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## **FISHERMEN'S ADVISORY BOARD**

James Boyd  
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Mr. Boyd,

April 15, 2021

The following comments are submitted by the Fisherman's Advisory Board relative to The Rhode Island Coastal Resources Management Council's **Advanced Notice of Proposed Rulemaking: Rule Identifier: 650-RICR-20-00-1**.

Section (S)(1)(b) All Rhode Island commercial and recreational fisheries known to operate within a proposed submerged renewable energy cables project within state waters need to be clearly defined as stakeholders that will be collaborated with to minimize or eliminate potential adverse impacts. Recreational fisheries are not mentioned in the document, but they are important stakeholders, particularly in the area proposed as the West Passage Corridor.

Section (S)(1)(c) currently includes some groups/entities that shall be represented when designating members of the Cable Working Group, similar to the member composition laid out in CRMC's statutory creation language. This section fails to acknowledge and include recreational fishing and tourism-based fishing to align with the two-fold consideration of both elsewhere in the Ocean SAMP.

Section (S)(2)(g)(1) Target burial depth should be 6 feet, if 4 feet is maintained as the lower end of a range it needs to be clear that burial depth is 4 feet to the top of the cable.

Section (S)(2)(h) Cable monitoring should include video survey after the cable is buried and regularly after installation for the lifecycle of the project.

Section (S)(2)(i) A Certified Verification Agent (CVA) should be present during EMF monitoring during background measurements and annual monitoring. CVA should provide a report to CRMC.

Section (S)(2)(j) Fisheries monitoring plan should include two (2) full years prior cable installation, through the entirety of the construction period, and for two (2) years following the commencement of cable activation and operation. The fisheries monitoring plan should capture all four seasons of the year.

Section (S)(2)(j)(2) states that EMF levels shall be monitored "at least once annually." As the draft regulations also recognize the "current state of uncertainty in the magnitude of potential impacts to

marine organisms” from EMF (Section (S)(1)(g)), it is recommended that the specified monitoring occur more in the initial years of operation to develop a heightened understanding of the potential impacts, just as the regulations require monthly cable monitoring. “At least once” leaves the door open for developers, seeking to save money and protect profits, to simply conduct monitoring once per year.

Section (S)(3)(a) Should include consultation with the FAB in addition to RIDEM when identifying APC’s important to fisheries harvesting.

Section (S)(3)(a) the FAB should additionally be added as a group capable of identifying areas for APC designation. “As new information becomes available and the scientific understanding of the Ocean SAMP planning area evolves, the FAB may identify new areas with unique or fragile physical features, important natural habitats, or areas of high natural productivity for designation by the Council as Areas of Particular Concern or Areas Designated for Preservation.” Ocean SAMP § 11.9.4(H).

Section (S)(4) The West Passage Cable Corridor appears to conflict with at least 2 historic recreational fishing areas. Detailed Map 2 and Detailed Map 5. Additional consultation with RI’s Charter/Party and Recreational groups is needed to better characterize these areas.

**In addition, the following should also be included in this document:**

Any submerged renewable energy cables within state waters shall require a meeting between the Fisherman’s Advisory Board (FAB), the applicant, and the Council staff to discuss potential fishery related impacts, such as, but not limited to, project location, construction schedules, alternative locations, project minimization and identification of high fishing activity or habitat edges. For any state permit process for submerged renewable energy cables within state waters, this meeting shall occur prior to submission of the state permit application.

The Council shall prohibit any other uses or activities that would result in significant long-term negative impacts to Rhode Island’s commercial or recreational fisheries. Long-term impacts are defined as those that affect more than one or two seasons.

The Council shall require that the potential adverse impacts any submerged renewable energy cables within state waters may have on commercial or recreational fisheries be evaluated, considered, and mitigated. Mitigation is defined as a process to make whole those fisheries user groups that are adversely affected by submerged renewable energy cables within state waters. Mitigation measures shall be in consonance with the purposes of duly adopted fisheries management plans, programs, strategies and regulations of the agencies and regulatory bodies with jurisdiction over fisheries in the project area. Mitigation shall not be designed or implemented in a manner that substantially diminishes the effectiveness of duly adopted fisheries management programs.

Mitigation measures may include, but are not limited to, compensation, effort reduction, habitat preservation, restoration and construction, marketing, and infrastructure improvements. Where there are potential impacts associated with proposed projects, the need for mitigation shall be presumed. Negotiation of mitigation agreements shall be a necessary condition of any approval or permit of a project by the Council. Mitigation shall be negotiated between the Council staff, the FAB, the project developer, and approved by the Council. The reasonable costs associated with the negotiation, which may include data collection and analysis, technical and financial analysis, and legal costs, shall be borne by the applicant. The applicant shall establish and maintain either an escrow account to cover said costs of this negotiation or such other mechanism as set forth in the permit or approval condition

pertaining to mitigation. This policy shall apply to all submerged renewable energy cables within state waters.

Glacial moraines are important habitat areas for a diversity of fish and other marine plants and animals because of their relative structural permanence and structural complexity. Glacial moraines create a unique bottom topography that allows for habitat diversity and complexity, which allows for species diversity in these areas and creates environments that exhibit some of the highest biodiversity. The Council also recognizes that because glacial moraines contain valuable habitats for fish and other marine life, they are also important to commercial and recreational fishermen. Accordingly, the Council shall designate glacial moraines as Areas of Particular Concern.

The Council recognizes that moraine edges are important to fishermen. The FAB may identify edge areas that are important to fisheries within a proposed project location. The Council shall consider the potential adverse impacts of future activities or projects on these areas to Rhode Island's commercial and recreational fisheries. Where it is determined that there is a significant adverse impact, the Council will modify or deny activities that would impact these areas.

The finfish, shellfish, and crustacean species that are targeted by commercial and recreational fishermen rely on appropriate habitat at all stages of their life cycles. While all fish habitat is important, spawning and nursery areas are especially important in providing shelter for these species during the most vulnerable stages of their life cycles. The Council shall protect sensitive habitats where they have been identified.

The Council shall consult with the U.S. Coast Guard, the U.S. Navy, marine pilots, the FAB, fishermen's organizations, and recreational boating organizations when scheduling offshore marine construction activities. Where it is determined there is a significant conflict with season-limited commercial or recreational fisheries activities, recreational boating activities or scheduled events, or other navigation uses, the Council shall modify or deny activities to minimize conflict with these uses.

The Council shall require the assent holder to provide for communication with commercial and recreational fishermen, mariners, and recreational boaters regarding offshore marine construction or dredging activities. Communication shall be facilitated through a project website and shall complement standard U.S. Coast Guard procedures such as Notices to Mariners for notifying mariners of obstructions to navigation.

At present the most recent and updated commercial and recreational fishing GIS layer and the Renewable Energy Cable Corridor layer are on separate maps. It would be beneficial for these routes to be layered on the same map when assessing the appropriateness of the corridor from a fisheries perspective, and to provide comments on areas that may be suitable for APC designation.

A gear loss program has yet to be completed. We recommend a gear loss program be included as part of this document and the assent holder should have to agree to its conditions prior to approval.

Respectfully Submitted,

**The Rhode Island Fishermen's Advisory Board**



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Mr. Boyd,

April 15, 2021

These supplemental comments build upon comments previously submitted by the Fisherman's Advisory Board relative to The Rhode Island Coastal Resources Management Council's **Advanced Notice of Proposed Rulemaking: Rule Identifier: 650-RICR-20-00-1**. We appreciate the opportunity to offer these additional requests for your consideration.

Building on our previous comments relating to gear conflicts, historical precedent tells us that the developers have failed to take necessary precautions and they have continued to disrupt fixed gear and mobile gear fishing during geophysical survey work. The FAB requests that developers operating in state waters be required to notify the fishing industry in advance of surveying plans and to compensate affected fishermen to voluntarily vacate the area during surveying. There is precedent for this requirement from Europe. In the event that gear is disrupted, the FAB requests that developers be held to the gear loss framework (attached) that was developed by Dr. Tom Sproul in 2020. Finally, if it can be shown that the developer acted carelessly in violation of basic standards to avoid towing up gear (for example, having the observer asleep while still surveying overnight), the FAB requests that there be a financial penalty assessed, sufficiently large to deter this behavior.

Regarding the matter of decommissioning, the FAB requests that CRMC staff estimate the expected cost of decommissioning at the end of the project lease. The FAB requests that CRMC require the developer to post a surety bond or equivalent instrument (or combination thereof) backed by an insurance carrier rated A- or better by AM Best with the following terms:

- the bond shall cover 150% of CRMC staff's estimated cost of decommissioning, in nominal dollars of the year of the lease end;
- the bond shall be payable in full in the event the cable has not been removed within 24 months following the date end of the initial lease;
- the bond must be extended if any lease extension occurs;
- the bond can only be extended after CRMC has certified that any compensatory mitigation from the lease period has been arranged to be paid on a pro-rata basis for the lease extension period.

Regarding the matter of mitigation, the FAB requests that complete mitigation be required for any projects supplying power to the cable, regardless of the status of any Federal decision to the contrary arising from Federal consistency for said project.

Respectfully Submitted,

**The Rhode Island Fishermen's Advisory Board**

## A Framework for Estimating the Costs of Gear Loss (Jun 2, 2020)

Thomas Sproul, PhD

This document was produced based on interviews with CFRF, CFCRI, members of the FAB, members of the RI fishing industry, fishing industry suppliers, and consultation with RI DEM. It reflects the various contributors' expertise with respect to the costs incurred when gear is lost. I first describe a common framework for evaluating gear losses, and then identify specifics for each of four gear types: Gillnet, Pots/Traps, Scallop Dredge, Trawl.

### Cost Components

1. Cost of replacement gear.
2. Cost of replacement rigging (for backup gear and for replacement gear).
3. Mileage for needed onshore activities.
4. Crew wages/shares.
5. Opportunity cost or time cost, i.e., lost profits from prevented or impaired fishing activity.
  - a. *Prevented Fishing*. For mobile gears (scallop dredge and trawl), prevented fishing is time spent not fishing due possible forced return to shore, attempting to retrieve lost or damaged gear from the sea bottom, rigging up backup gear, obtaining replacement gear, and rigging up replacement gear when available. For fixed gears (gillnet and pots/traps) prevented fishing is time spent not fishing due to search for lost fixed gear, return to shore, obtaining replacement gear, obtaining replacement tags (a regulatory requirement), and rigging up replacement gear when available. In both cases, prevented fishing is assumed to save variable costs since no trips are made for the purposes of calculations here. Importantly, this is a simplification since the time spent attempting to recover gear and steaming to/from shore still incurs fuel and maintenance costs with no offsetting revenue available.
  - b. *Impaired fishing*. For mobile gears, impaired fishing is a percentage efficiency loss, due to using lower quality backup gear while waiting for replacement gear (all of the gear has to be ordered and custom made). For fixed gears, impaired fishing is a loss of revenues due to the missing or damaged gear until it is replaced. In both cases, impaired fishing does not save variable costs because trips are made as usual, but they are just less productive in terms of catch.
6. Interest on the claim amount while awaiting reimbursement.

### Suggestions for a Claims Handling Framework

1. Cost of replacement gear – receipts.
2. Cost of replacement rigging – receipts or below estimates.
3. Mileage for needed onshore activities – 55c/mile.
4. Crew profit shares – to be distributed by captain or vessel owner making the claim.
5. Opportunity cost – to be based on formulas and/or records as described below.
6. Interest – to be based on the rate faced by fishermen for a commercial line of credit. Typical rate for 2019 estimated by CFCRI to be 12%.

## **Cost of Replacement Gear**

Estimates are provided for Orsted's convenience in budgeting for claims costs. These are estimates only. Because of variation across vessels, it is recommended that these be handled by receipts for actual replacement gear, except in cases of replacement rigging which can be standardized.

### **1. Gillnet**

Replacement cost is about \$500 per net (or "panel") including \$450 for the net itself and another \$50 for replacement tags, rope, anchors and surface gear. Generally takes 6 weeks to get them made. A typical vessel carries 100-150 panels and deploys them in "sets" of 15-20 panels per set. Panels can be lost as a set or individually, since they have breakaways to protect marine mammals (unlike lobster pots/traps, in which an entire trawl is often lost/destroyed).

### **2. Pots/Traps**

Replacement at \$150 per pot/trap, including rope, buoys, spinners, etc. A lost "trawl" will contain 15-30 pots, and generally, after getting towed up the non-missing part of the trawl is damaged to the point of being taken out of service. This means 15-30 pots are generally lost at once, with replacement cost of \$2,250 - \$4,500. Generally takes 6 weeks to get them made. Many suppliers will have a minimum order of 75 pots. Per RI DEM, lobster boats will carry up to 800 pots for Lobster Management Area 2 in trawls of 15-30. The average boat carries 475.

### **3. Scallop Dredge**

Replacement of 10.5' dredge (typical for "dayboat" General Category scallopers under 60' in length, largest allowable under their Federal permit), bags and club stick at \$6,000 and another \$1,500 for wire/cable (5/8 inch). Larger boats (full time limited access/days at sea permit) have larger/heavier dredges (15' heavy duty dredge et al. costs about \$12K) and heavier/longer cables (\$4,250 for 1 1/8 inch at 30% longer, per dredge), and the largest boats will have two dredges and twice as much cable.

### **4. Trawl**

Loss of a "net" refers to net, tailpiece, chaff mat, cod end and rope (\$10-15K for boats under 65', \$14-20K for boats 65-85', \$18-25K for boats 85' and up, or \$30-40K for spectra knotless twine), whereas loss of the whole trawl includes loss of a net plus loss of ground cables (\$2,000-2,500), scissors and legs (\$2,000-3,000), doors (\$10-20K for largest trawls), and typically \$2,000 worth of wire/cable. Doors with sensors to transmit data back to the boat may cost an extra \$25K.

## **Cost of Replacement Rigging**

### **1. Gillnet**

Included in estimated cost of replacement gear above. Backup gear generally not available.

### **2. Pots/Traps**

Included in estimated cost of replacement gear above. Backup gear generally not available.

### 3. Scallop Dredge

Cost of replacement wire/cable is \$1,500 for dayboat scallopers (up to 60'). Backup gear commonly available. Larger boats (full time limited access/days at sea permit) will have a cost of up to \$4,250 per dredge for the heavier and longer wire, and may operate two dredges at once.

### 4. Trawl

For "loss of a net," use of backup net with new tailpiece, bull rope, cod end, etc. costs \$2,500 (boats under 65'/450HP), \$3,000 (boats 65-80'/450-700 HP), or \$4,000 (boats 80'/700HP and up). Other lost trawl components extra (see cost estimates above) and commonly available within one week.

## Opportunity Cost

As mentioned above, opportunity costs include prevented fishing and impaired fishing. Prevented fishing saves variable costs, but impaired fishing does not. For each gear type, the total opportunity costs can be evaluated given the time value (estimated below from DEM data), the number of days of prevented fishing, the number of weeks of impaired fishing, the percentage (or dollar) impairment for impaired fishing, and the variable cost rate (share of gross landings spent on fuel, maintenance, wire/rope/chain, ice, and bait).

The estimates below are developed from coast-wide Vessel Trip Reports (VTRs) for all RI/MA vessels by gear type. MA is included because otherwise there would be accidental exclusion of some known RI vessels who are listed as MA, and the vessels deployed in each fishery are very similar. The period analyzed is 2013-2017. All dollar values are in 2019 dollars converted using the Consumer Price Index numbers provided by the Minneapolis Fed (2020 losses can assume a 2.1% inflation over 2019). The VTR data do not contain verified landings (for permit/quota purposes), but contain hail weights, which is an estimate. Using data in two papers from Palmer and Wigley (2007, 2009), VTR hail weights for 2004 and 2005 were matched to observer landings in the US Northeast across seven species, plus monkfish (which has known reporting issues and conversion factors that don't bear testing). For these 14 data points, testing was conducted by t-test, by rank sum test and by regression fitting – none of the tests provided statistical evidence of any bias in using VTR hail weights in place of actual landings.

### 1. Gillnet

Variable cost rate: 10%

Prevented fishing per loss event: 2 days for the first affected set of panels, 1 day for each additional. Example: 1 set is damaged = 2 days, 3 sets damaged = 4 days. This is proposed to be standardized as if all vessels are deploying the typical 100-150 panels.

Impaired fishing per loss event: 6 weeks.

Impairment: Loss of 100% of revenue for lost panels only.



*Estimate from DEM data: \$2,848 gross stock per panel per year. This is conservative since it is based on assuming a maximum 150 panels per permit/vessel.*

Important Note for Fixed Gear: while attending to the shoreside activities related to gear loss, the remaining gear can be deployed at sea. However, the time costs for owner, captain and crew must still be accounted for as their time is diverted away from productive activities. These time costs are exactly valued at gross revenues net of variable costs, so we use the same prevented fishing calculation throughout.

Formulas:

Prevented Fishing Cost = Prevented Days x Gross Stock Per Panel x 150 Panels x (1 – Variable Cost Rate)

$$= \text{Prevented Days} \times (\$427,127 / 365) \times 0.90$$

$$= \text{Prevented Days} \times \$1,053$$

Impaired Fishing Cost = Impaired Weeks x Lost Panels x Gross Stock Per Panel

$$= \text{Lost Panels} \times \$2,848 \times 6 / 52$$

$$= \text{Lost Panels} \times \$329$$

Total Opportunity Cost = Prevented Fishing Cost + Impaired Fishing Cost

*Example: A gillnetter loses 3 panels across 2 sets in one event. The prevented fishing is calculated as 3 days. The claim calculation is:*

$$\text{Prevented Fishing Cost} = 3 \text{ Days} \times \$1,053 = \$3,159$$

$$\text{Impaired Fishing Cost} = 2 \text{ Lost Panels} \times \$329 = \$658$$

$$\text{Total Opportunity Cost} = \$3,817$$

## **2. Pots/Traps**

Variable cost rate: 25%

Prevented fishing per loss event: 3 days.

Impaired fishing per loss event: 6 weeks.

Impairment: Loss of 100% of revenue for lost/damaged trawls.

*Estimate from DEM data: \$506 gross stock per pot/trap per year.*

Important Note for Fixed Gear: while attending to the shoreside activities related to gear loss, the remaining gear can be deployed at sea. However, the time costs for owner, captain and crew must still be accounted for as their time is diverted away from productive activities. These

time costs are exactly valued at gross revenues net of variable costs, so we use the same prevented fishing calculation throughout.

Formulas:

Prevented Fishing Cost = Prevented Days x Gross Stock Per Trap x Total Traps Permitted x (1 – Variable Cost Rate) / 365

$$= 3 \times \$506 \times \text{Total Traps Permitted} \times 0.75 / 365$$

$$= \$3.12 \times \text{Total Traps Permitted (typically 400-800)}.$$

Impaired Fishing Cost = Impaired Weeks x Lost Trawls x Traps Per Trawl x Gross Stock Per Trap

$$= \text{Lost Trawls} \times \text{Traps Per Trawl} \times \$506 \times 6 / 52$$

$$= \text{Lost Trawls} \times \text{Traps Per Trawl} \times \$58$$

Total Opportunity Cost = Prevented Fishing Cost + Impaired Fishing Cost

*Example: A lobsterman loses 1 trawl comprised of 15 traps. He fished 800 pots in 2019.*

$$\text{Prevented Fishing Cost} = \$3.12 \times 800 = \$2,496$$

$$\text{Impaired Fishing Cost} = 1 \text{ Lost Trawl} \times 15 \text{ Traps Per Trawl} \times \$58 = \$870$$

$$\text{Total Opportunity Cost} = \$3,366$$

### 3. Scallop Dredge

Variable cost rate: 8%

Prevented fishing per loss event: 4 calendar days for all scallopers.

For Full-Time Limited Access (big boats), the breakdown is one lost full day at sea from their permitted 24 (for search with grapple, steaming back to port, returning to offshore fishing grounds), and 3 lost calendar days. The lost (permit) full day at sea can be estimated at 3,000 lbs times the scallop price, and the lost calendar days can be estimated as lost days operating as a large trawler outside of scallop season (essentially, this is what's lost when the end of their scalloping season is delayed in this fashion). We are assuming that a "limited access area" trip would not be the subject of gear loss related to this wind farm because of distance.

For General Category (smaller boats), they are constrained to catching their quota at a maximum rate of 600 lbs. per day. In the case of impaired fishing, this means that they should have the same landings but at the price of increased variable costs and time costs for owner, captain and crew. As with fixed gear, we will treat the time costs as gross revenues net of variable costs. In the case of prevented fishing, GenCat scallopers generally go out on back-to-back days or on alternating days. To simplify evaluation of prevented days, the 4 calendar days prevented fishing loss is assumed to be 2.0 days with 600 lbs. landed per day (1,200 lbs. total),

this includes the day in which the dredge is lost (zero landings) and one additional day at sea. This figure is not adjusted by season factors, it represents an annual average.

2019 Average Scallop Price for RI/MA Landings: \$11.10/lb. (per RI DEM)

Impaired fishing per loss event: 4 weeks.

Percentage impairment: 20% for General Category, 10% per dredge for Full-Time Limited Access.

Important Note for Scallop Dredges: Opportunity costs for scallopers vary significantly by season because of biological factors (size and abundance of shellfish) and across boats according to quota held (for General Category) and permit held (General Category vs. Full-Time Limited Access). General Category are able to fish year-round, while Full-Time Limited Access have specified number of trips to Access Areas (5 trips with 18,000 lbs. trip limit) and days at sea (twenty four 24-hour days, no trip limit). Baseline opportunity cost will thus need to vary by vessel based on past records and/or type of permit held. Note that if one of the 24 days at sea is prevented, there are only 23 remaining days in the season.

Formulas for Full-Time Limited Access (FTLA/larger, double-dredge boats):

$$\begin{aligned}
 \text{Prevented Fishing Cost} &= \text{Prevented Days} \times (1 - \text{Variable Cost Rate}) \times \text{Gross Stock Per Day} \\
 &= 0.92 \times (1 \text{ Days} \times 3\text{K lbs.} \times \$11.10/\text{lb.} + 3 \text{ Days} \times \text{Trawl Baseline}) \\
 &= 2,760 \text{ lbs.} \times \$11.10/\text{lb.} + 2.76 \text{ Days} \times \text{Trawl Baseline} \\
 \text{Impaired Fishing Cost} &= 5\% \text{ impairment} \times 4/13 \text{ season} (=4 \text{ weeks}/3 \text{ mos}). \\
 &= 5\% \times 23 \text{ days} \times 3\text{K lbs.} \times \$11.10/\text{lb.} \times 4/13 + \\
 &\quad 5 \text{ trips} \times 18\text{K lbs.} \times \$11.10/\text{lb.} \times 4/13 \times (0.08 + 0.25) \times (1/0.95 - 1) \\
 &= 1,542 \text{ lbs.} \times \$11.10/\text{lb.} \\
 \text{Total Opportunity Cost} &= \text{Prevented Fishing Cost} + \text{Impaired Fishing Cost} \\
 &= 4,302 \text{ lbs.} \times \$11.10/\text{lb.} + 2.76 \text{ Days} \times \text{Trawl Baseline} \\
 &= \$47,752.20 + 2.76 \text{ Days} \times \text{Trawl Baseline}
 \end{aligned}$$

Formulas for General Category (GenCat/smaller, single-dredge boats):

$$\begin{aligned}
 \text{Impaired Fishing Cost} &= \text{Impaired Weeks} \times \text{Baseline} \times \text{Impairment Percentage} \\
 &= 4 \text{ Weeks} \times \text{Baseline} \times 0.2 \\
 \text{Prevented Fishing Cost} &= 2.0 \text{ Days} \times 600 \text{ lbs./day} \times \$11.10/\text{lb.} \times (1 - \text{Variable Cost Rate}) \\
 \text{Total Opportunity Cost} &= \text{Impaired Fishing Cost} + \text{Prevented Fishing Cost}
 \end{aligned}$$

Baseline opportunity cost of fishing (GenCat): Gross 2019 Landings x Season Factor x \$11.10/lb.

Season Factors based on Share of Annual Landings (SF = Share divided by 25%):

<u>Season</u>	<u>Share</u>	<u>Season Factor</u>
Winter (Jan-Mar):	14%	0.54
Spring (Apr-Jun):	39%	1.57
Summer (Jul-Sep):	31%	1.24
Fall (Oct-Dec):	16%	0.65

\*Above is for lost/destroyed dredge. Damaged dredge requires half of the prevented fishing, repair cost of materials, and no impaired fishing.

*Example1: A General Category scalloper experiences a damaged dredge on July 1, 2019.*

$$\begin{aligned} \text{Prevented Fishing Cost} &= 1.0 \text{ Days} \times 600 \text{ lbs./day} \times \$11.10 / \text{lb.} \times 0.92 \\ &= \$6,127 \end{aligned}$$

$$\text{Impaired Fishing Cost} = \$0$$

$$\text{Total Opportunity Cost} = \$6,127$$

*Example2: A General Category scalloper loses a dredge on June 15, 2019. Gross landings for that permit in 2019 were 40,000 lbs.*

$$\begin{aligned} \text{Prevented Fishing Cost} &= 2.0 \text{ Days} \times 600 \text{ lbs. / day} \times \$11.10 \text{ lb.} \times 0.92 \\ &= \$12,254 \end{aligned}$$

$$\begin{aligned} \text{Baseline} &= 40,000 \text{ lbs.} \times \$11.10 / \text{lb.} \times ((16 \text{ June days} + 12 \text{ July days}) / 28) / 365 \\ &= 40,000 \text{ lbs.} \times \$11.10 / \text{lb.} \times (16 \times 1.57 + 12 \times 1.24) / (28 \times 365) \\ &= \$1,738 \text{ (per calendar day)} \end{aligned}$$

$$\begin{aligned} \text{Impaired Fishing Cost} &= 28 \text{ Days} \times 0.20 \text{ Impairment Factor} \times \text{Baseline} \\ &= 28 \times 0.20 \times \$1,738 \\ &= \$9,733 \end{aligned}$$

$$\text{Total Opportunity Cost} = \$21,987$$

*Example3: A Full-Time Limited Access scalloper loses a dredge. The vessel has non-scallop gross stock over 9 months totaling \$2.50 million for 2019.*

$$\begin{aligned} \text{Trawl Baseline} &= (1 / (1 - 3/365)) * \$2.5 \text{ MM} / (9/12) / 365 \\ &= \$9,208.10 \text{ per Day} \end{aligned}$$

$$\begin{aligned} \text{Total Opportunity Cost} &= 4,302 \text{ lbs.} \times \$11.10/\text{lb.} + 2.76 \text{ Days} \times \$9,208.10 \text{ per Day} \\ &= \$73,166.56 \end{aligned}$$

#### 4. Trawl

Variable cost rate: 24% for ice boats, 20% for RSW/freezer boats

Prevented fishing per loss event: 3 days for net, 7 days for full trawl.

Impaired fishing per loss event: 4 weeks.

Percentage impairment: 25%.

Important Note for Trawlers: Opportunity costs for trawlers are not as easily standardized as they are for other gear types. DEM data covers small trawlers making under \$100K per year, up to giant freezer boats that may gross \$5-10M per year. Gross stock is not easily standardized by vessel features because there is substantial variation even after accounting for length, horsepower, size of net, standard permit or sound permit, and primary species pursued. The formulas below were generated to standardize the claims approach, but they still require documentation for each vessel by historical records.

Baseline opportunity cost of fishing: Historical Gross Stock x Adjustment Factor (AF).

*Estimate from DEM data: 2019 gross stock for trawlers was not found to be statistically different from their 2013-2017 average. This means that Historical Gross Stock can just be 2019 landings (provided by trawlers' documentation) and the Adjustment Factor just has to account for the fact that the reported 2019 landings are net of a loss. **This means the adjustment factor and resulting baseline have to be calculated at the end.** For calculations below, we will assume the baseline opportunity cost of fishing is an annual value.*

Formulas:

$$\text{Prevented Fishing Cost} = \text{Prevented Days} \times \text{Baseline} \times (1 - \text{Variable Cost Rate}) / 365$$

$$\text{Impaired Fishing Cost} = \text{Impaired Weeks} \times \text{Baseline} \times \text{Pct Impairment} / 52$$

$$\text{Total Opportunity Cost} = \text{Prevented Fishing Cost} + \text{Impaired Fishing Cost}$$

*Example1: A trawler (ice boat) loses a full trawl. Gross stock for 2019 was \$600,000.*

$$\text{Prevented Fishing Cost} = \text{Baseline} \times 0.76 \times 7/365$$

$$= \text{Baseline} \times 0.014575$$

$$\text{Impaired Fishing Cost} = \text{Baseline} \times 0.25 \times 4 / 52$$

$$= \text{Baseline} \times 0.019231$$

$$\text{Total Opportunity Cost} = \text{Baseline} \times (0.014575 + 0.019231)$$

$$= \text{Baseline} \times 0.033806$$

$$= \$600,000 \times 0.033806 / (1 - 0.033806) = \$19,598$$

*Example2: A trawler (RSW boat) loses a net. Gross stock for 2019 was \$900,000.*

$$\text{Prevented Fishing Cost} = \text{Baseline} \times 0.80 \times 3/365$$

$$= \text{Baseline} \times 0.006575$$

$$\text{Impaired Fishing Cost} = \text{Baseline} \times 0.25 \times 4 / 52$$

$$= \text{Baseline} \times 0.019231$$

$$\text{Total Opportunity Cost} = \text{Baseline} \times (0.006575 + 0.019231)$$

$$= \text{Baseline} \times 0.025806$$

$$= \$900,000 \times 0.025806 / (1 - 0.025806) = \$22,626$$