CLIMATE CHANGE VULNERABILITY ASSESSMENT OF WILDLIFE REFUGES AND THEIR SUPPORTING LANDSCAPES

NAF APRIL 2, 2013

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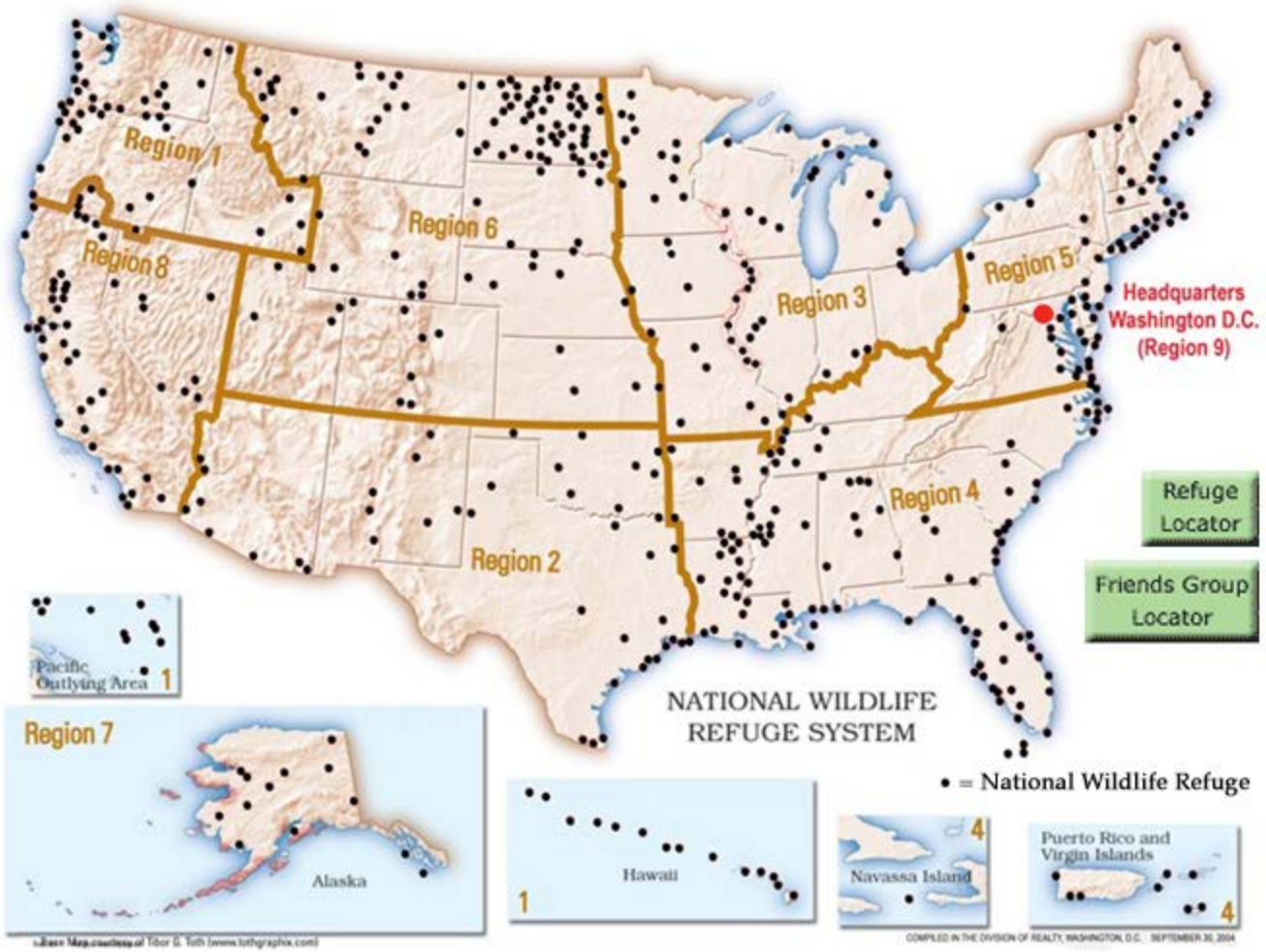
NWRS Importance & Vulnerability



95,000,000 acres (384,451 km^2), 556 national wildlife refuges and other units of the Refuge System, plus 38 wetland management districts

Concentrated along coast and water bodies subject to SLR and large hydro changes

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Challenges to Integrating Climate Change

- Lots of demand but little capacity for advanced CC work
- Lots of new information, guides, frameworks, etc.
- Confusion about how to integrate CC with traditional assessments & planning
- Uncertainty about what conservation objectives should be with changing climate
- Not much $$ for individual refuge attention

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Refuge Vulnerability Assessment Overview: what is it?

Primarily spatially-enabled process to:

- Identify resources for assessment & planning
- Identify key drivers of change
- Conduct cumulative effects assessments over multiple scenarios
- Develop response strategies and optional management scenarios
- Facilitate cooperative planning through the supporting landscape/subregion

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FWS Planning Application Focus

- Landscape Conservation Cooperatives (LCCs) – providing regional context and priorities
  - Refuge complex/subregion (more efficient analyses for groups of refuges & partners in a subregion)
    - **Comprehensive Conservation Plan (CCP) – the Refuge/Refuge complex Plan**
      - Habitat Management Plans
      - Other step down plans

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Key Concepts Incorporated in the Framework

- Vulnerability assessment
- Cumulative effects assessment, integrating climate change effects
- The mitigation hierarchy (w/ adaptation)
- Systematic conservation planning
- Ecosystem-based & adaptive management

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Products

- Technical guide
- Manager's guide
- Two pilot project reports

Intended for refuges, partners, or consultants to carry out in support of planning objectives

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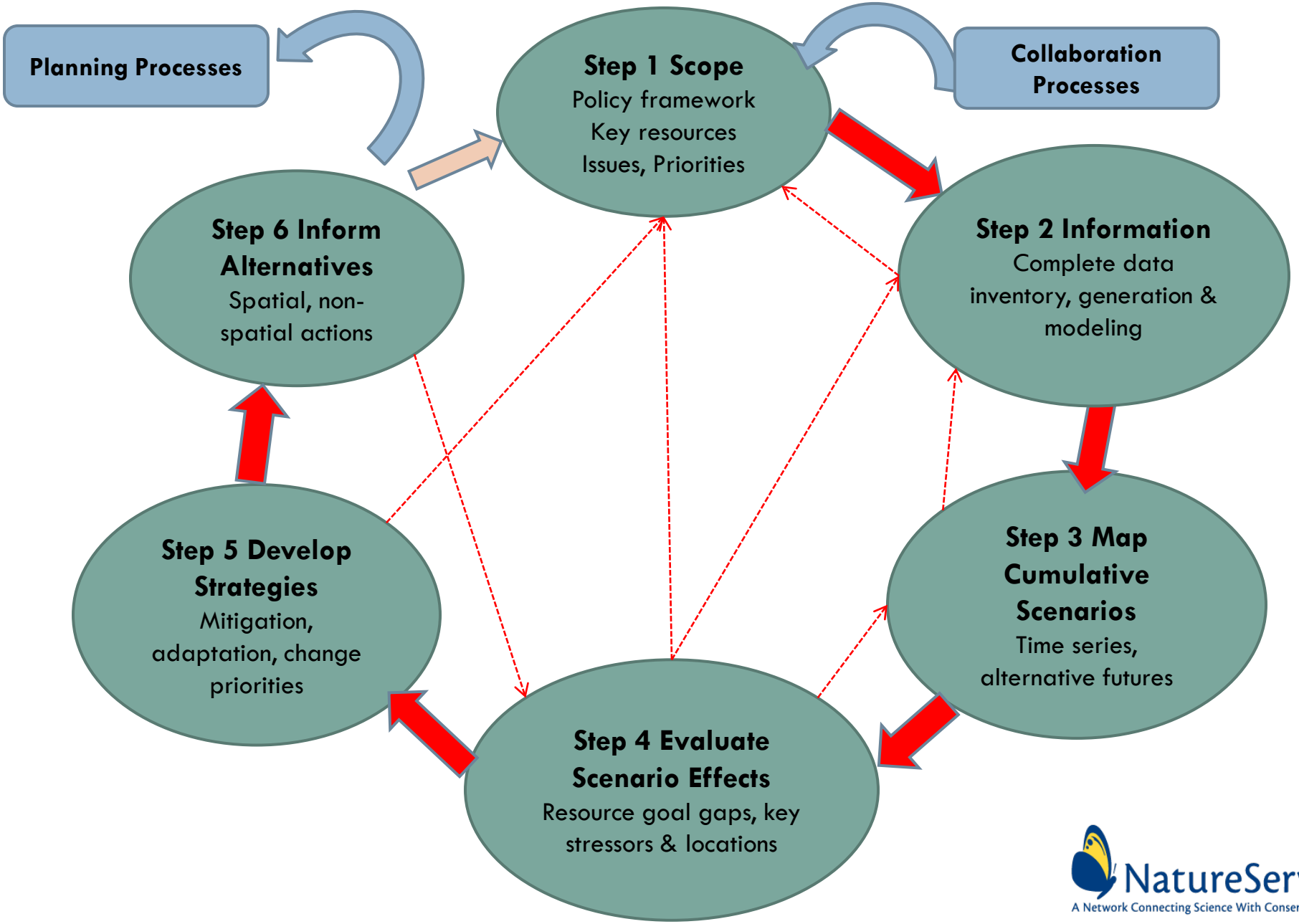
RVA Process Workflow (abbreviated)



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Pilot Projects

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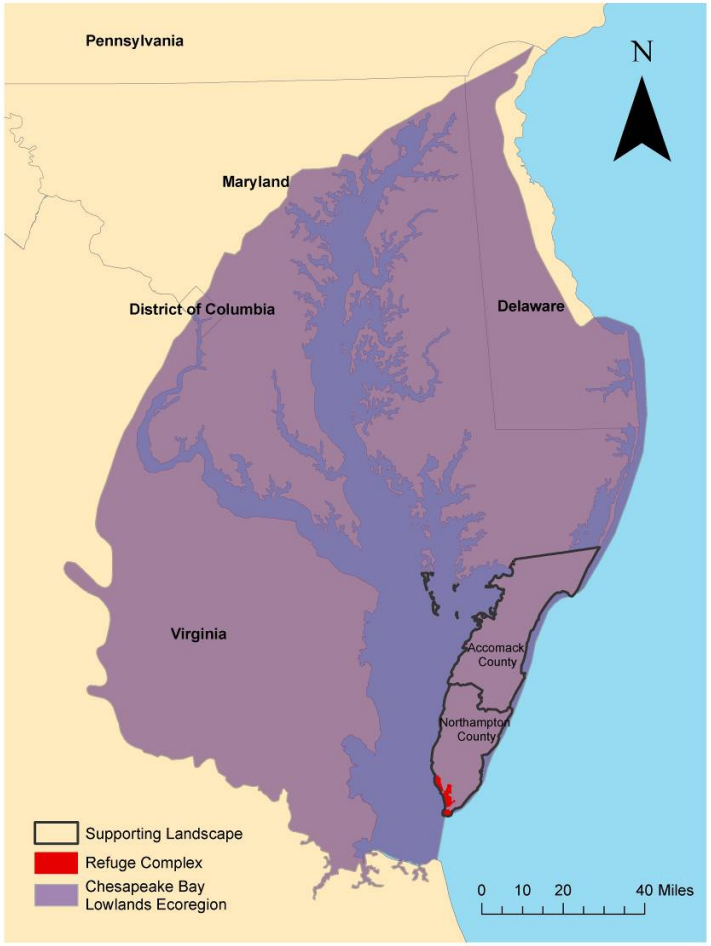
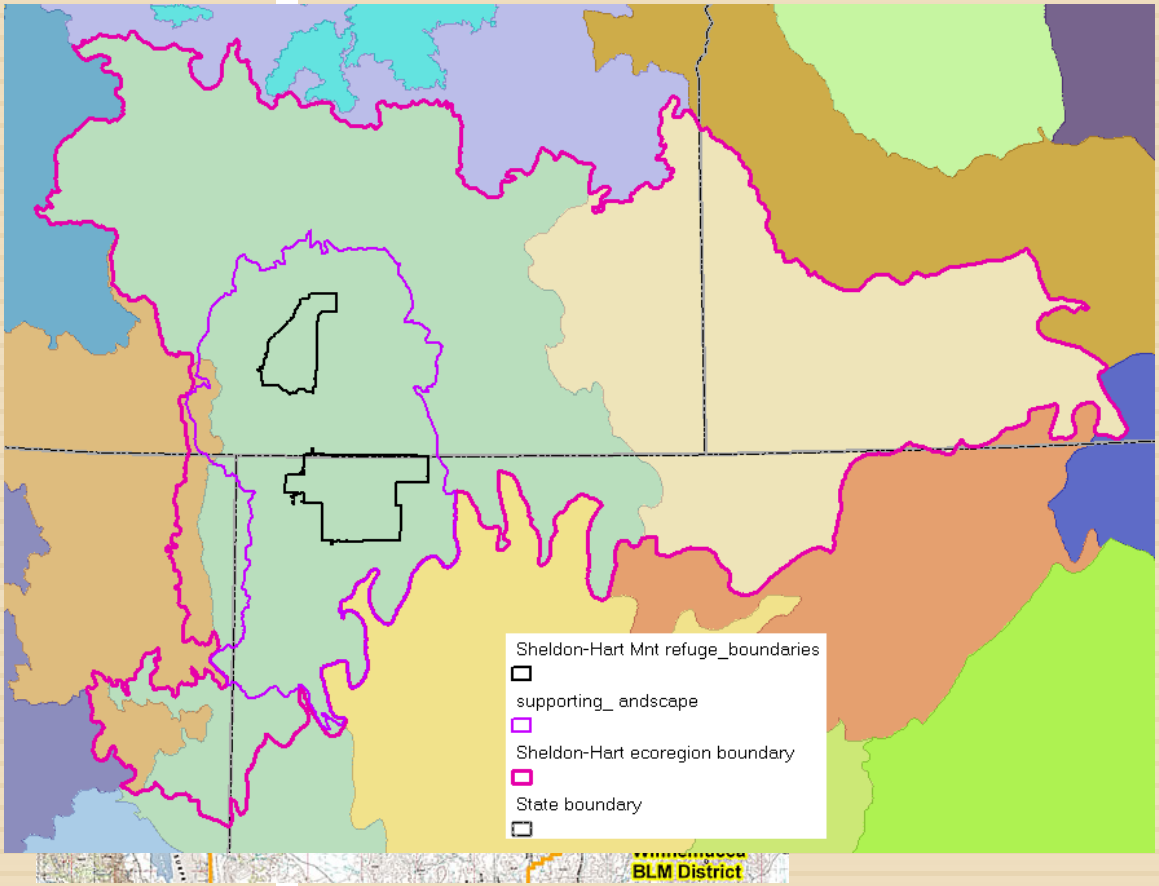
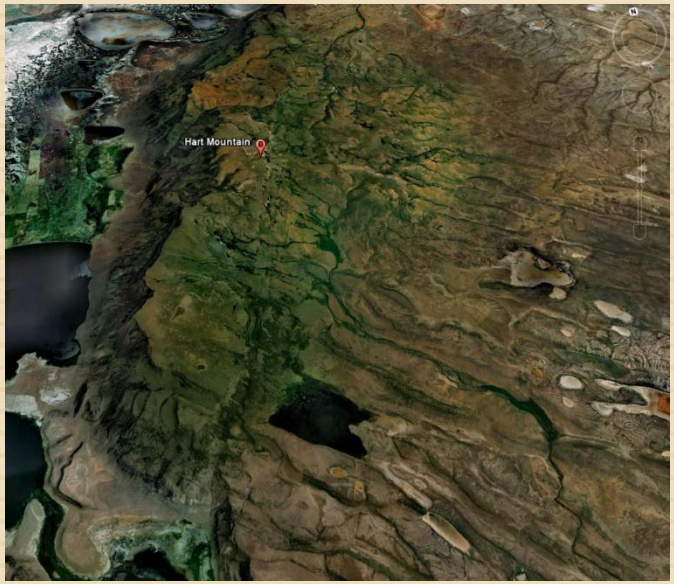


Eastern Shore of Virginia NWRC (1850 ac)

Issues: Urbanization, sea level rise, habitat management conflicts

DCR
Virginia Department of Conservation & Recreation





Sheldon/Hart Mountain NWRC (850k ac)

Issues: feral horses, history of grazing and water development, invasives and juniper expansion, expected deleterious climate changes on species composition and ecological integrity

Institute for Natural Resources

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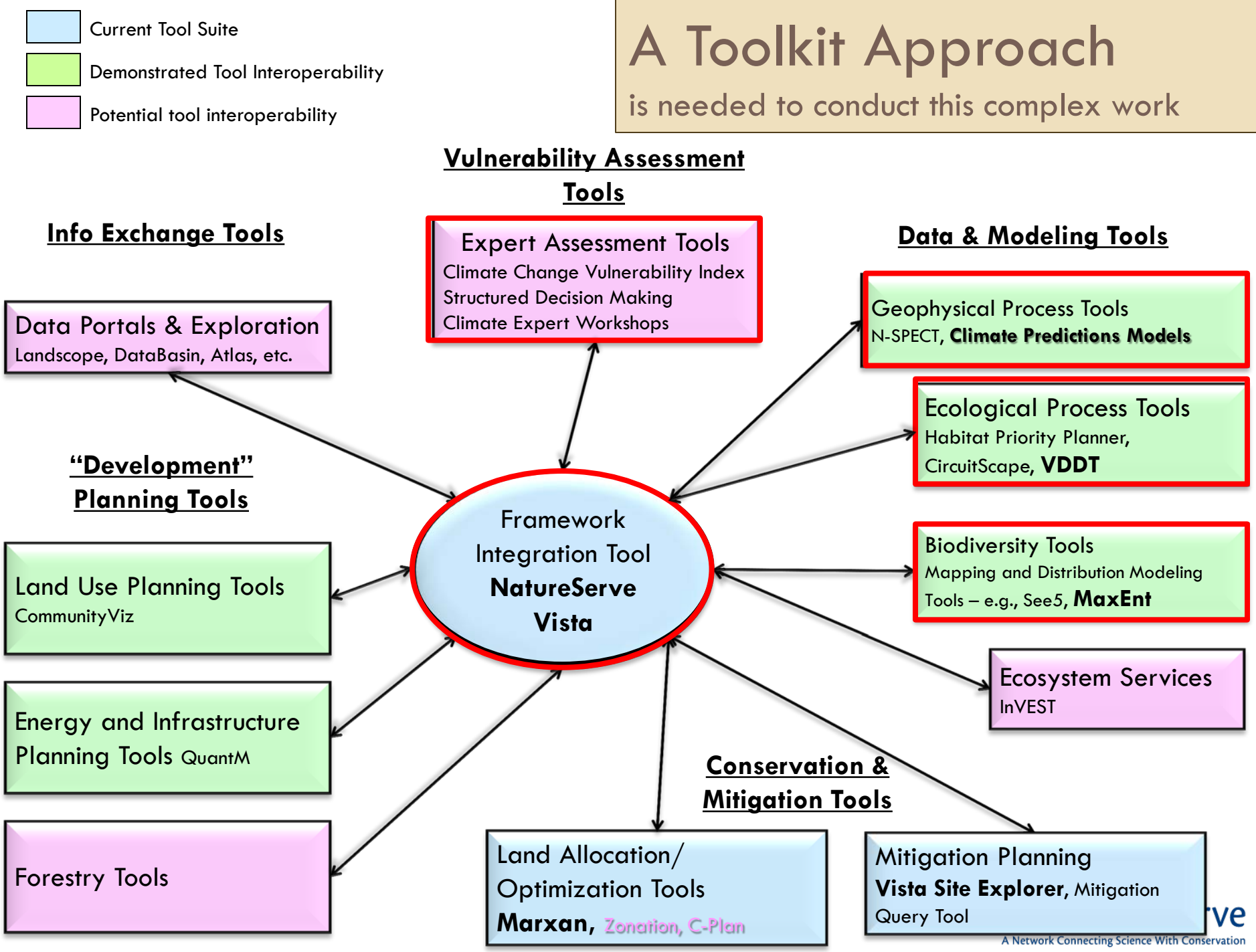
Current Tool Suite
Demonstrated Tool Interoperability
Potential tool interoperability
A Toolkit Approach
is needed to conduct this complex work
Vulnerability Assessment Tools
Info Exchange Tools
Data & Modeling Tools
Expert Assessment Tools
Climate Change Vulnerability Index
Structured Decision Making
Climate Expert Workshops
Data Portals & Exploration
Landscope, DataBasin, Atlas, etc.
Geophysical Process Tools
N-SPECT, Climate Predictions Models
Ecological Process Tools
Habitat Priority Planner,
CircuitScape, VDDT
"Development" Planning Tools
Framework Integration Tool
NatureServe Vista
Biodiversity Tools
Mapping and Distribution Modeling Tools – e.g., See5, MaxEnt
Land Use Planning Tools
CommunityViz
Ecosystem Services
InVEST
Energy and Infrastructure Planning Tools QuantM
Conservation & Mitigation Tools
Forestry Tools
Land Allocation/ Optimization Tools
Marxan, Zonation, C-Plan
Mitigation Planning
Vista Site Explorer, Mitigation Query Tool
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Supporting Landscape Cumulative Effects Analysis: Scenario Evaluation of Goal Achievement (Vista model)

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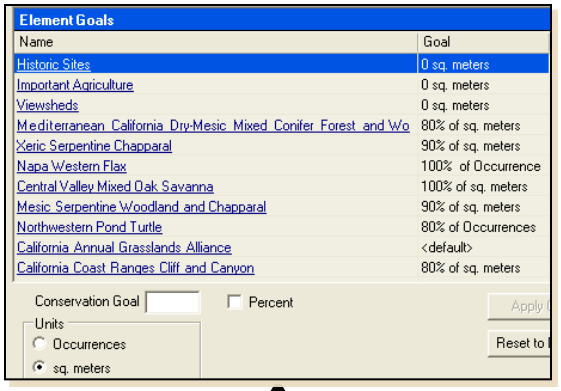
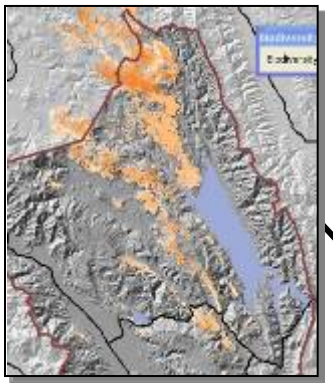
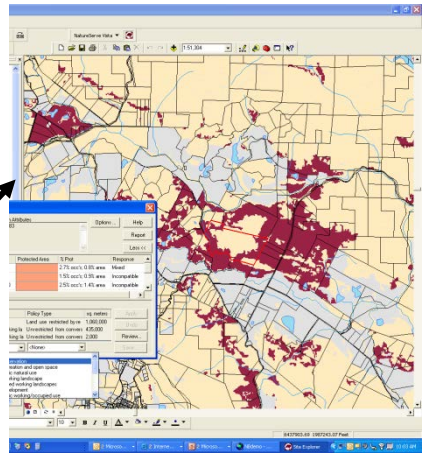
Element Retention Goals



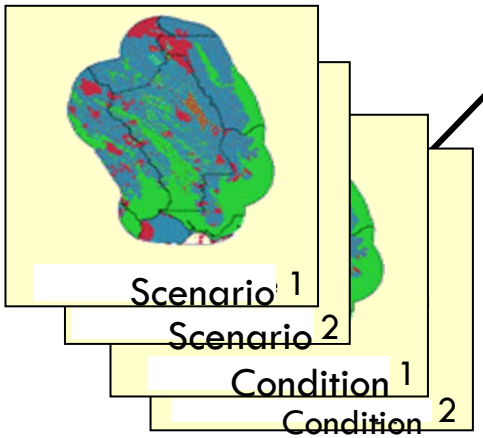


Element Distribution

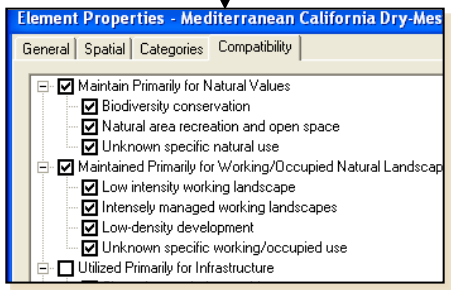
Impact Maps



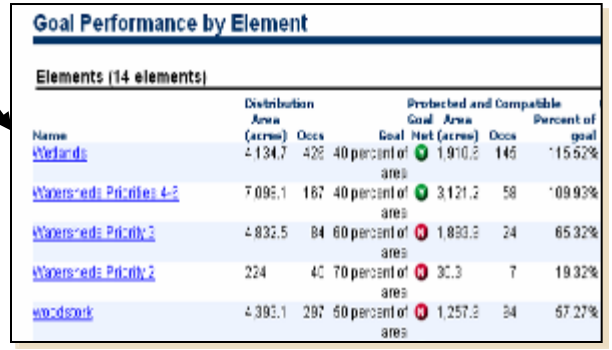
Spatial Intersect or Condition Model & Reqs Lookup



Scenario Outputs



Element Response/Sensitivity To management & stressors



Quantitative Reports

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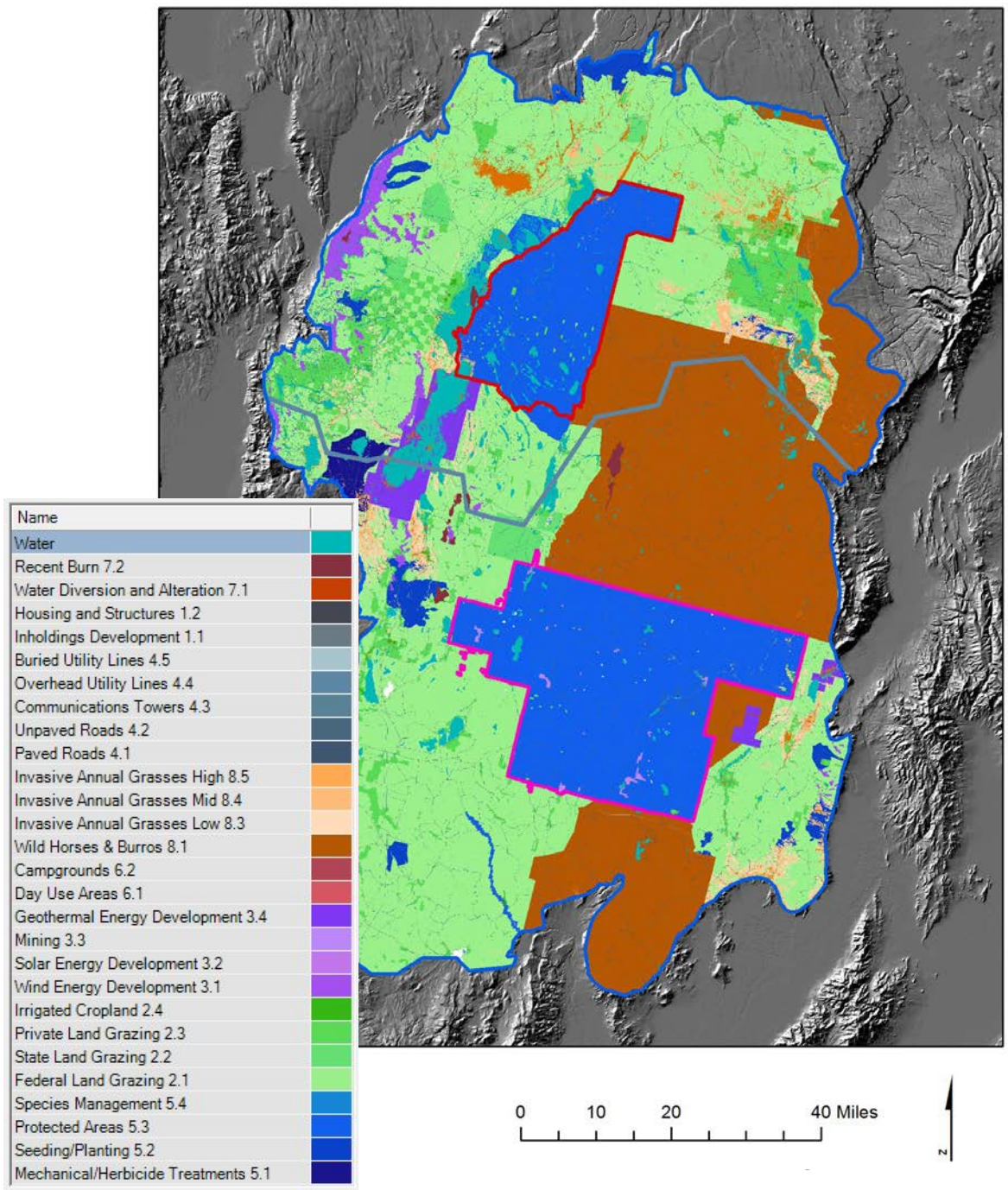
Characterizing Scenarios

Sheldon-Hart Mtn example

2025 scenario incorporating:

- Current land management (+ proposed end of Sheldon horse grazing)
- Current urban & ag uses
- Current & future infrastructure (pipeline, transmission)
- Future renewable energy development



Scenario Effects Evaluation

Basic Vista Evaluation for Sheldon-Hart Mtn

Scenario Evaluation Report : BaselineEval

Back | Forward | Stop | Refresh | Print | Export | Show XML | Customize

Goal Performance by Priority

Summary

Name	Protected and Compatible Goal Met For	Goal Unmet For	Compatible Goal Met For	Goal Unmet For
1 (19 elements)			2 elements (10.53%)	17 elements (89.47%)
2 (13 elements)			0 elements (0%)	13 elements (100%)
3 (22 elements)			0 elements (0%)	22 elements (100%)

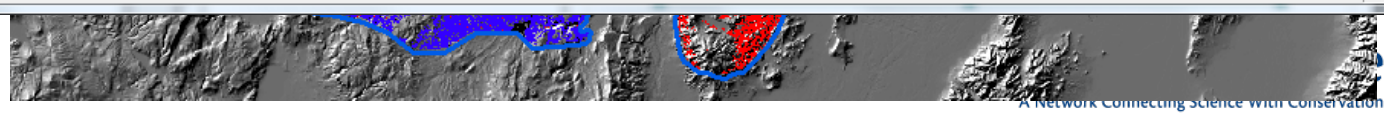
Back to top

Details

1 (19 elements)

Name	Distribution Area (hectares)	Occs	Avg Condition	Goal	Goal Met	Compatible Area (hectares)	Occs	Avg Condition	Percent of goal
Pronghorn Winter Range	65,306.52	6	0.72	100 percent of area	N	42,369.84	2	0.72	64.88%
Pronghorn Nonwinter Range	155,912.94	6	0.7	100 percent of area	N	19,016.64	3	0.77	12.2%
Pronghorn Corridors	4,233.24	2	0.58	100 percent of area	N	0	0	0	0%
Sage Grouse Range	1,309,723.65	10	0.67	100 percent of area	N	90,111.15	10	0.72	6.88%
Sage Grouse Nesting Habitat	1,733,429.88	9	0.68	100 percent of area	N	92,787.48	2	0.71	5.35%
Last Chance Ranch	2.88	1	0.66	100 percent of occurrences	N	0	0	0	0%
Pronghorn Primary Habitat	1,236,809.79	23	0.68	100 percent of area	N	78,499.17	2	0.72	6.35%
Sheldon Boundary Fence	924.66	4	1	100 percent of area	Y	924.66	4	1	100%
Sage Grouse	36.45	121	0.68	100 percent of occurrences	N	6.57	22	0.72	18.18%
Rocky Mountain Aspen Forest and Woodland	14,952.69	672	0.72	100 percent of area	N	809.82	54	0.68	5.42%
Hart Boundary Fence	526.68	2	1	100 percent of area	Y	526.68	2	1	100%
Sheldon Headquarters	3.15	1	1	100 percent of occurrences	N	0	0	0	0%
Inter-Mountain Basins Semi-Desert Grassland	172,380.6	892	0.68	100 percent of area	N	6,621.39	45	0.69	3.84%
Hart Headquarters	3.15	1	1	100 percent of occurrences	N	0	0	0	0%
Inter-Mountain Basins Montane Sagebrush Steppe	319,827.69	740	0.69	100 percent of area	N	168,270.57	440	0.7	52.61%
Inter-Mountain Basins Big Sagebrush Steppe	464,670.9	219	0.67	100 percent of area	N	202,864.14	134	0.68	43.66%
Inter-Mountain Basins Big Sagebrush Shrubland	742,469.49	457	0.68	100 percent of area	N	388,215.72	232	0.7	52.29%
Columbia Plateau Low Sagebrush Steppe	528,015.6	410	0.69	100 percent of area	N	44,238.42	22	0.72	8.38%
Sage Grouse Breeding Habitat	648,207.9	53	0.68	100 percent of area	N	49,769.28	4	0.72	7.68%

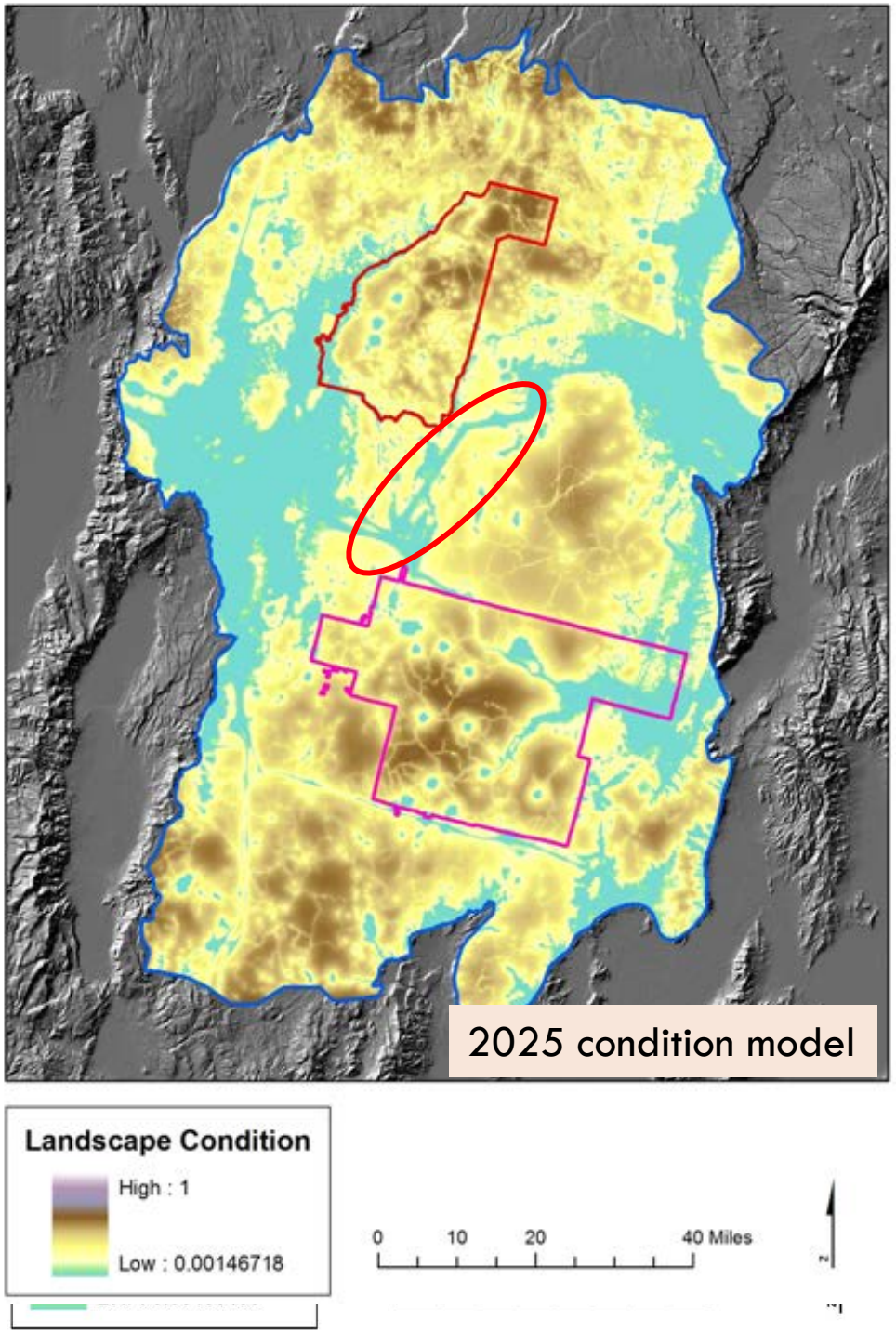
Done



Ecological Integrity Assessment

Utilizes scenarios to model landscape condition effects at and around impacts

- Note fragmentation in 2025 from major energy transmission corridor proposal

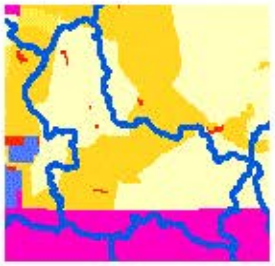


Advanced Analyses: combined veg dynamics and climate change

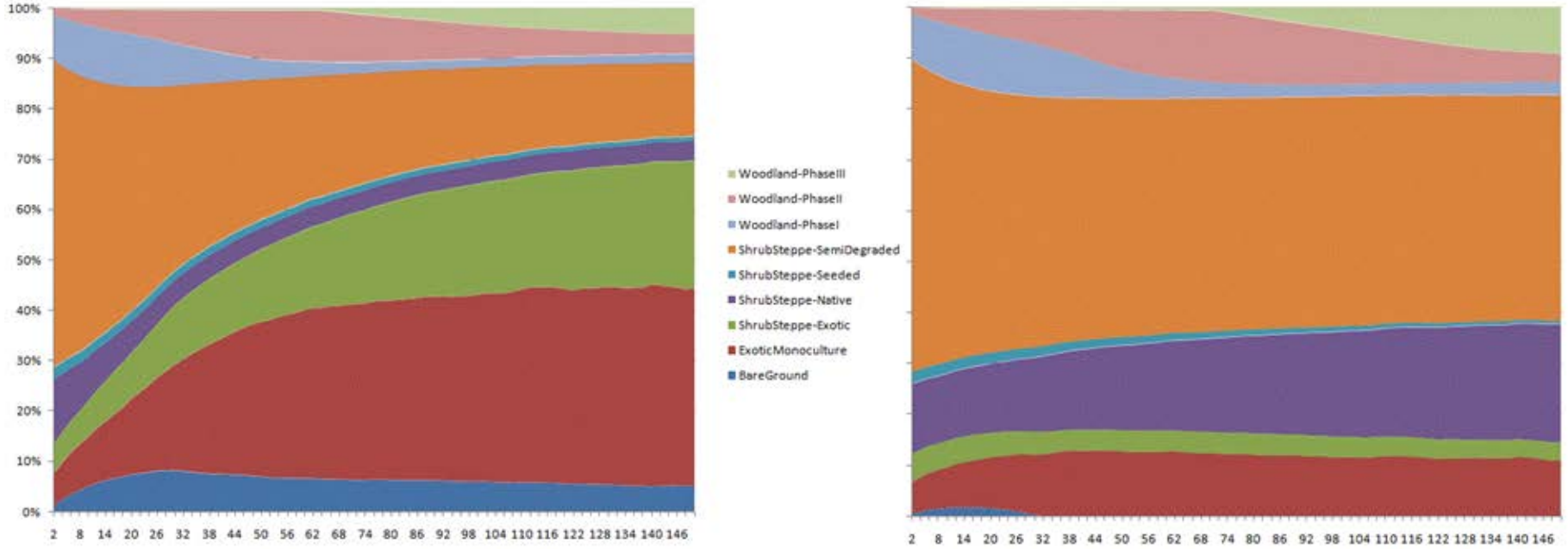
Using VDDT to evaluate grazing effects in Sheldon-Hart Mtn with climate change over 150 yr timeframe

Sage Hen Creek (HUC Id:1712000802)

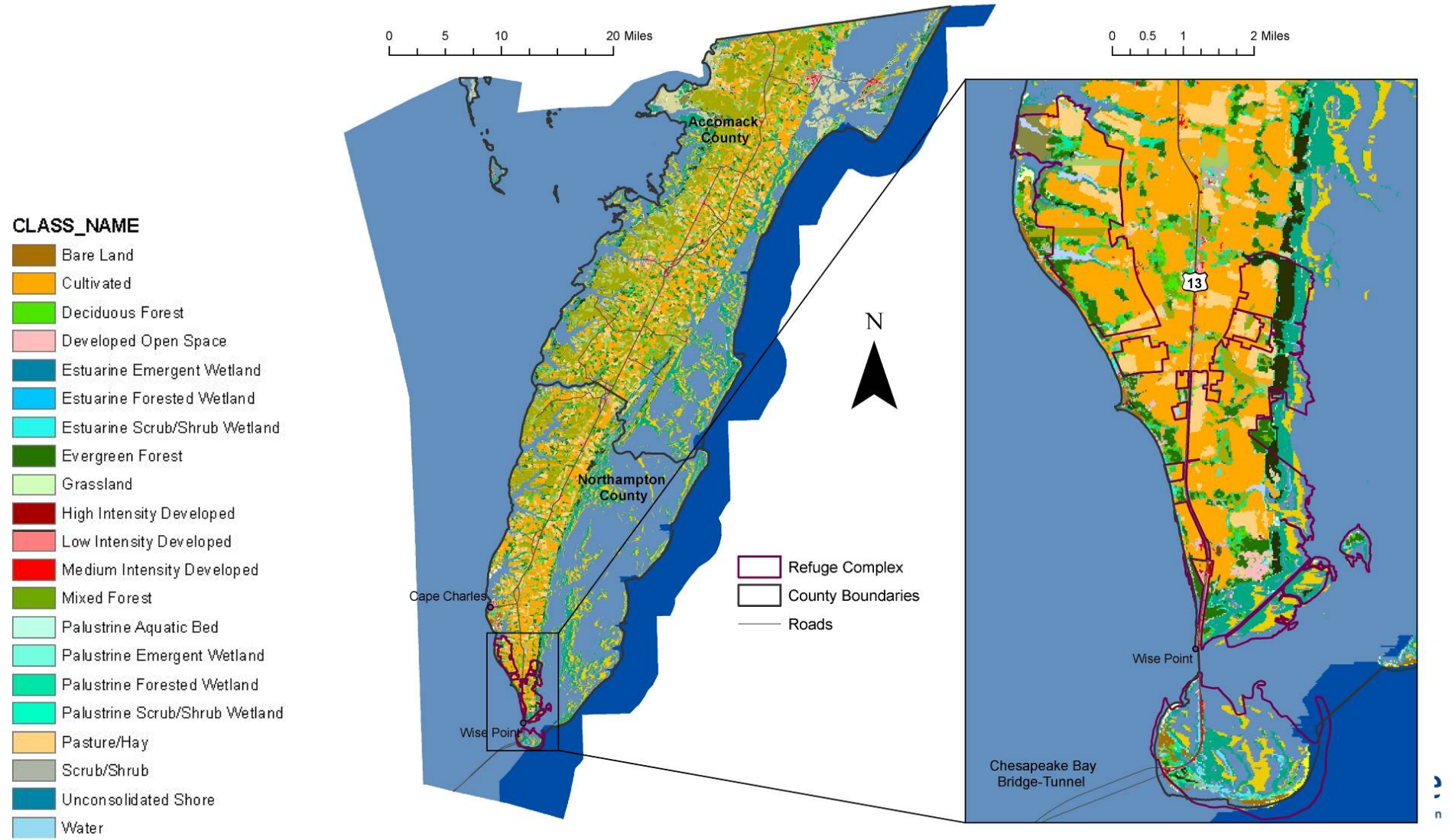
Scenario 1: Grazing



Scenario 2: No Grazing

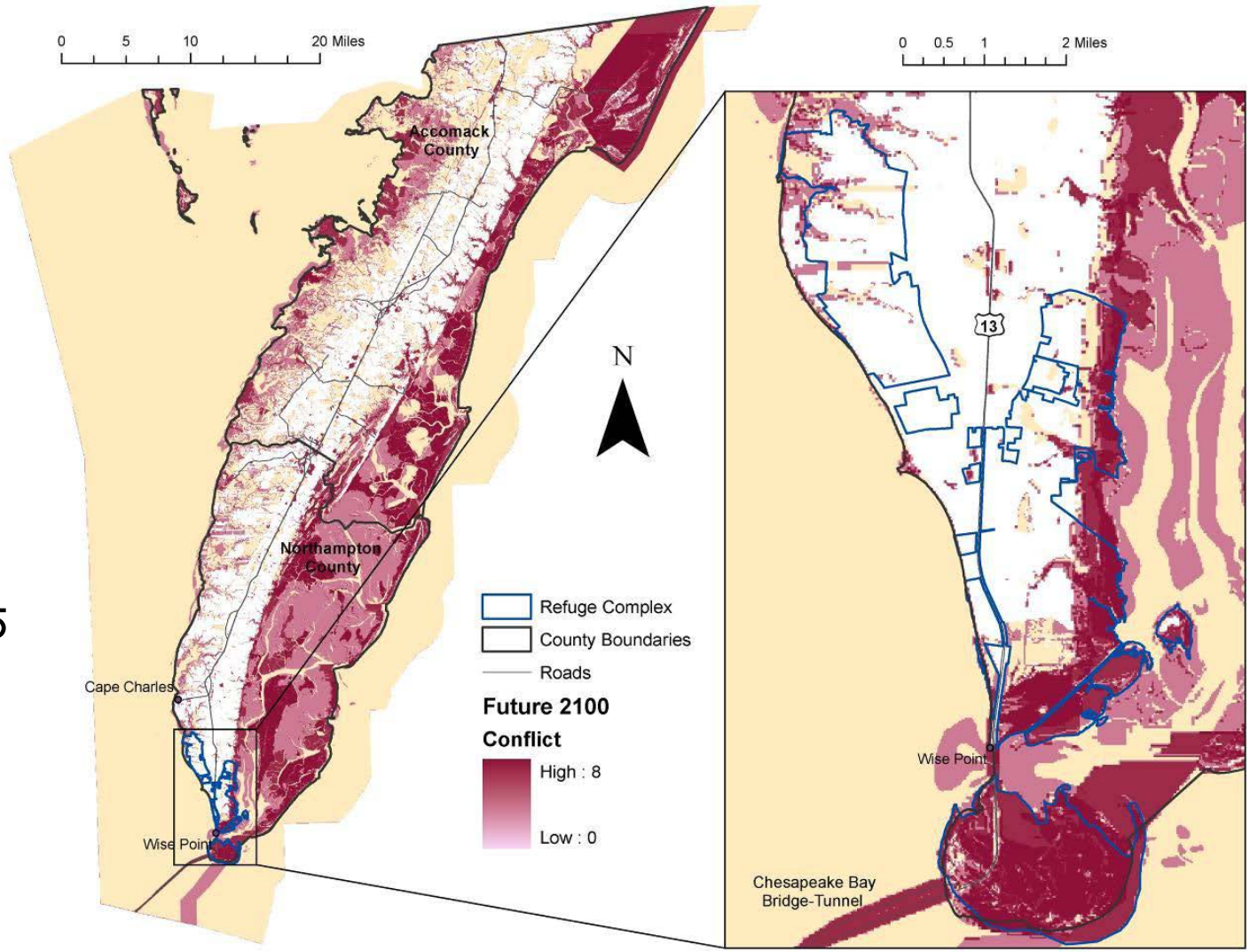


Scenarios integrating sea level rise



Evaluating Resource Conflicts

Eastern Shore Example
Depicts resource conflict index in 2025 to 2100 from combined stressors



Opportunities & Strategies

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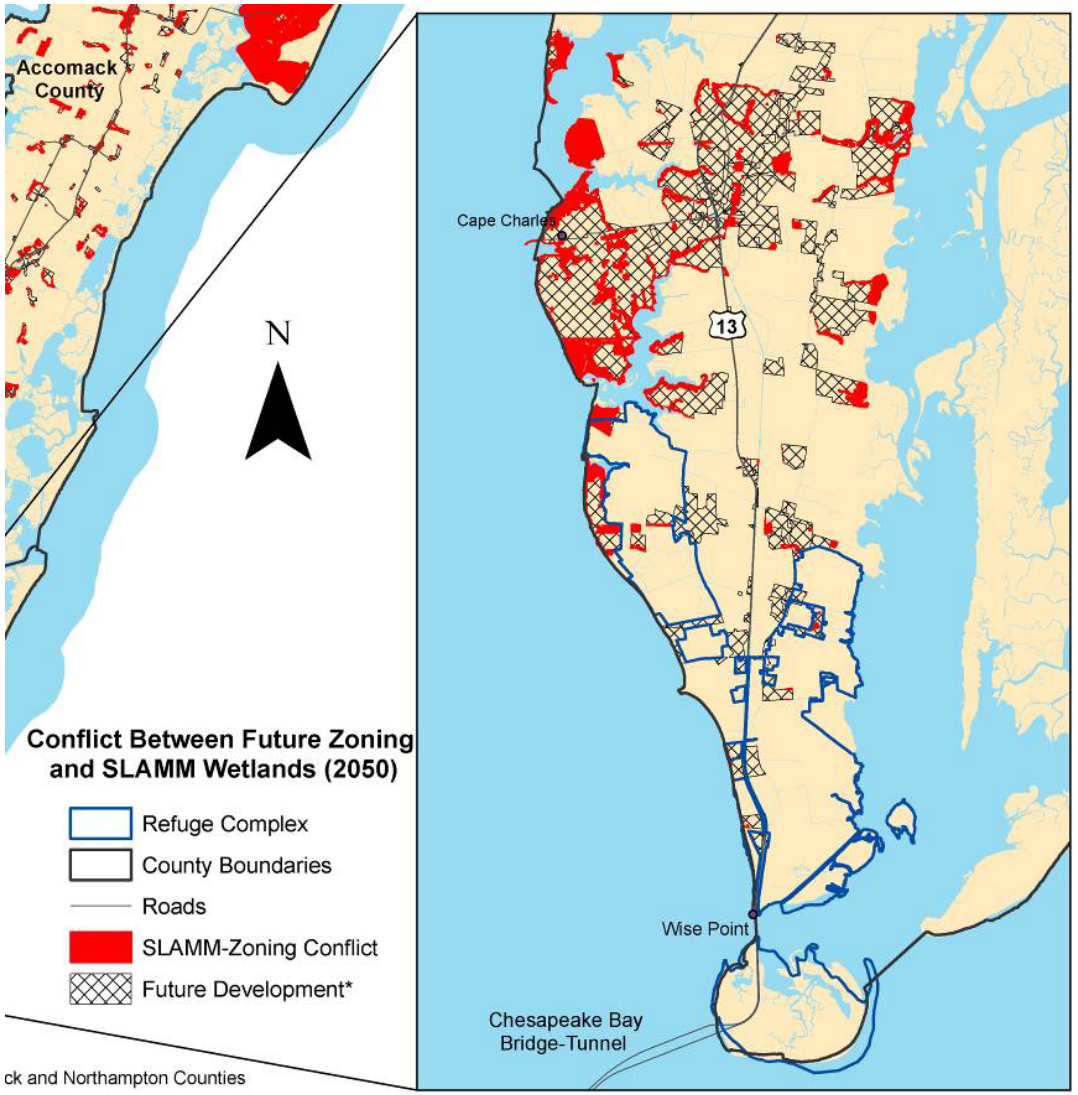
Opportunities

Eastern Shore Example
Areas of potential future growth expected to be in a wetland state in 40 years

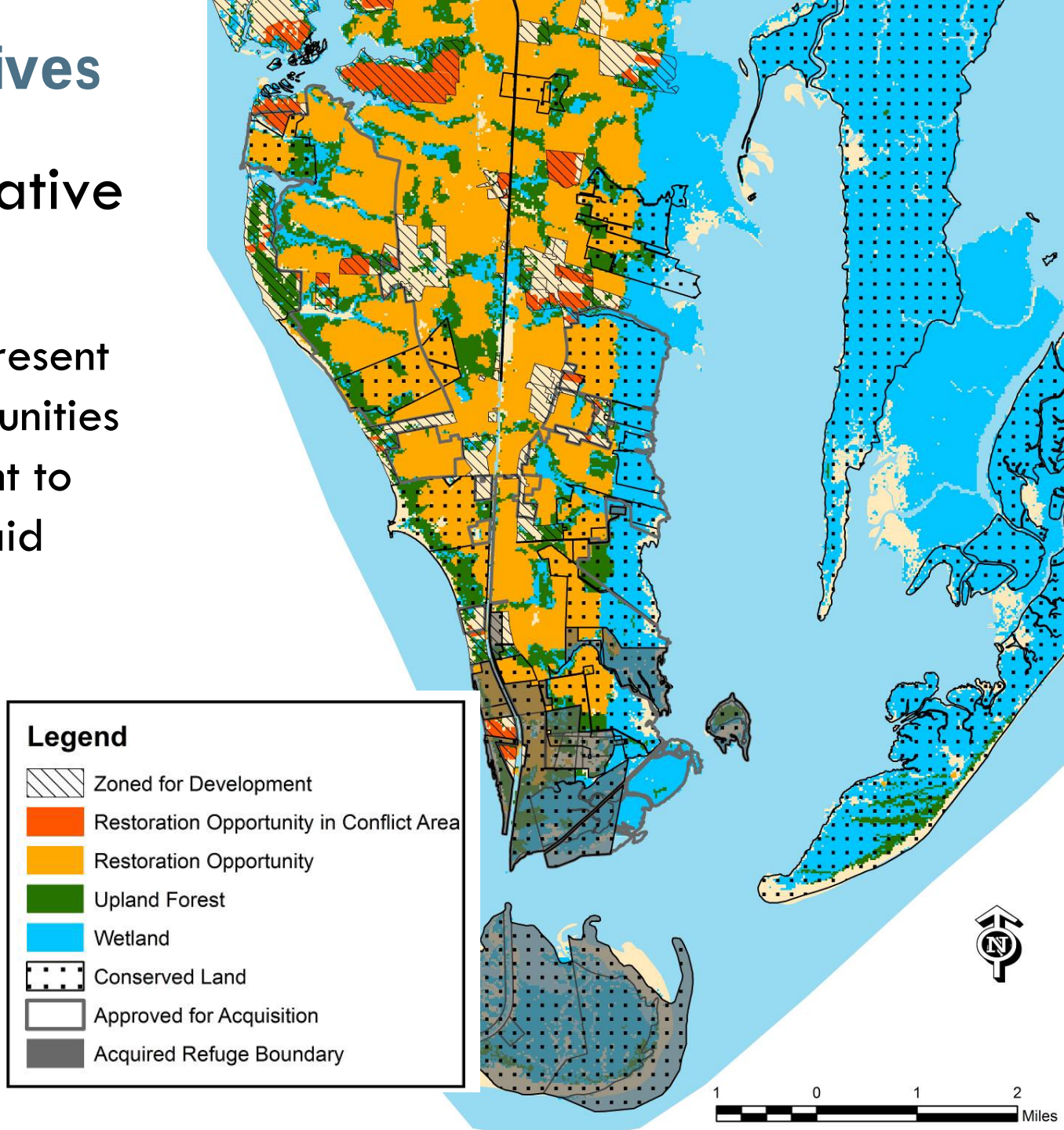


Inform Alternatives

Example Alternative

Eastern Shore

Areas in orange represent collaboration opportunities with local government to avoid hazards and aid conservation



Strategies

Sheldon-Hart Mountain Example

- Complete the removal of grazing on the refuges
- Control juniper and manage invasives, work to establish a buffer of similar management on adjacent lands
- Preserve and maintain the priority sagebrush habitats
- Explore connecting the two refuges through compatible management & cooperative acquisition with NGOs of private inholdings
- Complete the study of antelope migration use between the refuges to support evaluation of proposed transmission lines

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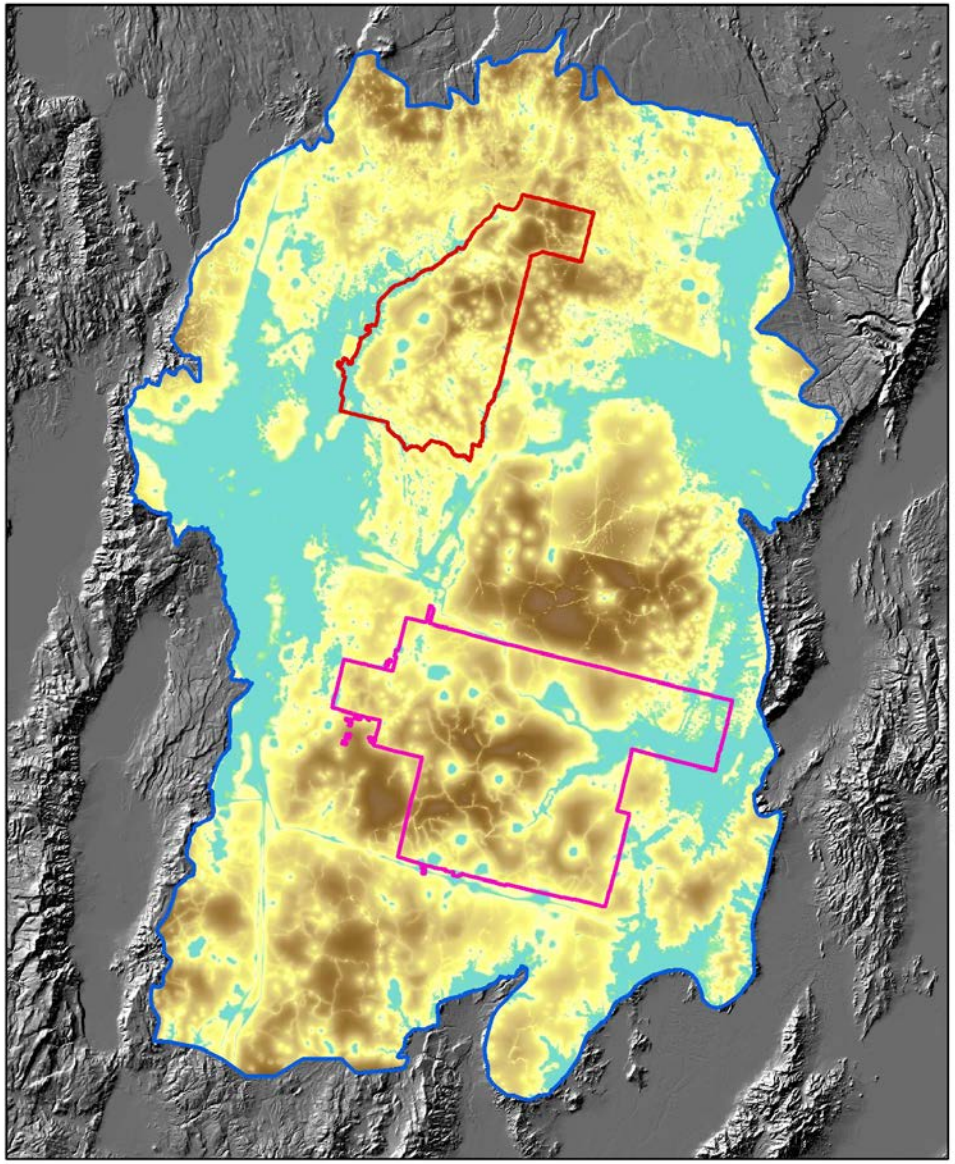
Inform Alternatives

Example Alternative

Sheldon-Hart Mtn NWR

Refuge-compatible management (blue) proposed for areas around and between the refuges to conserve species populations and pronghorn migration



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Lessons Learned

- RVAAs are most efficiently & appropriately conducted in partnerships over landscapes (~1M-25M acres)
- The RVAA fills a gap in technical guidance for climate change VA and adaptation
- The framework and toolkit are applicable anywhere for multiple planning sectors

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Questions?

Contact: patrick_crist@natureserve.org

RVAA guide: https://connect.natureserve.org/publications/rvaa

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- National Wildlife Refuge System for RVAA funding
- NatureServe Vista endowment for presentation support

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Issues and Questions for this Session

- What do we need from vulnerability assessments to best inform adaptation strategies for biodiversity?

➢ Species: we cannot adequately assess all species individually

- *What might be practical selection criteria to consider?*

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Issues and Questions for this Session

- Regions & Landscapes: We need sufficient specificity to inform strategies

  - *What types of strategies are well-informed by regional landscape assessment?*

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Issues and Questions for this Session

- For any given area, what might be a robust combination?
  - Landscapes
  - Communities
  - Species

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