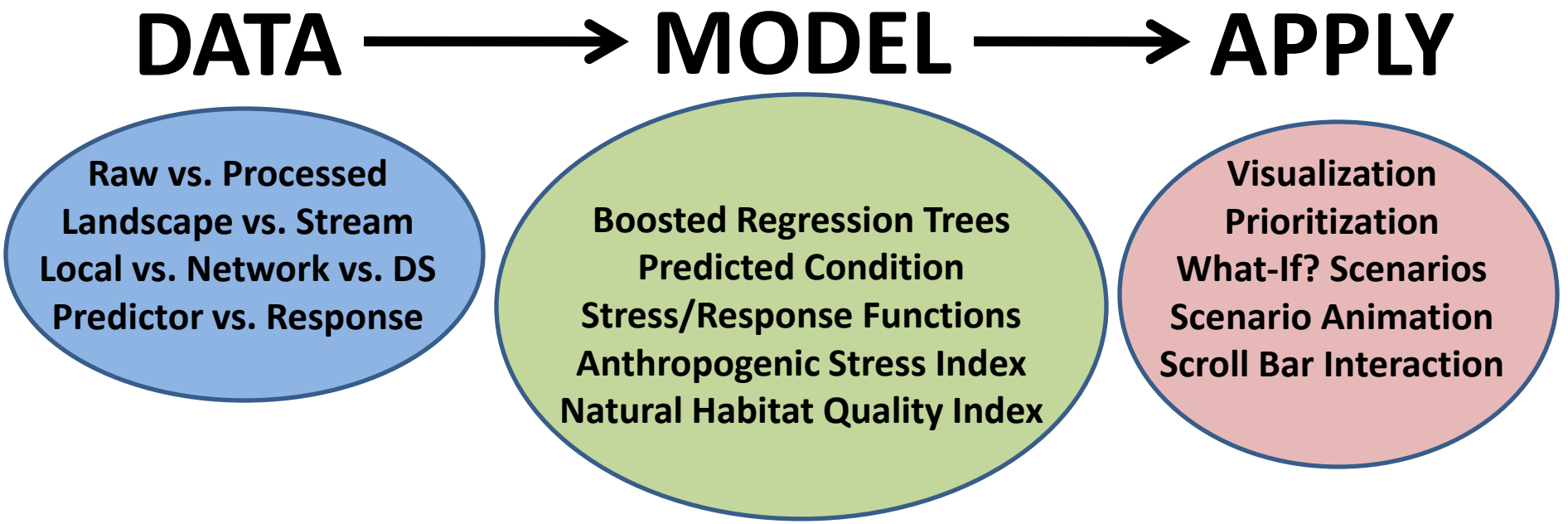
Habitat assessment models and decision support tools for aquatic habitats

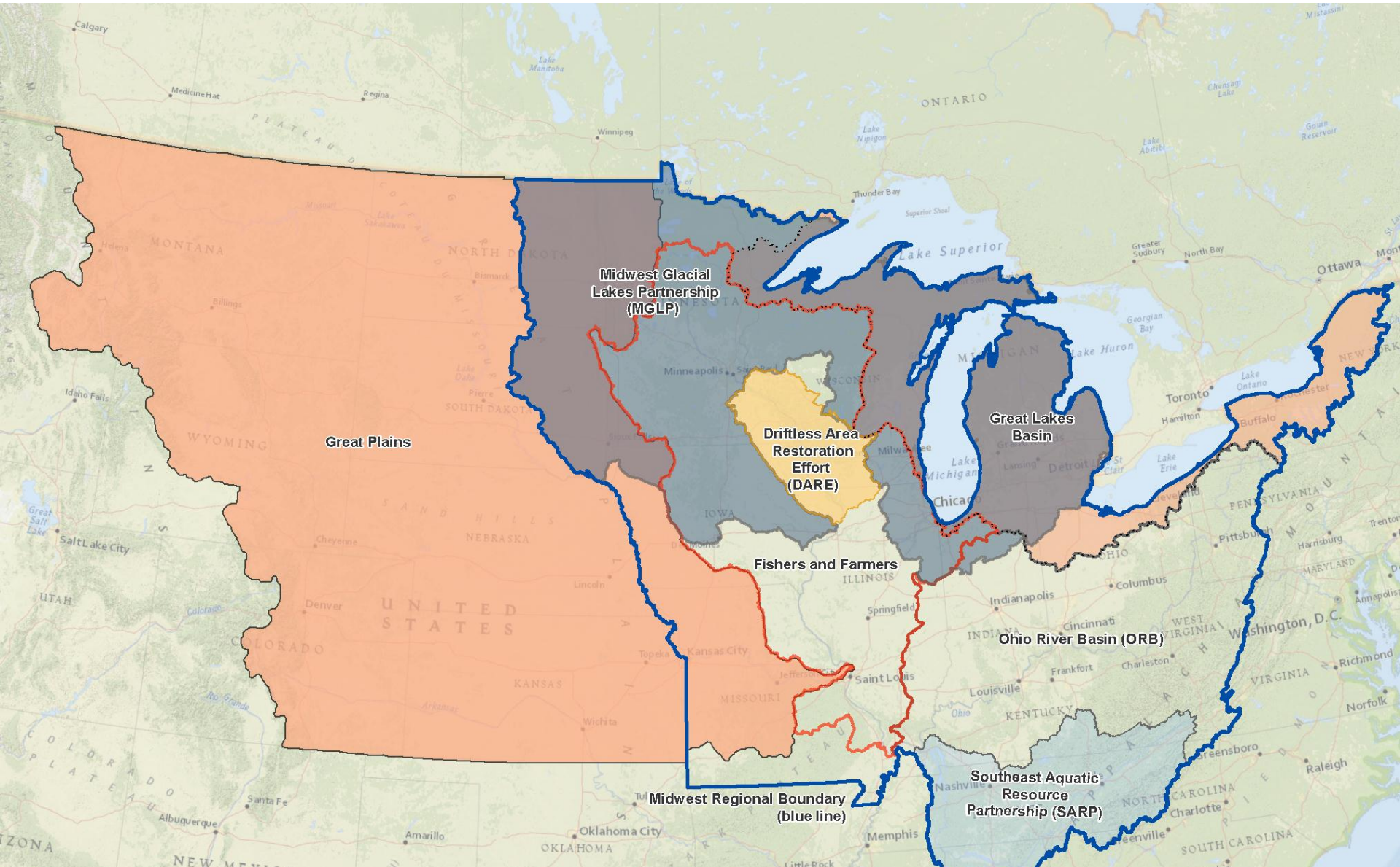


WestVirginiaUniversity.

Downstream Strategies

CRITIGEN

Seven FHP/Partnership Assessments– 2010-2013



Seven FHP/Partnership Assessments

35 Separate Models

- *Ohio River Basin/Southeast Aquatic Resource Partnership (7)*
- *Driftless Area Restoration Area (5)*
- *Great Lakes (5)*
- *Midwest Glacial Lakes (5)*
- *Fishers and Farmers (5)*
- *Great Plains(5)*
- *Midwest Regional (3)*

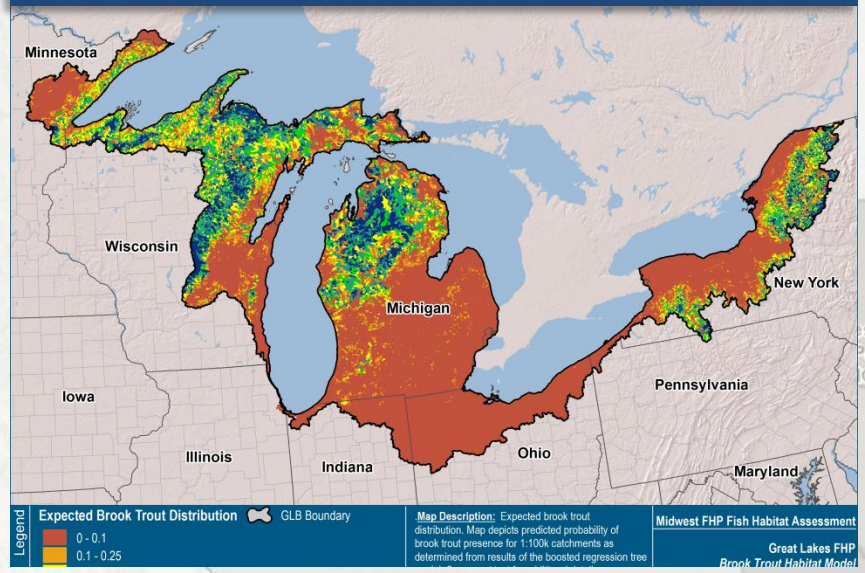
Species Model Examples

- Brook trout
- Walleye
- Smallmouth bass
- Large river species
- Intolerant mussels
- Redhorse
- Long nose dace

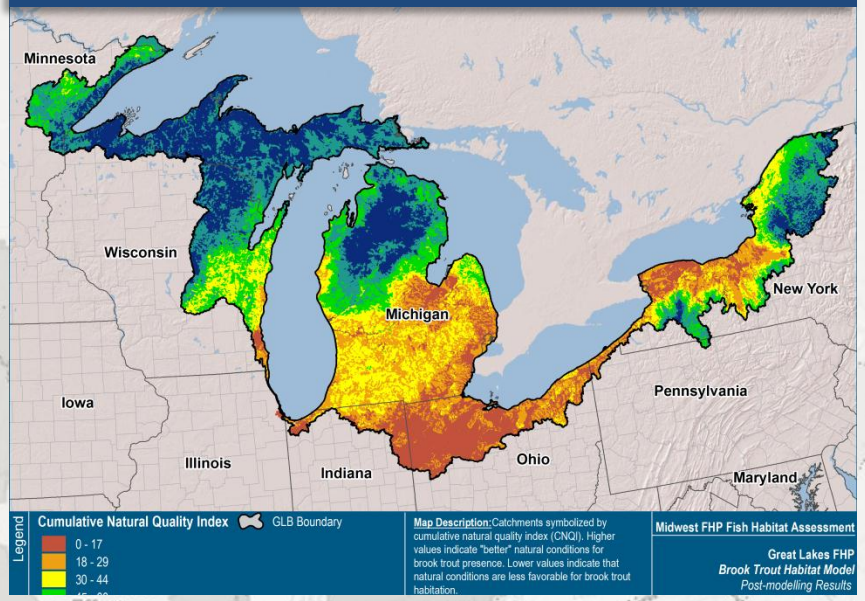
Aquatic Endpoint Examples

- Coldwater index
- Water quality (total summer phosphorous)
- Species richness
- Lithophilic species richness
- Modified index of centers of diversity score
- Small streams signature fish index score

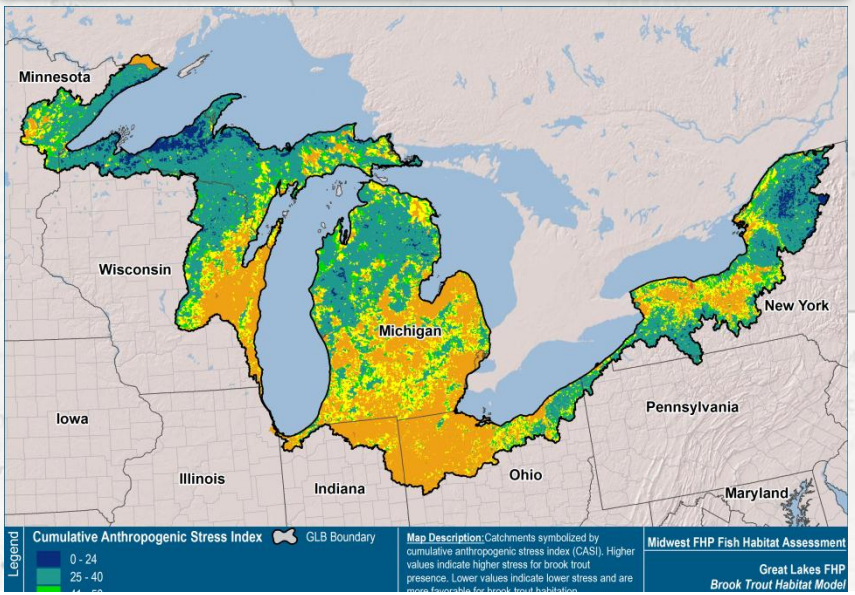
Predictions



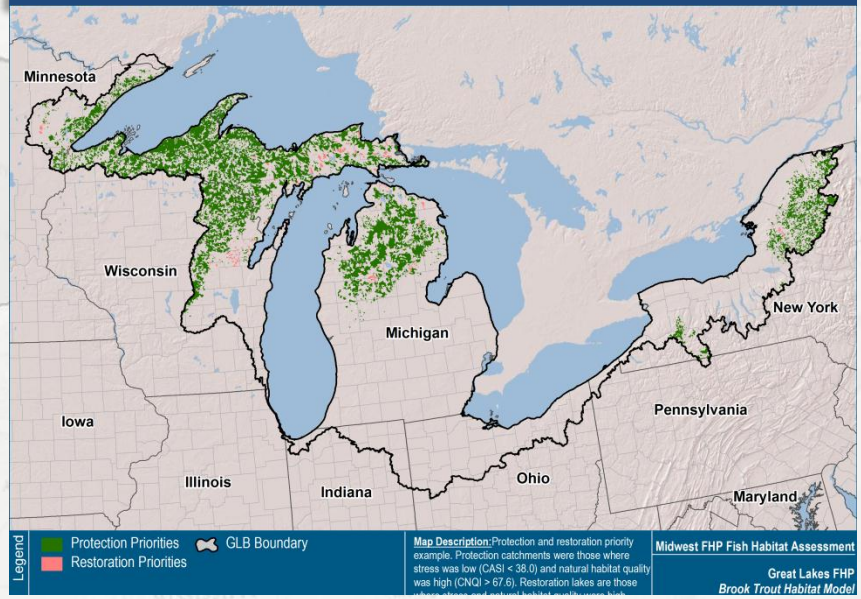
Natural Quality Index



Anthropogenic Stress Index



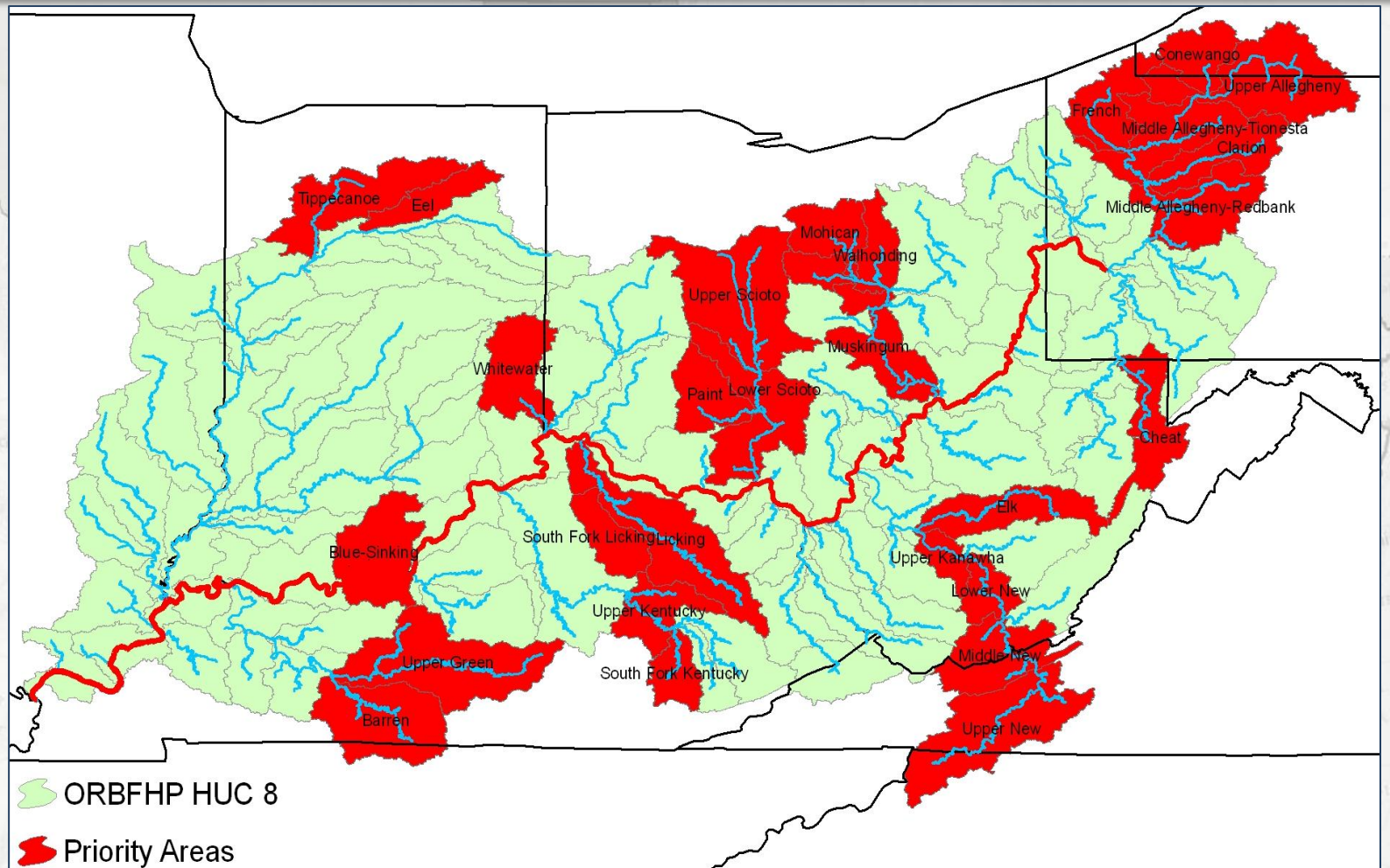
Restoration Protection Priorities



Application Example

Ohio River Basin Priorities

Using the model results, combined and scored all the models to develop a list of priority watersheds. This list was integrated as a factor for project selection



Assessment Outputs

Technical Reports

- Project background
- Overview of assessment process
- Modeling inputs
- Modeling process
- Post-modeling
- Mapped results

Data and Maps

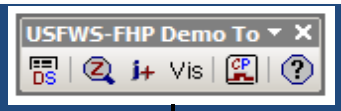
- Geodatabase of model inputs and outputs
- Metadata and data dictionaries
- Processing notes and documentation
- Response (fish) database
- HUC-8 Mapbooks of prediction maps, at the catchment scale

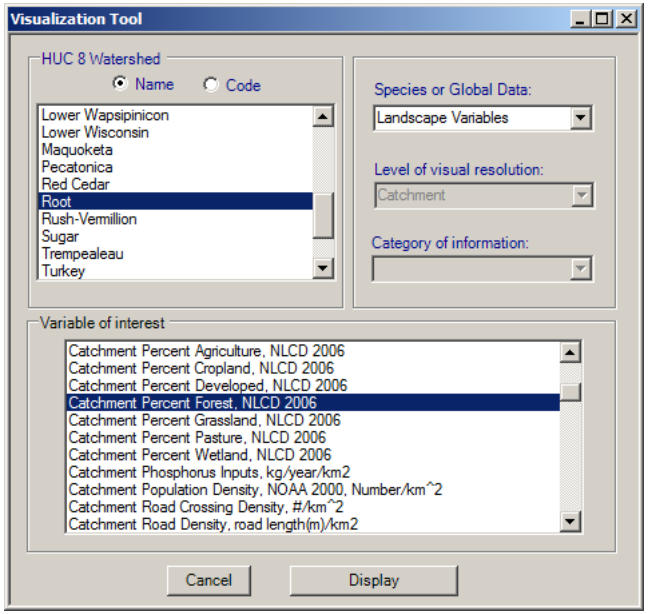
GIS Decision Support Tool

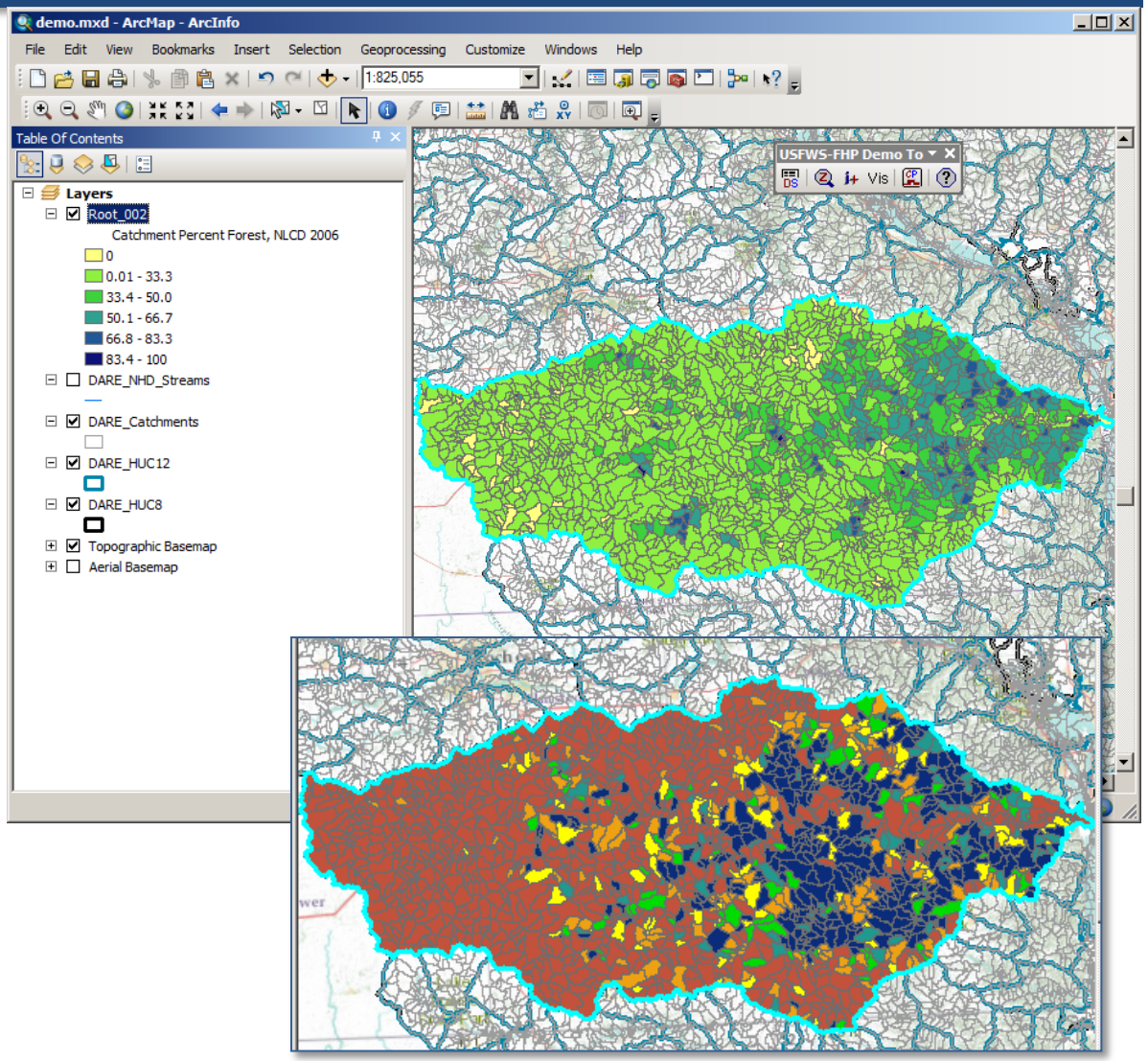
- Integrate ArcMap 10.1 toolbar
- Visualization and Zoom-to features
  - Landscape variables
  - Predictor datasets
  - CASI and CNQI metrics
  - Predictions
  - Socioeconomic data
- Ranking model
  - Weight datasets based on criteria or preference
  - Comprise programming model
  - Identify catchments most / least like criteria
- Futuring tool (new for 2013)
  - Change current conditions at the local level
  - Propagate changes downstream
  - Visualize the impact of that change, locally and downstream

Decision Support Tools (v1)

Visualize the data

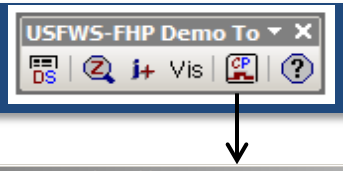


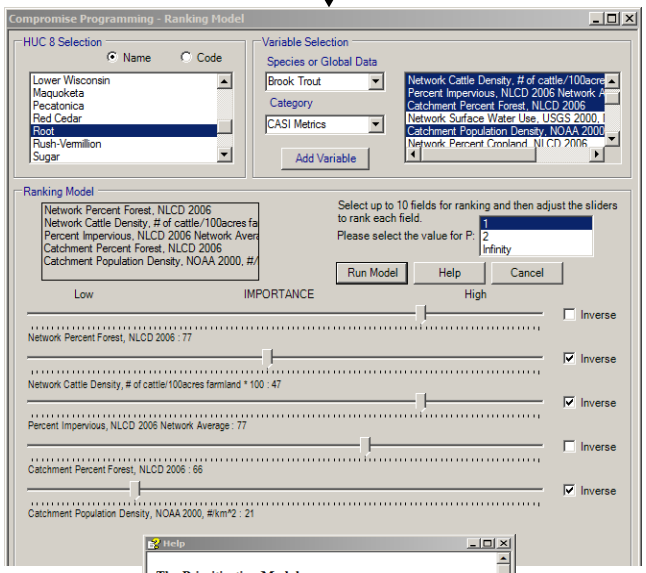


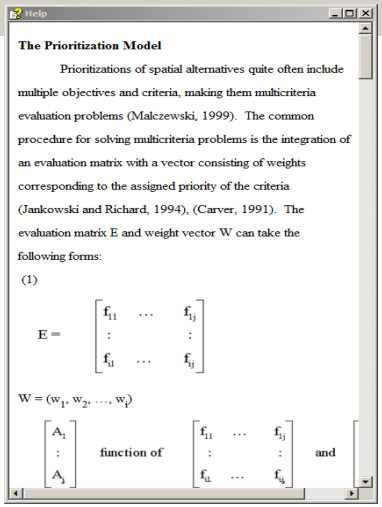


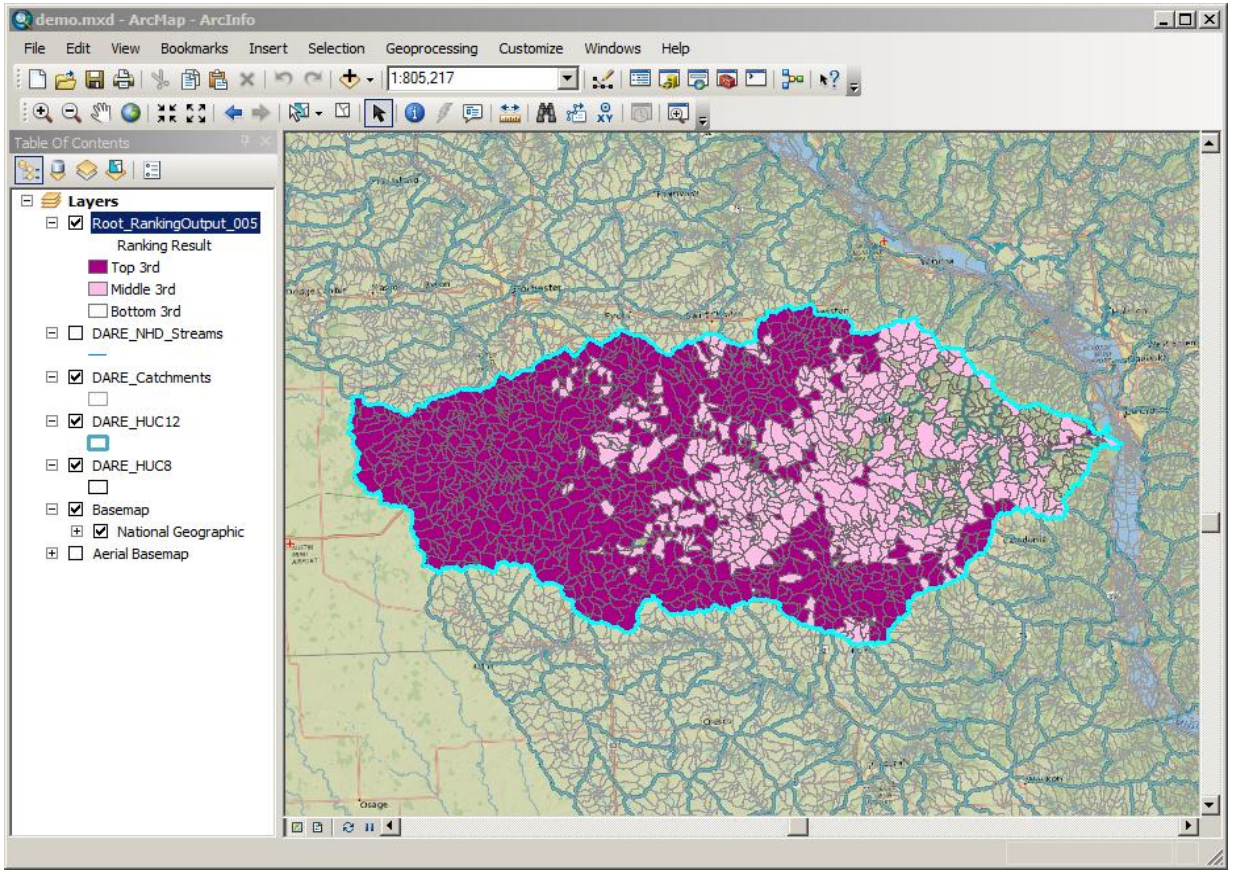
Decision Support Tools (v1)

Rank criteria and results



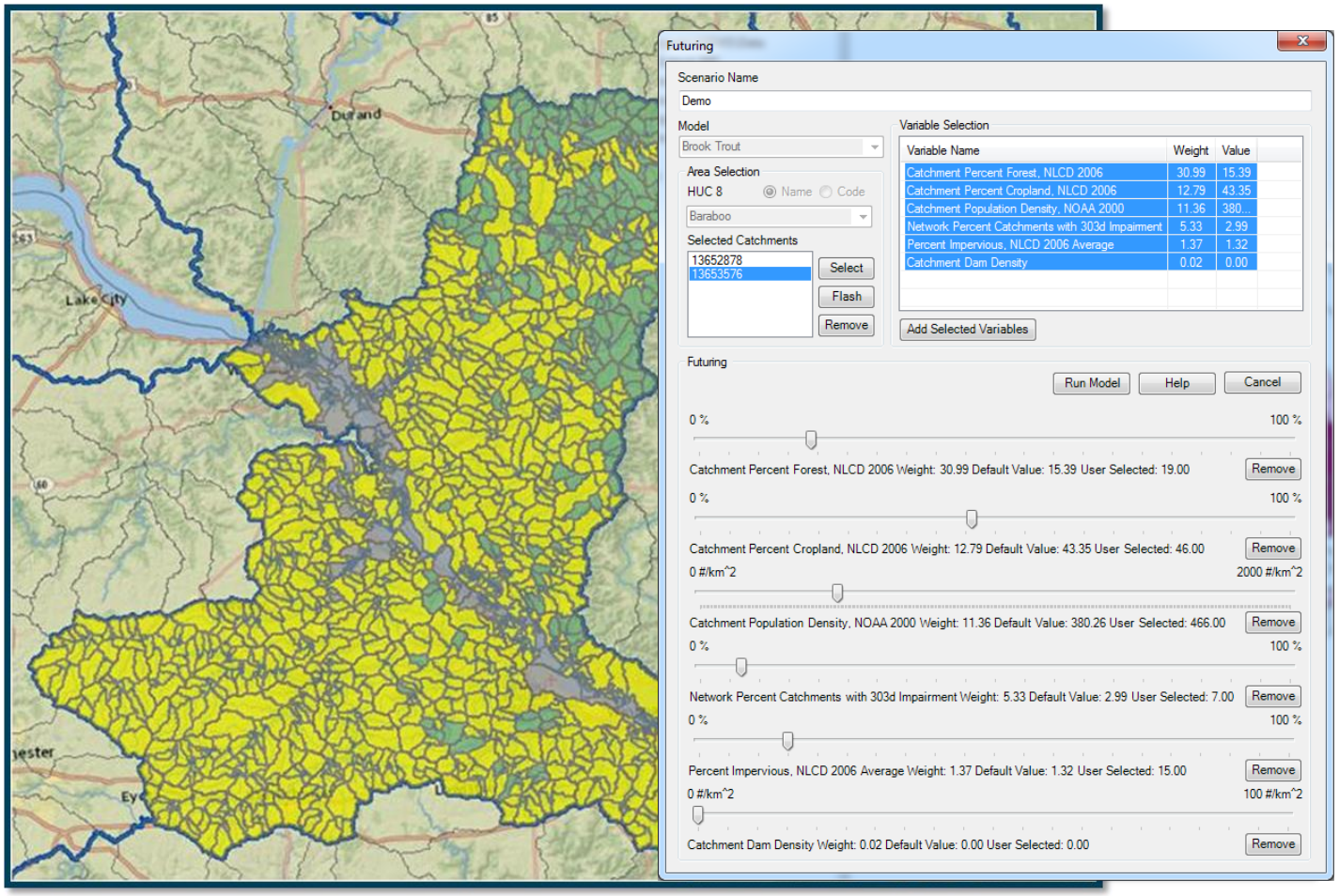


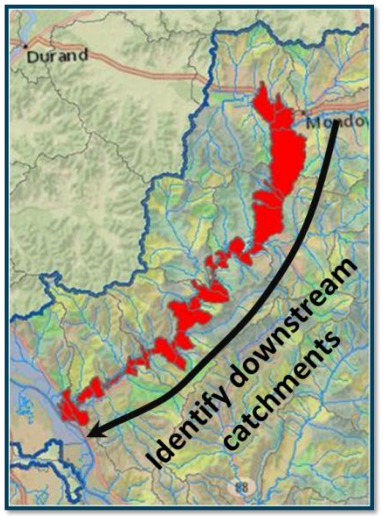


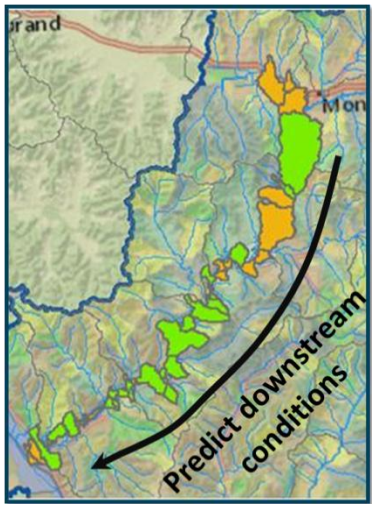


Decision Support Tools (v2)

Futuring tool



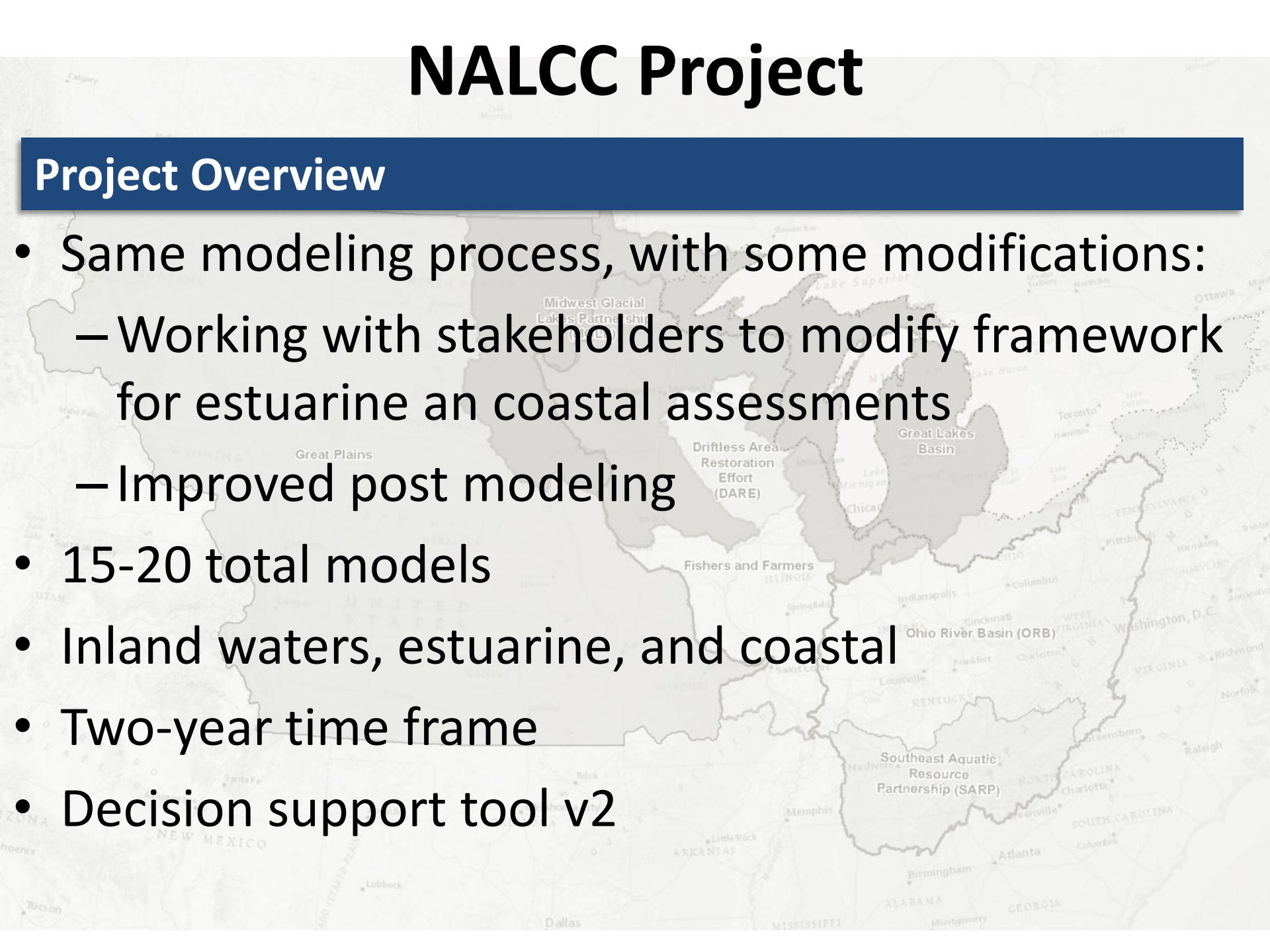




NALCC Project

Project Overview

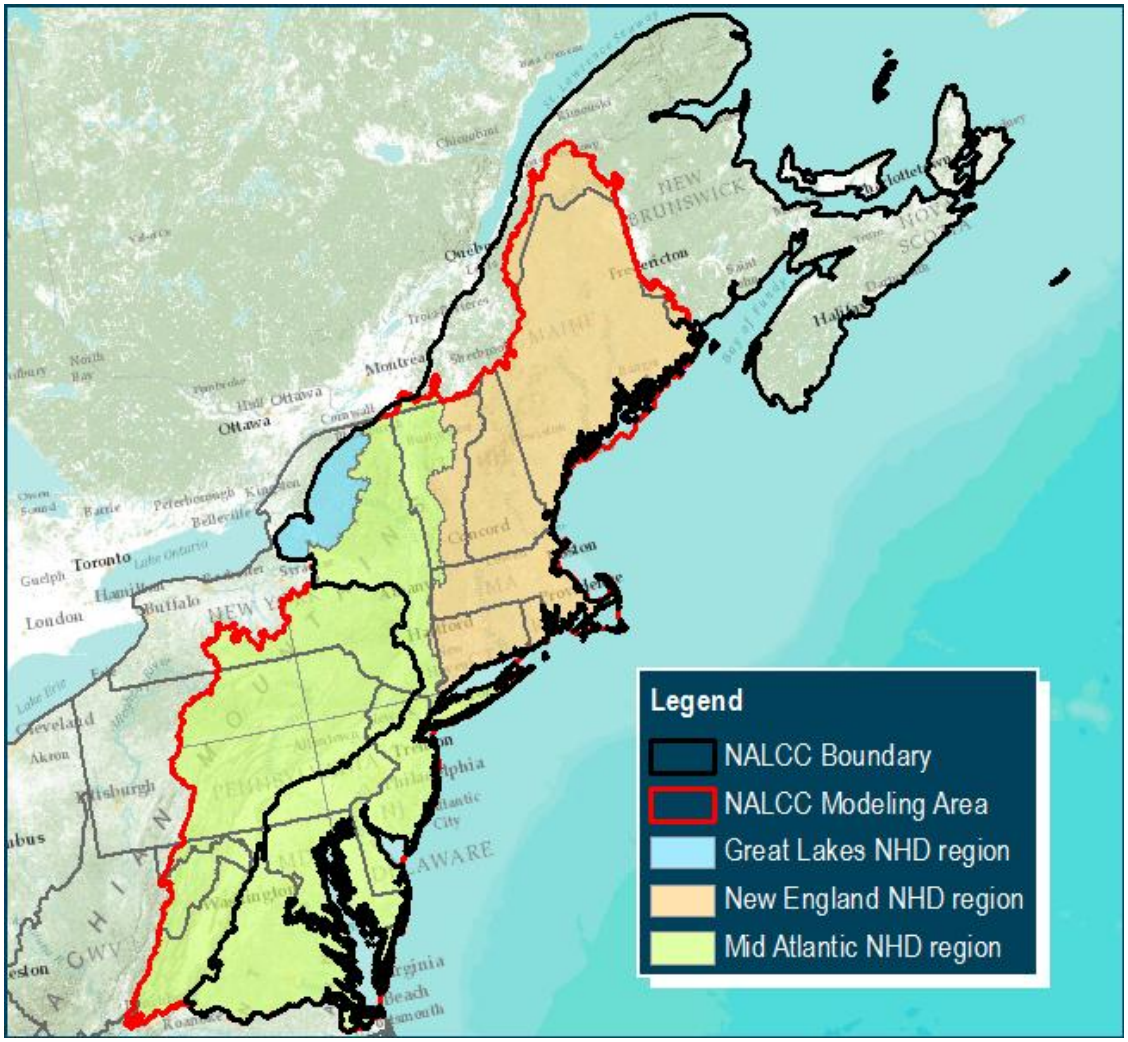
- Same modeling process, with some modifications:
  - Working with stakeholders to modify framework for estuarine an coastal assessments
  - Improved post modeling
- 15-20 total models
- Inland waters, estuarine, and coastal
- Two-year time frame
- Decision support tool v2



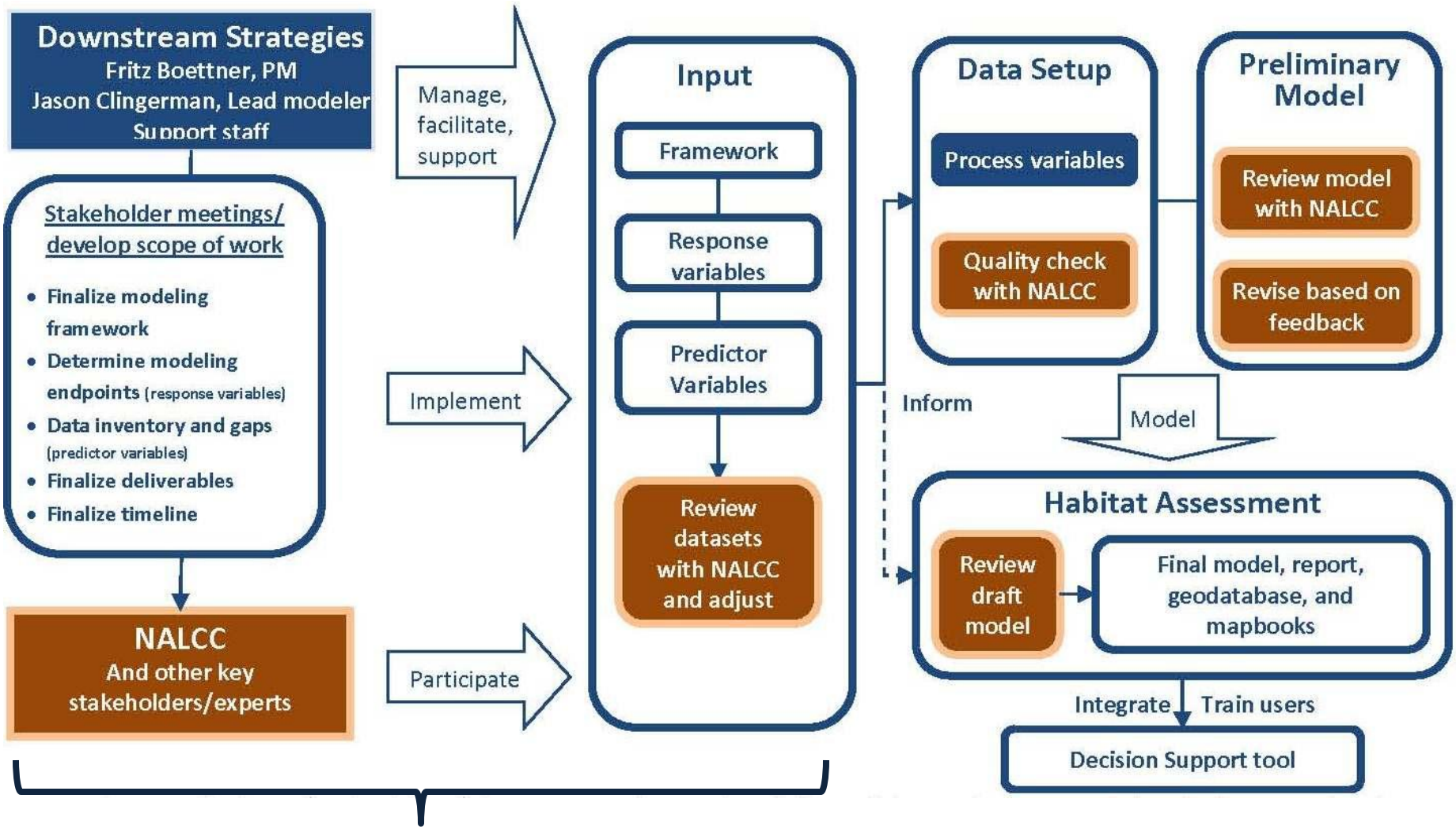
NALCC Project

Modeling area

- Geographic scope includes NALCC region (excluding areas outside the NHD extent, Canada) plus the Hudson, Delaware, Susquehanna, Potomac-Shenandoah, and James River Drainages

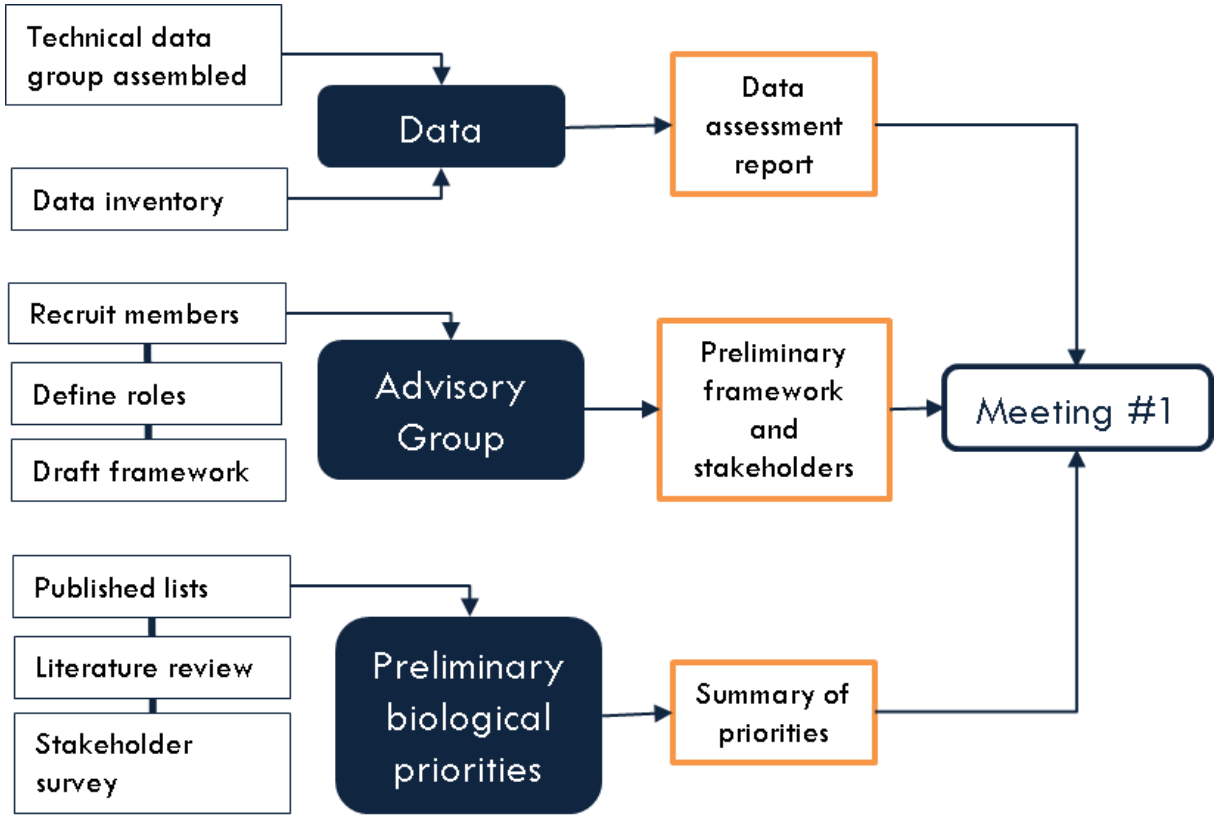


Project Process



NALCC Project Status

Phase 1 – Spring 2013



- Form stakeholder and advisory groups
- Research methods, data, and priorities
- Webinars, committee meetings, set actions
- Face-to-face stakeholder meeting late summer

NALCC Project Status

Advisory groups

- **Project advisor and coordinators:** Assist the project team with organizing and compiling resources (people, data, tools, etc.).
- **Technical review committees:** Participate in the modeling process (one or more models) by providing critical feedback and expertise in reviewing methods, preliminary models, and model outputs.
- **Data development and acquisition committees**: Assist the project team with gathering data for the modeling process.

NALCC Project Status

Priority Species

Common Name	ACFHP	Federal	ME	NH	VT	MA	RI	CT	NY	NJ	PA	DE	MD	DC	VA	WV	TOTAL
Shortnose Sturgeon		E	X	X		X	X	X	X	X	X	X	X	X	X		IIIIIIIIIII
Atlantic Sturgeon*	X	IF	X	X		X	X	X	X	X	X	X	X	X	X		IIIIIIIIIII
American Eel		IF	X	X	X	X	X	X	X		X			X	X	X	IIIIIIIIII
American Brook Lamprey*				X	X	X	X	X		X	X	X	X		X	X	IIIIIIIIII
American Shad		IF	X	X	X	X	X	X	X				X	X	X		IIIIIIIII
Banded Sunfish*				X		X	X	X	X	X	X	X	X		X		IIIIIIIII
Bridle Shiner*				X	X	X	X	X		X	X	X	X		X		IIIIIIIII
Brook Trout		SS	X	X	X	X	X	X	X	X			X			X	IIIIIIIII
Alewife		IF		X		X	X	X	X		X			X	X		IIIIIIII
Blueback Herring		IF		X	X	X	X	X	X					X			IIIIIII
Rainbow Smelt			X	X			X	X	X	X	X						IIIIIII
Atlantic Salmon	X	E	X	X	X	X	X	X	X								IIIIIII
Hickory Shad		IF						X		X	X	X	X	X			IIIIII
Slimy Sculpin				X		X		X		X					X	X	IIIIII
Swamp Darter			X	X		X		X	X				X				IIIIII
Ironcolor Shiner									X	X	X	X	X		X		IIIIII
Longnose Sucker			X			X		X			X		X				IIIII
Least Brook Lamprey											X	X	X		X	X	IIIII
Burbot			X	X		X		X			X						IIIII
Comely Shiner									X	X		X	X			X	IIIII
Sum	*2*	*9*	*10*	*15*	*7*	*15*	*12*	*17*	*13*	*11*	*13*	*9*	*13*	*7*	*11*	*6*	

Atlantic Coast FHP

Coastal/Estuarine considerations

- Different methodology likely, but same framework
  - Perhaps raster-based multi-scale approach like Gulf coastal assessment
  - Need time to research best methods once data availability is known
  - Need technical and data support
  - Integrating climate change and future growth scenarios
- Data Availability
  - Predictor variables
  - Response variables

Atlantic Coast FHP

Planning priorities

- **ACFHP Strategic Plan, C.2.3 Strategic Action**
  - **"…**products that can be used to inform the goals and objectives laid out in this plan and to develop time-bound, spatially-explicit, and quantitative conservation objectives in future Plans or revisions to the Strategic Conservation Plan."
- **Approved FHP Policies and guidance, capabilities for scientific assessment**
  - "Organizations involved in each FHP will have capabilities to measure and demonstrate progress – through existing programs where possible – using science based resource assessment, project evaluation, and reporting of …"
- **Evaluating FHP performance**
  - "…partnership uses resource condition assessment and/or analysis results to determine conservation priorities and identify the actions they require…
  - "…listing of the conservation priorities, and the actions they require, determined by the resource condition assessment and/or analysis results."

NALCC Project Status

Next steps

- **Publish background information and research**
  - Project website (www.northatlanticlcc.org/projects/downstream-strategies-project)
  - Modeling framework, methodology, and data summaries
  - Climate change and future growth case studies
- **Develop priorities**
  - Literature review of listed priority species
  - Administer survey to respondents for stakeholder recruitment and the development of priorities
- **Recruit Stakeholders**
  - Assist the project team with gathering data, finalizing priorities, and providing technical review(s) of the modeling process.
- **Webinars and face-to-face meeting**
  - Several webinars to explain the process and organize stakeholders
  - 2-day workshop to set modeling endpoints and methodology for coastal/estuarine assessments