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Monitoring the movements of a critical marine resource: tracking a forage fish in Puget Sound

Theresa Liedtke  
Geological Survey (U.S.), tliedtke@usgs.gov

Ryan Tomka  
Geological Survey (U.S.)

Collin Smith  
Geological Survey (U.S.)

Lisa Gee  
Geological Survey (U.S.)

Dennis Rondorf  
Geological Survey (U.S.)

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Monitoring the movements of a critical marine resource: tracking a forage fish in the Salish Sea

T. Liedtke, R. Tomka, L. Gee, C. Smith, & D. Rondorf

Western Fisheries Research Center
Columbia River Research Laboratory

U.S. Department of the Interior
U.S. Geological Survey
Forage fish guild: Important marine resource

- WDFW 30 year dataset on spawning
  - Spawning beaches
  - Seasonal timing
- Large data gaps
  - Movement and distribution
  - Site fidelity
  - Feeding ecology
Acoustic Telemetry

Powerful tool
- Monitor individual animals
- Fine-scale movement information

But.....
- Requires a big assumption: limited tag effects
- Best to have some baseline info to design monitoring

Our effort was a pilot study designed to:
1) Test fish handling & tag implantation procedures
2) Collect baseline data to inform future efforts
Methods

Vemco 69 kHz
- V7 tags (73 d life)
- Compatible with other deployed receivers

Ross Pt in Sinclair Inlet
- Well document spawning beach
- Popular recreational fishing site
- Dip netting with local fishers

Tagged 12 males in Nov 2012
- Mean size: 167 mm FL and 43 g
- Mean tag burden 3.8%
Also did limited mobile tracking in Sinclair Inlet

13 monitoring locations
> 90 d deployment

5 receivers

2 receivers
ATTENTION: SURF SMELT ANGLERS

TAG REWARD

- Made fish visually distinct
- Dorsal beads & ventral stitches
- Signs at all fishing access points
- Word of mouth
Results

- All fish detected within a few days of release
- Detections restricted to:
  - Ross Pt: all individuals
  - Port Washington Narrows: 1 individual

Port Washington Narrows
- Good detection across channel
- Ross Pt for 6 d after release
- Not detected again
Ross Pt

- Station positioned to monitor the spawning beach
- Spawning beach across the Inlet
  - Not within range of Ross Pt station
Ross Pt Results

- Average of 6 visits to the site (max 17)
- Residence time: 2.2 h (max 8 h)
- Lag time: 2.3 h (max 5 d)

mean=10 d  
max=44 d
Where did they all go?

No longer at Ross Pt
Not detected elsewhere

Possibilities:

- Fish died
- Left Sinclair Inlet without being detected
- Within Sinclair Inlet but outside of detection range
  - Detections at spawning beach on opposite shoreline (mobile)
- Captured by recreational or commercial fishers

1 reward issued
Large commercial effort
Ross Pt Detections

Detections by Photoperiod

- Dark: N=1481
- Crepuscular: N=127
- Daylight: N=151

Detectsions by tide classification:
- Low: 81%
Next Steps

- Full-scale effort in fall-winter of 2014-2015
  - Tag fish earlier in the season
  - Mix of males and females

- Focused monitoring in Sinclair Inlet
  - Head of the Inlet
  - Alternate spawning beach
  - Detailed movements around Ross Pt
Study Context

- Part of a larger USGS program
  - Coastal Habitats in Puget Sound (CHIPS)
  - Interdisciplinary approach
- Address some of the forage fish data gaps
  - Focus on habitat
- Current research topics include:
  - Sand lance burrowing habitats
  - Habitat use & food habits of juvenile sand lance & surf smelt
Study Relevance

Movement & phenology information useful for:

- Modeling efforts
  - Climate impacts
  - Contaminant exposure risk
  - Trophic dynamics
    - Predator-prey interactions
    - Seabirds, salmon, marine mammals
- Habitat protection & restoration
- Resource management
  - Stock monitoring
Jerry Twogood & Chuck Gautier
- Coastal Conservation Association of Washington
Doris Small & Chris Waldbilling
- WDFW Port Orchard office
Questions?
November 7, 2012

Tide Height (ft)

0 3 18156 129 21 24

Tide Height:

Daylight

0 3 18156 129 21 24

Tide Height:

Dark

0 3 18156 129 21 24

Tide Height:

Daylight

0 3 18156 129 21 24

Tide Height:

Dark
Transmitter selection

V7-2x-A69-1303

- 73 day tag life
- 45 second nominal pulse rate
- 30-60 sec pulse rate range
- 1.6g in air