The science and process behind habitat management areas in New England

Lessons learned from Omnibus EFH Amendment 2

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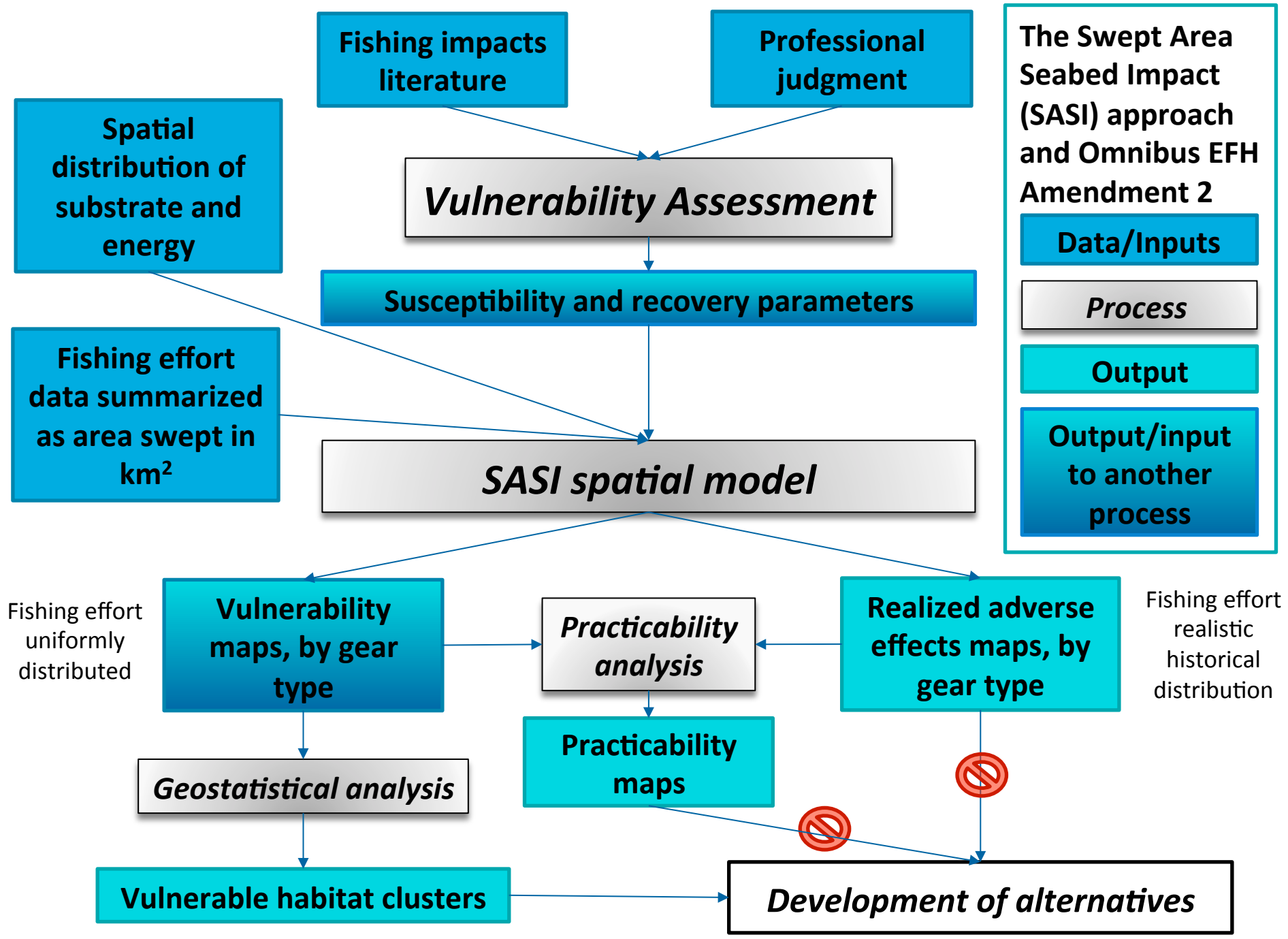
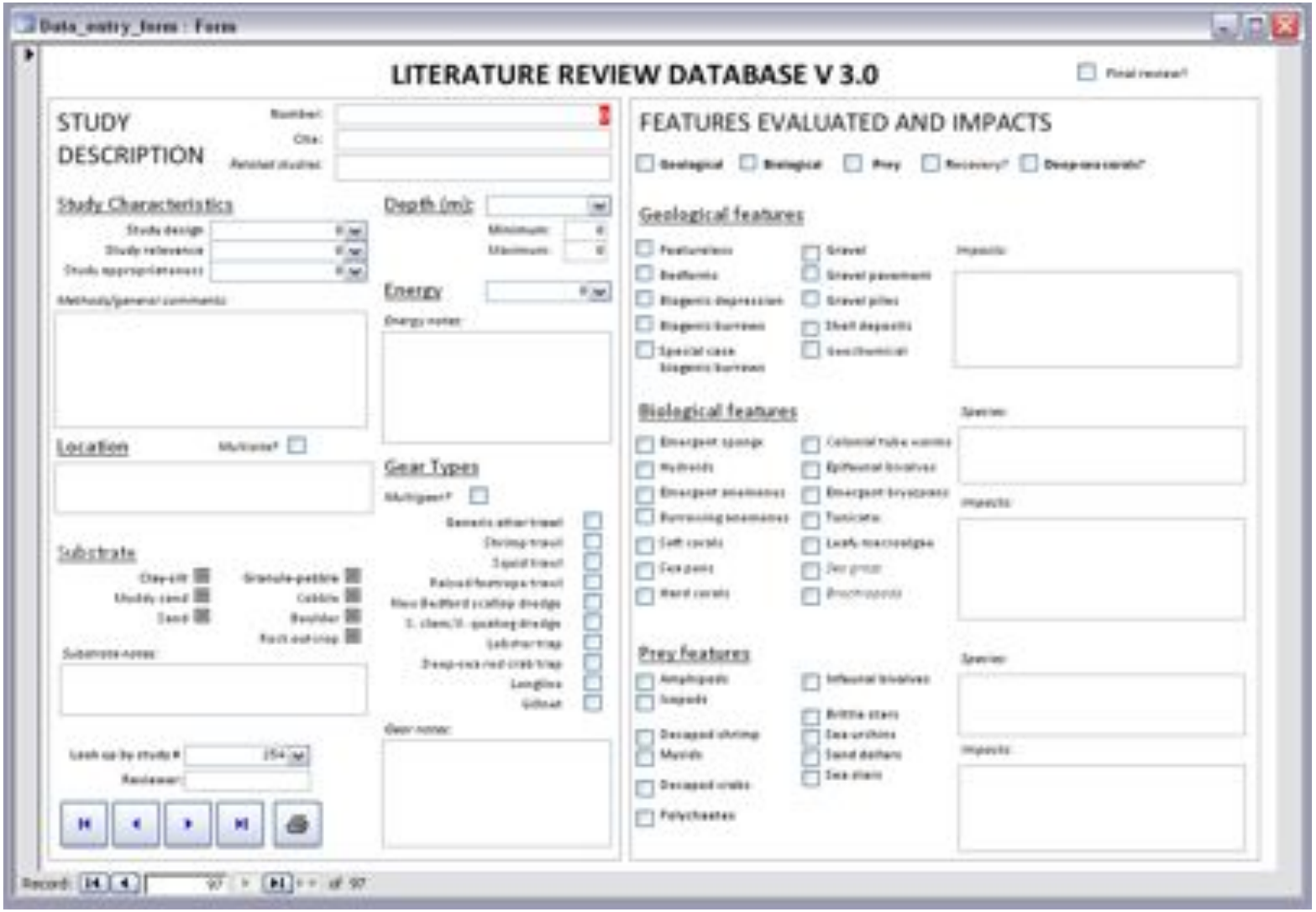

Fishing impacts literature
Professional judgment
Spatial distribution of substrate and energy
Vulnerability Assessment
Susceptibility and recovery parameters
Fishing effort data summarized as area swept in km²
SASI spatial model
The Swept Area Seabed Impact (SASI) approach and Omnibus EFH Amendment 2
Data/Inputs
Process
Output
Output/input to another process
Fishing effort uniformly distributed
Vulnerability maps, by gear type
Practicability analysis
Realized adverse effects maps, by gear type
Fishing effort realistic historical distribution
Practicability maps
Geostatistical analysis
Vulnerable habitat clusters
Development of alternatives

Fishing impacts literature review



Vulnerability assessment: develop operational definitions of susceptibility and recovery

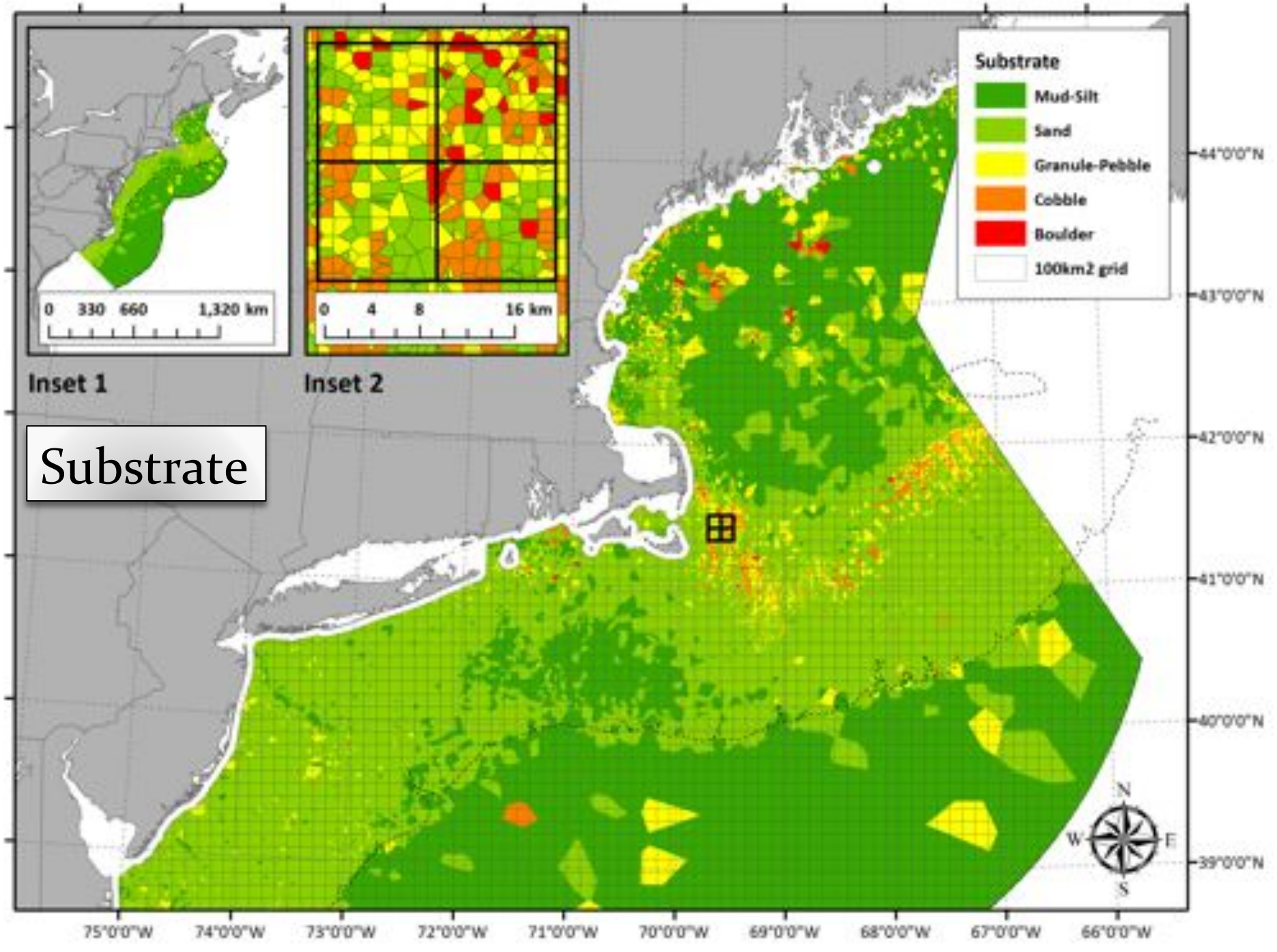
- Susceptibility: percentage change in functional value of a habitat component due to a gear effect
- Recovery: the time in years that would be required for the functional value of that unit of habitat to be restored

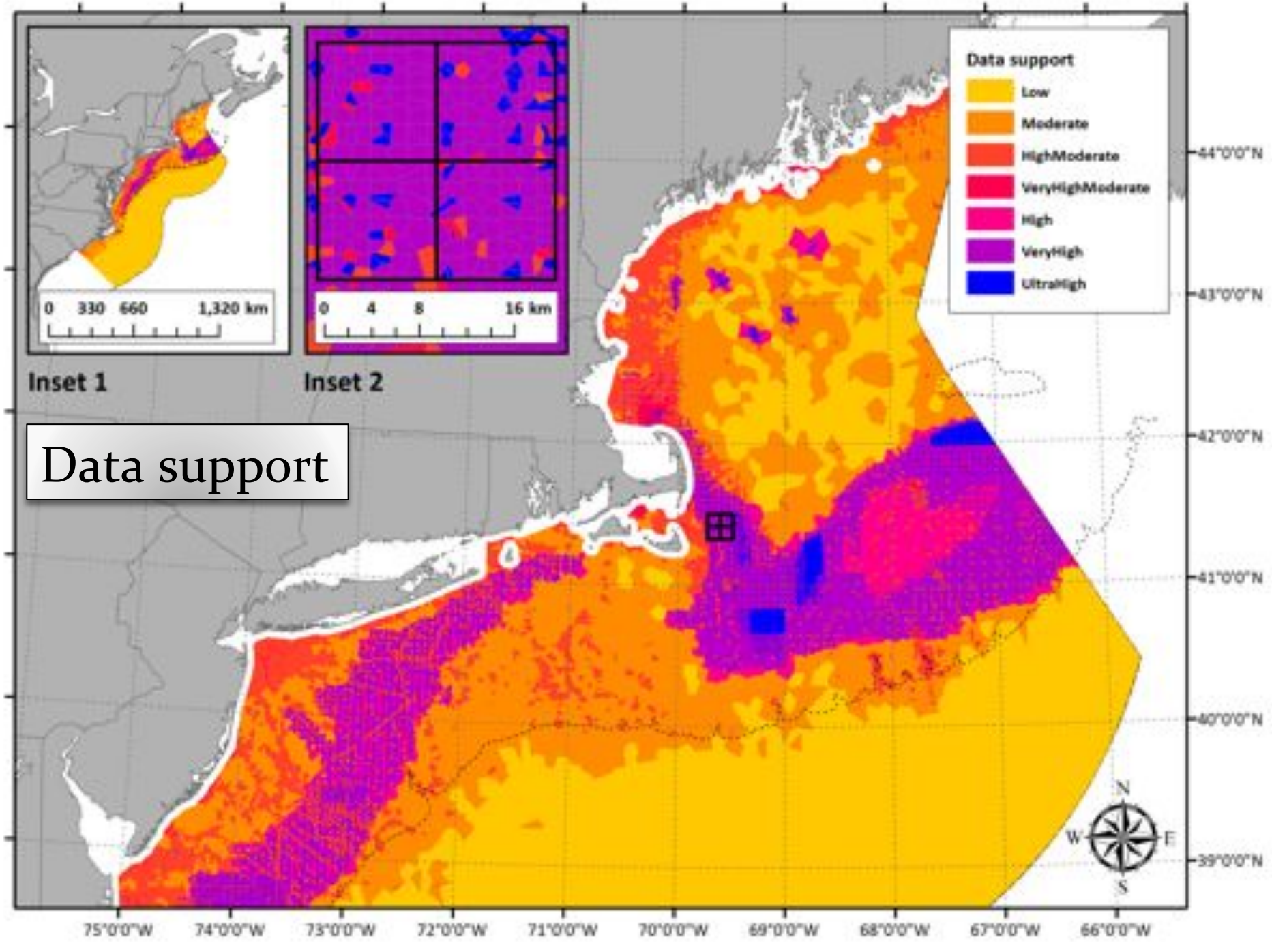
Code	Susceptibility	Recovery
0	0 – 10%	< 1 year
1	>10%-25%	1 – 2 years
2	25 - 50%	2 – 5 years
3	> 50%	5-10 years

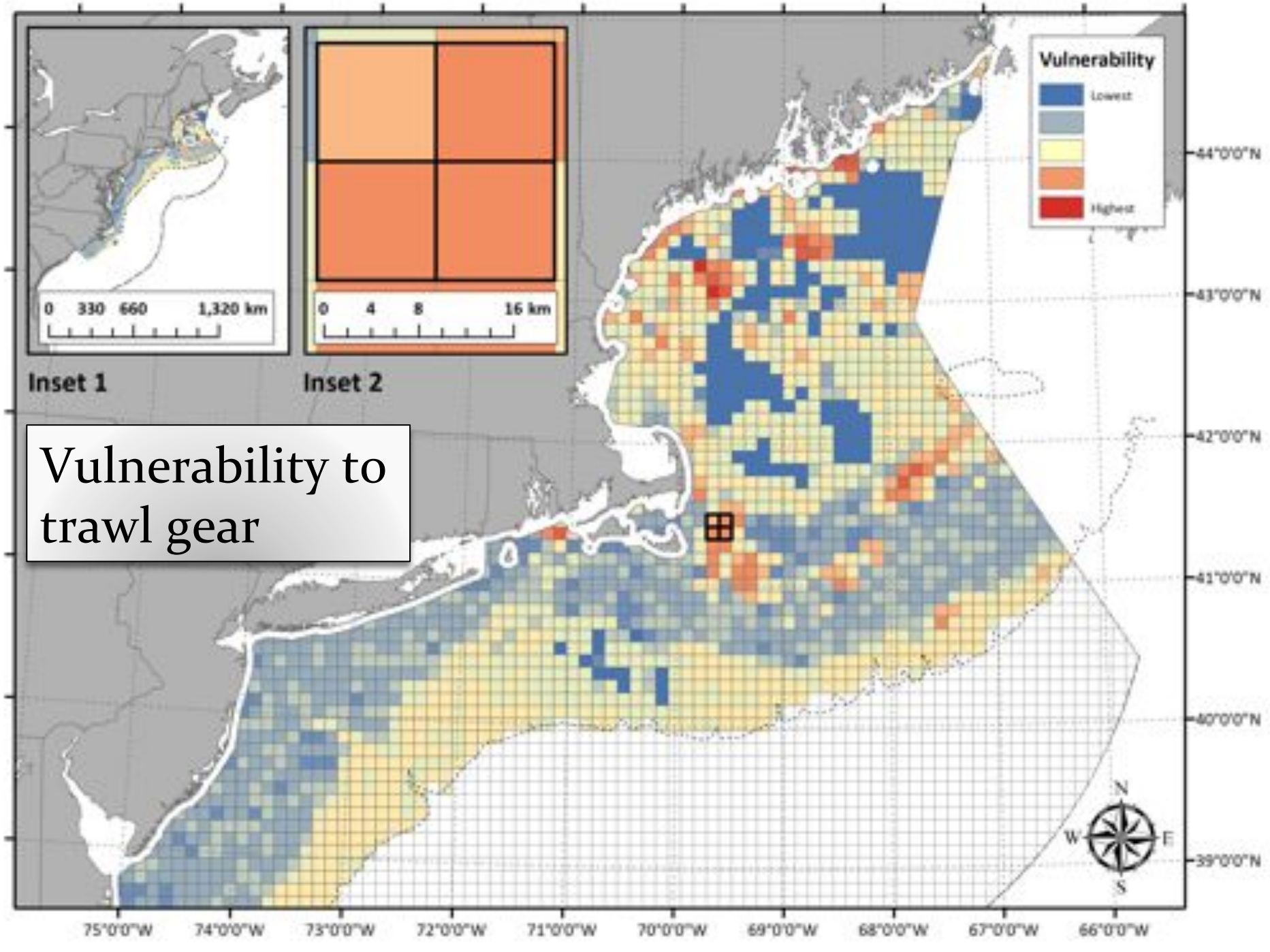
Evaluate gear effects on habitat features

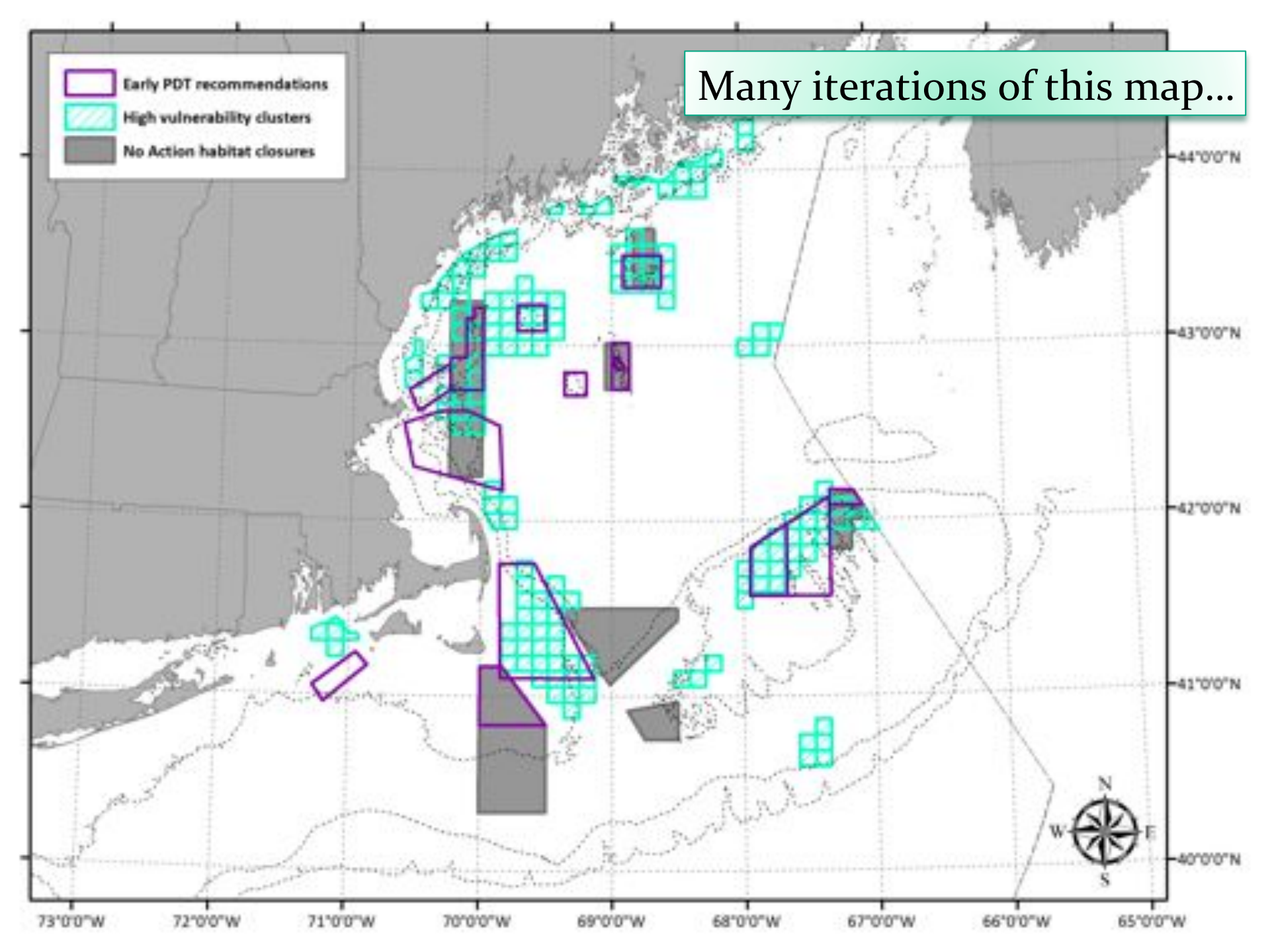
Gear: Trawl							
Substrate: Mud							
Feature name and class – G (Geological) or B (Biological)	**Gear effects**	**Literature high**	**Literature low**	**S High**	**S Low**	**R High**	**R Low**
Biogenic burrows (G)	filling, crushing	334, 408, 409	97, 101, 313, 333, 336, 407	2	2	0	0
Biogenic depressions (G)	filling	236, 408, 409	101, 247, 336	2	2	0	0
Sediments, surface (G)	re-suspension, compression, geochemical	88, 92, 211, 236, 330, 334, 406, 408, 409, 599	88, 97, 211, 247, 277, 283, 313, 320, 333, 335, 336, 338, 372, 407, 414	3	3	0	0
Amphipods, tube-dwelling (B) – see note	crushing	34, 113, 119, 211, 228, 292, 334, 408, 409, 599, 658	89, 80, 97, 113, 149, 320, 575	1	1	0	0
Anemones, cerianthid burrowing (B)	breaking, crushing, dislodging, displacing	none	none	2	2	2	2
Corals, sea pens (B)	breaking, crushing, dislodging, displacing	none	101, 164	2	2	2	2
Hydroids (B)	breaking, crushing, dislodging, displacing	408, 409	368	1	1	1	1
Mollusks, epifaunal bivalve, *Modiolus modiolus* (B)	breaking, crushing, dislodging, displacing	21, 34, 368, 408, 409	89, 203, 360, 368	2	2	3	3

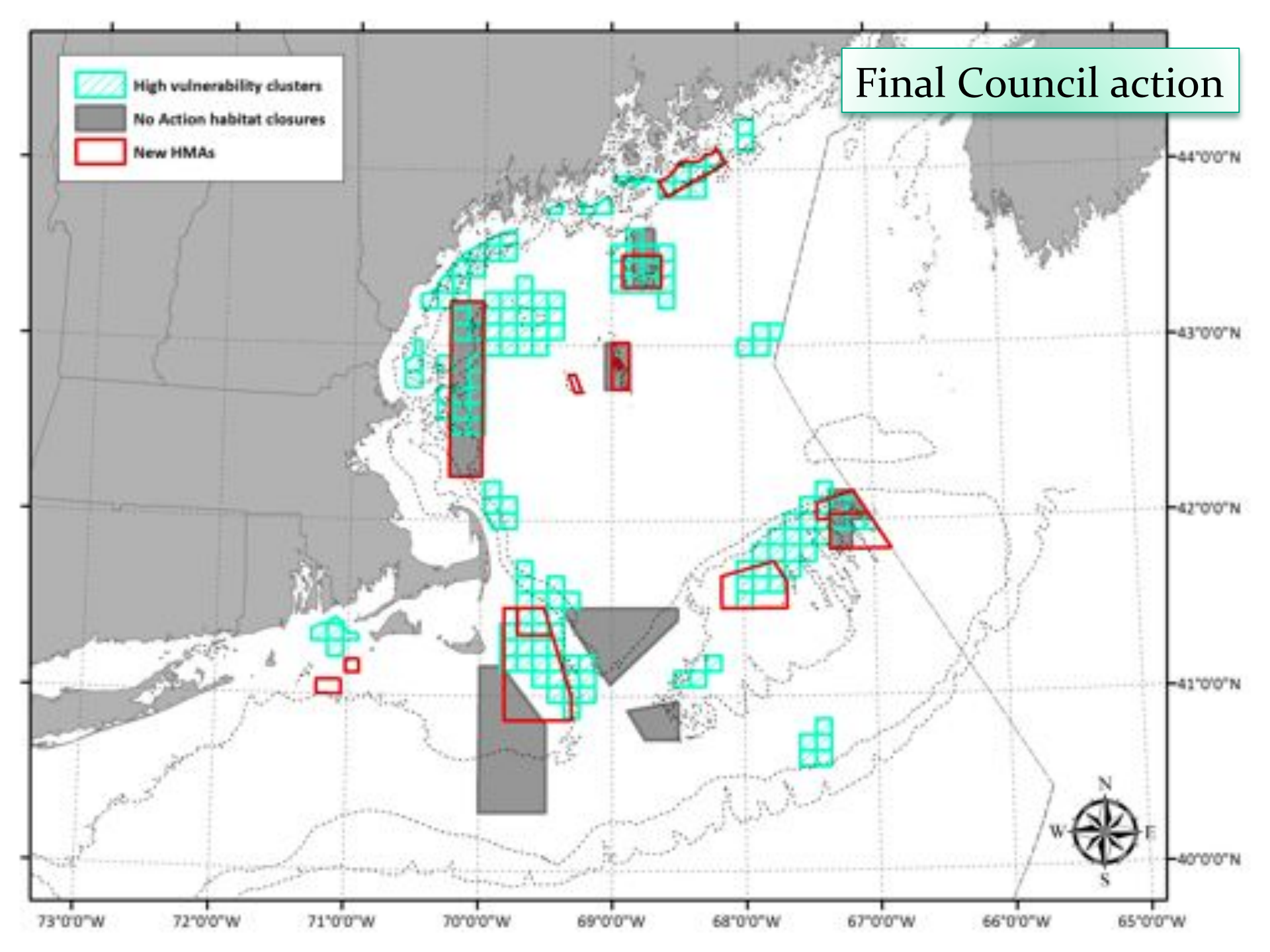
Grabowski, J.H., Bachman, M., et al. (2014) Assessing the Vulnerability of Marine Benthos to Fishing Gear Impacts. Reviews in Fisheries Science & Aquaculture, 22(2):142–155.


Substrate
Mud-Silt
Sand
Granule-Pebble
Cobble
Boulder
100km2 grid
0 330 660 1,320 km
0 4 8 16 km
Inset 1
Inset 2
Substrate
44°0'0"N
43°0'0"N
42°0'0"N
41°0'0"N
40°0'0"N
39°0'0"N
75°0'0"W
74°0'0"W
73°0'0"W
72°0'0"W
71°0'0"W
70°0'0"W
69°0'0"W
68°0'0"W
67°0'0"W
66°0'0"W
N
W
E
S


Data support
Low
Moderate
HighModerate
VeryHighModerate
High
VeryHigh
UltraHigh
0 330 660 1,320 km
0 4 8 16 km
Inset 1
Inset 2
Data support
44°0'0"N
43°0'0"N
42°0'0"N
41°0'0"N
40°0'0"N
39°0'0"N
75°0'0"W
74°0'0"W
73°0'0"W
72°0'0"W
71°0'0"W
70°0'0"W
69°0'0"W
68°0'0"W
67°0'0"W
66°0'0"W
N
W
E
S


Vulnerability
Lowest
Highest
0 330 660 1,320 km
Inset 1
0 4 8 16 km
Inset 2
Vulnerability to trawl gear
44°0'0"N
43°0'0"N
42°0'0"N
41°0'0"N
40°0'0"N
39°0'0"N
75°0'0"W
74°0'0"W
73°0'0"W
72°0'0"W
71°0'0"W
70°0'0"W
69°0'0"W
68°0'0"W
67°0'0"W
66°0'0"W
N
W
E
S


Early PDT recommendations
High vulnerability clusters
No Action habitat closures
Many iterations of this map…
44°0'0"N
43°0'0"N
42°0'0"N
41°0'0"N
40°0'0"N
73°0'0"W
72°0'0"W
71°0'0"W
70°0'0"W
69°0'0"W
68°0'0"W
67°0'0"W
66°0'0"W
65°0'0"W
N
W
E
S


High vulnerability clusters
No Action habitat closures
New HMAs
Final Council action
44°0'0"N
43°0'0"N
42°0'0"N
41°0'0"N
40°0'0"N
73°0'0"W
72°0'0"W
71°0'0"W
70°0'0"W
69°0'0"W
68°0'0"W
67°0'0"W
66°0'0"W
65°0'0"W
N
W
E
S

Benefits/strengths of SASI

- Gave stakeholders a common way to talk about habitat impacts and made the process more science-driven
- Map-based results are fairly intuitive, and a good way to communicate spatial variation in data quality and uncertainty in results
- Allowed for comparisons across gear and habitat types
- Vulnerability assessment allowed us to integrate conclusions of multiple studies and apply them in a standard way
- Highlighted limitations of literature; helpful for research priorities
- Transparent and flexible framework – can be updated with new information

Challenges & limitations

- Complexity of approach
  - Challenging to explain model and results
  - Updates would be a significant task
- Temptation by council and stakeholders to become over-reliant on results and use them prescriptively
- Regional scale model not very useful for fine scale comparisons of habitat management areas
- Model did not account for additional value of recovery within existing habitat management areas; hard to assess tradeoffs
- Does not interface with individual EFH designations

Practicability assessment – an ongoing challenge

- Tried to develop a SASI-based analysis, but not well-received during peer reviews
- No clear guidance on estimating costs and benefits
  - Benefits are hard to measure, and in the future
  - Potentially displaced revenue is a proxy for costs, but these analyses are also uncertain
  - Cannot evaluate economic costs and ecological benefits using same "currency"
- Practicability is assessed differently by every decision maker, based on what they value
- Ultimately, presented as much information as possible about each option, and let the Council process play out