

Decision Support for Conservation Assessment and Planning in a Landscape Context

Results of a DoD Legacy Grant



Summary: How did we get here

- 2014-15 Legacy Grant
 - demonstrate use of species distribution modeling (SDM) for rare and imperiled species
 - NatureServe Vista ArcGIS extension for current and future threats assessment
- 2015 NatureServe continued development
 - Demonstrate integration of sea level rise
 - Demonstrate prioritization and planning capabilities at landscape and site levels

Agenda

- Overview of Vista
- Live demonstration of Eglin AFB Vista project

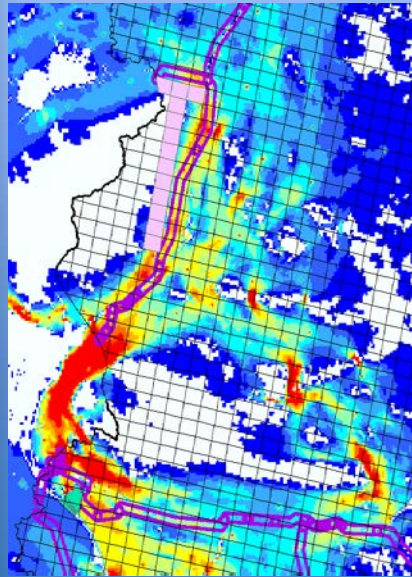
Conservation on the land, in the water, anywhere on the globe



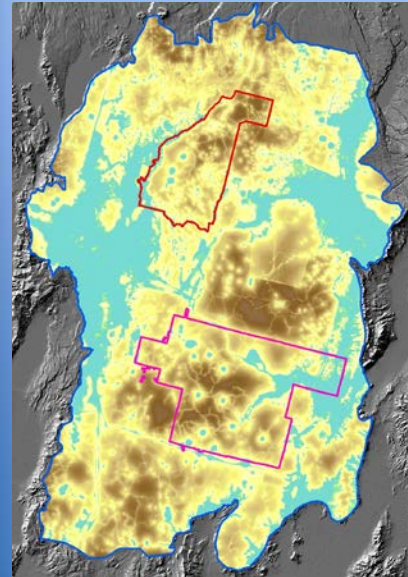
Conservation & Climate Change



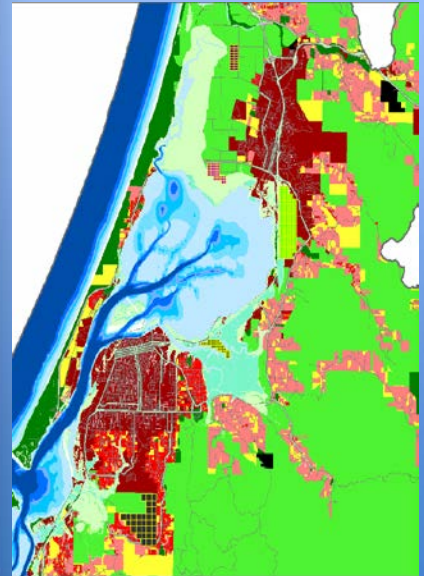
Land Use & Infrastructure



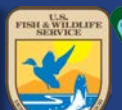
Public Land Management



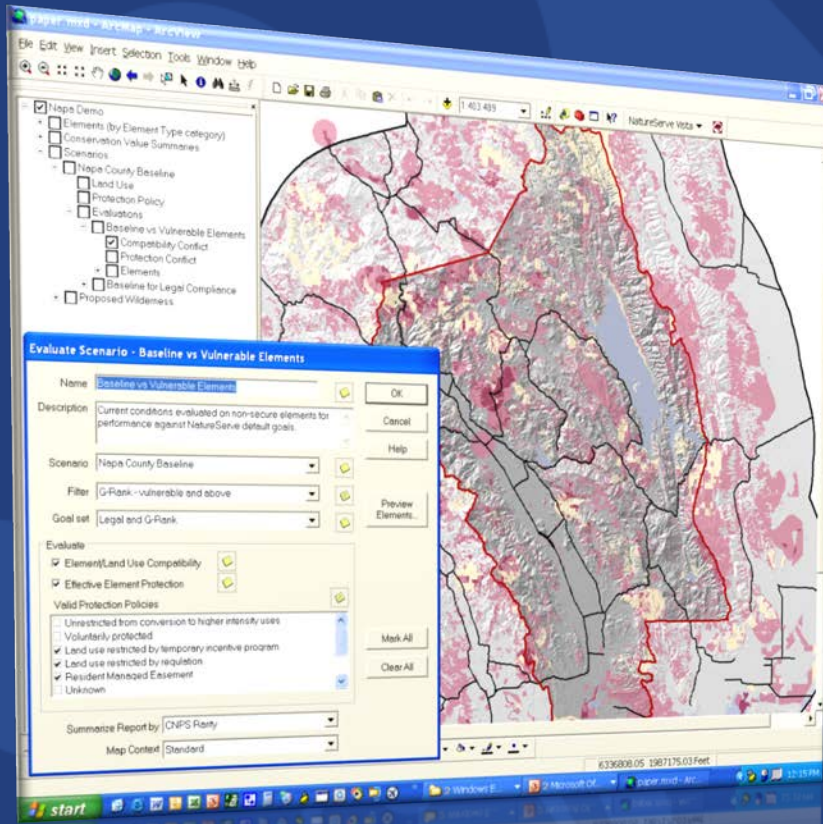
Coastal/Marine



Our funders: \$4M development & endowment



Vista Basics



- A Free ArcGIS Extension maintained for new Esri releases since 2004
- A broadly capable tool designed to help integrate conservation with a variety of planning & management activities in the land, air, water.
- Usable by a variety of skill levels with proper support
- Full integrated help and available tech support, training, assistance
- > 2000 downloads worldwide

Our first pilot for Napa County, CA

What Does Vista Help You Do?

- **Apply well-vetted concepts** from *scenario-based planning, cumulative effects assessment, mitigation hierarchy, green infrastructure, systematic conservation planning, and ecosystem-based management & climate adaptation*
- **Work at multiple scales:** Vista maintains data at its source resolution so you can move from regional to site scales and back
- **Incorporate expert knowledge:** about biodiversity requirements and sensitivities is the scientific backbone that drives Vista analyses and good planning
- **Define** a variety of **scenarios** that incorporate unlimited issues
- **Evaluate scenarios'** ability to support your goals
- **Create alternatives** at a site specific level or systematically across the planning region
- **Support plan implementation, monitoring, and adaptive management**

Vista Components & Management Questions

Conservation Elements

Where are my features of interest?

- What condition are they currently in?
- How confident is their distribution?
- What are their patterns of diversity, condition, and confidence
- What are their conservation requirements?

Scenarios

What is the pattern of land use and other factors that affect my elements?

- Where is this particular feature?
- What and where are the policies enforcing conservation?
- How much area does each feature occupy

Scenario Evaluation & Site Explorer

How are my elements doing now and in the future?

- Did I meet my element retention/viability goals under this scenario?
- Where are there conflicts preventing me from meeting my goals?
- Where will this element be viable/non-viable?
- What features are impacting my elements?

Where should I act?

- Where are areas of high conflict?
- Where are areas of high value?
- Where are areas of high irreplaceability?

What should I do?

- Is the area in good condition but high threat?
- What are the elements' requirements to be viable?

Building Block: Conservation Elements

Biodiversity

- Species
- Ecosystems
- Habitats & Communities

Already identified priority areas

“Enduring features/land facets”

Climate refugia areas

Cultural Elements

- Critical infrastructure, e.g., escape routes
- Archaeological & cultural sites
- Environmental justice areas
- Recreation areas

Hazard zones

Other land uses/Training ranges in

multi-objective planning when also entered
in scenarios

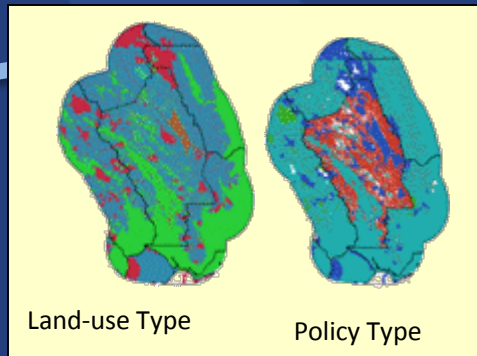
If you can map it and
give it requirements,
you can include it



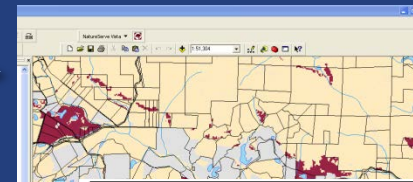
Vista Supported Analytical Process



Conservation Value Summary



Cumulative Effects Models



Evaluation Maps & Reports

Terrestrial Ecological System (33 elements)				Protected and Compatible		
Name	Area (hectares)	Occs	Goal Met (hectares)	Occs	Percent of goal	
Caribbean wet montane forest- Sierra Palm alliance	11,965.95	1	2,481 hectares	1	167.33%	
Caribbean wet montane forest- Palo Colorado alliance	3,713.49	1	762 hectares	1	469.46%	
Caribbean seasonal evergreen submontane lowland forest (young secondary)	97,270.47	1	10,862 hectares	1	10.06%	
Caribbean wet submontane lowland forest (young secondary)	1,877.22	1	9,402 hectares	1	0.77%	
Caribbean montane submontane karst forest (young secondary)	15,090.96	1	0 hectares	1	100%	
Caribbean montane wet serpentine woodland (young secondary)	1,001.25	1	0 hectares	1	100%	
Caribbean lowland moist serpentine woodland (young secondary)	1,951.38	1	0 hectares	1	100%	
Caribbean lowland dry semideciduous forest (young secondary)	19,810.44	1	7,283 hectares	1	27.81%	
Caribbean lowland dry riparian woodland and forest (young secondary)	1,231.2	1	1,229 hectares	1	7.62%	
Caribbean lowland dry limestone semideciduous forest (young secondary)	3,919.32	1	0 hectares	1	100%	
Caribbean lowland dry limestone semideciduous forest (young secondary)	10,679.4	1	0,500 hectares	1	35.90%	
Caribbean wet semideciduous forest (young secondary)	11,768.58	1	0 hectares	1	100%	
Caribbean wet evergreen forest	1,802.78	1	196 hectares	1	82.1%	

Scenario Outputs baseline, buildout, trends, alternatives & new plan

Adaptive Management Cycle

Element Goals

Name: Mediterranean California Dry Mes

Goal: 0 sq. meters

0 sq. meters

0 sq. meters

80% of sq. meters

90% of sq. meters

100% of Occurrence

90% of sq. meters

80% of Occurrences

<default>

80% of sq. meters

Apply

Reset to

General Spatial Categories Compatibility

Maintain Primarily for Natural Values

Biodiversity

Natural area

Unknown sp

Maintained Primarily for Natural Values

Low intensity

Intensely managed

Low-density

Unknown sp

Utilized Primarily

Occurrence

sq. meters

Elements, values, & expert knowledge

Site Explorer

Element Name

Element Name	Total	Protected Area	% Protected
Madroño, California Earth and	1.27 ac	1.27 ac	1.1%
Large Montane Pine - Oak Woodland	1,381 ac	1.55 ac	0.1%
Central Valley Riparian Woodland	229 ac	0 ac	0%
California Annual Grasslands Alliance	4,752 ac	1.55 ac	0.3%
Central Valley Grasslands Alliance	475 ac	1.44 ac	0.3%
Napa-Sonoma Woodland	744 ac	3.73 ac	0.5%
Central Valley Mixed Oak Savanna	2,739 ac	1.33 ac	0%
Southern Riparian Woodland	75 ac	2.76 ac	0.4%
Sierra Nevada Chaparral	581 ac	8.91 ac	1.5%
Northwest California Dry Riparian	940 ac	1.65 ac	0.2%

Screen Composition

Layer	Land Use	Policy Type	sq. meters
Area_30_m_zone	Uncovered	Land use restricted by map	3,076,500
zoning_def	Low intensity working land	Unrestricted from conversion	2,034,500
Development	High intensity working land	Unrestricted from conversion	2,034,500
Development_Land	Uncovered from conversion	Unrestricted from conversion	8,000

Override: Natural area recreation (None)

Backstory/conservation

Unknown specific natural use

Low intensity working land

Intervally managed working landscapes

Low density development

High intensity working land

Mitigation & alternative scenario development

Generate Conservation Solution

NatureServe VISTA

Welcome to the Protection Solution Wizard

Generate Conservation Solution

Solution Generation Tool

Select solution generation tool

MAR-VAN

SPOT

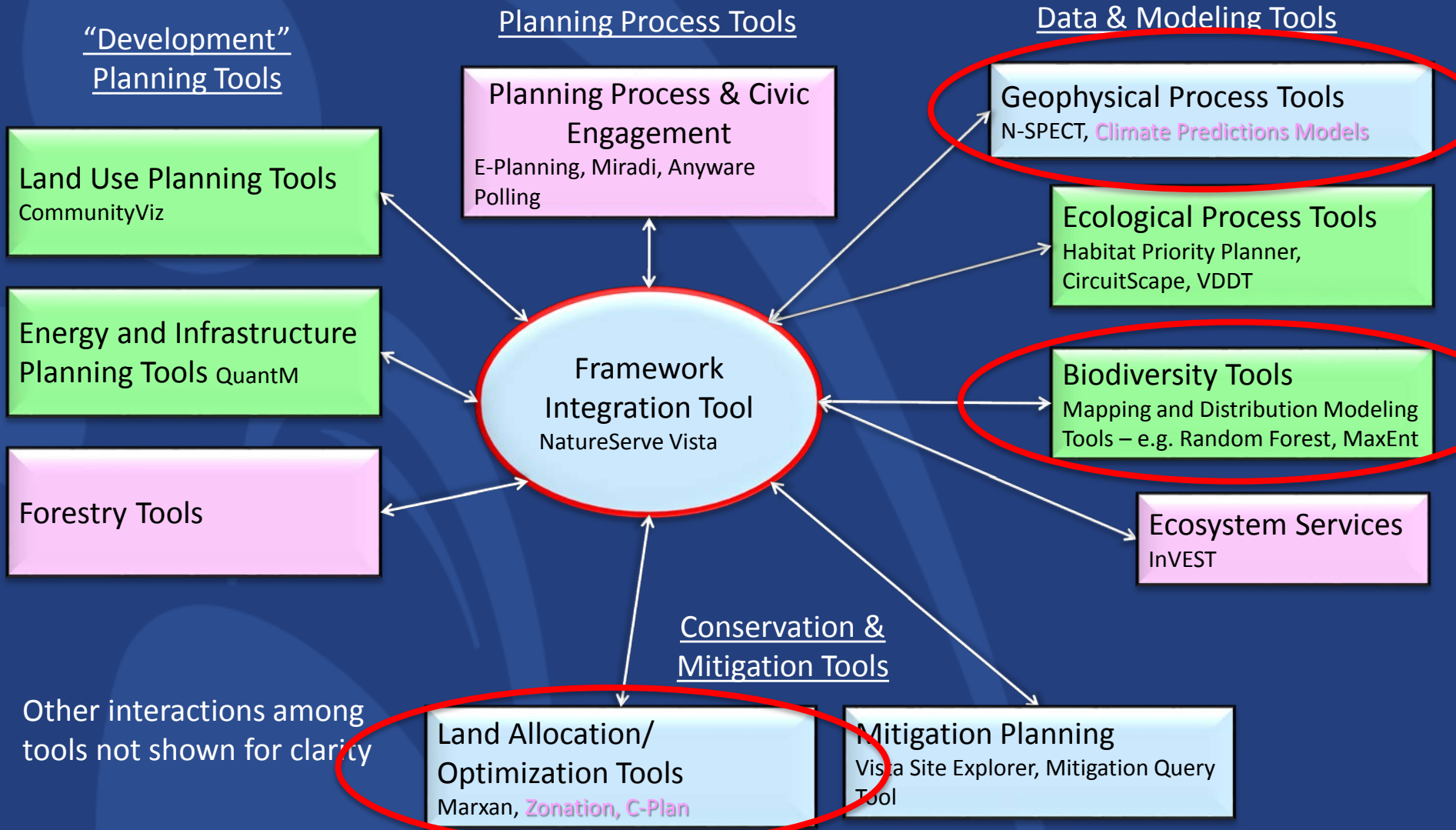
[Link to MAR-VAN website](#)

[Link to SPOT website](#)

Optimized spatial solution generation via interoperating tools

A Toolkit Approach

- Current Tool Suite (automated interoperability)
- Demonstrated Manual Interoperability
- Potential tool interoperability



Ongoing Implementation & Adaptive Planning

- In seconds, evaluate any proposed action for any site (e.g., training, facility, restoration, etc.)
- Find “next best” alternatives when new situations override the plan
- Update projects with new/revised data and science
 - Maintain a baseline situation and trends over time
 - Refresh analyses and update the plan

Live Demo

Example situations:

1. Cumulative effects assessment of scenarios (current, future urbanization, sea level rise)
2. Place installation in a landscape prioritization
3. Identify on-base conflict to be mitigated off-base

Caveats

- This is a demonstration project but used real data
- Only 5 imperiled species assessed
- Did not include local/installation level data

Conclusions, Q&A

- Vista tool available for free download
- All levels of support available
- NatureServe available to partner on ESTCP or Legacy proposals with your installation/region
- Look me up at NMFWA

Contact

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Screenshots

In Lieu of Live Demo

Current condition assessment

meadow beauty evaluation with overlay (light pink) of FL Forever priorities.

Scenario Evaluation Report : Current eval with occurrences

Back Forward Stop Refresh Print Export Show XML Customize

	Goals Met For	% of Goals Met	Goals Unmet For	% of Goals Unmet
Viable	3 elements	60%	2	40%

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Goal Performance by Element Type

Summary

Name	Protected and Viable Goal Met For	Goal Unmet For	Viable Goal Met For	Goal Unmet For
Reptile (1 elements)			0 elements (0%)	1 elements (100%)
Amphibian (1 elements)			1 elements (100%)	0 elements (0%)
Vascular Plant (3 elements)			2 elements (66.67%)	1 elements (33.33%)

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Details

Reptile (1 elements)

Name	Distribution Area (hectares)	Occs	Avg Condition	Goal	Goal Met	Viable Area (hectares)	Occs	Avg Condition	Percent of goal
Occ gopher tortoise	347,059.26	7	0.5	70 percent of area	N	108,556.92	4	0.94	44.68%

Amphibian (1 elements)

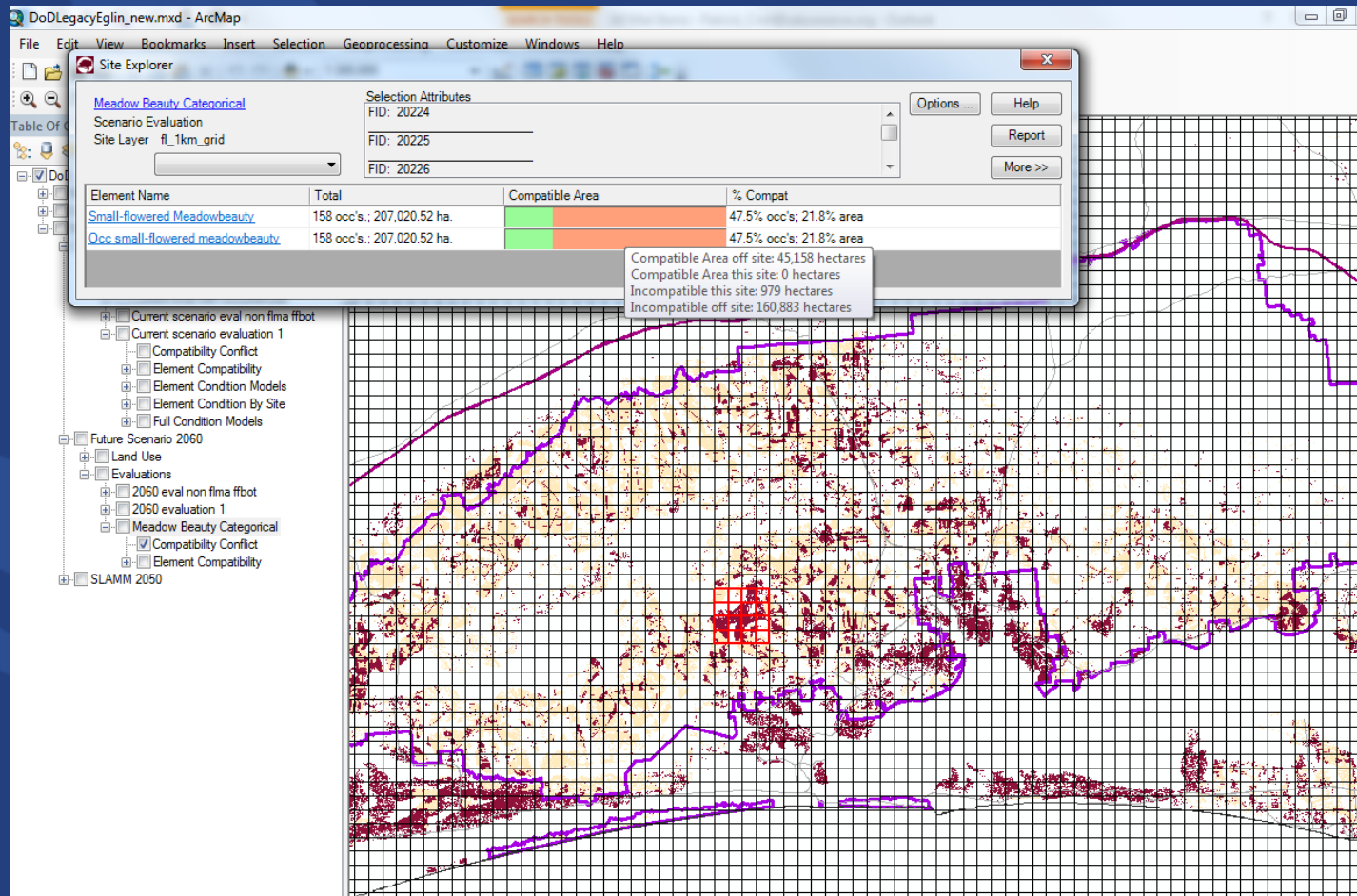
Name	Distribution Area (hectares)	Occs	Avg Condition	Goal	Goal Met	Viable Area (hectares)	Occs	Avg Condition	Percent of goal
Occ Florida bog frog	4,421.25	44	0.79	70 percent of area	Y	3,258.45	34	0.98	105.29%

Vascular Plant (3 elements)

Name	Distribution Area (hectares)	Occs	Avg Condition	Goal	Goal Met	Viable Area (hectares)	Occs	Avg Condition	Percent of goal
Occ small-flowered meadowbeauty	21.24	19	0.77	70 percent of area	Y	15.3	17	0.91	102.91%
Occ panhandle meadowbeauty	20,006.91	35	0.71	70 percent of area	Y	14,295.87	30	0.85	102.08%
Occ panhandle lily	73,999.89	128	0.73	70 percent of area	Y	47,766.15	75	0.98	92.21%

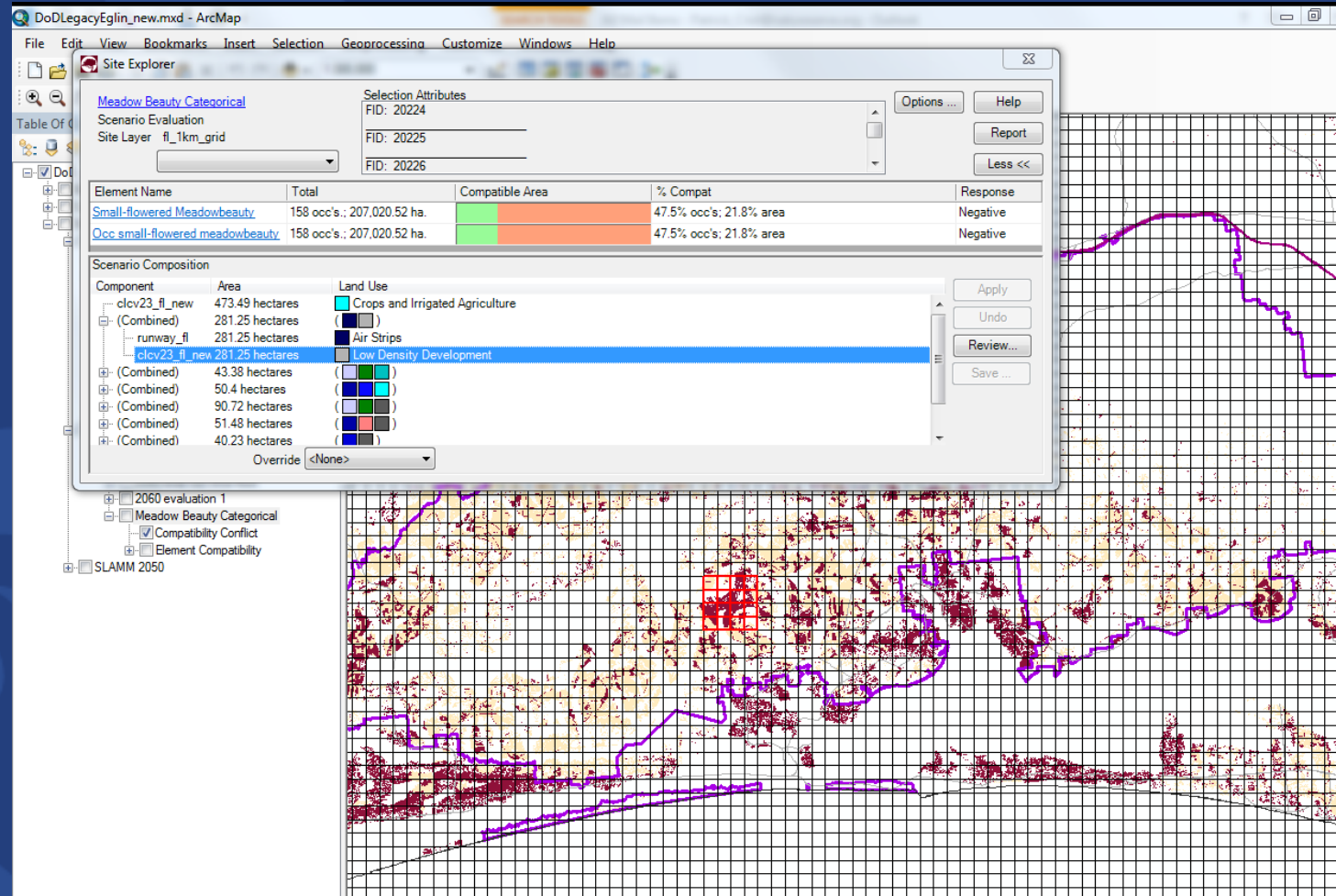
Conflict Identification on base site

Site outlined in red can be queried in Site Explorer to ID elements condition onsite, relative importance of the site, and impacting land uses onsite.



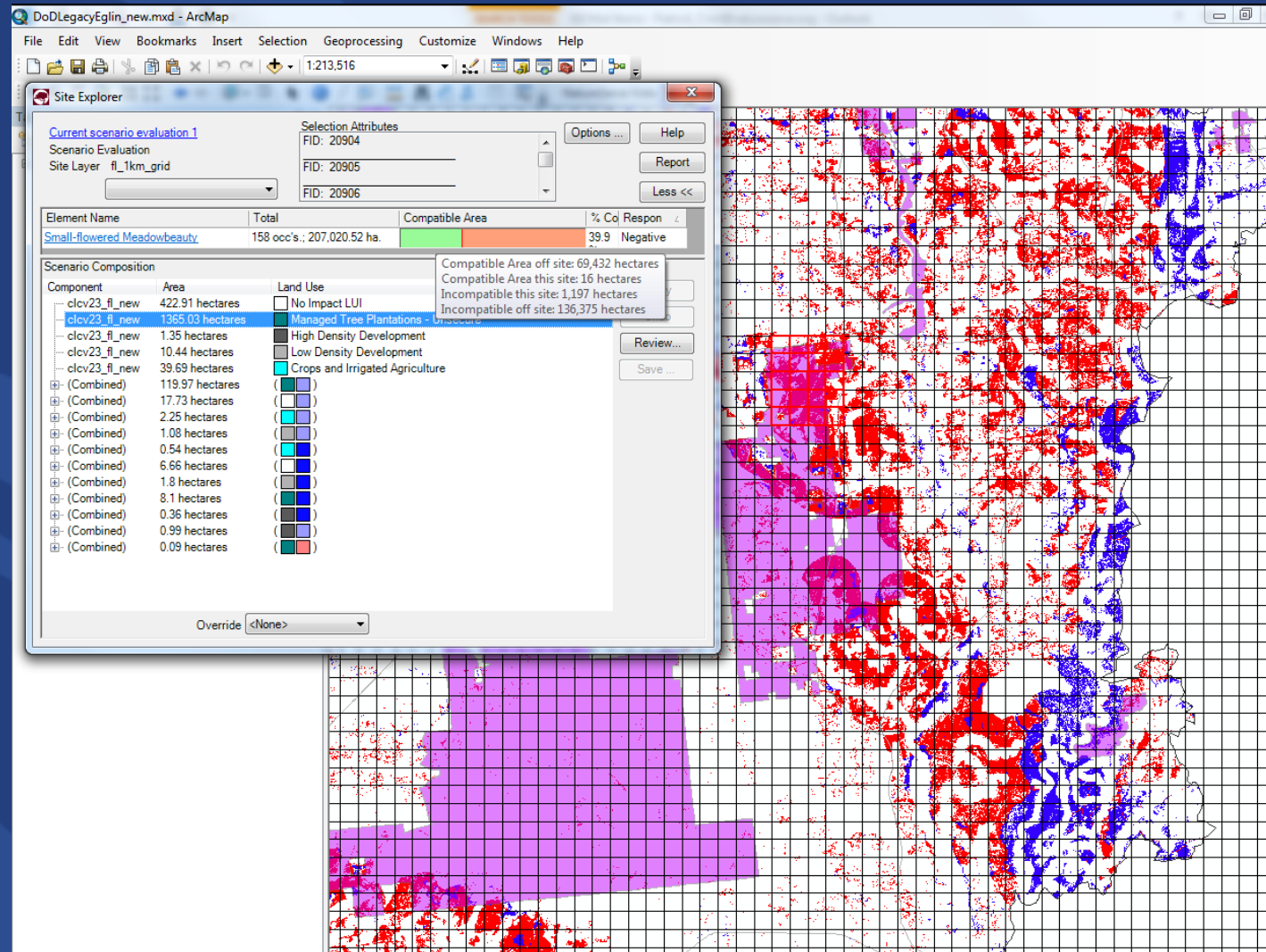
Conflict Identification on base site

Because the impacts are caused by existing strip and low density development, no onsite mitigation is considered. Instead we'll look for an offsite location.



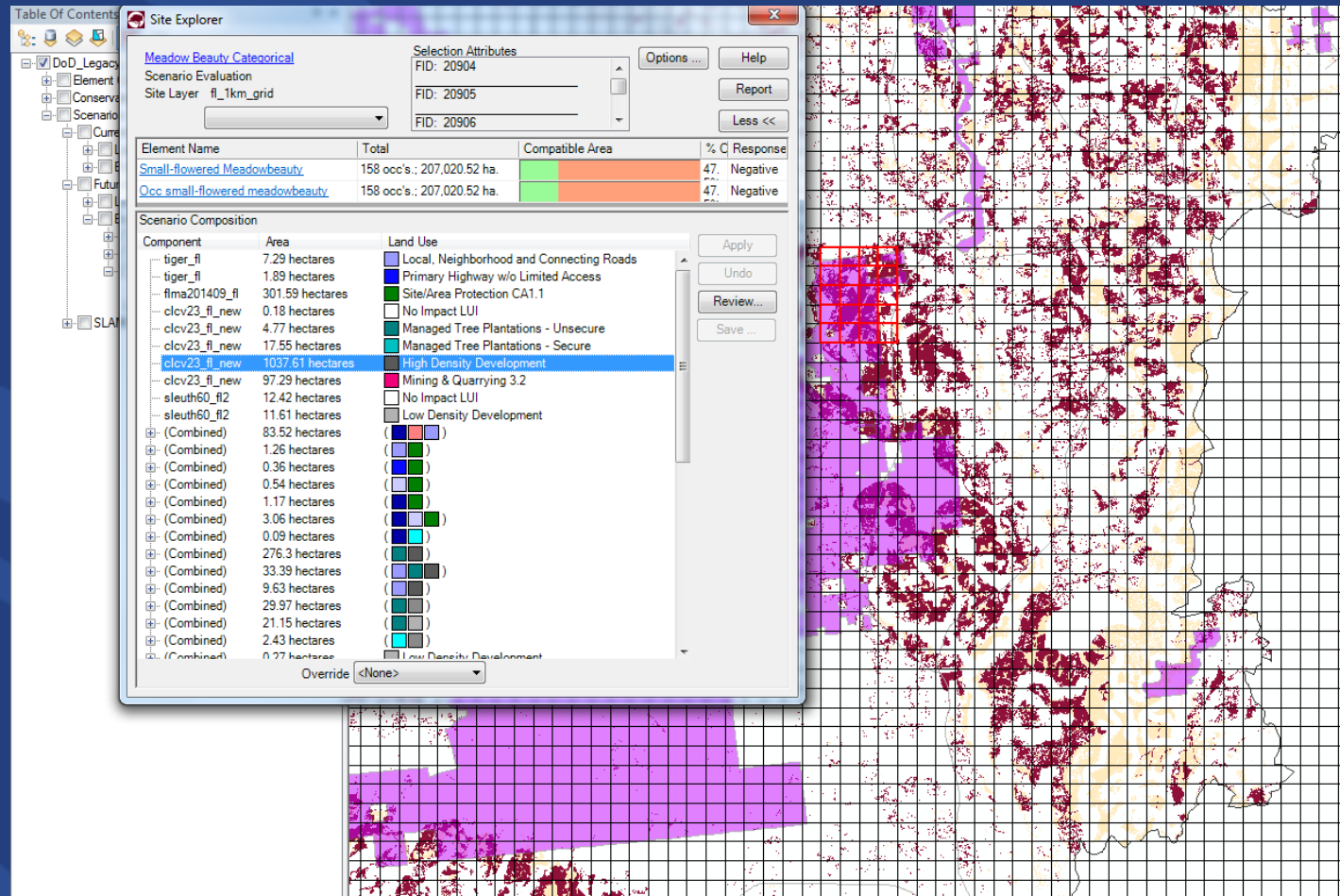
Conflict Identification on Potential Mitigation Site

FL Forever unprotected site outlined in red indicating managed plantation (unsecure) land use is generating low condition scores for meadow beauty.



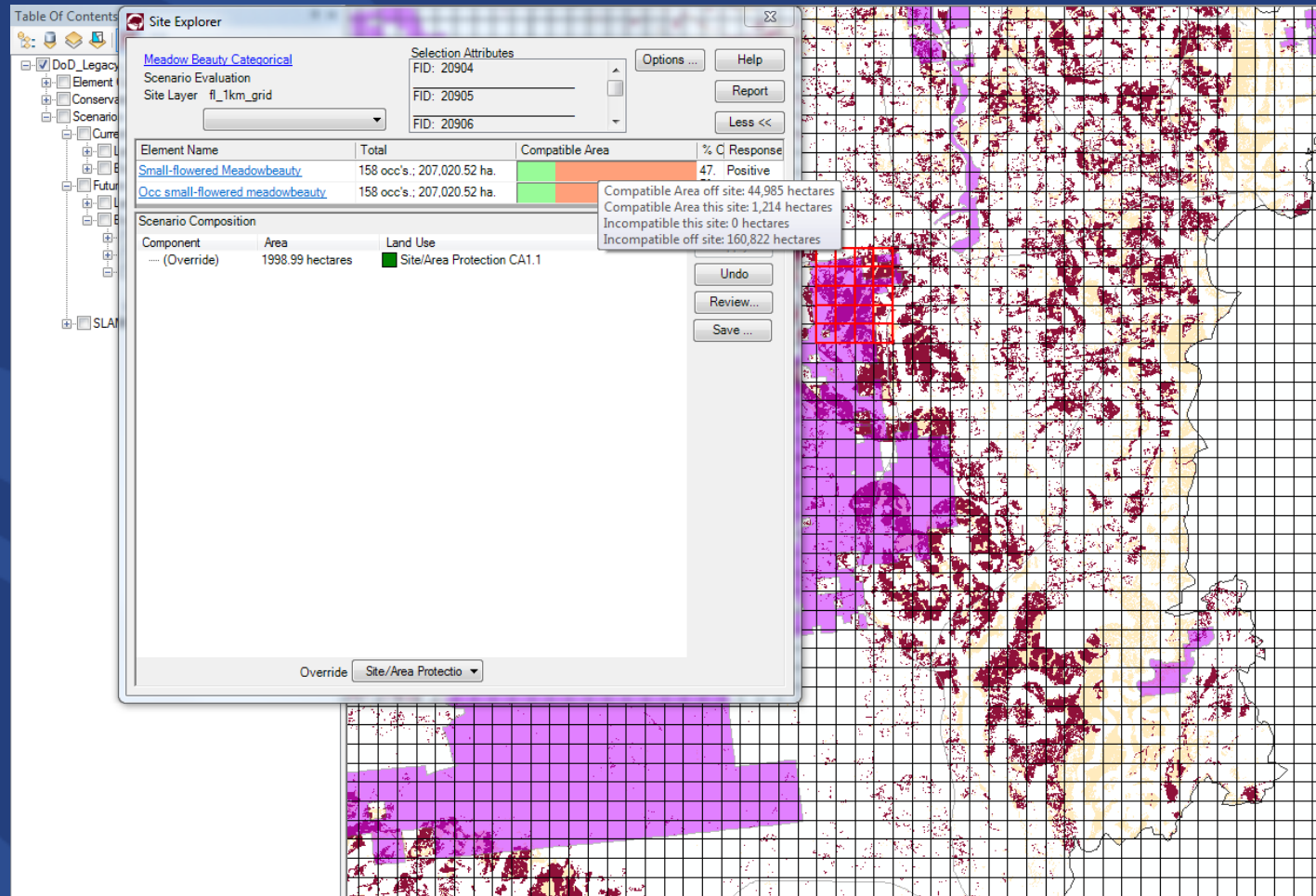
Conflict Identification on Potential Mitigation Site

Examining future scenario, it is modeled to have conversion from plantation to high density development



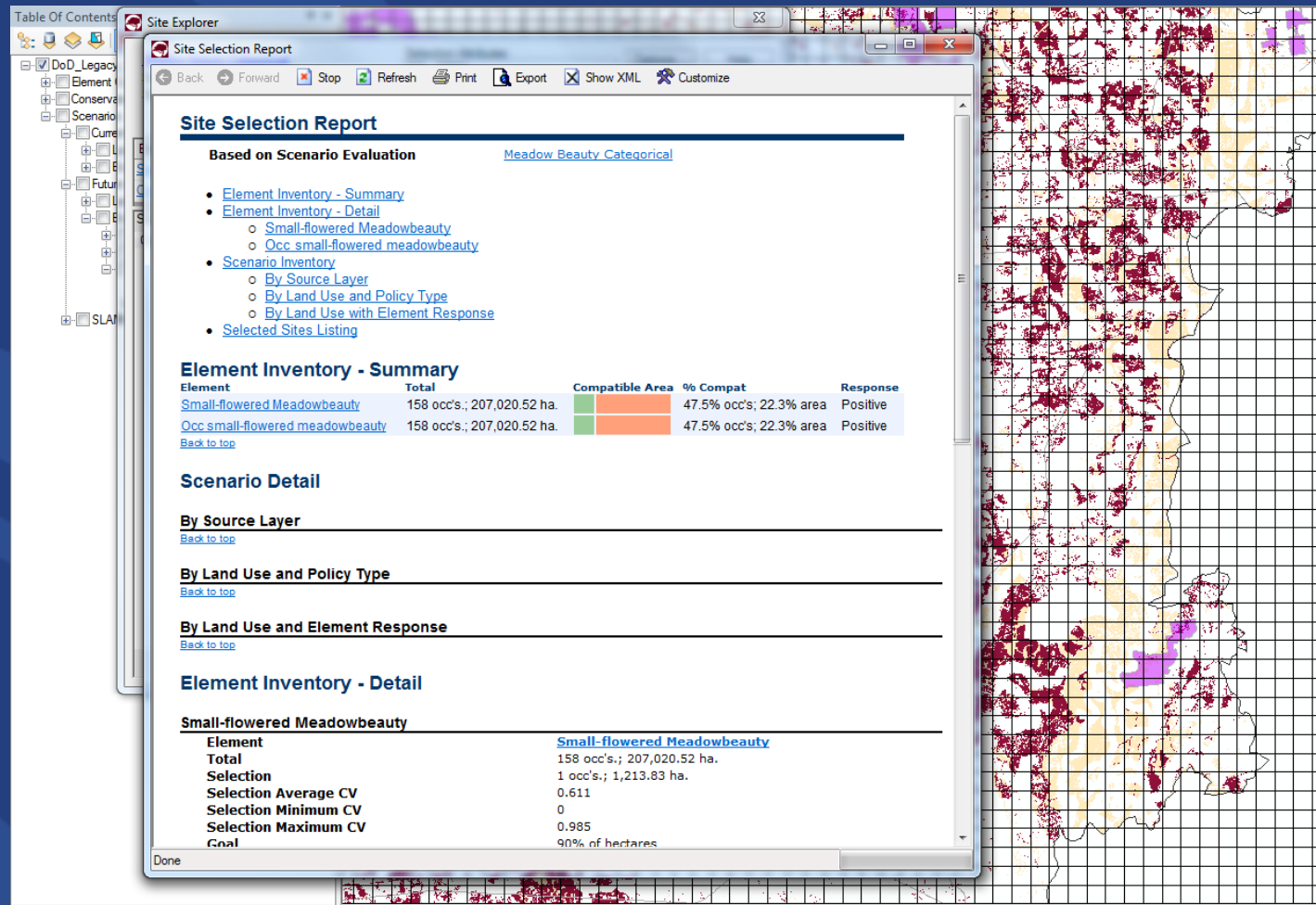
Proposing Land Use Change for Potential Mitigation Site

Selected site is investigated for conflict and then an alternative site use is selected (e.g., purchase for conservation). It is also possible to add implementation mechanisms to attribute the site with the land use and the mechanism (e.g., REPI purchase)



Proposing Land Use Change for Potential Mitigation Site: Report



A one-click report can be generated of whatever was in Site Explorer at the time so the original results or in this case, the proposed changes.



Site Selection Report
Based on Scenario Evaluation [Meadow Beauty Categorical](#)

- [Element Inventory - Summary](#)
- [Element Inventory - Detail](#)
 - [Small-flowered Meadowbeauty](#)
 - [Occ small-flowered meadowbeauty](#)
- [Scenario Inventory](#)
 - [By Source Layer](#)
 - [By Land Use and Policy Type](#)
 - [By Land Use with Element Response](#)
- [Selected Sites Listing](#)

Element Inventory - Summary

Element	Total	Compatible Area	% Compat	Response
Small-flowered Meadowbeauty	158 occ's.; 207,020.52 ha.		47.5% occ's; 22.3% area	Positive
Occ small-flowered meadowbeauty	158 occ's.; 207,020.52 ha.		47.5% occ's; 22.3% area	Positive

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Scenario Detail

By Source Layer
[Back to top](#)

By Land Use and Policy Type
[Back to top](#)

By Land Use and Element Response
[Back to top](#)

Element Inventory - Detail

Small-flowered Meadowbeauty

Element	Small-flowered Meadowbeauty
Total	158 occ's.; 207,020.52 ha.
Selection	1 occ's.; 1,213.83 ha.
Selection Average CV	0.611
Selection Minimum CV	0
Selection Maximum CV	0.985
Goal	90% of hectares

Saving site result

User is prompted to save the shapefile with the new attributes that can be integrated into the scenario to re-evaluate the landscape with that change and/or create a new implementation plan.

The screenshot displays a GIS application interface. In the foreground, a 'Save Changes to Shape File' dialog box is open, showing the file path 'Libraries > Documents' and the file type 'Shape file (*.shp)'. The background window, 'Site Explorer', shows a 'Meadow_Beauty_Categorical' scenario evaluation. It includes a table of results and a scenario composition summary.

Element Name	Total	Compatible Area	% C	Response
Small-flowered Meadowbeauty	158 occ's.: 207,020.52 ha.		47	Positive
Occ small-flowered meadowbeauty	158 occ's.: 207,020.52 ha.		47	Positive

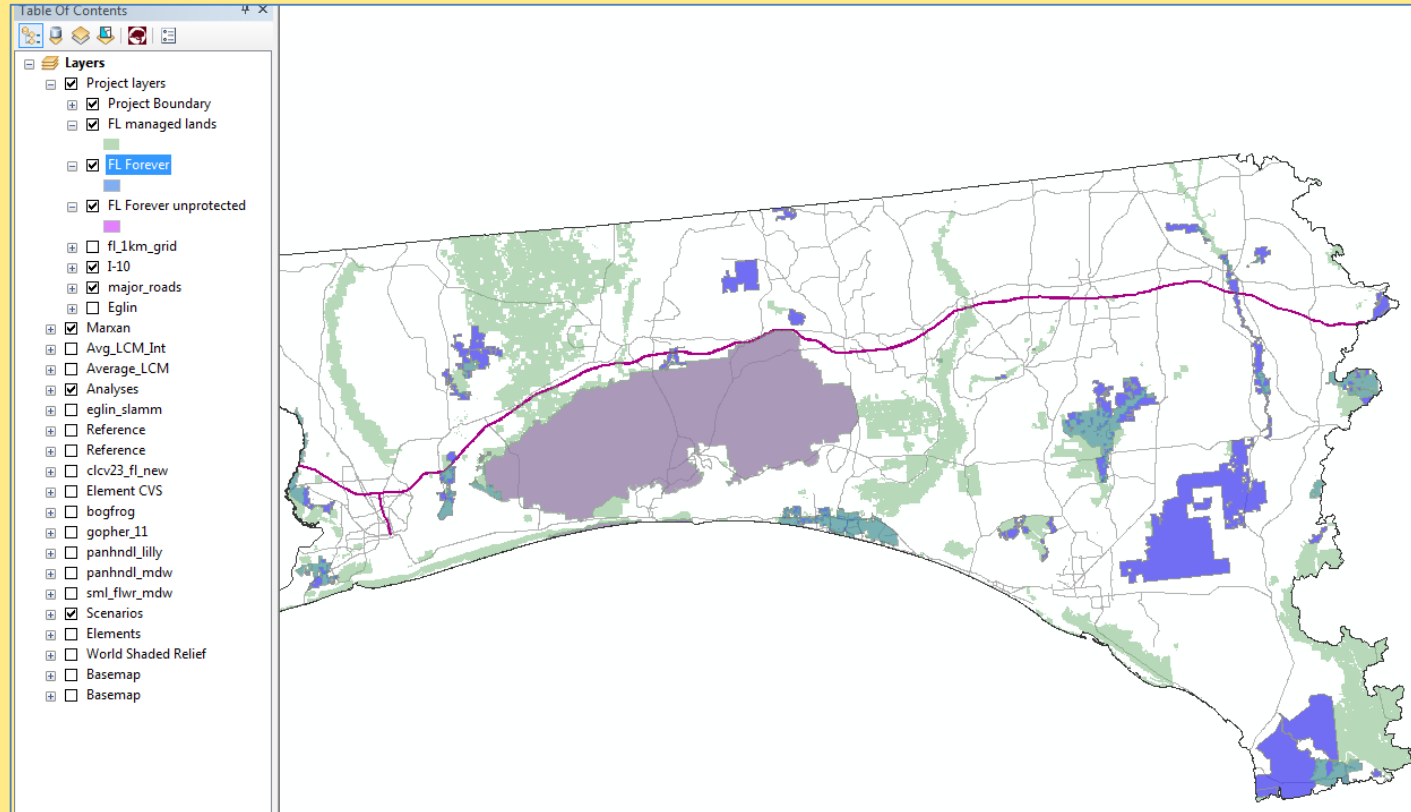
Component	Area	Land Use
--- (Override)	1998.99 hectares	Site/Area Protection CA1.1

Landscape prioritization

Prioritization can be used to help create an entire network, determine how “irreplaceable” any particular site is for conservation, and to guide individual conservation or development projects to highest gain, lead impact decisions

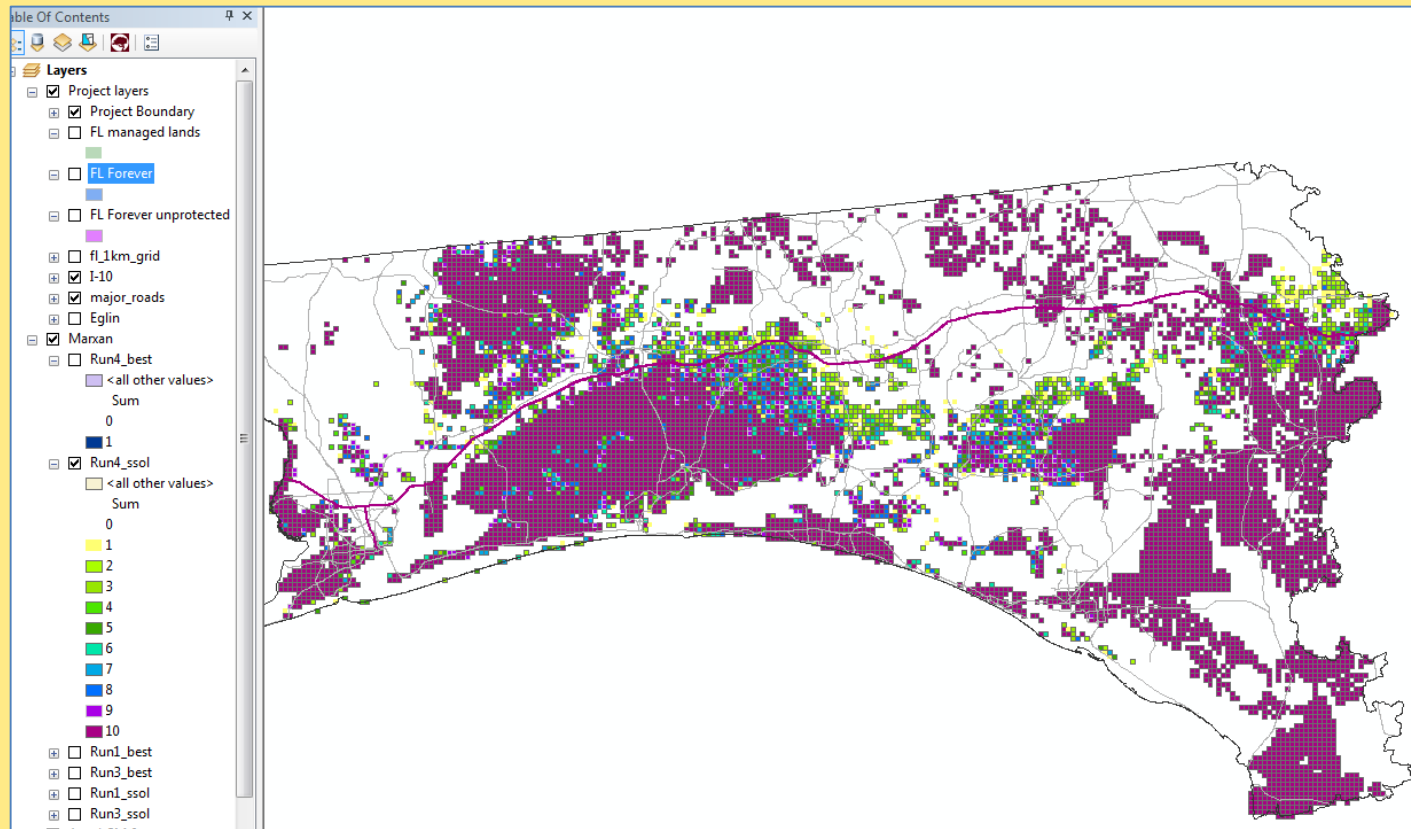
Existing protected and priority lands

We locked in the FL Forever priorities and unprotected lands into our prioritization of the selected Eglin target species.



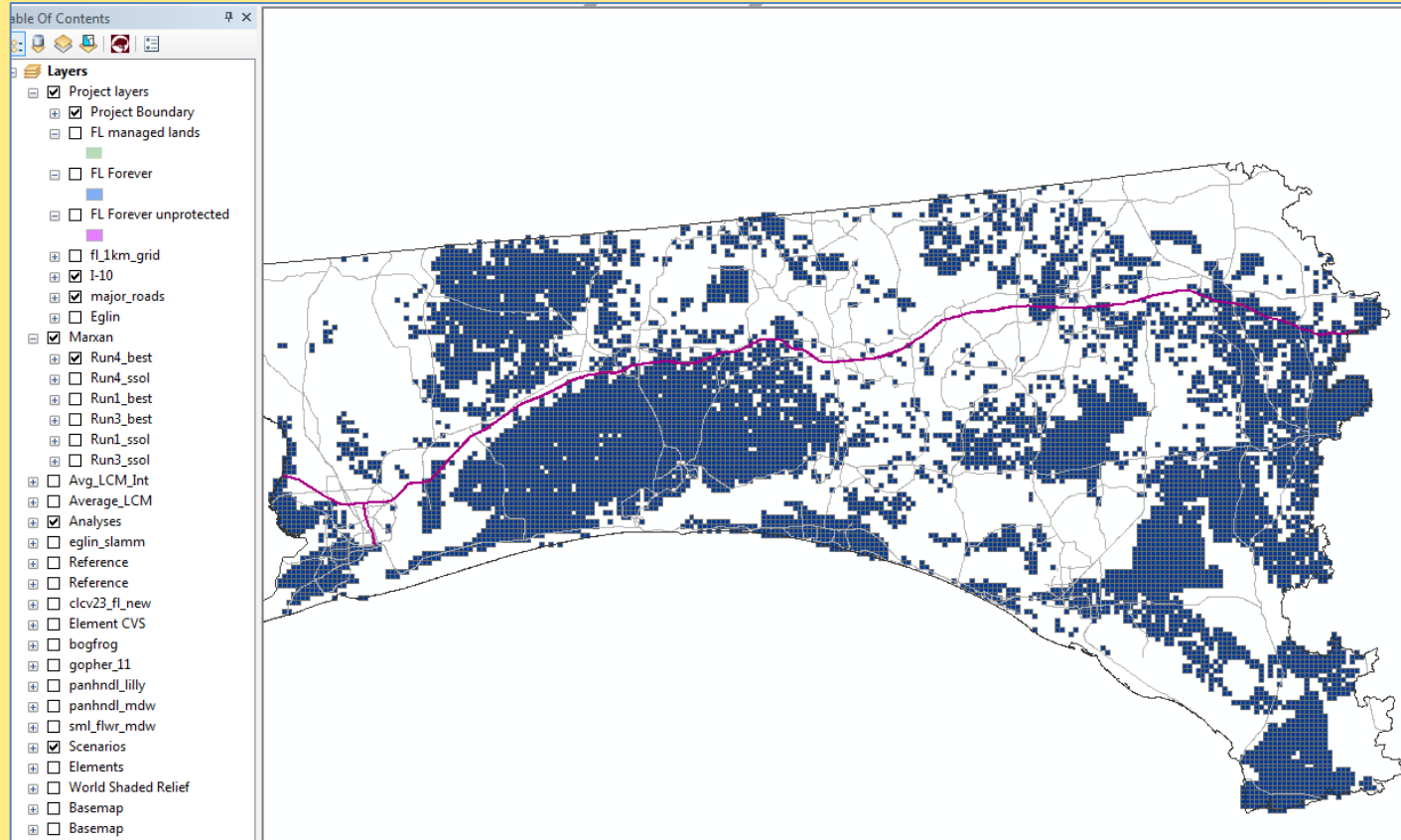
Relative Irreplaceability

This Marxan “sum of solutions” result indicates the number of times a site unit was selected for a conservation network. Low numbers (yellows-greens) have relatively low scores and are therefore replaceable with other options. Higher scores (blues to purples) are increasingly irreplaceable meaning that purple areas are required for the solution (note again that many of these areas were “locked in” to all solutions).



Best of runs

This Marxan
“best of runs”
shows the
most efficient
result
(keeping in
mind we
locked in the
FL Forever
areas).



Best of runs with FL Forever Lands

This Marxan “best of runs” shows the most efficient result (keeping in mind we locked in the FL Forever areas). It is overlaid with those FL Forever lands to indicate correspondence.

