginners luck
- No landings of commercial significance
- Size range: 8-30cm mantle length
- Could outperform w/ R&R
- High quality squid
- No Illex caught

# Challenges: environmental & biological

**Environmental Factors**

- Moon Phases
- Tide
- Temperature
- Swell/wind
- Salinity
- Surface conditions

**Biological**

- Predation
  - Dolphins (Long Island Sound)
  - Seabirds
- Life/reproductive cycles