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

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With Gratitude to:
Dave Smith, Mary Freeman,
Jason Dunham & others for Ideas and thoughts!!
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
- Population Abundance
- Spatial Complexity of Occupied Range
- Suitable Habitat

Resilient populations that represent entire breadth of diversity

Representation
- Genetic Diversity
- Morphological Diversity
- Behavioral Diversity
- Physiographic Province Diversity

Species Viability

Redundancy
- Multiple Populations across the range of variability

Spatially uncorrelated populations that maintain connectivity

Multiple Resilient Populations
DON'T MIND ME I'M JUST DOING SCIENCE STUFF
SSA’s context within the FWS workflow

- Project Planning
- Species Status Assessment
  - Analysis
  - Reporting
  - Peer Review
- Decision Analysis
- Decision Document
- Review and Surname Process

Input from States and Other Experts
Components of Species Status Assessment?

• Three stages:
  
  **SPECIES’ ECOLOGY**
  
  Current Availability
  or Condition of Ecological Needs

  **SPECIES’ CURRENT CONDITION**

  Future Availability
  or Condition of Ecological Needs

  **SPECIES’ FUTURE CONDITION**
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. Pandolfo¹,6, W. Gregory Cope¹,7, Consuelo Arellano²,8, Robert B. Bringolf³,9, M. Christopher Barnhart⁴,10, AND Edward Hammer⁵,11

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

Kayla N. Key¹,², Amanda E. Rosenberger³, Garth A. Lindner⁴, Kristen Bouska⁵, and Stephen E. McMurray⁶

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

Jennifer A. Johnson¹, Jason M. Wisniewski², Andrea K. Fritts¹, and Robert B. Bringolf¹,*
Resolving Taxonomic Questions

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

Cheryl L. Morrison¹ | Nathan A. Johnson² | Jess W. Jones³ | Michael S. Eackles¹ | Aaron W. Aunins¹ | Daniel B. Fitzgerald¹ | Eric M. Hallerman⁴ | Tim L. King¹,
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
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  - Provide reliable distribution data (presence and absence)
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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:
  - **SPECIES’ ECOLOGY**
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  - **SPECIES’ CURRENT CONDITION**
    - Future Availability or Condition of Ecological Needs
  - **SPECIES’ FUTURE CONDITION**
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
Current Conditions

42 - 62% range reduction
Components of Species Status Assessment?

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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

risk of extirpation

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

*Abundant defined as more than 500 individuals reported or densities greater than 0.70/m²; common defined as 100–500 individuals reported or densities between 0.10–0.70/m²; rare defined as less than 100 individuals reported or densities fewer than 0.10/m².*

<sup>†</sup>Probability of persistence represents estimated risk of extirpation over 30 years (roughly 3 generations).