Summary of Structured Decision Making Workshop

October 17-21, 2011, Modoc Hall, Sacramento State University, Sacramento, California

Questions? Contact Brady Mattsson at bmattsson@usgs.gov

1) **Coordinate and implement landscape-scale conservation to address existing and future challenges to sustain/perpetuate landscapes and habitats for fish, wildlife, and other resources**
   a) Coordinator: Soch Lor, FWS; Coach: Steve Morey, FWS
   b) Decision makers: Fish and Wildlife Service staff
   c) Fundamental objectives: sustain/perpetuate landscapes and habitats for fish, wildlife and resources
   d) Means objectives -> actions
      i) Facilitate strategic, science-based management -> ID science needs
      ii) Establish cross-programmatic conservation objectives and actions -> incentives to promote cooperative conservation
      iii) Improve efficient use and leveraging of resources and information -> optimal workload allocation
   e) Usefulness of this workshop
      i) Helped clarify the issue
      ii) Created a draft objectives hierarchy and linked management strategies to objectives
      iii) Better understanding of SDM process and what types of problems it is suited for
   f) Next steps
      i) Submit a proposal to go through SDM workshop process again at NCTC in 2012
      ii) Incorporate "outsiders" like human-dimensions folks
      iii) Refine framework to make it "compelling" and useful for FWS staff under the emerging LCC program
2) **Efficiently use management resources to maximize the quality and amount of channel and floodplain habitat for spawning and rearing by anadromous salmonids in the lower American River**
   a) Coordinator: Julie Zimmerman, FWS; Coach: Jim Peterson, USGS
   b) Decision Makers: Julie Zimmerman, FWS; John Hannon, BoR
   c) Fundamental objectives
      i) Maximize natural production of anadromous fishes
      ii) Minimize management costs
   d) Means objectives
      i) Maximize fry emergence -> Increase spawning habitat within the spawning zone
      ii) Maximize potential juvenile capacity -> Increase juvenile rearing habitat within the rearing zone
   e) Actions (small vs. large projects)
      i) Injection
      ii) Gravel placement
      iii) Excavation
   f) Modeling and optimization
      i) Utility: marginal gain in out-migrants per unit cost

    ii) Model: habitat availability, spawning/rearing potential, population dynamics
    iii) Parameterization: many available datasets, expert judgment (to be completed)
    iv) Optimization: Bayesian Network (to be completed)
    v) Sensitivity analysis to ID model components for further refinement, learning, and adaptive management
  g) Usefulness of this workshop
    i) Created a template for refinement to inform management actions over time
    ii) Forced to simplify for the sake of developing a framework to guide decisions rather than piecemeal learning

3) **Develop a framework for an optimized, spatially explicit, state-wide, hierarchical vegetation classification map to be used as a base layer for scientists and decision makers regarding land management in Alaska**
  a) Coordinator: Diane Granfors; Coach: Mitch Eaton, USGS
  b) Primary fundamental objective: maximize usefulness of map to natural resource managers in AK
  c) Secondary fundamental objectives: Provide information on…
    i) Species and habitat vulnerability
    ii) Distribution and abundance of species, communities, and habitats
    iii) Species-habitat relationships
    iv) Ecosystem processes
    v) Corridors & refugia
    vi) Consequences of management actions for the above
  d) Alternative vegetation classes 1-5
  e) Modeling & Optimization
    i) Model: spatially-explicit consequence table representing secondary fundamental objectives for each alternative vegetation class
    ii) Optimization: swing-weighting to allow tradeoffs among objectives across stakeholders
  f) Usefulness of this workshop
    i) Progress on framing the problem
    ii) Prototype spatially-explicit decision tool for further refinement

4) **To conserve San Francisco Bay tidal marshes in light of future climate change, what actions (management, restoration, protection) if any should be conducted (where, when, and how)?**
  a) Coordinator: John Takekawa, USGS; Coach: Brady Mattsson, USGS
  b) Fundamental objectives: Perpetuate tidal marsh ecosystem functions, services, and human benefits; measureable attributes:
    i) Ecosystem condition
      (1) Endangered species: recovery criteria met yes/no
      (2) Other ecosystem elements of concern: marsh ecosystem index comprised of components not included in the recovery criteria (e.g., water quality metrics, native vegetation richness), range: 0-n, where n is the number of components. Each component has its own utility function on a scale of 0-1. Utilities are then summed to yield the index. Alternatively, could be weighted by importance and then standardized. (to be developed)
    ii) Index of human benefits comprised of an index for recreational use (0-1), flood mitigation (0-1), and mosquito-borne disease (0-1)
  c) Means objective: annual budget

d) Classes of management actions
    i) Marsh Migration – to allow for upslope movement
    ii) Climate Restoration – engineer & manage marshes accounting for sea-level rise and extreme events
    iii) Wildlife Enhancement – add habitat features, captive rearing, translocation
e) Alternative annual budget allocations among classes of actions through 2050:
    i) Status quo: fixed allocation at current levels
    ii) Marsh Migration – linearly increase allocation toward marsh migration, while allowing an early peak allocation toward Climate Restoration
    iii) Climate Restoration – large quick increase and slight quick increase of Climate Restoration and Marsh Migration to static levels, respectively.
    iv) Reduced Wildlife –Climate Restoration allocation except for quick canceled allocation toward Wildlife Enhancement shifted toward increased level of Climate Restoration instead
f) Modeling and optimization
    i) Utility: human benefits at 2020 along with ecosystem attributes at 2020 and 2050
    ii) Model:
        (1) Ecosystem condition as a function of budget allocation, total budget, and extreme storm events
        (2) Human benefits as a function of budget allocation, total budget, and ecosystem condition
    iii) Parameterization: elicited utility values and predictions from workshop participants using modified Delphi approach
    iv) Optimization and sensitivity: Bayes Net predicted optimal strategy is Marsh Migration under many possible assumptions about ecosystem condition, budget, and extreme storm events.
g) Next steps
    i) Organize follow-up SDM workshop that includes broader set of stakeholders
    ii) Consider increasing specificity for spatial resolution and ecosystem-component specificity
    iii) Consider developing framework for dynamic optimization
    iv) Revise framework and reparameterize if needed
    v) Conduct sensitivity analysis and identify areas for refinement through further modeling work and/or adaptive management
h) Usefulness of workshop
    i) Generated momentum to revise process for decision-making for tidal marshes in SF Bay
    ii) Prototyped a robust allocation strategy
    iii) Identified areas needed for future refinement