

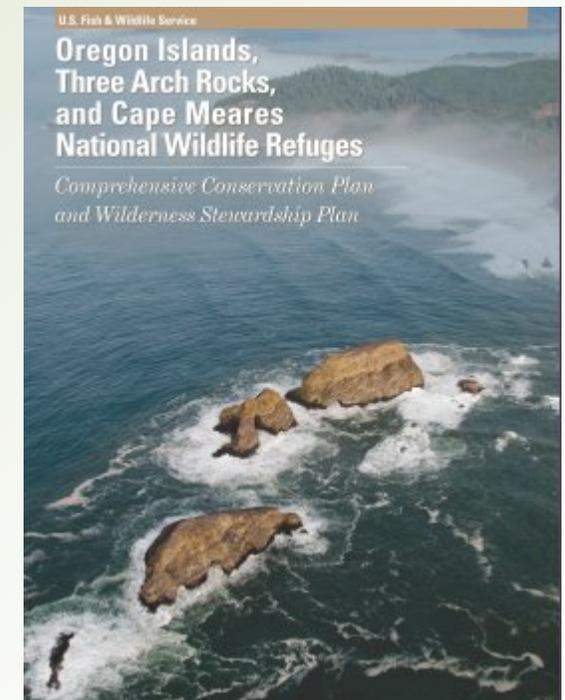
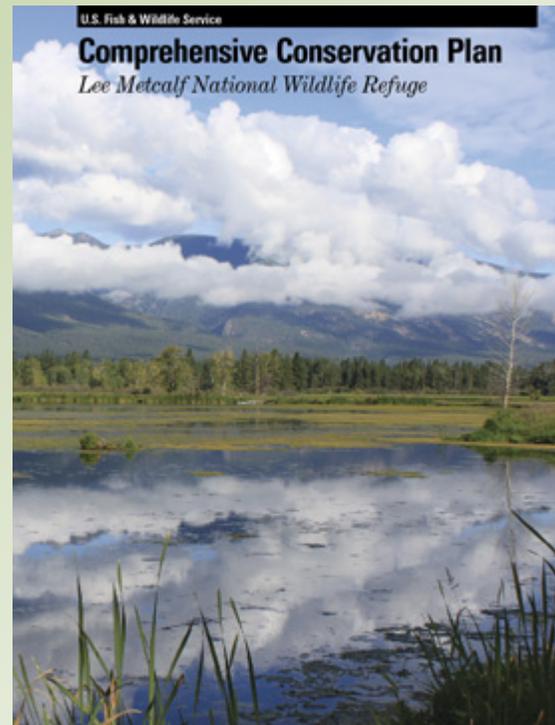
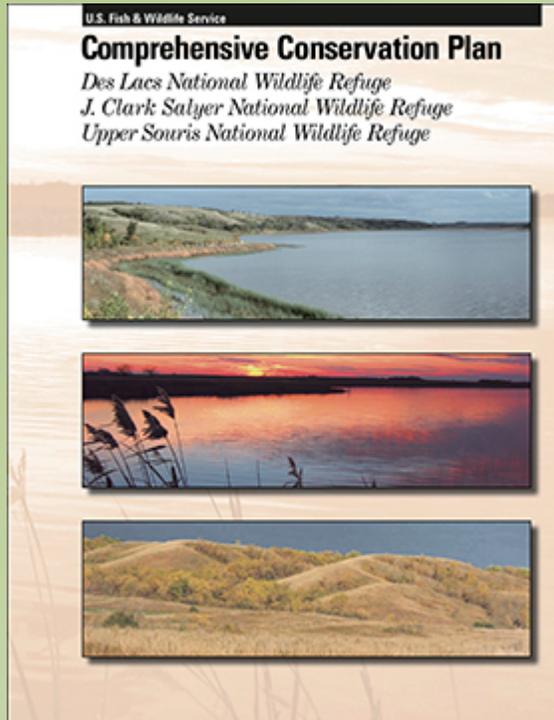


Climate Change Adaptation in National Wildlife Refuge Planning

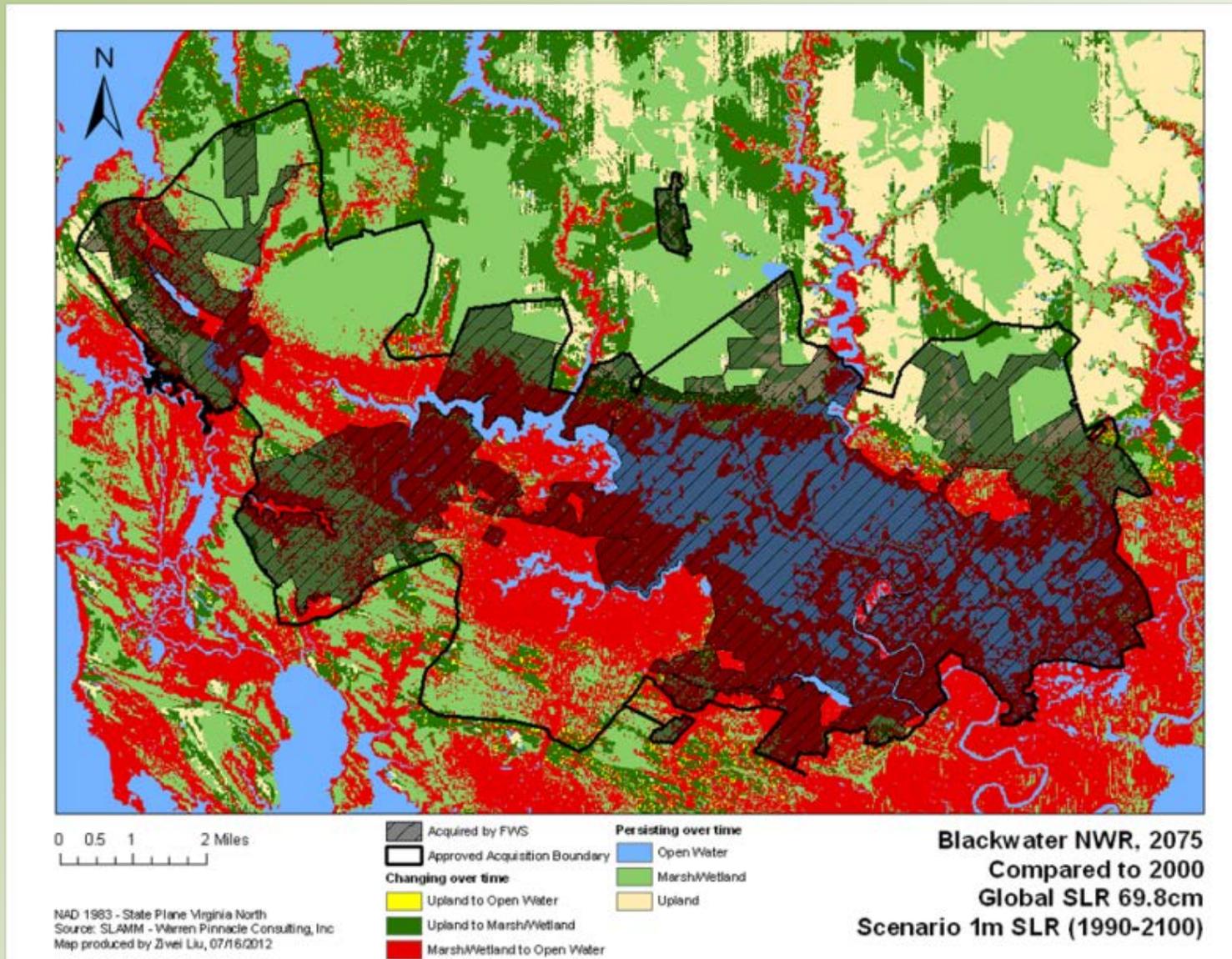


Noah Matson

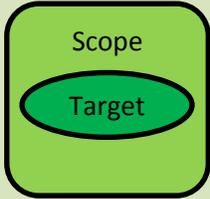
Comprehensive Conservation Plans

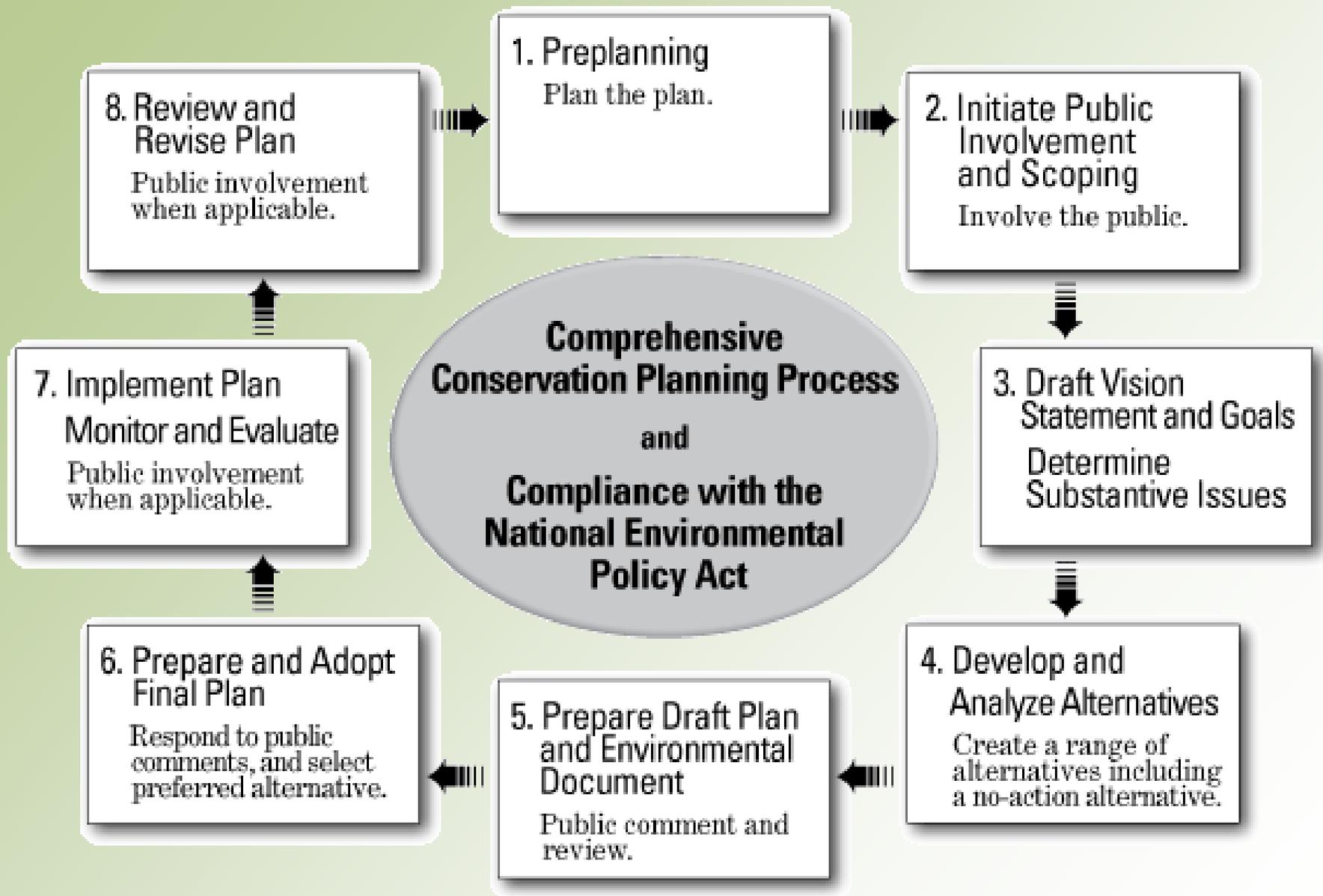


Climate Change and Refuge Planning



Rosetta Stone for Refuge Planning

Open Standards	CC BMP	Refuge CCPs
	<p>How range shifts and changes in communities affect target selection</p>	<p>Refuge Overview/ Affected Environment</p>
	<p>ID exposure factors ID ecological impacts Rank CC and non CC threats</p>	<p>Planning Issues/ Environmental Consequences</p>
	<p>ID intervention points on direct and indirect CC impacts</p>	<p>Management Direction/ Description of alternatives</p>



Comprehensive Conservation Planning

Recommended Outline (Exhibit 4,602 FW 3, USFWS 2000)

Background

- Refuge Overview: History , Acquisition, Management
- **Purpose of and Need for Plan**
- NWRS Mission, Goals, and Guiding Principles
- Refuge Purpose(s)
- **Refuge Vision Statement**
- Legal and Policy Guidance
- Existing Partnerships



Comprehensive Conservation Planning

Recommended Outline (Exhibit 4,602 FW 3, USFWS 2000)

Background

Planning
Process

- Description of Planning Process
- **Planning Issues**



Comprehensive Conservation Planning

Recommended Outline (Exhibit 4,602 FW 3, USFWS 2000)

Background

Planning
Process

Refuge and
Resource
Descriptions

- **Geographic/Ecosystem Setting**
- **Refuge Resources, Cultural Resources, and Public Uses**
- Special Management Areas



Comprehensive Conservation Planning

Recommended Outline (Exhibit 4,602 FW 3, USFWS 2000)

Background

Planning
Process

Refuge and
Resource
Descriptions

Management
Direction

- **Refuge Management Direction: Goals, Objectives, Strategies**
- Refuge Management Policies and Guidelines



Comprehensive Conservation Planning

Recommended Outline (Exhibit 4,602 FW 3, USFWS 2000)

Background

Planning
Process

Refuge and
Resource
Descriptions

Management
Direction

Implementation
and Monitoring

- Funding and Personnel
- Step-Down Management Plans
- Partnership Opportunities
- Monitoring and Evaluation
- Plan Amendment and Revisions



Planning Area and Data Needs

Target

- Context of the planning unit in relation to the surrounding ecosystem.

Target

Key attribute

- Structures, components, and functions of the ecosystem(s) of which the planning unit is a part.

Target

Key attribute

Threats

Stresses

- Natural and historic role of fire and other natural occurrences affecting ecological processes. Past land use and history of settlement, including a description of any changes in topography, hydrology, and other factors.

Target

- Current and historic description of the flora and fauna and the diversity of habitats and natural communities.

Target

CONDITION

- Distribution, migration patterns, and abundance of fish, wildlife, and plant populations, including any threatened or endangered species, and related habitats.

Target

- Fish, wildlife, and plants and their habitats and communities that are rare and/or declining within the ecosystem.

Target

CONDITION

- Water resources including quality and quantity.

Target

- Archaeological and other cultural resources.

Planning Area and Data Needs

- Threats
- Strategies
- Significant problems that may adversely affect the ecological integrity or wilderness characteristics and the actions necessary to correct or mitigate the problems.

- Strategies
- Identify opportunities to improve the health of habitats or the functioning of ecosystems.

- Threats
- Strategies
- Significant problems that may adversely affect the populations and habitats of fish, wildlife, and plants (including candidate, threatened, and endangered species) and the actions necessary to correct or mitigate the problems.

- Threats
- Known or suspected sources of environmental contaminants and their potential impacts on the planning unit (refer to the Contaminant Assessment Program).

- Strategies
- Land acquisition or habitat protection efforts.

- Strategies
- Habitat management practices.

Comprehensive Conservation Planning

Recommended Outline (Exhibit 4,602 FW 3, USFWS 2000)

Background

Planning
Process

Refuge and
Resource
Descriptions

CLIMATE CONSIDERATIONS

Describe current climate conditions and observed trends over time

- **Geographic/Ecosystem Setting**
- **Refuge Resources, Cultural Resources, and Public Uses**



Comprehensive Conservation Planning

Recommended Outline (Exhibit 4,602 FW 3, USFWS 2000)

Background

Planning
Process

CLIMATE CONSIDERATIONS

- **Planning Issues**

Identify specific climate change exposure and associated issues (disease, invasives, fire) and the impacts on each of the refuge's major habitat types and major wildlife species described in *Refuge Resources*



Planning Issues

CLIMATE CONSIDERATIONS

Threats

- Significant problems that may adversely affect the populations and habitats of fish, wildlife, and plants (including candidate, threatened, and endangered species)

Determine whether climate exposure(s) will compound non-climate threats

Identify new potential impacts from climate exposure

Determine what human-driven activities may result from climate change and affect the species

Planning Issues

CLIMATE CONSIDERATIONS

Threats

- Significant problems that may adversely affect the ecological integrity or wilderness characteristics

Threats

- Significant problems that may adversely affect the populations and habitats of fish, wildlife, and plants (including candidate, threatened, and endangered species)

Threats

- Known or suspected sources of environmental contaminants and their potential impacts on the planning unit (refer to the Contaminant Assessment Program).

Rate threats (including climate exposures) with respect to their impact on refuge resources



Comprehensive Conservation Planning

Recommended Outline (Exhibit 4,602 FW 3, USFWS 2000)

CLIMATE CONSIDERATIONS

Background

Planning
Process

Refuge and
Resource
Descriptions

Management
Direction

For highly rated climate threats:
Identify actions that address climate-related impacts on species numbers, habitat or essential interactions

- **Refuge Management Direction: Goals, Objectives, Strategies** ←
- Refuge Management Policies and Guidelines



Strategy Development

CLIMATE CONSIDERATIONS

Threats

Strategies

- Significant problems that may adversely affect the ecological integrity or wilderness characteristics and the **actions necessary to correct or mitigate the problems.**

Strategies

- Identify opportunities to improve the health of habitats or the functioning of ecosystems.

Threats

Strategies

- Significant problems that may adversely affect the populations and habitats of fish, wildlife, and plants (including candidate, threatened, and endangered species) and the **actions necessary to correct or mitigate the problems.**

Threats

- Known or suspected sources of environmental impacts on the planning unit (refer to the C...

Strategies

- Land acquisition or habitat protection

Strategies

- Habitat management practices.

Include actions that intervene on non-climate human activities that compound impacts from climate exposure

Strategy Development

CLIMATE CONSIDERATIONS

Threats

Strategies

- Significant problems that may adversely affect the ecological integrity or wilderness characteristics and the **actions necessary to correct or mitigate the problems.**

Strategies

- **Identify opportunities to improve the health of habitats or the functioning of ecosystems.**

Threats

Strategies

- Significant problems that may adversely affect fish, wildlife, and plants (including candidate species) and the **actions necessary to address the problems.**

Threats

- Known or suspected sources of environmental impacts on the planning unit (refer to the Contaminant Assessment Program).

Strategies

- **Land acquisition or habitat protection efforts.**

Strategies

- Habitat management practices.

Prioritize actions that protect/restore occurrences of refuge resources that may be less affected by changes in climate



REFUGE CCP PLANNING

& Climate Adaptation

- Climate considerations can be built into the existing structure of the Comprehensive Conservation Plans
- Adaptation becomes part of the process
- Targeting the most appropriate adaptation strategies requires:
 - Climate threats and impacts to be explicitly addressed as Planning Issues
 - Rated alongside other threats (currently not required)
 - Strategies to be more explicitly linked to addressing threats
 - Ratings used to prioritize actions



Planning Issues

CLIMATE CONSIDERATIONS

Threats

Strategies

- Significant problems that may adversely affect the ecological integrity or wilderness characteristics and the problems.

Strategies

- Identify opportunities to improve ecosystems.

Determine whether climate exposure(s) will compound current threats that are behind species' decline and endangerment

Threats

Strategies

- **Significant problems that may adversely affect the populations and habitats of fish, wildlife, and plants (including candidate, threatened, and endangered species)** and the actions necessary to correct or mitigate the problems.

Threats

- Known or suspected sources of environmental contaminants and their potential impacts on the planning unit (refer to the Contaminant Assessment Program).

Identify new potential impacts from climate exposure that are likely to contribute to species' decline and endangerment

action efforts.

Determine what human-driven activities may result from climate change and affect the species and its likelihood for recovery