Integrating Climate Change Vulnerability Assessments And Adaptation Strategies Into United States Fish And Wildlife Action Plans

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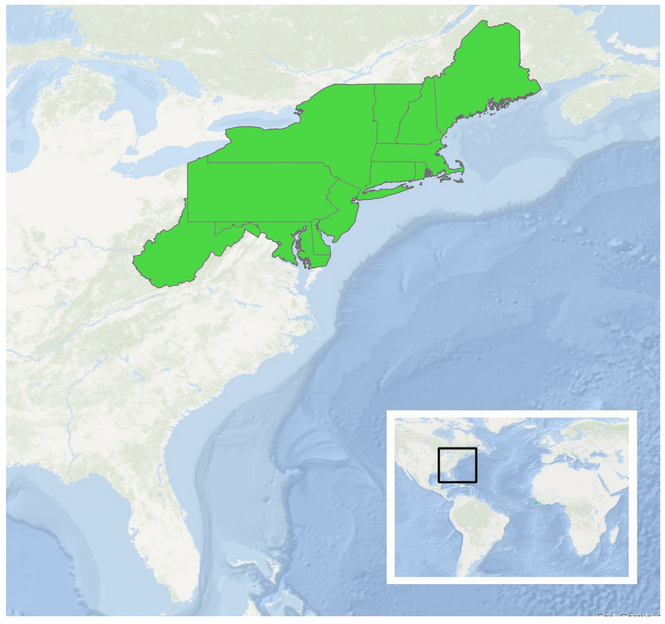


The Northeast Association of Fish & Wildlife Agencies (NEAFWA) is a quasi-governmental organization consisting of 13 states (shaded in green) in the Northeast region of the United States.

State Wildlife Action Plans (SWAPs)

❖ Proactive planning documents that:
- Assess the health of priority fish, wildlife and habitats
- Identify key threats and management challenges
- Outline long-term conservation strategies
- Broadly used by state and federal agencies to set priorities

❖ SWAPs are revised every 10 years
- Last revision → 2015
- Next revision → 2025

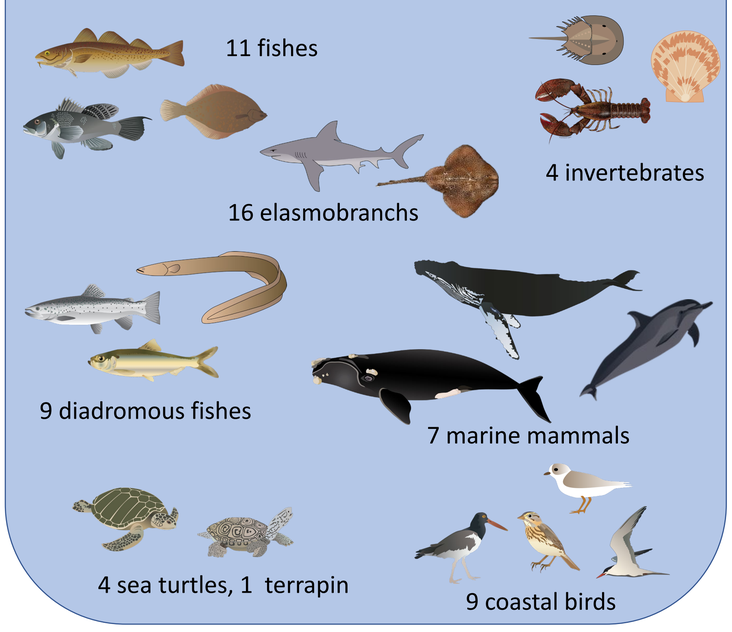
❖ Threats and actions listed in SWAPs support socioecological planning processes across local to regional scales for **Species of Greatest Conservation Need (SGCN)**

Regional Species of Greatest Conservation Need (RSGCN)

❖ Species that regional States identify as needing:
- High conservation attention
- Prioritized investments
- Communication
- Proactive conservation actions to improve desired outcomes

❖ As of 2023, there are 418 RSGCN identified in the Northeast U.S. 15% (N=61) are marine and coastal

RSGCN Targets



Objectives

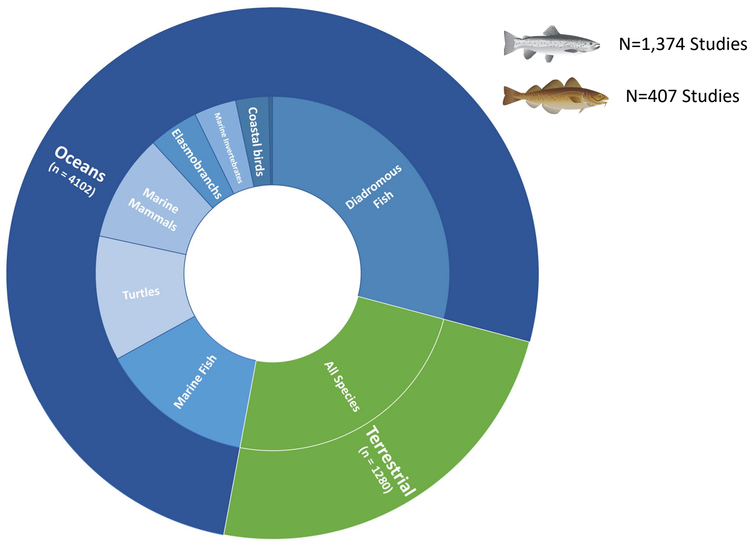
Synthesize current data and literature on:
- Regional downscaled climate projections
- Biological responses to climate change
- Climate Change Vulnerability Assessments (CCVA)
- Scale-appropriate adaptation actions
- Climate tools and resources

Approach

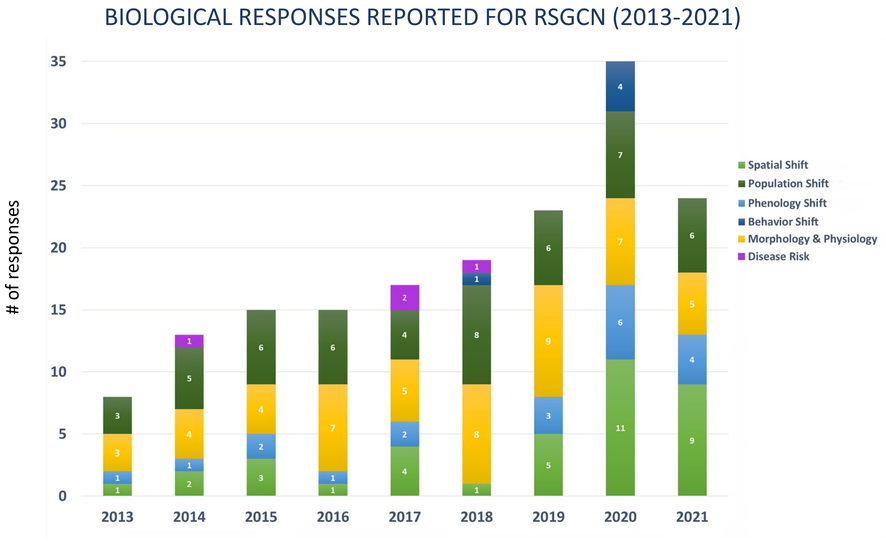
Combine results from literature search, BioShifts database, and CCVAs to:
- Identify knowledge gaps
- Prioritize research and monitoring
- Develop threat-to-action climate adaptation case studies to demonstrate implementation options

Biological Responses

LITERATURE REVIEW RESULTS



BIOLOGICAL RESPONSES REPORTED FOR RSGCN (2013-2021)



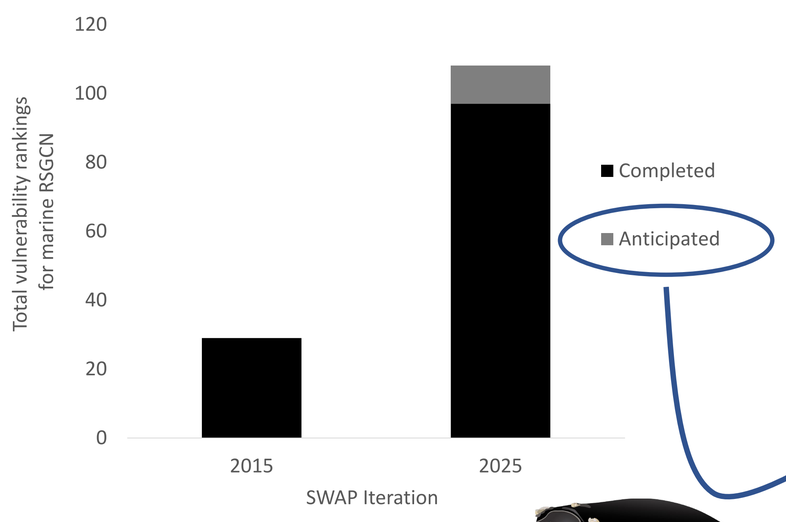
Papers were counted >1 if they contained info on multiple climate responses

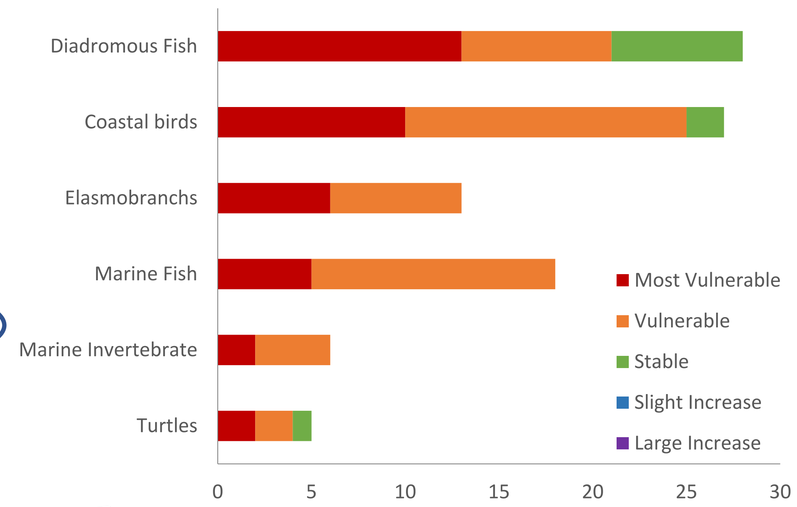
OBSERVED RANGE SHIFTS

BioShifts data from Lenoir et al. 2020. Nature ecology & evolution. https://doi.org/10.1038/s41559-020-1198-2

Climate Change Vulnerability Assessments

TOTAL CCVA RESULTS FOR MARINE RSGCN





Socio-economic factors integrated in CCVA rankings included economic importance, cultural importance, range overlap with protected areas, management or recovery plans, protection legislation, harvest/trade regulation

Key Takeaways

- Climate change studies and CCVAs on marine RSGCN have increased significantly over the last decade
- Coastal birds and exploited fishes have the greatest amount of spatial shift data (depth, lat/long) and responses are highly non-uniform across all RSGCN
- Global and regional trait-based CCVAs show consistent rankings for marine RSGCN with 90% ranked in the top two vulnerability categories, and 39% ranked as most vulnerable
- Key traits related to marine RSGCN climate vulnerability:
  - Strong association w/climate drivers
  - Small range sizes
  - Microhabitat specificity
  - Food specialization
- Key opportunities related to marine RSGCN
  - High adaptive capacity in some species
  - Non-climate threats on many populations are reversable

Adaptation Options

Resist-Assist-Direct Framework is a decision tool to help resource managers make informed strategies for responding to ecological changes resulting from climate change

DIADROMOUS FISHES

VULNERABILITY: Complex migration, early life history; sensitivity to warming, hydrology

GOAL: Increase access to critical seasonal habitat

ACTIONS:
- Restore, protect aquatic habitat and connectivity
- Reduce movement barriers

MARINE FISHES

VULNERABILITY: Reduced population sizes; sensitivity to warming, OA

GOAL: ↑ adaptive capacity to respond to novel conditions

ACTIONS:
- ↓ harvest to ↑ stock size, genetic diversity
- Create spatial-temporal networks of closed / protected areas to facilitate dispersal

Resist
Work to maintain or restore ecosystem composition, structure, processes, or function on the basis of historical or acceptable current conditions

Accept
To allow ecosystem composition, structure, processes, or function to change autonomously

Direct
Actively shape change in ecosystem composition, structure, processes, or function toward preferred new conditions

SEABIRDS

VULNERABILITY: Dispersal limited during breeding period; specialized foragers

GOAL: Maximize habitat and food resources during breeding season

ACTIONS:
- Assisted migration to locations w/ climate refugia and persistent forage resources
- Enhance seasonal forage and habitat resources on / near colonies through restoration and harvest restrictions

Lynch et al. 2022. Fisheries Management & Ecology https://doi.org/10.1111/fme.12545