Derelict Gillnets in the Salish Sea: Causes of Gillnet Loss, Extent of Accumulation and Development of a Predictive Transboundary Model

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Committee: Terrie Klinger (Chair), Miles Logsdon, Ginny Broadhurst
Derelict Fishing Gear & The Salish Sea

- Derelict fishing gear is lost or abandoned nets, lines, pots, traps and other gear utilized in commercial and recreational fisheries.

- Derelict nets made of nylon materials persist in the marine environment.

- Since 2002, the Northwest Straits Initiative (NWSI) derelict gear removal program has accomplished several milestones in gear recovery and research in the WA - Salish Sea.

- This research focuses specifically on salmon gillnets.
Removed Derelict Net Locations from Puget Sound Marine Waters as of September 30, 2014

Northwest Straits Foundation
Data Source: WA State Derelict Fishing Gear Database

- Gillnet: 95%
- Purse Seine: 4%
- Aquaculture Net: 1%
- Trawl Net: 0%

Nets Removed: 5,038

Total Projected Annual Impact of Removed Derelict Nets
- Mammals: 1,316
- Birds: 25,179
- Fish: 101,901
- Invertebrates: 3,730,964
Description of Gillnet Fisheries and Gear

○ WA - Salish Sea
  ○ Max length: 549 m (1,800 ft)
  ○ ~No depth limits
  ○ Common: 30 m (100 ft) in depth

○ BC - Salish Sea
  ○ Max length: 375 m (1,230 ft)
  ○ Depth limits: 60 to 90 mesh
  ○ Approx. 6 to 14 m (20 to 45 ft) in depth
Salish Sea historical salmon gillnet effort – Deliveries

Number of gillnet caught salmon deliveries (x, 1,000)

Year

BC Gillnet Deliveries (1,000 Slips)
WA Gillnet Deliveries (1,000 Tickets)
WA Gillnet Deliveries Estimate

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Salish Sea historical salmon gillnet effort – Deliveries

Cumulative deliveries per management area

1965 to 2011

Total Deliveries from 1965 - 2011

- 1 - 3,926
- 3,927 - 10,736
- 10,737 - 17,971
- 17,972 - 33,573
- 33,574 - 62,839
- 62,840 - 108,460
- 108,461 - 230,754
- 230,755 - 582,639

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The Research Questions

**Question**
- What is the extent of derelict gillnets in the WA - Salish Sea?
- What are the main causes of gillnet loss?
- Where would derelict gillnets occur in BC - Salish Sea?

**Method**
- (Loss rates from interviews) x (Effort)
- Summarize interview data & analyze removal records
- Spatial analysis – ArcGIS
  - Linear additive model
    - Bathymetry
    - Bathymetric Variance
    - Fishing Effort
Interview Data: Number of active fishers who lose all or part of a net each year

1965-1994: 5% to 9%  
1995-Present: 2% to 4%  

# Active Fishers per year

3,550 to 6,442
Causes of gillnet loss

- **Operator inexperience & Operator error**
  
  “…probably 75% of all gear that is lost is from first or second year guys.”

- **Equipment failure**
  
  “Undercapitalized vessels”

- **Crowding**
  
  “Three hundred fathoms [549 m] of these deep nets is about all anybody can handle…these deep nets basically fish you.”

- **Gear is too large**

- **MISMATCH OF NET DEPTH TO WATER DEPTH**

  - Vessel strikes
  - Volume of catch sinks net
Net Depths and Depth at Derelict Net Locations

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Results: Derelict gillnet removal locations

Observed depths
- Mean: -17.58 m & -19.88 m

Bathymetric depth (raster)
- Mean: -20.44 m

Bathymetric Variance (raster)
- Mean: 15.07 m

WDFW Net depth survey
- Mode: -24.20 m
- Mean: -20.14 m
Results: Model analysis BC - Salish Sea

BC2: BC gillnet effort only, and adjusted bathy ranking to account for shallower BC gillnet fishing depths.

Percent of Study Area by Probability

- None 5%
- High 17%
- Moderate 23%
- Remote 34%
- Low 21%
Baynes Sound Region Derelict Fishing Gear Project

- Important wintering & spring stop-over habitat for large number of marine birds, including surf scoters
- Heavy fishing effort from salmon and herring fisheries

Summer/Fall 2015
- Sidescan sonar surveys
- Diver verification surveys
- Dive removal operations
Discussion & Conclusion

- Refining previous estimates of historical gillnet loss in WA - Salish Sea
- Is assisting in planning continued efforts in WA
- Findings suggest fishing depth (net depth) influences gillnet loss
- Model used to plan derelict gillnet survey operations in BC - Salish Sea 2015
- With minimal data the model could be exported to other regional locations

Other Variables to be Considered:

- Fetch or Wind Velocity
- Tidal activity or Current Velocity
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Questions??

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