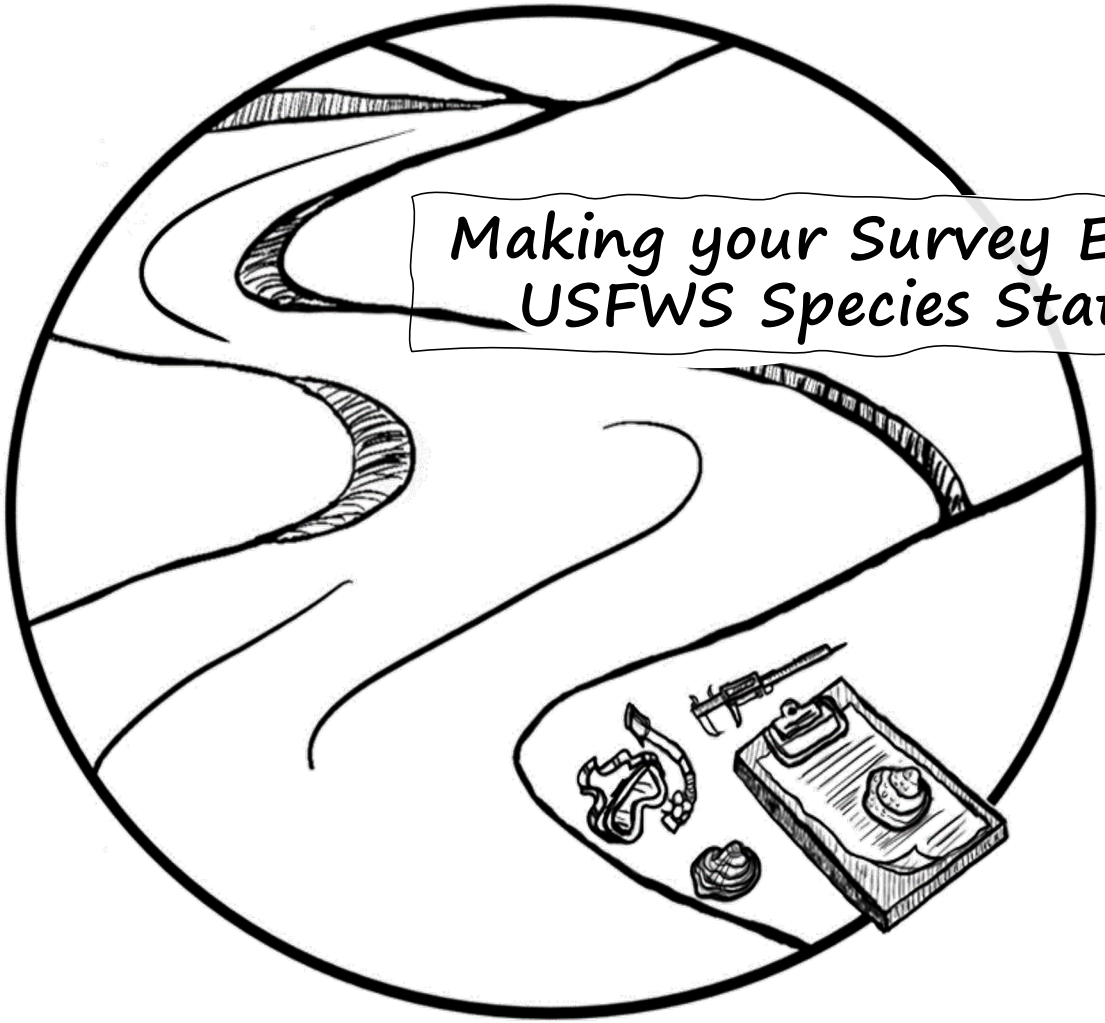


Making your Survey Effort Count Towards the USFWS Species Status Assessment Process

Amanda Rosenberger
Daniel Fitzgerald
Kristin Irwin Womble

With Gratitude to:
Dave Smith, Mary Freeman,
Jason Dunham & others for
Ideas and thoughts!!


235
Will
Work For
Habitat

What is Species Status Assessment?

- Species current condition relative to extinction risk

- Purpose: Describe the viability of species to support ESA decisions.

Conservation Principles in the SSA Process

Viability is ***the ability of a species to sustain populations in the wild beyond a biologically meaningful time frame.***

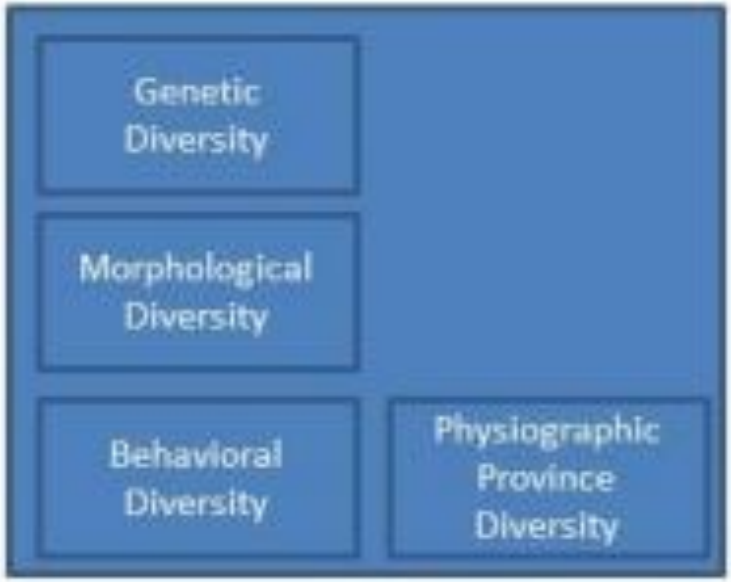
Representation – adaptive potential to changing conditions

Resiliency – withstanding stochasticity

Redundancy – withstanding catastrophe

Representation – Adaptive potential to changing conditions

- Evolutionary potential
  - Multiple Populations
  - Range extremes
  - Habitat edges
  - Life history variability

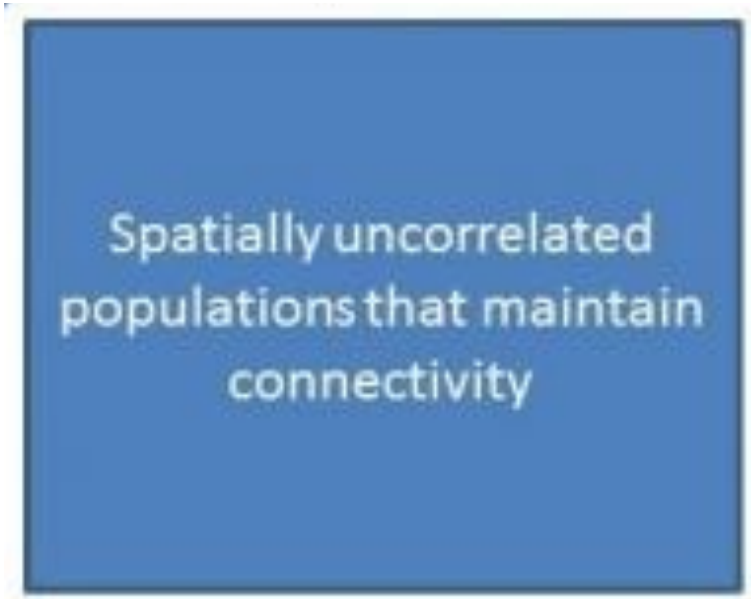


Resiliency – Ability to withstand stochasticity

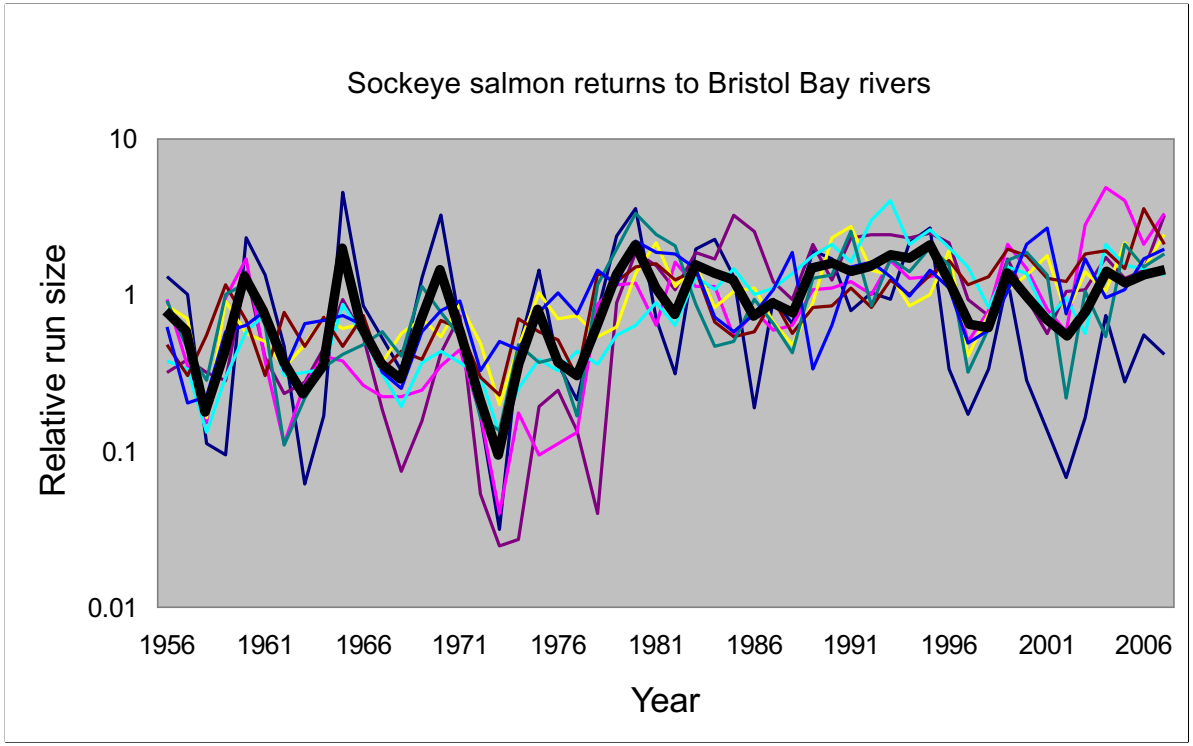
- Population Health
  - Abundance
  - Growth
  - Recruitment (multiple age classes)
  - Extent (larger populations than standard disturbances)

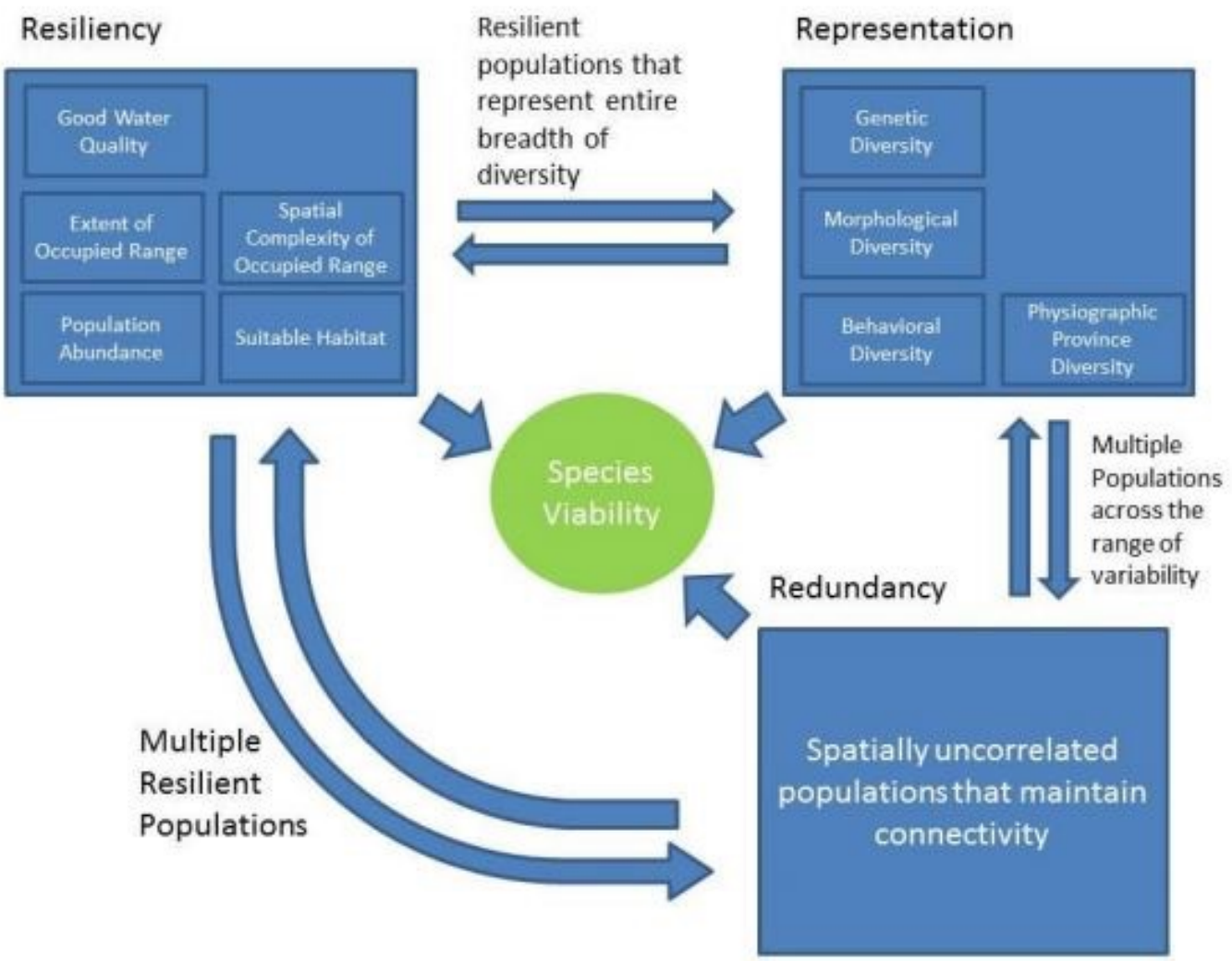
Redundancy – Withstanding catastrophe

- Number and distribution of populations
- Spatially AND Temporally uncorrelated

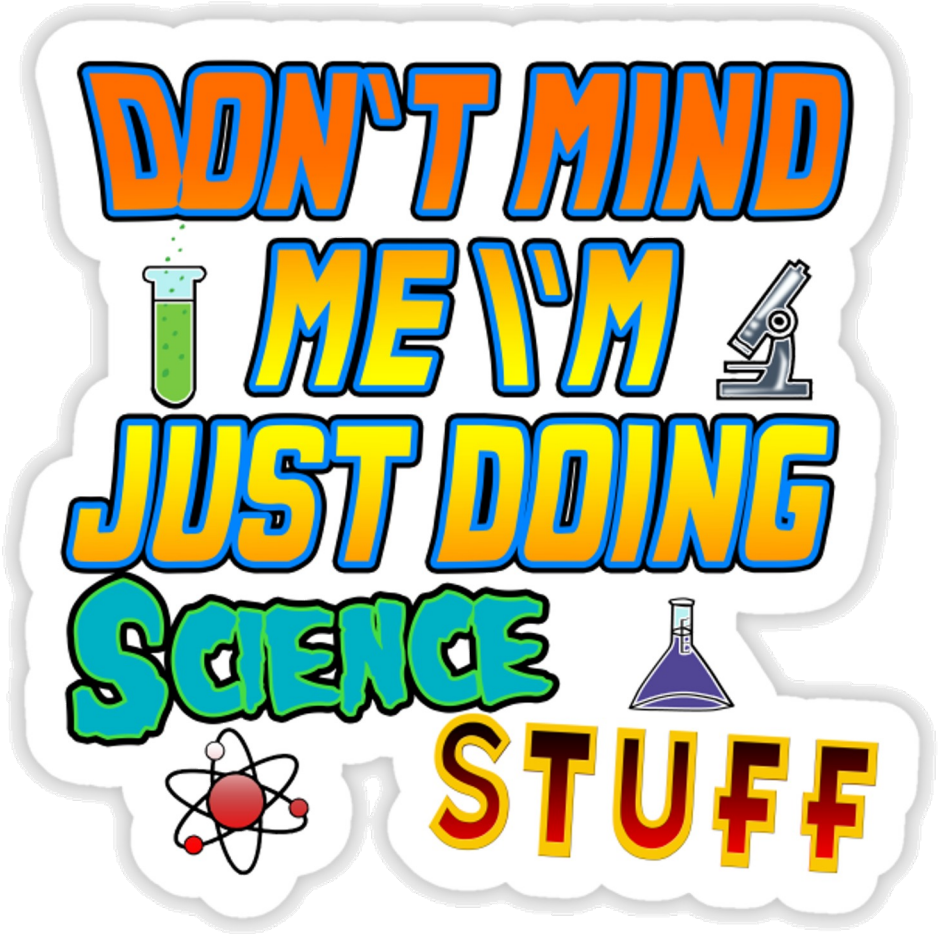


Different dynamics in stocks of Bristol Bay sockeye produce portfolio effects in fisheries

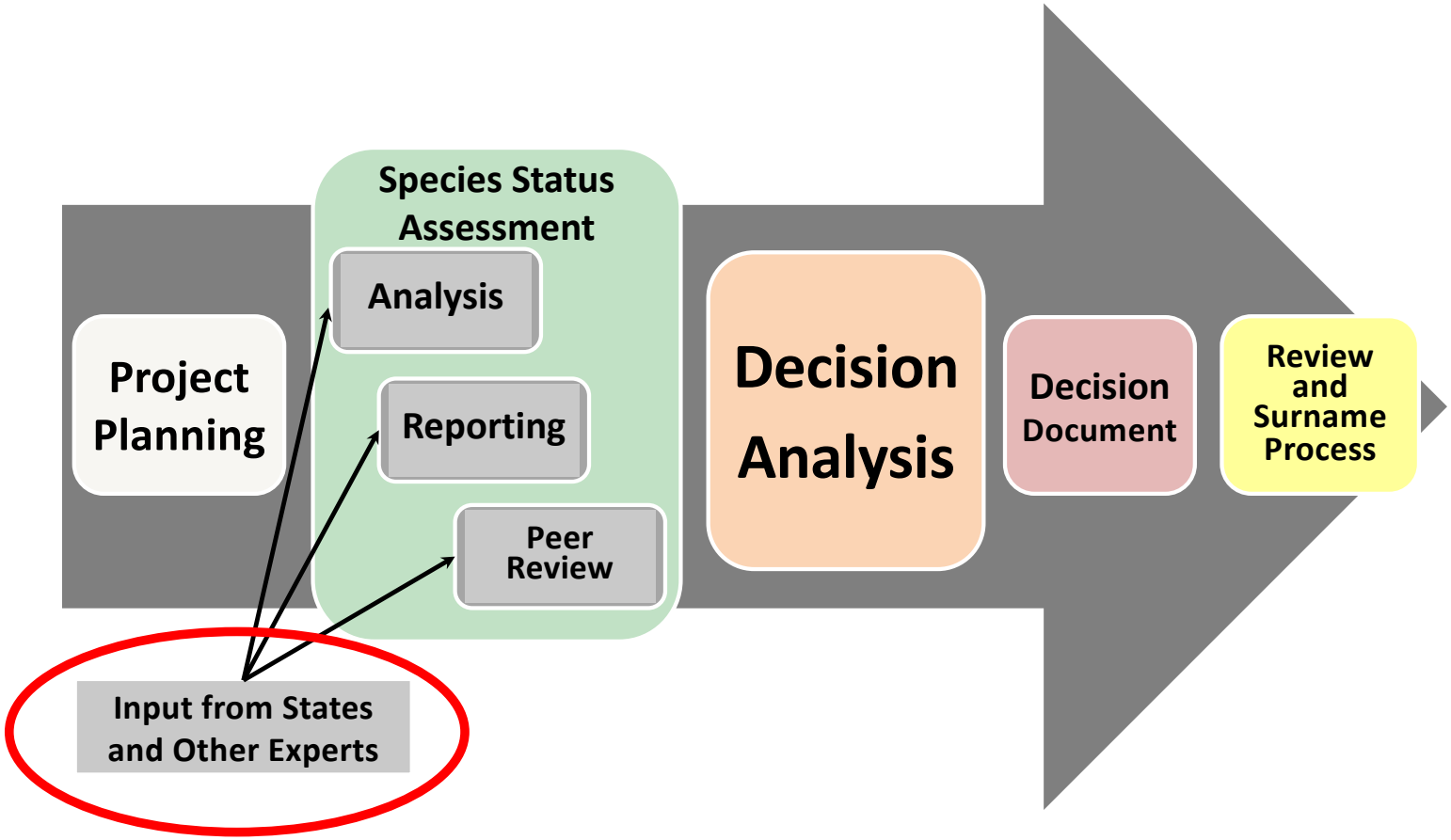



Resiliency
Good Water Quality
Extent of Occupied Range
Spatial Complexity of Occupied Range
Population Abundance
Suitable Habitat
Resilient populations that represent entire breadth of diversity
Representation
Genetic Diversity
Morphological Diversity
Behavioral Diversity
Physiographic Province Diversity
Species Viability
Multiple Populations across the range of variability
Redundancy
Multiple Resilient Populations
Spatially uncorrelated populations that maintain connectivity

Information only

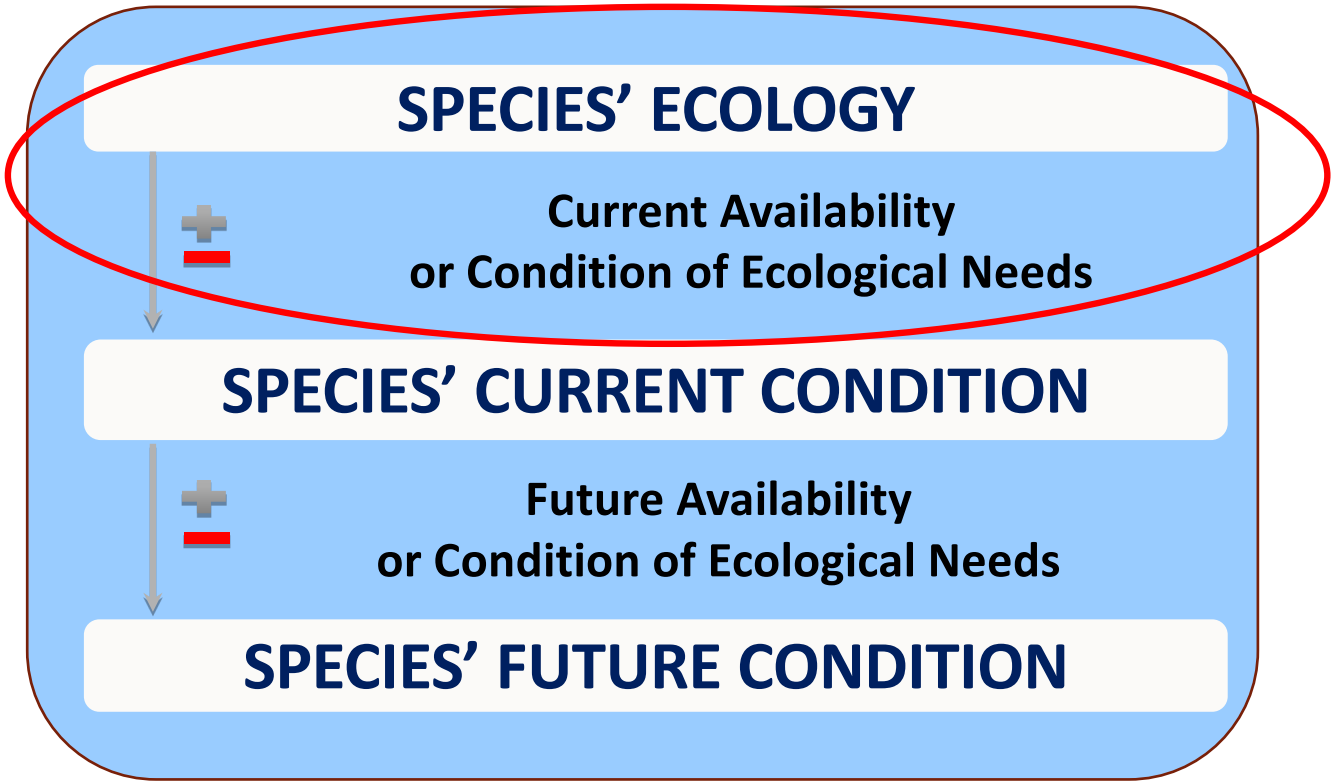


SSA's context within the FWS workflow



Components of Species Status Assessment?

- Three stages:



Information Needs: Species Ecology

Life history, ecological relationships, and current condition

- Where we can be most helpful:
  - Tolerance thresholds of temperature, water quality, and other threats
  - Resolve taxonomic questions
  - Provide reliable distribution data (presence and absence)
  - Provide information on relative health and continuity of populations

Tolerance, Habitat Requirements, Life History

Upper thermal tolerances of early life stages of freshwater mussels

Tamara J. Pandolfo[1,6], W. Gregory Cope[1,7], Consuelo Arellano[2,8], Robert B. Bringolf[3,9], M. Christopher Barnhart[4,10], AND Edward Hammer[5,11]

RIVERSCAPE-SCALE MODELING OF FUNDAMENTALLY SUITABLE HABITAT FOR MUSSEL ASSEMBLAGES IN AN OZARK RIVER SYSTEM, MISSOURI

Kayla N. Key*[1,2], Amanda E. Rosenberger[3], Garth A. Lindner†[4], Kristen Bouska[5], and Stephen E. McMurray[6]

2012 *SOUTHEASTERN NATURALIST* 11(4):733–746

Host Identification and Glochidia Morphology of Freshwater Mussels from the Altamaha River Basin

Jennifer A. Johnson[1], Jason M. Wisniewski[2], Andrea K. Fritts[1], and Robert B. Bringolf[1,*]

Resolving Taxonomic Questions

Received: 2 April 2021 | Revised: 14 August 2021 | Accepted: 26 August 2021

DOI: 10.1002/ece3.8219

RESEARCH ARTICLE

Ecology and Evolution Open Access WILEY

Genetic and morphological characterization of the freshwater mussel clubshell species complex (*Pleurobema clava* and *Pleurobema oviforme*) to inform conservation planning

Cheryl L. Morrison[1] | Nathan A. Johnson[2] | Jess W. Jones[3] |
Michael S. Eackles[1] | Aaron W. Aunins[1] | Daniel B. Fitzgerald[1] |
Eric M. Hallerman[4] | Tim L. King[1,†]

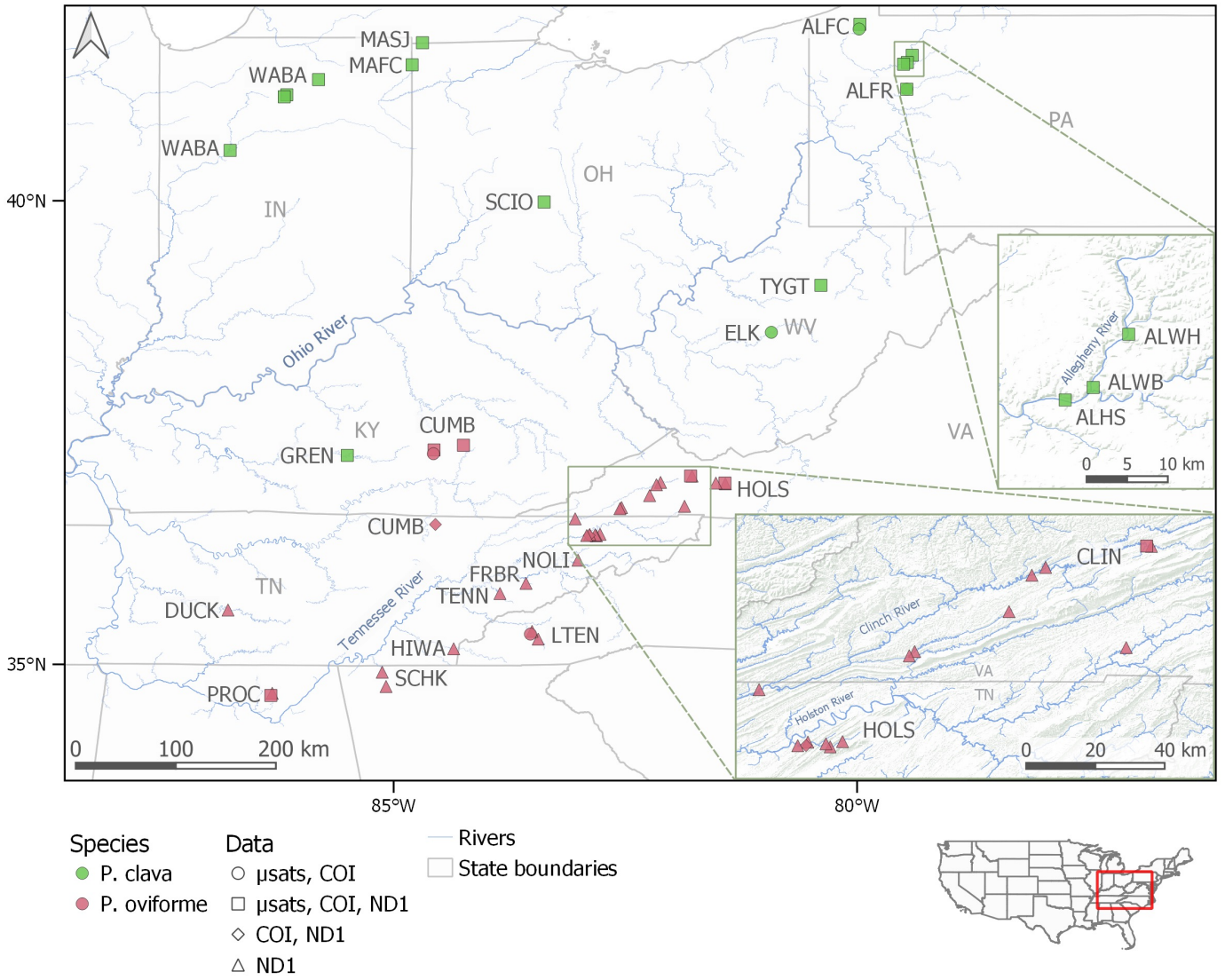
Information Needs: Species Ecology

Life history, ecological relationships, and current condition

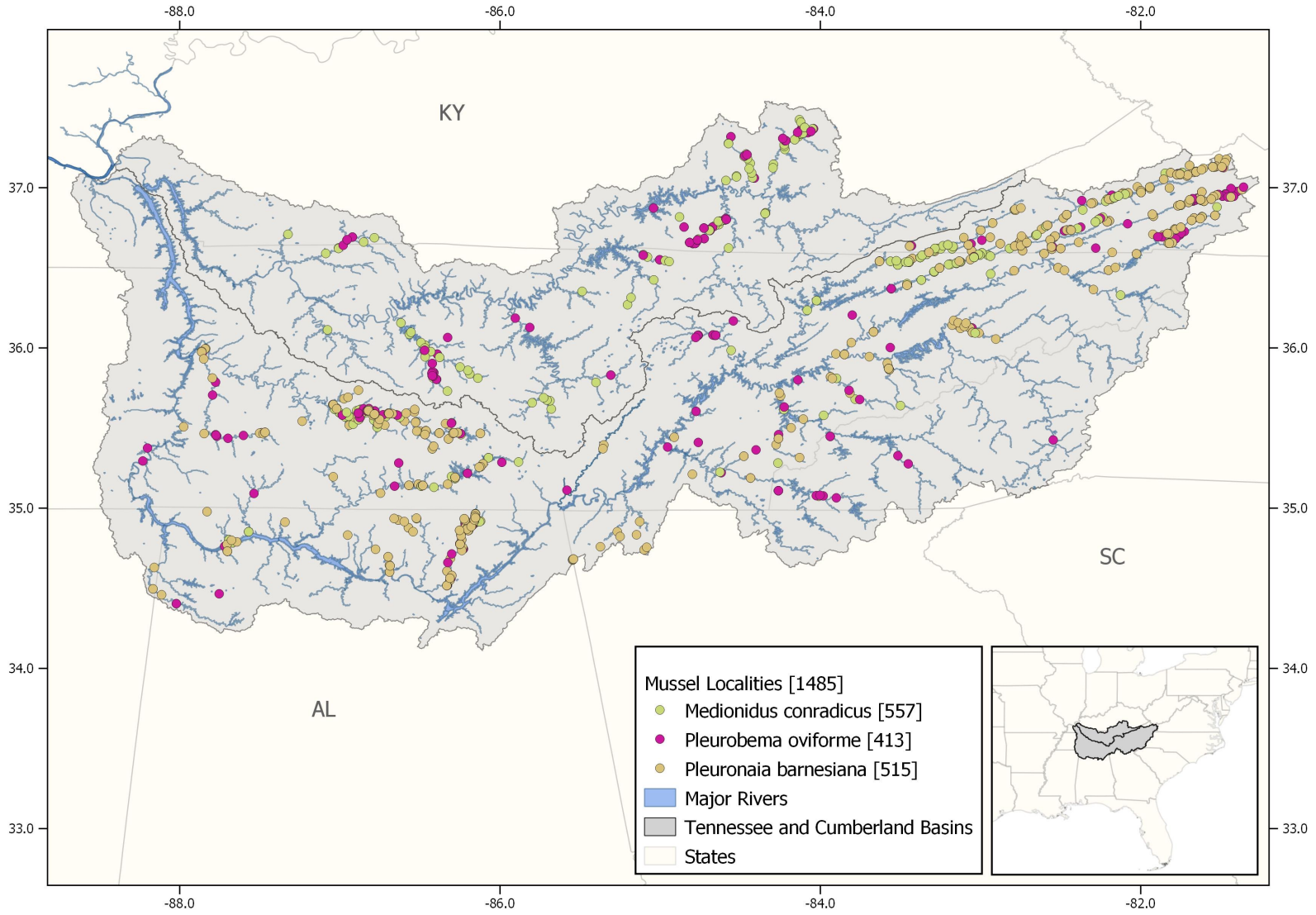
- Where we can be most helpful:
  - Tolerance thresholds of temperature, water quality, and other threats
  - Resolve taxonomic questions
  - Provide reliable distribution data (presence and absence)
  - Provide information on relative health and continuity of populations

With this, we can resolve many ecological relationships

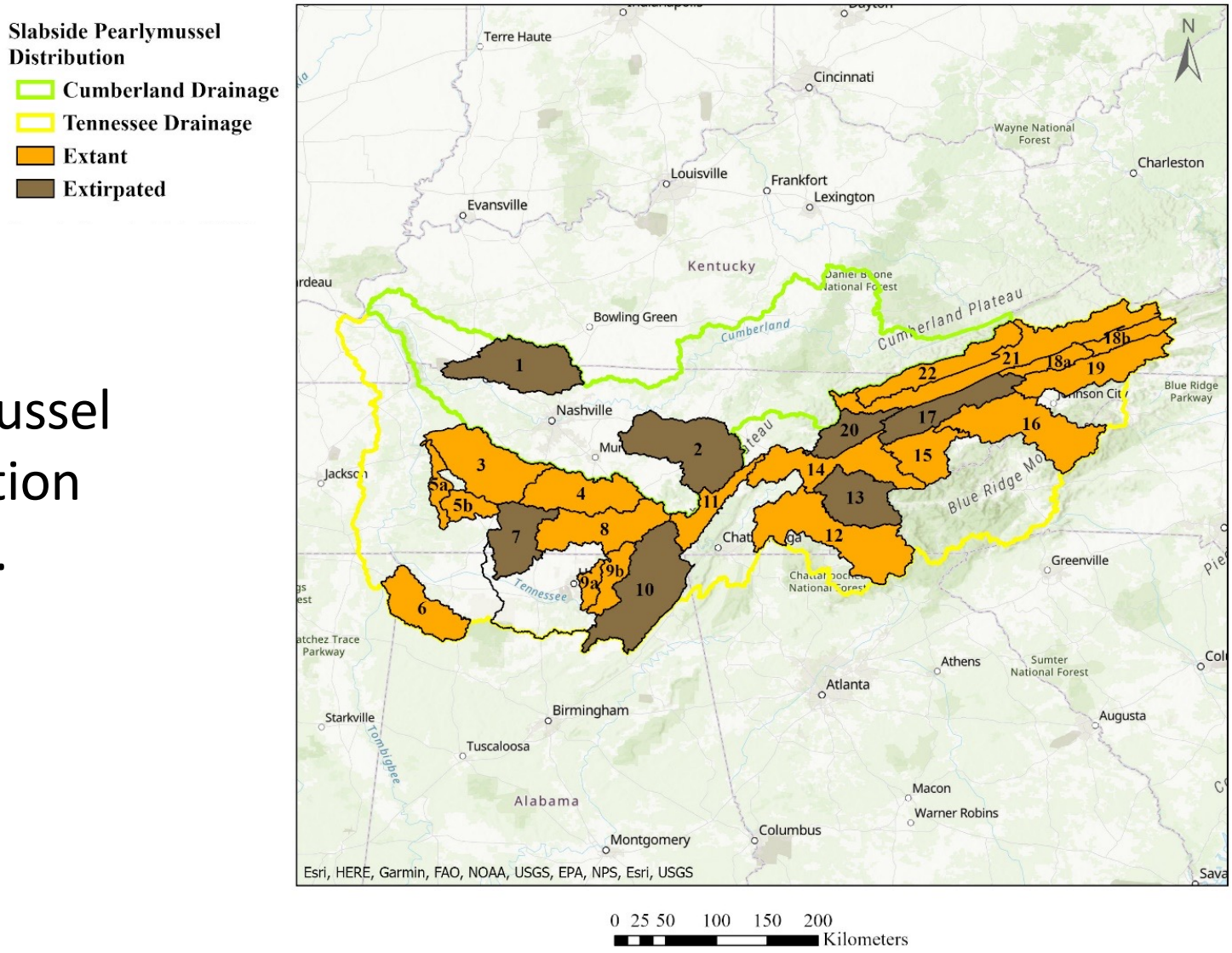
Clubshell and
TN Clubshell range



Combined Species Assessments



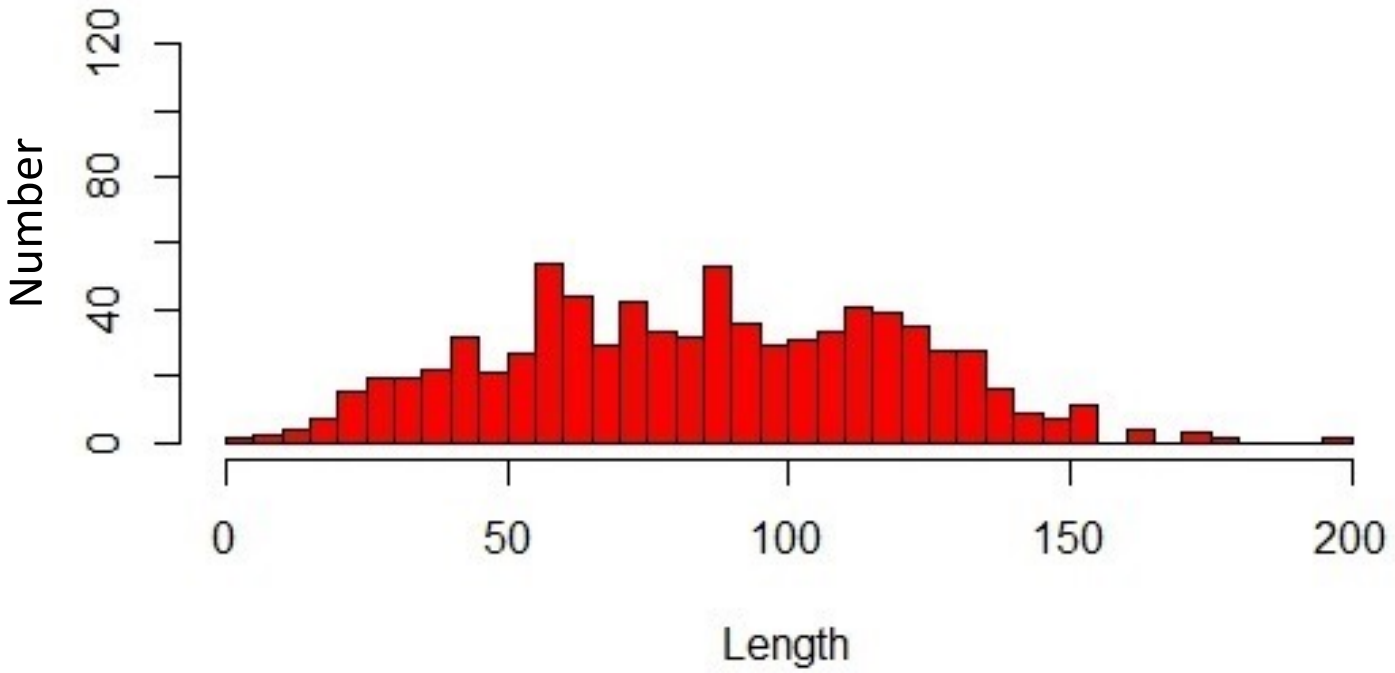
Slabside Pearlymussel Distribution (HUC8s).



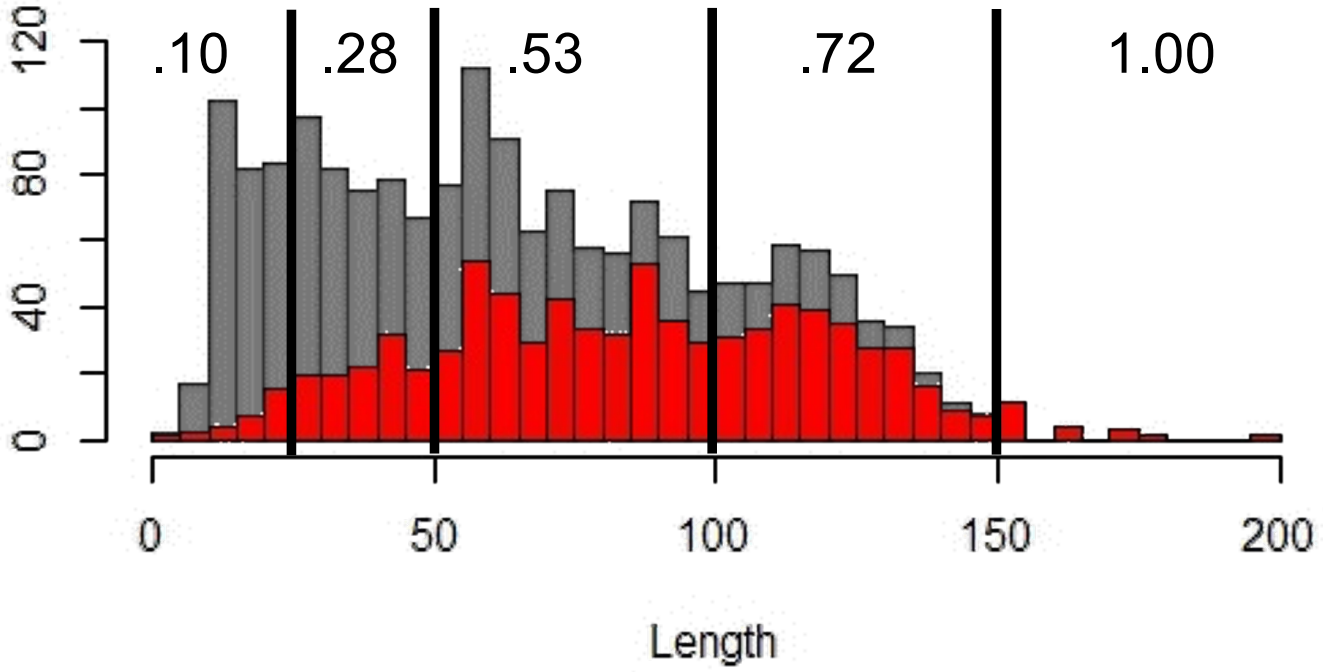
Current Conditions: Data needed

- Distribution, abundance, occurrence, etc.
  - (data needs to be accessible and well organized)
- Repeat surveys for detectability, turnover, trends
- Evidence of reproduction (shell lengths and size class structure)
- Information on shell condition (fresh dead or fossil shells?)
- Method!!!!!!

The Importance of Method
Size Class Distribution – Visual Only



Size Class Distribution – with Excavation



Consider common relationships

- Abundance ~ Diversity ~ Recruitment

- Healthy Populations tend to have:
  - High abundance
  - High continuity over their ranges
  - Lots of neighbors in species-rich beds

- Examine those relationships with your data sets
  - Inference is our friend!!

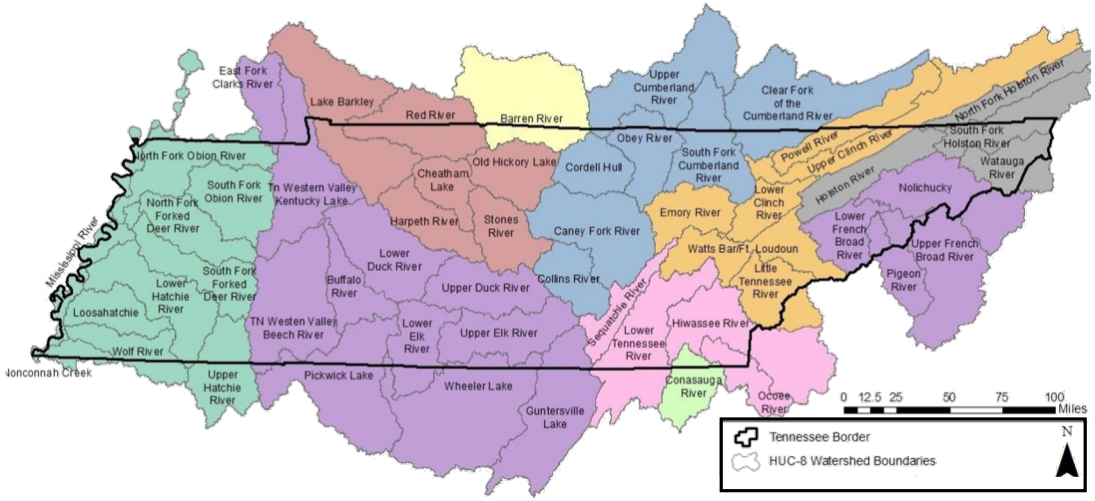
Standard practices

- Repeat Sampling
  - Detectability
- Double sampling
  - Inferential power
- Continuity (longitudinal surveys)
- Coordinates (spatially explicit)

Information Needs – Statewide Database

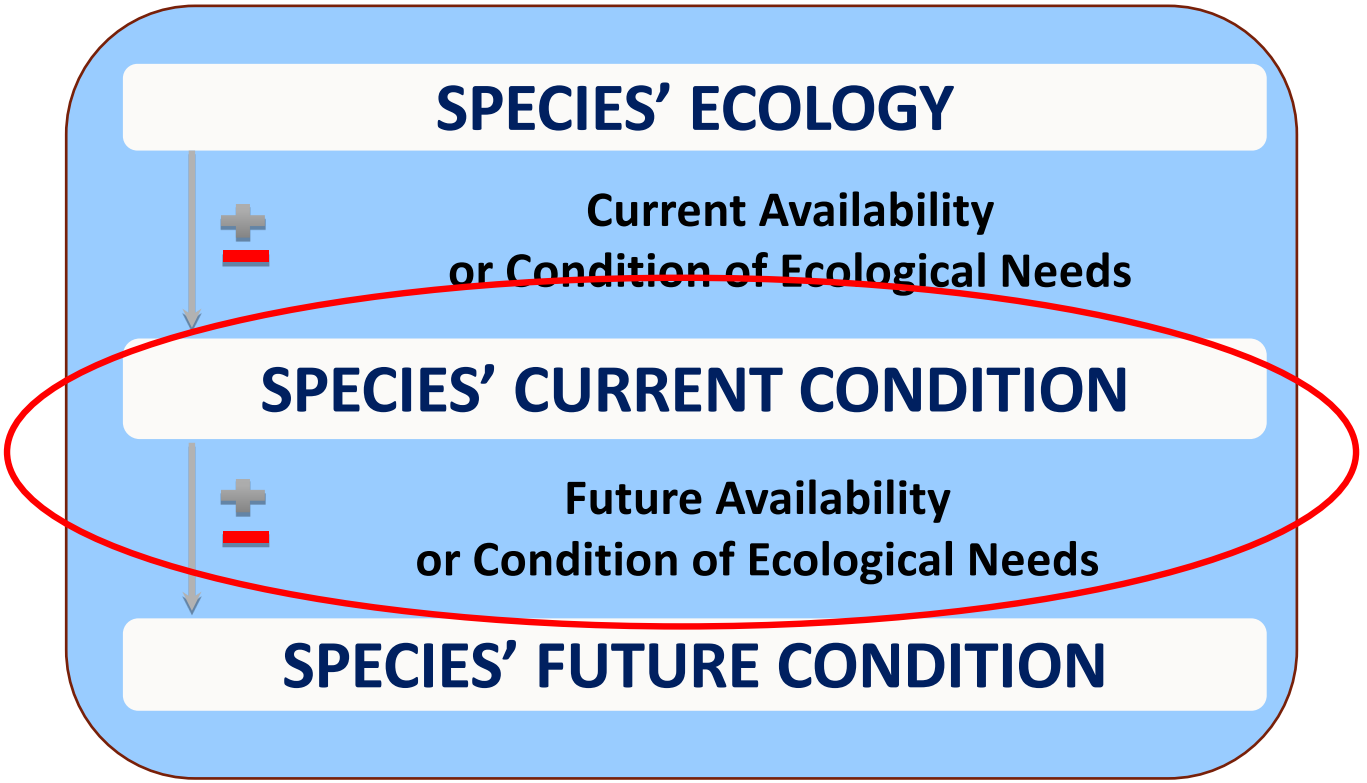
- Data must be explicit
  - Spatially
  - Temporally
  - Method
- Information
  - Occurrence
  - Size
  - Method
  - Collector/ Program
  - Shell condition

- Searchable
- Map based
- Expandable
- Centralized



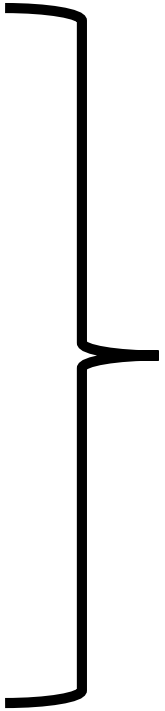
Components of Species Status Assessment?

- Three stages:



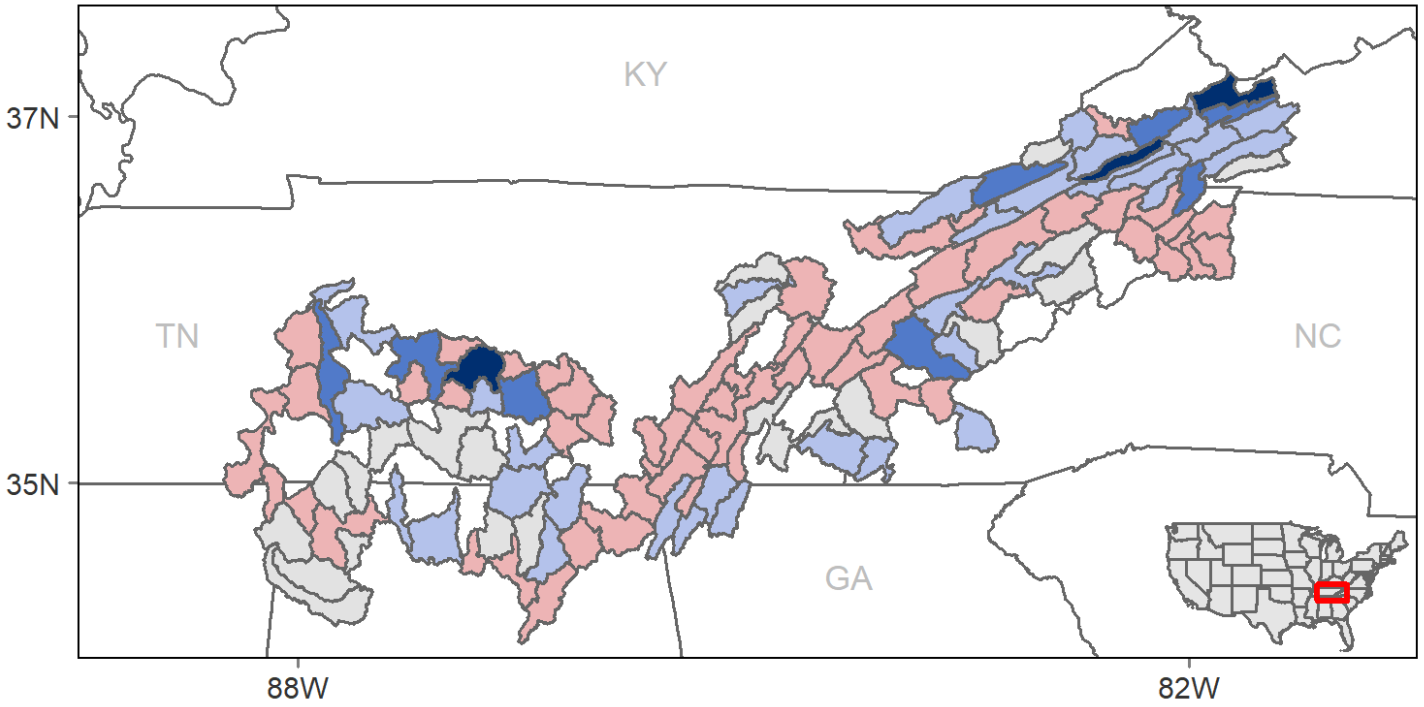
What we can DO with these data: Developing resilience criteria

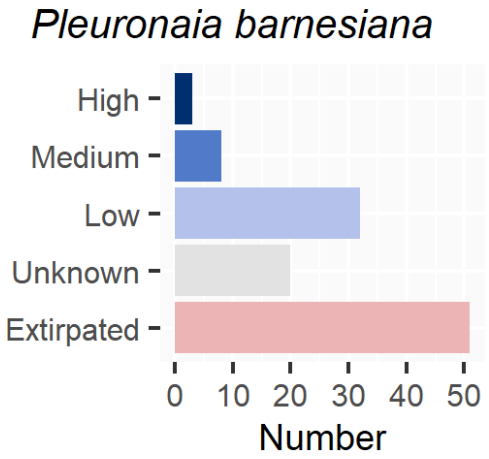
- Abundance
  - Abundant, Common, Rare
- Reproduction
  - Evidence of recruitment
  - Increasing or decreasing trend in time series
- Distribution
  - Occurs continuously over X river km
  - % occurrence over range in river system (patchy)
  - Rare or small area of occurrence



Population Condition

Current Conditions

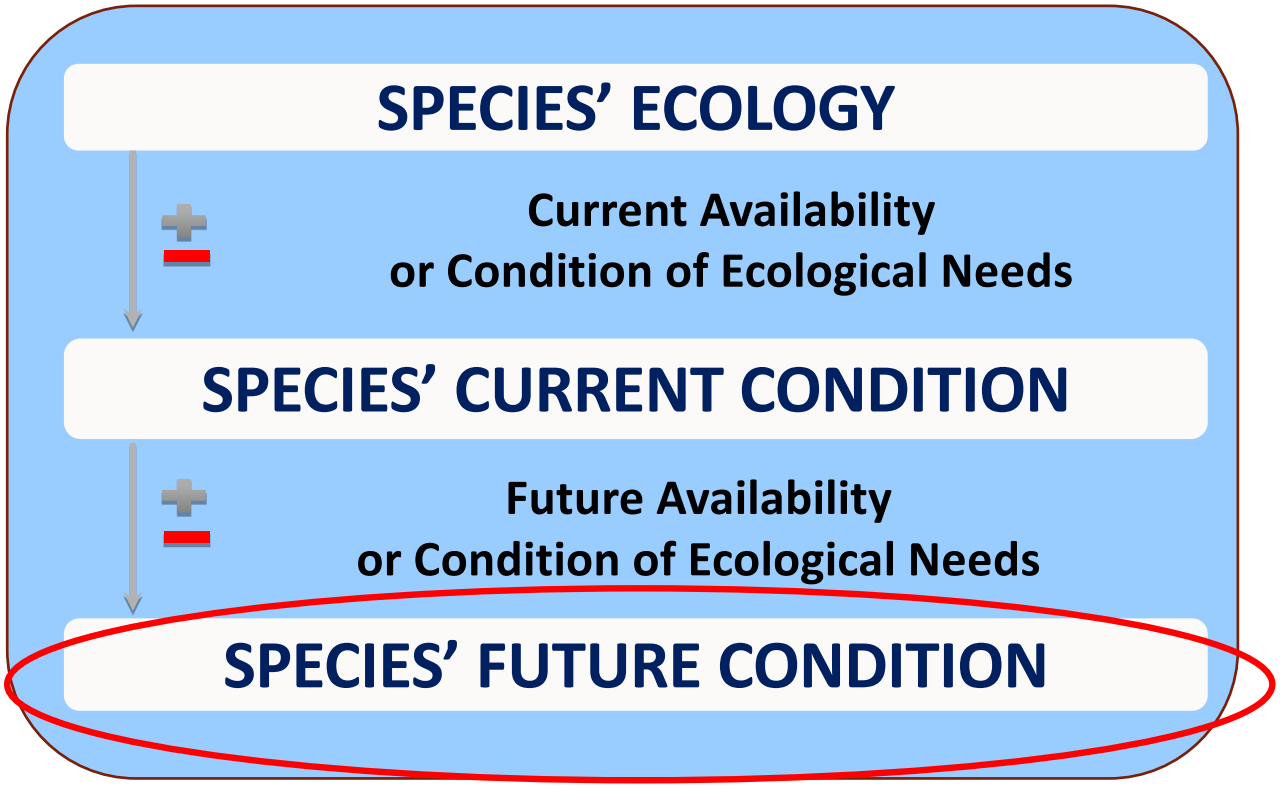




42 - 62% range reduction

Components of Species Status Assessment?

- Three stages:



Future Conditions: Risk analysis

- Intended to forecast likelihood of extinction

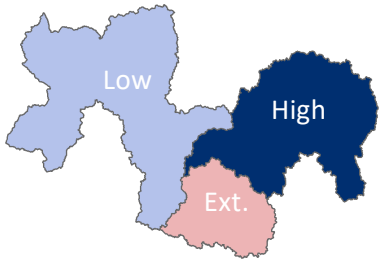
- Data needed
  - Good historical and current data for solid projection models
  - Models on how populations may change and the impact of threats

- An example - Threats analysis as basis for a projection model

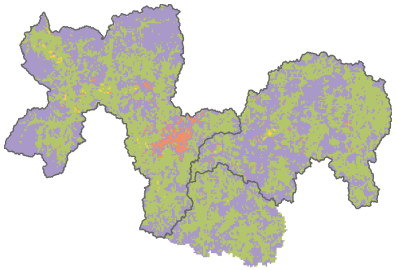
species data

classification criteria

current conditions

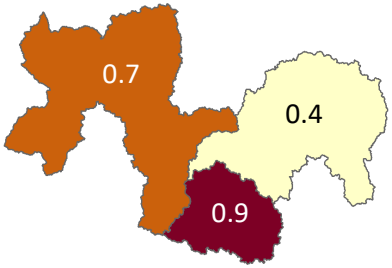


landscape analysis



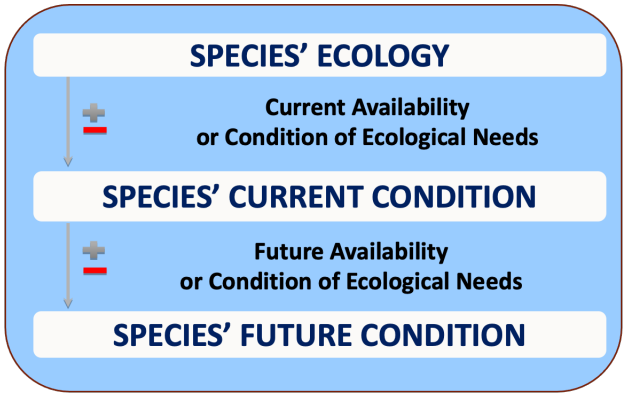
ordinal regression

risk of extirpation



Bottom Lines for Species Ecology

- Taxonomic resolution
- Tolerance studies
- Metanalysis and generalized studies needed
- Community level analysis and reporting



Bottom Lines for Current Condition

- Repeat and continuous sampling
- Report methodology, combining extensive with intensive methods
- Assemblage-reporting even for single-species studies
- Identification of features of mussel concentrations indicating health
  - Distinguish relic shells from fresh dead and live
  - Recruitment (+/-) multiple age classes
  - Continuity of high-concentrations
  - Healthy host fish populations
  - Protected areas
- Identified list of potential species with presence AND absence
- Reporting of historical data with current data
- Reporting of data to centralized, standardized database

Bottom Lines for Future Conditions

- Risk analysis using occupancy data
- Understand how risks are distributed across the landscape
- Investigate causal factors for declines

Keep your FWS partners informed!!!

	Demographic Criteria			
Condition	**Abundance***	**Reproduction**	**Distribution Criteria**	**Probability of Persistence†**
High	Abundant	Evidence of reproduction	Occurs in more than 50 river km	> 0.75
	Common	Increasing trend or evidence of reproduction		
Medium	Abundant	Decreasing trend or no evidence of reproduction	Occurs in 10–50 river km	0.25–0.75
	Common	No information available		
	Rare	Evidence of reproduction		
Low	Common	Decreasing trend or no evidence of reproduction	Occurs in fewer than 10 river km	< 0.25
	Rare	Decreasing trend or no evidence of reproduction		
	Presence-absence data only			
Unknown	Historical records of occurrence in watershed with no surveys in past 30 years		Subwatershed (HUC10) lacking site-specific surveys in watershed (HUC8) of known occurrence	
Extirpated	No live or fresh dead individuals collected in surveys within the past 30 years		No areas known to be currently occupied within watershed	

*__Abundant defined as more than 500 individuals reported__ or densities greater than 0.70/m^2; __common defined as 100–500 individuals reported__ or densities between 0.10–0.70/m^2; __rare defined as less than 100 individuals reported__ or densities fewer than 0.10/m^2.
†Probability of persistence represents estimated risk of extirpation over 30 years (roughly 3 generations).