



A Decision Analytic Approach to Hierarchical Decisions for Double-Crested Cormorant Conflict Resolution

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Caption: Image of double-crested cormorant colony. Credit: Sarah Meadows (USFWS)

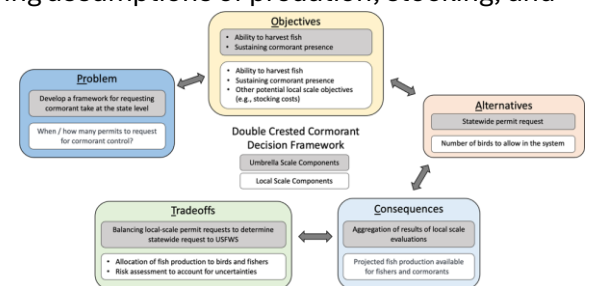
Goal: Develop a hierarchical structured decision-making framework to guide when, where, and how much cormorant management is needed to balance fishery objectives with sustaining cormorant populations

- Objectives:**
1. Provide a clear, decision-ready framework for determining when cormorant management actions (e.g., lethal take permits) are warranted across different systems.
 2. Demonstrate how structured decision making can balance fishery outcomes with cormorant conservation, explicitly incorporating uncertainty, tradeoffs, and stakeholder values.
 3. Illustrate application through a practical case study (e.g., Brevoort Lake) to show how agencies can estimate impacts and guide site-specific management decisions

Management Implications: Management of cormorant–fishery conflicts is constrained by uncertainty in predation, fish responses, and unclear criteria for action. Structured decision making offers a transparent framework to address uncertainty and tradeoffs, supporting consistent, site-specific decisions.

- Methods:**
- Developed a hierarchical structured decision-making (SDM) framework to define the problem, objectives, alternatives, consequences, and tradeoffs across regional (umbrella) and local scales.
 - Applied the framework to a case study (Brevoort Lake, MI) to evaluate cormorant impacts on stocked walleye and inform local management decisions.
 - Used a quantitative cohort life-table model to simulate fish population dynamics, estimate cormorant consumption effects, and evaluate tradeoffs under varying assumptions of predation, stocking, and fishing pressure.

- Key Findings:**
- The framework successfully integrated ecological data and stakeholder input to produce decision-relevant outputs, demonstrating its practicality for guiding cormorant management decisions at local scales.
 - Cormorant impacts on fisheries were highly sensitive to uncertain parameters (e.g., consumption rates, feeding duration, diet composition, stocking levels), leading to large variability in predicted outcomes and management thresholds.
 - Management decisions involved clear tradeoffs between fishery yield and cormorant abundance, which could be explicitly evaluated with modeling to support transparent, defensible decisions.



Caption: The hierarchical decision framework for considering when and how much cormorant control is needed at umbrella (i.e., multi-state) and local (e.g., inland lake) scales. The steps of the process correspond to the PROACT framework of structured decision making (Hammond et al. 1999)

Deliverables: Robinson, K.F., TO. Brenden, A. Maguffee, C.R, Bronte, R. Claramunt, T.R. Cooper, and 8 co-authors. In press. A decision-analytic approach to hierarchical decisions for double-crested cormorant conflict resolution. Environment Systems and Decisions.

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