Cape Cod National Seashore
Town of Wellfleet

Herring River Stakeholders Group
June 19, 2019
Adaptive Management and Decision-Analysis Update

Tim Smith
Restoration Ecologist
Cape Cod National Seashore
tim_p_smith@nps.gov

Cape Cod National Seashore
Town of Wellfleet

Herring River Stakeholders Group
June 19, 2019
Adaptive Management and Decision-Analysis Update

- *Previous Presentation at Last Meeting*

HERRING RIVER: Structured Decision-Making & Adaptive Management

WHAT IS STRUCTRED DECSION MAKING AND ADAPTIVE MANAGEMENT?

STRUCTURED DECISION MAKING

"PrOACT"

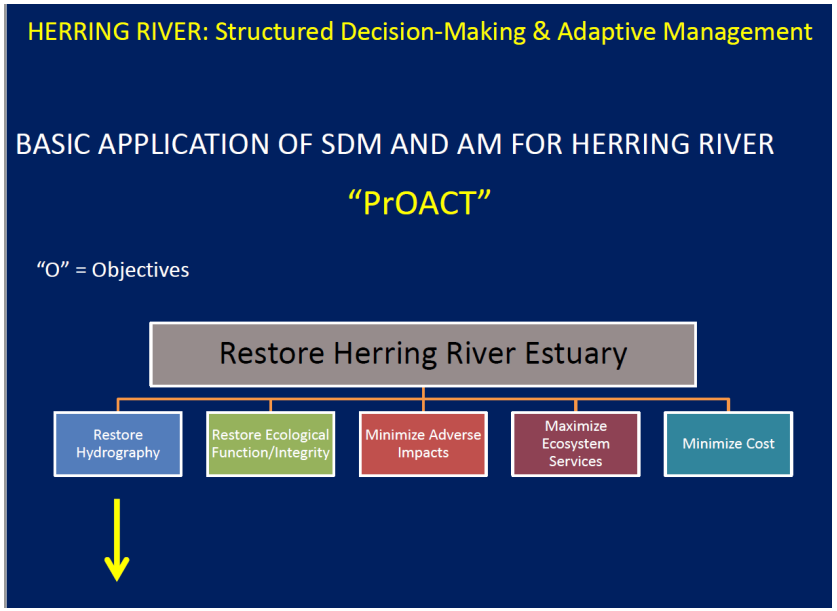
"Pr" = Problem Statement

"O" = Objectives

"A" = Actions/Alternatives

"C" = Consequences

"T" = Trade-Offs

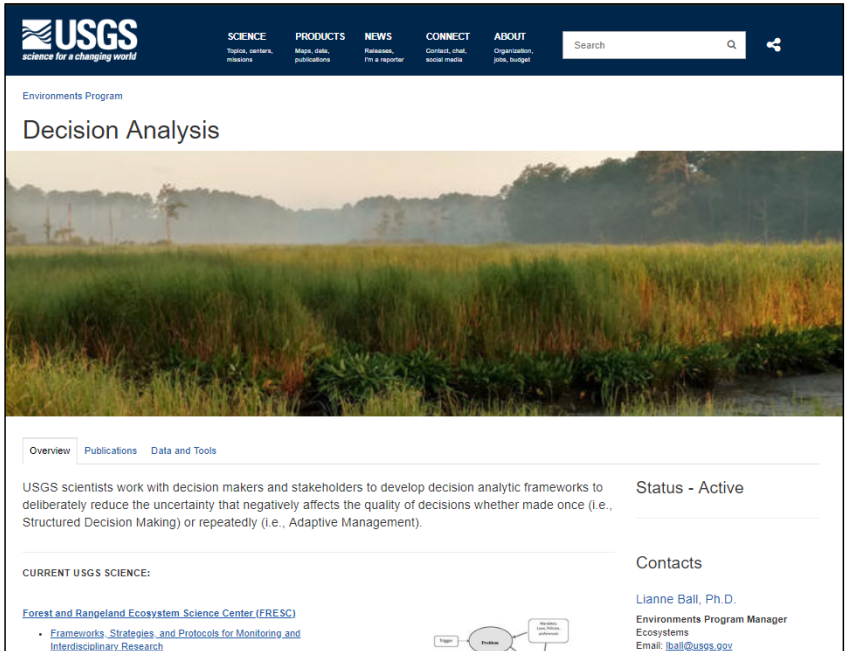


Cape Cod National Seashore
Town of Wellfleet

Herring River Stakeholders Group
June 19, 2019
Adaptive Management and Decision-Analysis Update

- *Summary of AM program*

  2013: Initiate Collaboration with USGS Decision Science Program



- Ad hoc stakeholder meetings
  - ✓ October 2014
  - ✓ November 2015

In order to assess whether stakeholder concerns have been adequately captured within the existing list of objectives, USGS led the group in an exercise to answer the following questions:

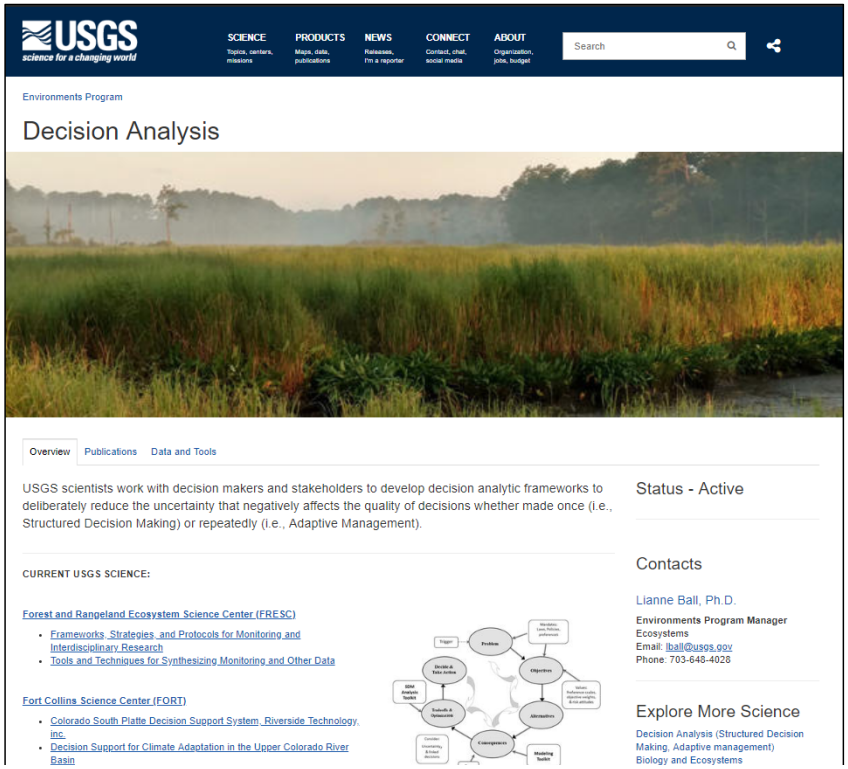
- What do you want to achieve [with the Herring River Restoration project]?
- What do you want to avoid [with the Herring River Restoration project]?

Cape Cod National Seashore
Town of Wellfleet

Adaptive Management and Decision-Analysis Update

- *Summary of AM program*

  2013: Initiate Collaboration with USGS Decision Science Program



- Ad hoc stakeholder meetings
  - ✓ October 2014
  - ✓ November 2015

- What do you want to achieve [with the Herring River Restoration project]?
- What do you want to avoid [with the Herring River Restoration project]?

Stakeholder Statements/Concerns

↓

Objectives

↓

Specifications (critieria, monitoring methods, prediction methods, time and spatial scales, etc.)

Cape Cod National Seashore
Town of Wellfleet

Adaptive Management and Decision-Analysis Update

HERRING RIVER: Structured Decision-Making & Adaptive Management

BASIC APPLICATION OF SDM AND AM FOR HERRING RIVER

"PrOACT"

"O" = Objectives; Socioeconomic/"BioSocial" Objectives: Developed With Input From AdHoc Stakeholders Meetings and Other Consultations, 2013-15

- Prevent Impacts to Structures and Roads
- Minimize Risk to Public Safety
- Minimize Risk at Water Control Structures
- Maximize Access to Emergency Response
- Minimize Adverse Impacts to Shellfish Beds
- Minimize Excess Nitrogen Export
- Minimize Fecal Coliform Levels
- Minimize Deposition onto Shellfish Beds
- Minimize Loss of Privacy
- Maximize Aesthetics
- Minimize Negative Appearance
- Minimize Hydrogen Sulfide Smell
- Minimize Noise
- Minimize Turbidity
- Minimize Community Conflict
- Maximize Natural Mosquito Control
- Maximize Greenhouse Gas Sequestration
- Maximize Shellfishing Opportunities
- Maximize Recreational Opportunities
- Minimize Loss of Recreational Opportunities
- Maximize New Recreational Opportunities

Cape Cod National Seashore
Town of Wellfleet

Adaptive Management and Decision-Analysis Update

TO EVALUATE DECISIONS:

- Some Form of Prediction Is Needed for Each Objective So That We Can Evaluate & Compare The Effectiveness of the Management Options That Are Under Consideration

PREDICTIONS CAN COME FROM:

- Numerical Models (i.e. computer simulations of hydrology, vegetation change)
- Judgments/Elicitation From Experts and Stakeholders

HERRING RIVER: Structured Decision-Making & Adaptive Management

BASIC APPLICATION OF SDM AND AM FOR HERRING RIVER

"PrOACT"

"O" = Objectives; Socioeconomic/"BioSocial" Objectives: Developed With Input From AdHoc Stakeholders Meetings and Other Consultations, 2013-15

- Prevent Impacts to Structures and Roads
- Minimize Risk to Public Safety
- Minimize Risk at Water Control Structures
- Maximize Access to Emergency Response
- Minimize Adverse Impacts to Shellfish Beds
- Minimize Excess Nitrogen Export
- Minimize Fecal Coliform Levels
- Minimize Deposition onto Shellfish Beds
- Minimize Loss of Privacy
- Maximize Aesthetics
- Minimize Negative Appearance
- Minimize Hydrogen Sulfide Smell
- Minimize Noise
- Minimize Turbidity
- Minimize Community Conflict
- Maximize Natural Mosquito Control
- Maximize Greenhouse Gas Sequestration
- Maximize Shellfishing Opportunities
- Maximize Recreational Opportunities
- Minimize Loss of Recreational Opportunities
- Maximize New Recreational Opportunities

Cape Cod National Seashore
Town of Wellfleet

Adaptive Management and Decision-Analysis Update

Some Ecological Objectives Have Direct Predictions from the Hydrodynamic Model and Sea Level Affecting Marshes Model:

- Tide Range
- Hydroperiod
- Salinity
- Residence Time (water quality)
- Vegetation Change

Other Ecological Objectives Do Not Have Numerical Models and We Are Relying on Judgments from Recognized Subject-matter Experts:

- Water Quality
- Sediment Transport and Accretion
- Benthic and Shellfish Habitat
- Mosquito Habitat
- Hydrogen Sulfide Production

Socioeconomic Objectives Also Need to Be Quantified and Predicted in a Manner Similar to Ecological Objectives:

Minimize loss of privacy for abutting property owners

Maximize aesthetics

- *Maximize viewscapes from public vantage points*
- *Minimize negative appearance of dead woody veg*
- *Minimize hydrogen sulfide smell*

Minimize community conflict

Maximize recreational opportunities

- *Minimize loss of existing recreational opportunities*
- *Maximize newly created recreational opportunities*

Prevent impacts to structures and roads

Minimize risk to public safety

- *Minimize risk to public at water control structures*
- *Minimize risk to public elsewhere*
- *Maximize access to emergency response*

Cape Cod National Seashore
Town of Wellfleet

Herring River Stakeholders Group
June 19, 2019
Adaptive Management and Decision-Analysis Update

For A Fully Informed Analysis of Management Decisions for the Herring River:

- Develop Measureable, Quantified Attributes for All Objectives
- Identify Methods to Monitor
- Establish Pre-restoration, Baseline Conditions
- Formulate Predictions of Future Conditions Over a Range of Possible Management Strategies (i.e. varying approaches to managing new tide gates)

For Ecological Objectives:

- Numerical Model Output
- A Web-based Survey for Recognized Subject-matter Experts; informed by numerical models

For Socioeconomic Objectives:

- Developing Methods to Elicit Information in a Systematic and Quantifiable Manner From Stakeholders and the Broader Community
- Will Present More Specific Plans at the Next Meeting

Cape Cod National Seashore
Town of Wellfleet

Herring River Stakeholders Group
June 19, 2019
Adaptive Management and Decision-Analysis Update

Tim Smith
Restoration Ecologist
Cape Cod National Seashore
tim_p_smith@nps.gov

Excerpted Comments from 2014 AdHoc Stakeholder Meeting

"…wanted to see that anadromous and catadromous fish have adequate passage to migrate; avoid conflict in the community…"

"…wanted to make sure that the public understands the environmental benefits of the Restoration Project; noted that there would be both ecological and aesthetic benefits of restoring tidal flow; avoid conflict in the community."

"…wanted to achieve a consensus and a good working relationship among all the stakeholders."

"…wanted to achieve restoration of all the ecological services that the river system used to provide; concerned about "drowning" the salt marsh in areas where the marsh surface has subsided; noted that sediment accretion is needed to restore healthy salt marsh vegetation."

"…herring and eels should be considered stakeholders, as they will benefit greatly from restoring a healthy salt marsh; avoid impacts to these species during the construction process."

"….concerned that vegetation die-off in the river could negatively impact shellfish beds in the harbor; concerned that traditional recreational opportunities such as dog walking, horseback riding, hunting, and berry picking could be lost."

"…would like to see improved water quality in the river so that residents and visitors could enjoy the things that a restored natural system can offer; concern that community acrimony could prevent the Restoration Project from being completed."

"…wants to see a playable golf course at CYCC; hopes that the Restoration Project will have a system in place to address low-lying property impacts…"