Science, Service, Stewardship

Research update: Can Satellite Tags Inform Management for a Data Poor Species?

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Outline:

1. Satellite tagging project info

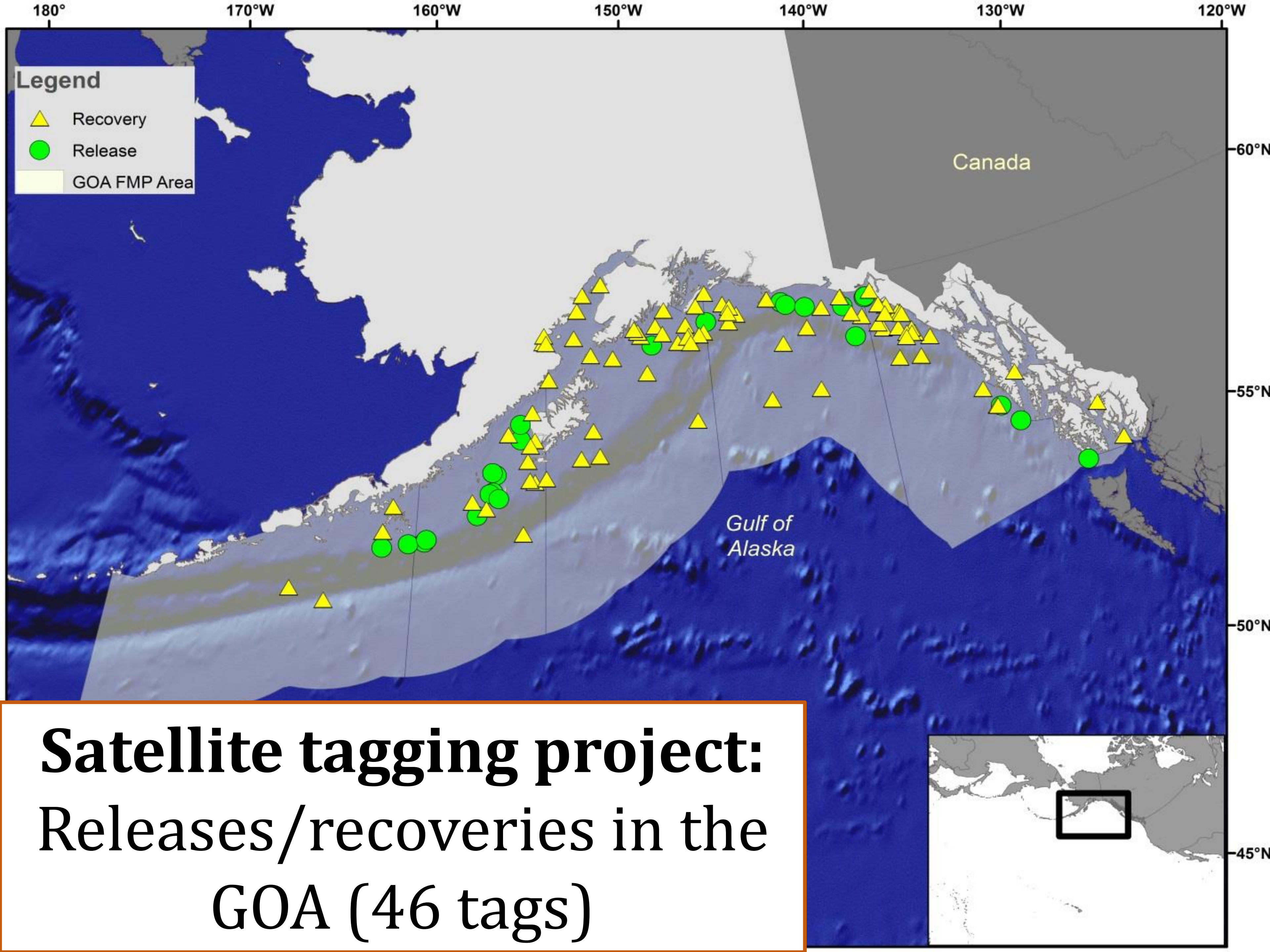
2. Satellite tags to estimate location ⇒ bottom depth

3. Estimating vertical availability to bottom trawl survey

Satellite tagging project:

- Used Pop-off Satellite Archival Tags (PSAT): Temperature, depth, light intensity

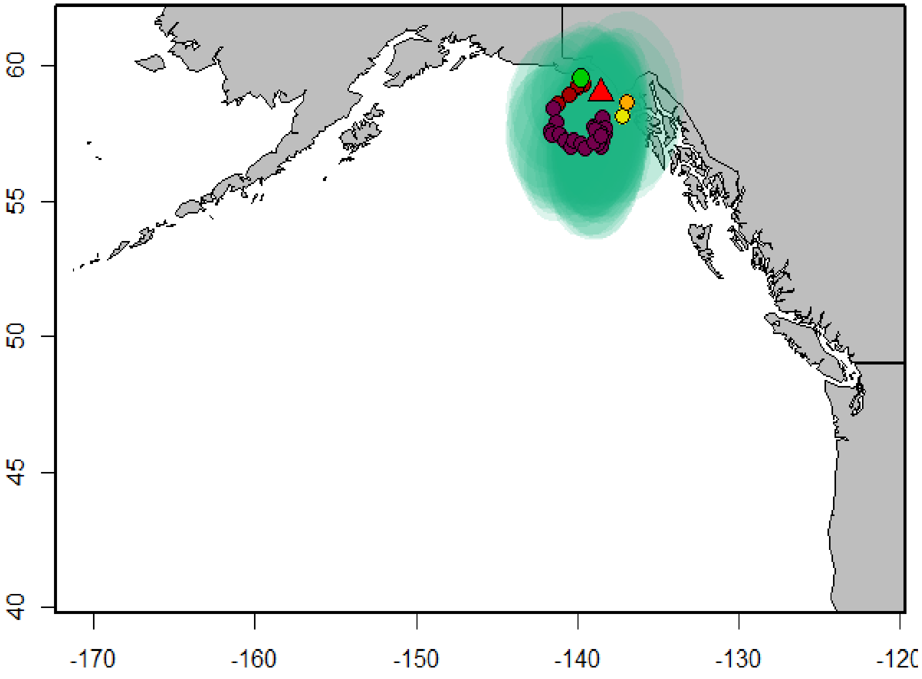
- Tagging occurred 2009 – 2013: 2010 – 2013 evaluated here

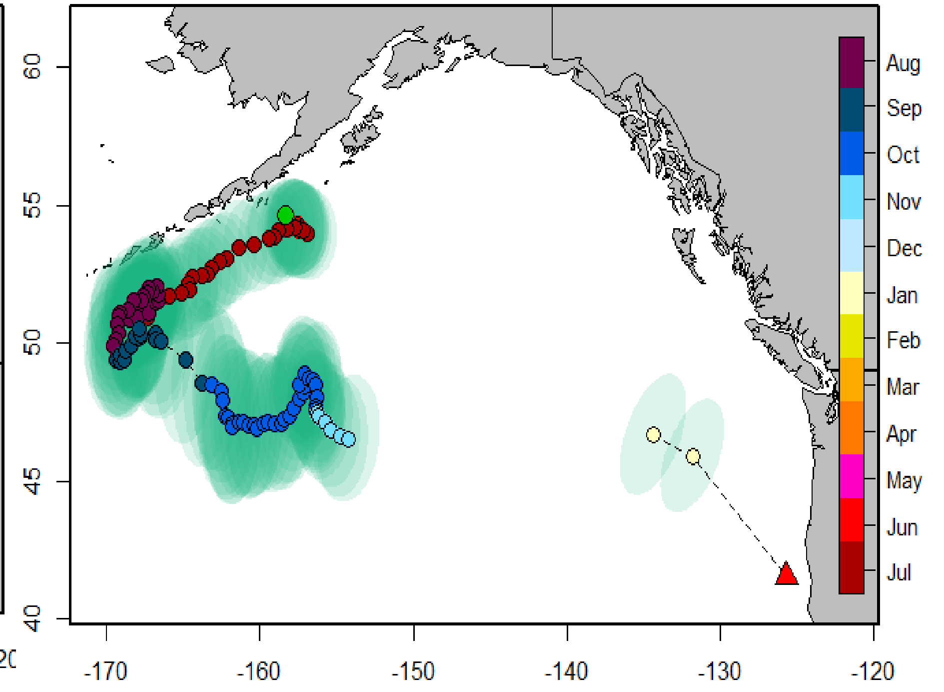


Satellite tagging project:
Releases/recoveries in the GOA (46 tags)

Satellite tagging project: Location data

- Light info provides ‘observed’ daily location at local noon (zenith)
- Observed data can be variable, use geolocation model (Kalman filter) to estimate track line with uncertainty

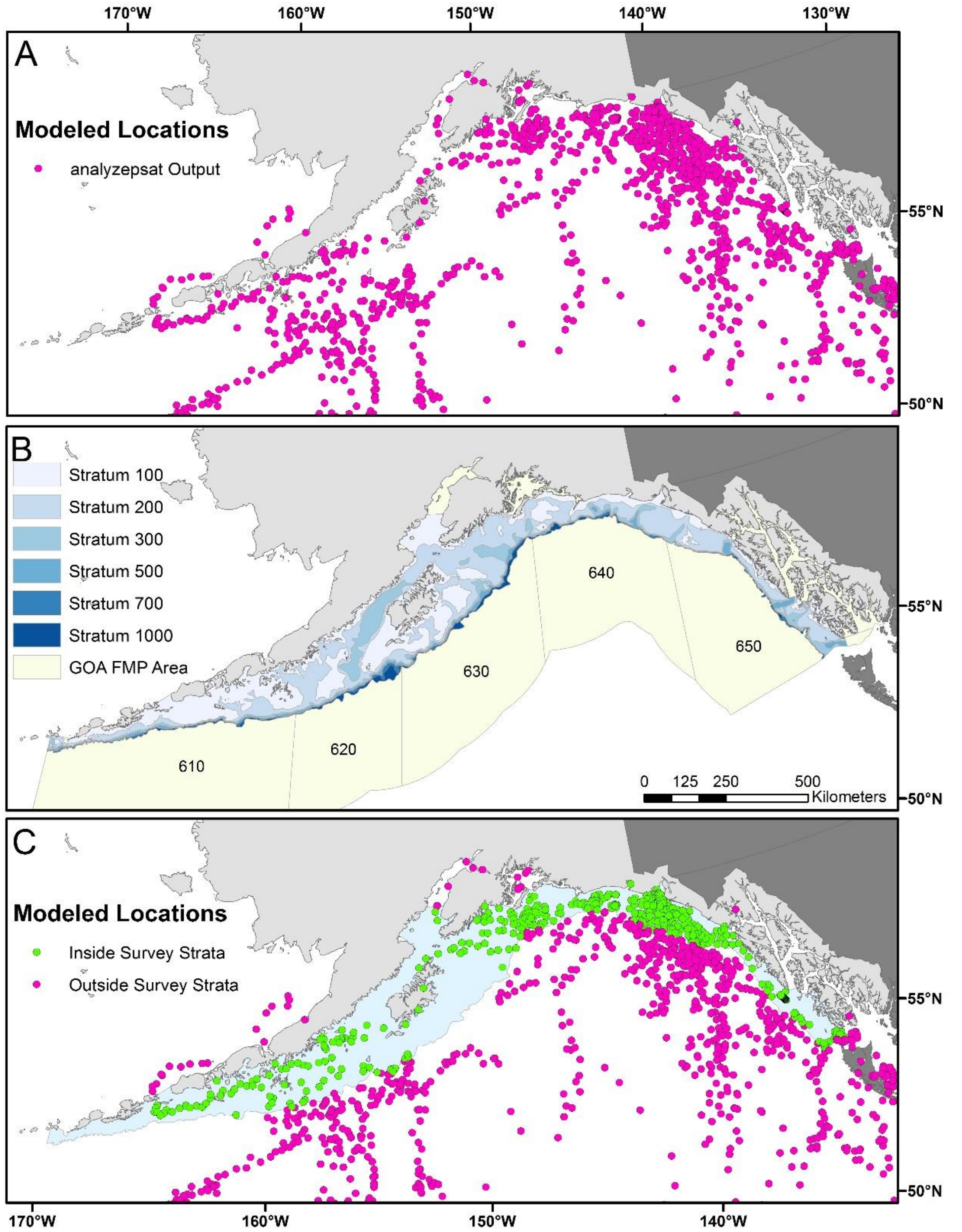




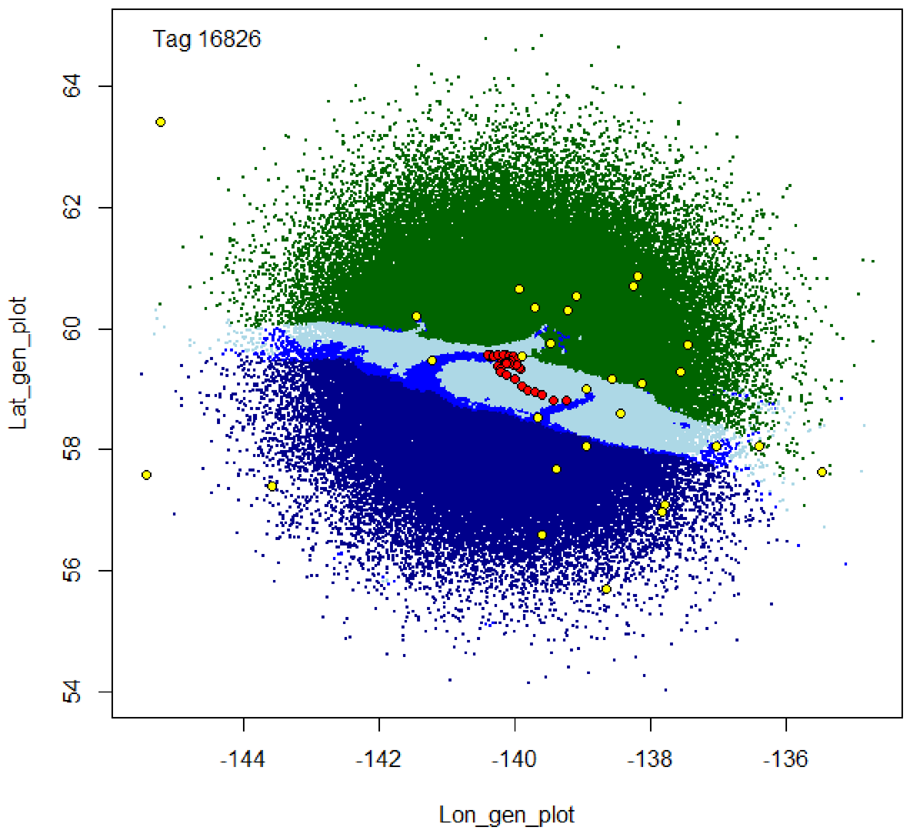
Satellite tagging project: location estimates

- Location estimates provide opportunity to match with bottom depth through bathymetry observations

- Not perfect, includes fairly substantial uncertainty in location

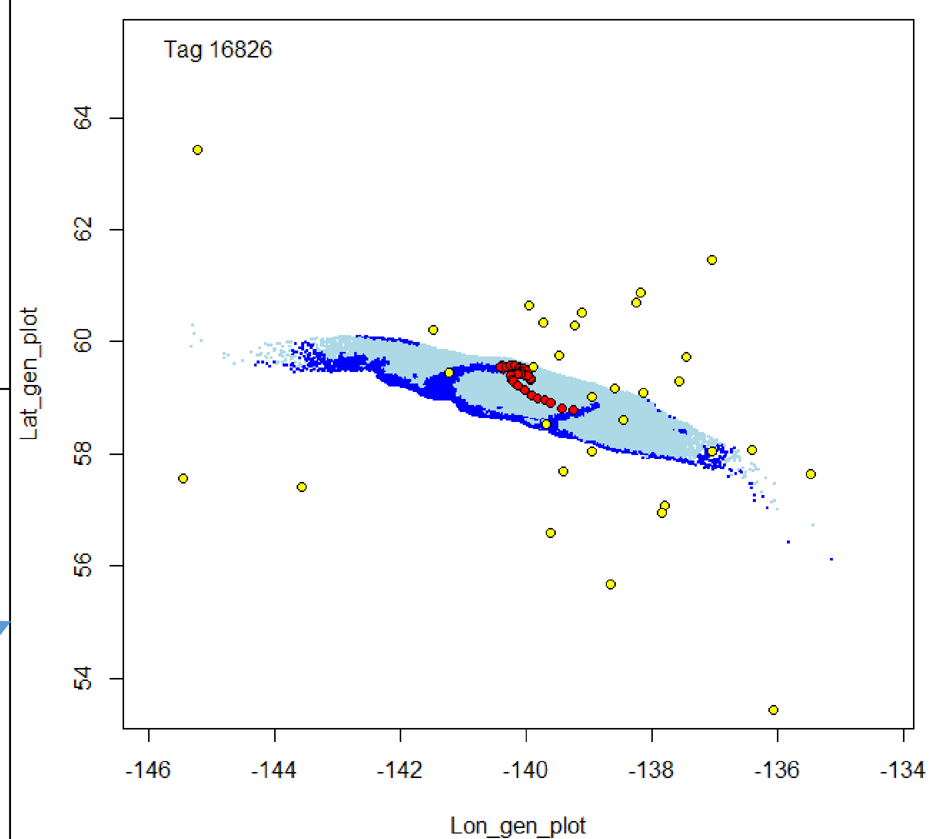


Satellite tagging project: including uncertainty



Overall generated locations

Generated locations that we used in the analysis

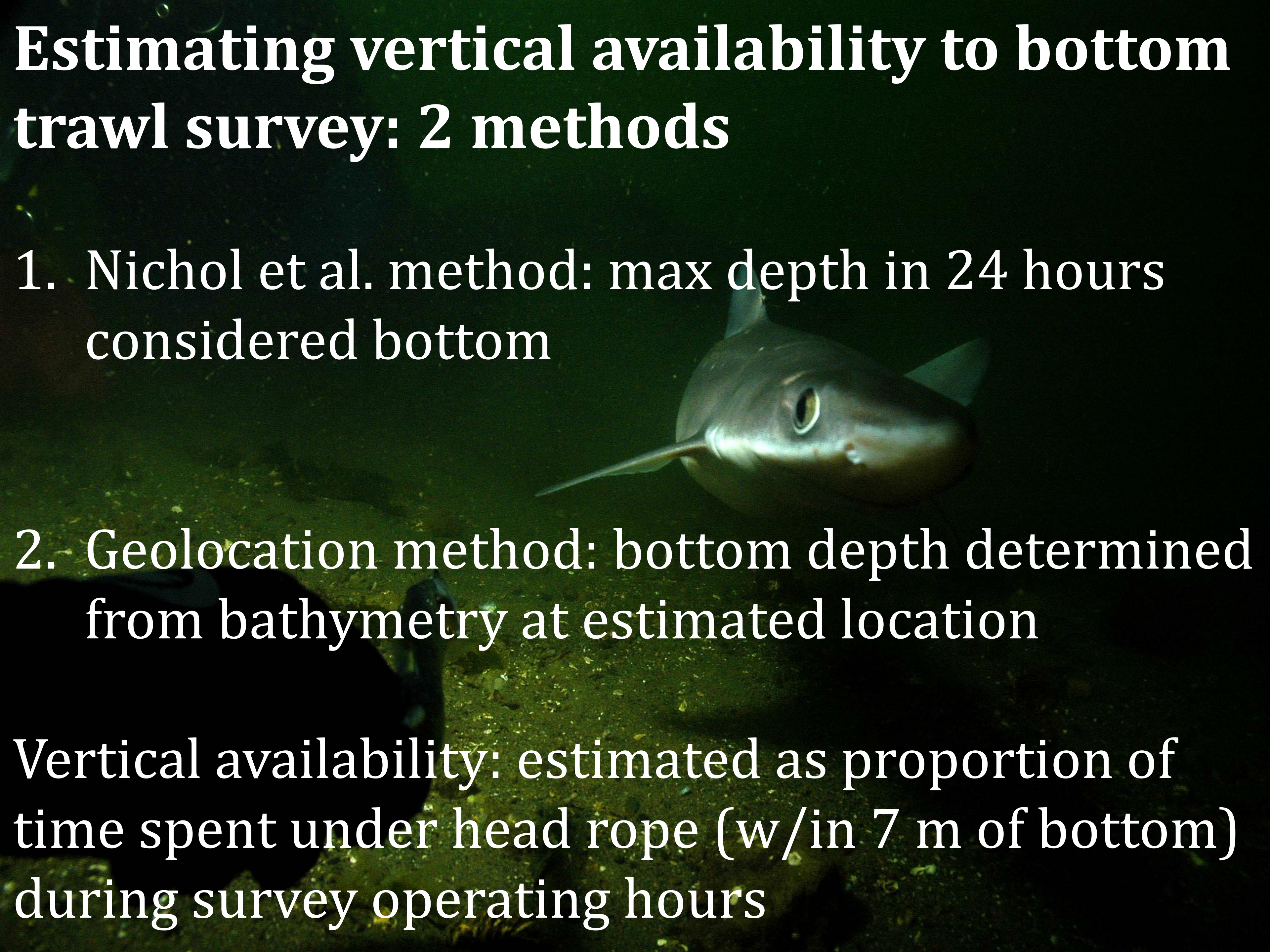


Estimating vertical availability to bottom trawl survey: 2 methods

1. Nichol et al. method: max depth in 24 hours considered bottom

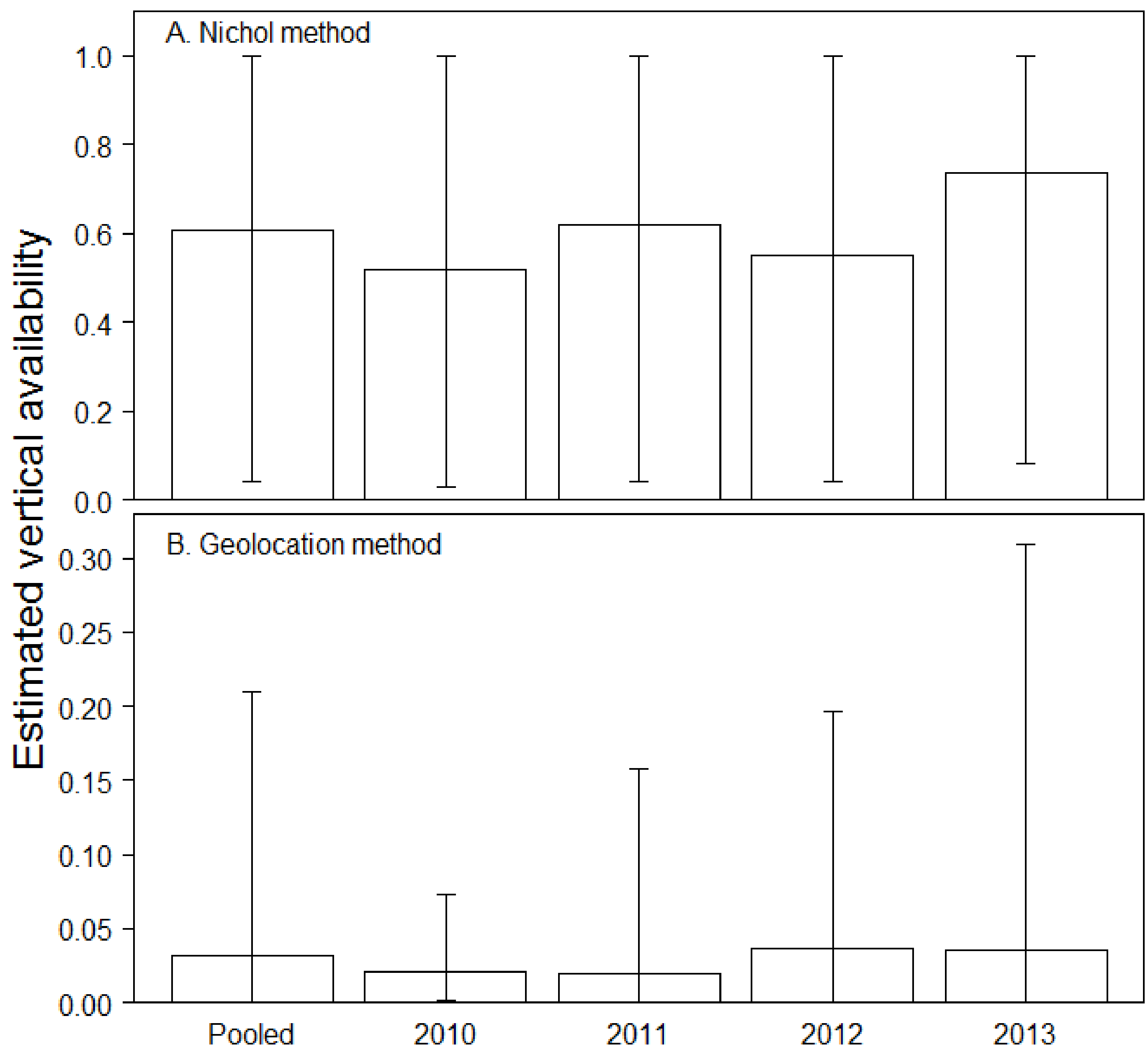
2. Geolocation method: bottom depth determined from bathymetry at estimated location

Vertical availability: estimated as proportion of time spent under head rope (w/in 7 m of bottom) during survey operating hours

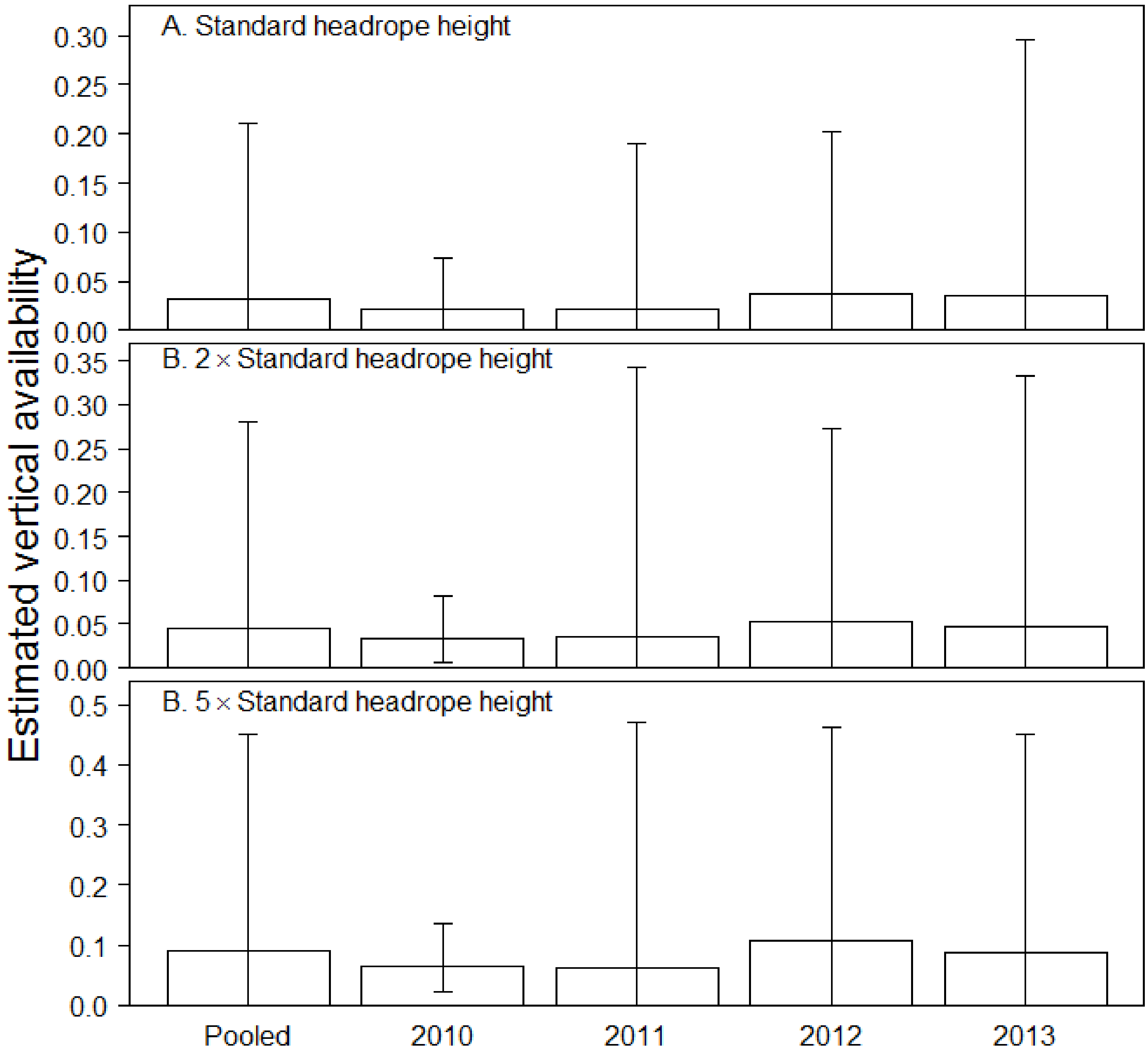


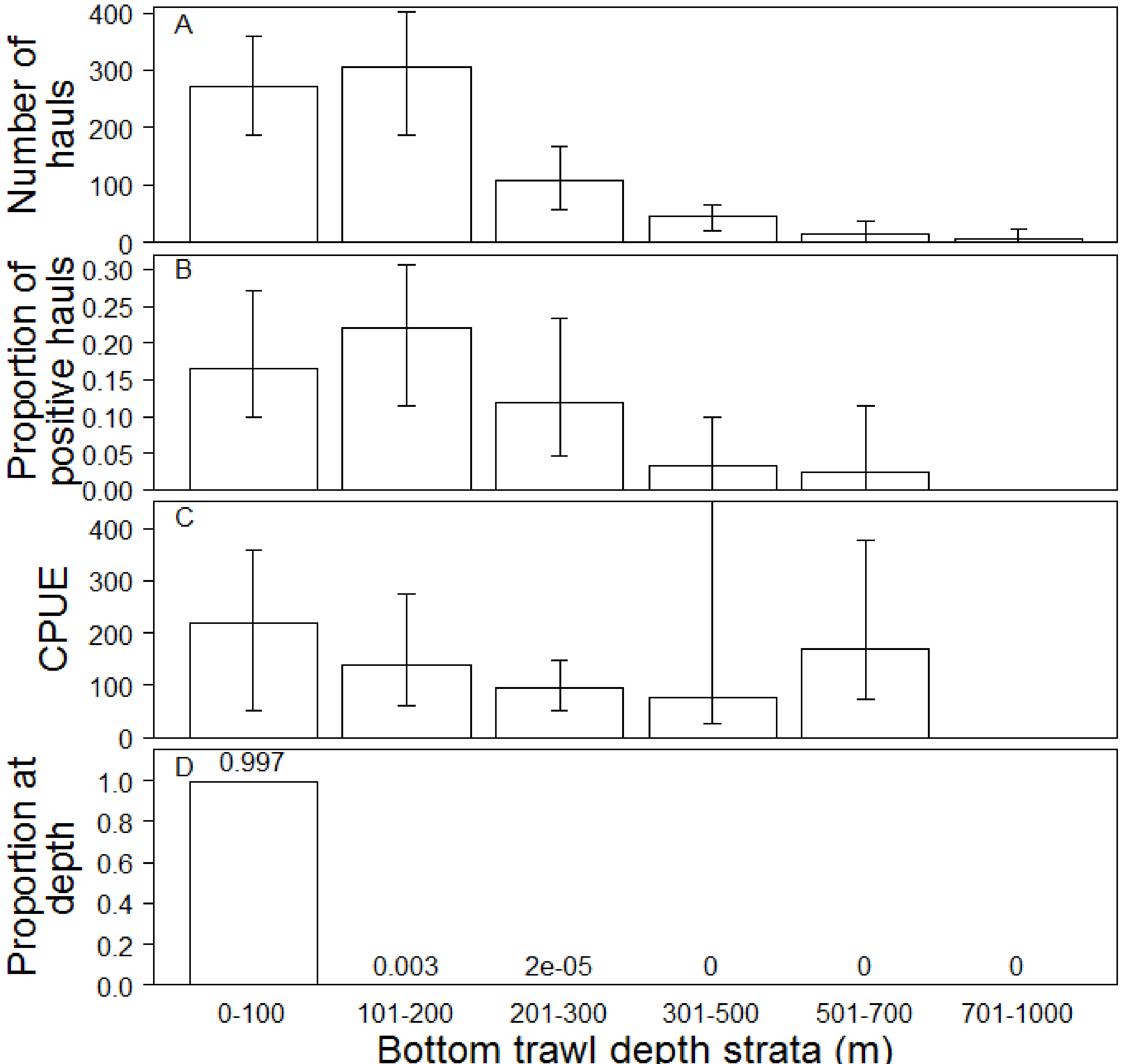
Estimating vertical availability to bottom trawl survey: Results

	Number of days	VA (Nichol)	SD in VA (Nichol)	VA (Geolocation)	SD in VA (Geolocation)
Pooled	1585	$\boxed{0.609}$	0.341	$\boxed{0.031}$	0.071
2010	261	0.519	0.329	0.021	0.019
2011	269	0.619	0.345	0.020	0.069
2012	670	0.551	0.325	0.037	0.069
2013	385	0.736	0.328	0.035	0.092

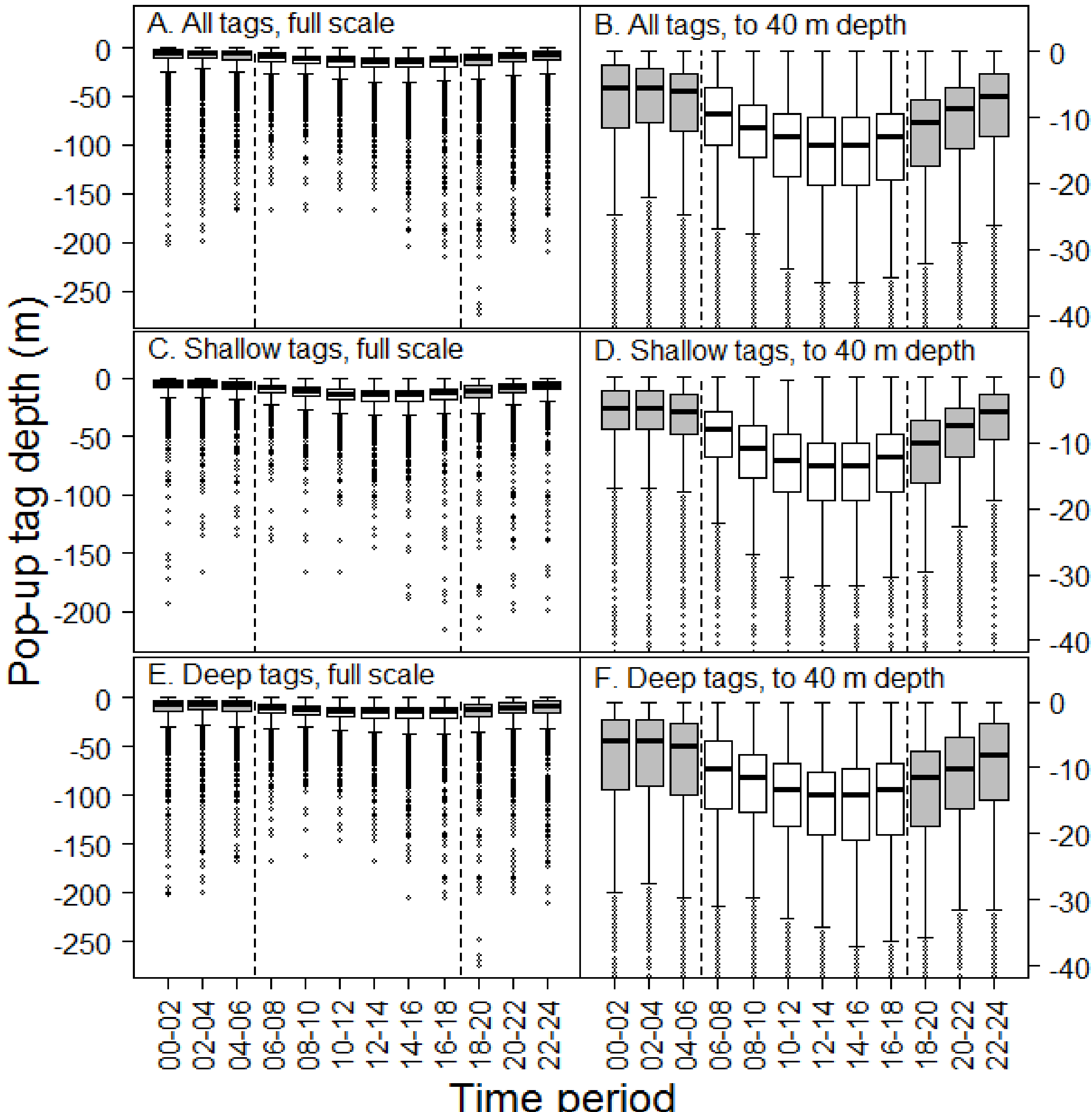


A. Nichol method
B. Geolocation method
Estimated vertical availability
1.0
0.8
0.6
0.4
0.2
0.0
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Pooled
2010
2011
2012
2013


A. Standard headrope height
B. 2 × Standard headrope height
B. 5 × Standard headrope height
Estimated vertical availability
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.0
0.1
0.2
0.3
0.4
0.5
Pooled
2010
2011
2012
2013



A
Number of hauls
400
300
200
100
0
B
Proportion of positive hauls
0.30
0.25
0.20
0.15
0.10
0.05
0.00
C
CPUE
400
300
200
100
0
D
Proportion at depth
1.0
0.8
0.6
0.4
0.2
0.0
0.997
0.003
2e-05
0
0
0
0-100
101-200
201-300
301-500
501-700
701-1000
Bottom trawl depth strata (m)


A. All tags, full scale
B. All tags, to 40 m depth
C. Shallow tags, full scale
D. Shallow tags, to 40 m depth
E. Deep tags, full scale
F. Deep tags, to 40 m depth
Pop-up tag depth (m)
Time period
0
-50
-100
-150
-200
-250
-10
-20
-30
-40
00-02
02-04
04-06
06-08
08-10
10-12
12-14
14-16
16-18
18-20
20-22
22-24

Conclusions:

- **Nichol et al method largest estimate, but has large uncertainty that ranges from 0-1**

- **Geolocation is more defendable, but uncertainty present in both location estimates and bathymetry data**

- **If we've learned anything, it's that we now have a quantitative idea of how relative the trawl survey biomass is for spiny dogfish**
  - **Our biomass estimates from the trawl survey are possibly half as large (or less) than the actual abundance**

Conclusions:

- For comparison:
  - q/efficiency = 0.432 in NEFSC spiny dogfish assessment
  - NWFSC (ASA) estimates trawl catchability between 0.04 – 0.55 for trawl surveys

Survey catchability (*Q*)	
AFSC triennial early survey	0.22
AFSC triennial late survey	0.16
AFSC slope survey	0.55
NWFSC shelf slope survey	0.28
NWFSC slope survey	0.04
IHPC survey	3.46E-07

  - North sea spurdog (ICES) q = 0.0006

Plan Team Discussion:

- **What do you think of the method?**

- **Let's save implementation/implications discussion for tomorrow morning during Cindy's talk, but, food for thought tonight:**

  OFL = F x B, ABC = 0.75 x OFL

- **F as estimated from a demographic model is, by definition, applied to the true biomass. The results suggest here that the true biomass is not the trawl survey biomass.**