# Supporting Landscape-Scale Planning with Decision Support Toolkits

IWC	Patrick Crist Director of Conservation Planning
Biodiversity, Threatened & Imperiled Species Symposium September 11, 2014	NatureServe
	,

# The site in a landscape context

- All conservation is ultimately implemented at the site level
- Site level decisions benefit from a landscape context to:
  - 1. Understand patterns and connections from the site to the surrounding landscape
  - 2. Understand the relative value and importance of the site to all other potential sites

# Challenges

Putting site decisions in a landscape context has traditionally been very difficult

- Coarse data and assessments at the landscape scale not useful for site level
- Stove-piped conservation programs, decisions, funding sources
- Myriad of potential partners & stakeholders that may not agree on priorities
- Lack of tools that can move between site and landscape scales

# The role of tools

- Tools are software/applications that facilitate:
  - Gathering and distributing relevant data
    - Example: Regional data portals
  - Conducting analyses and modeling
     Example: Tools for conducting vulnerability assessments
  - Visualizing data and analysis/modeling results
     Example: online decision support systems/viewers
  - Integrating information into planning for conservation, land use, and land management
     Example: planning decision support systems

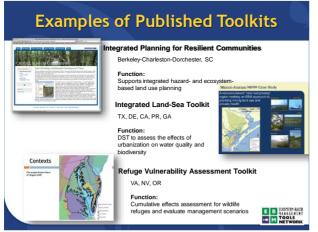


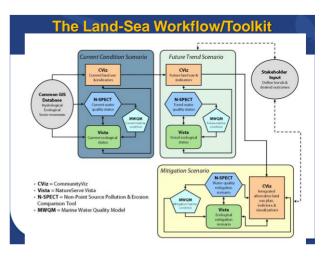
***Plastie for resolutio source: Tamin scolarble for less addlerd source reary aloss for applicable for record addlerd		User		Many tools
Function	General Public	Resource Managers and Planners	Technical / Science Experts	Marry LOUIS
General Data Access	Google Barth and Google Meye, Sardsorpe America Weeten Landscapes Rejorm	2025 PePLEE Conservation Paraming Attac Natabasin, Partana RD, Bibliospe, Softwan, Wast Costa Costa Partal	Photos	
Francisco and Francisco Madeline		Ecologica	Autos	
General	Naturalismos Explores Western Landersgas Explores	inva. iati	ApartMontellar Mastering (LUMP) Mastering, Mandison Format,	Example:
		Pastinat Printity Planman, Mirani, Pasturationon Vista	Flatter, Handlern, Landstrager Programmeters Trent, Hanaraflarive Est Mathewat, Dataset	
Analyzing fait analyzing	Namonal Fair Plating Particip Index System, Normal ST Stream Temp, Trans University Offic, Wast Simon Plating Ocuments of	NUMA Parlantes Pacific Coastal Salmon Recovery Parts Project and Pactomarca Metrics Database Regional Aquatic Providention and Mapping Test	B.MAGA	North Pacific
	weins derstift	Geographical Analysis, Georgenetic Georgenet, Management Georgenetics, URBERG, Washington Halmet Conserving Phile Teolog	Karrustaraga, Kiayadar, Kati, Fizadan, Karia, Jake, Kariagahayan,	LCC Tool
	NOAA Sea Level Pice and Coastal Plonding	Constant Residences & m. LONGT- UNLASS Constant Data Vienaur	And a second sec	
	Band Adjuster Visional Funds Band Adjuster Provides Funds Bandad, Marina Antonio (Pro- Minister Pro- Minister Pro-	Constant Description of the	Alaaska Shorashara Cosstat Unseriory and Mapping Propert, Midd Y, Middel Syn	Selection
March provinces	Partic Dated Fait, Pathod Associations Partic Marine & Estantina Fait Pathod Participation Participation Association		64.0000	A A m A main a
Hotology applies sectored depositor		Mission Francesco	Countries Countries	Matrix
Firs regime, variatellar succession	Landfile	former browner	PRAMES.	
Perest mateing		Forest Planter	Longer III.	(~130 tools)
invasios associes distribution	Mapirossions (cobile app)		Bandone Forest, Salah Kalanga Fores, Kalanga	(~150 10015)
Circuits charge effects, e.s. wanted or	Killmane Variaer, Planibilitier	Colonale Waters, Colonale Waters, Phillips Regional Analysis Yout	COMPANY, Malin Avenue President Section and company	
Anamaria Charanterization		Extension/Ma, Extension, Mathematica Matta	FARMA	
Assessment		Additi 1 Statu Gradena V Lister, Envaluant Plainter Printing Perunan, Nature Printing Perunan, Security Perunan, Security Peruna	GAVA Exalisti PAGINA	
Aquatic (marine and freebooster) elimeter odrenshility assessment (trobaling sas local 1988)	His Parts has been threaten handling books, Nidd, fais band has and boaster Ponding Experts Verse, Page fearant based theatence, Pagenet based that and fearant Freener Baselisers, Baselisers, Verset, Verset,	LIMPACT 20157 . Croasta Residence a.m. CYAM, Economic Research Research Constantion and Mapping York.	NALWIN, N. JAMM	
incesive searches, discuss, and past effects	Onegon Junipar Managament Your	Manual Anna	Balanta Balanta	
Management index after the appropriate	Western Landsrapas Explorer, Oragon Junipar Managament Tool	Environme, Plantinas Principy Plantinas, Pasturastantos Visita	ENDER, PERMIT RA EVALUE SUBJECT	
Coastal amples	O. Alark Land General Hammers, Constant Change Hearners, Constant Ownery Responses, Constant Owners, Response Hearners, Constant Owners, Response Hearners, Constant Constants, Mohrt Seit and Riss and Constant Frankrig Polyan, Seit and Riss and Constant Frankrig Degeneral Southerability Advance.	Graantel Resilience e.e., 19545, SurSY anandes IV V Resident Off V Ook.	Garbyel Kath, Balancickand Y, Balanskan, Voll Bala	
Environments and value trade of the Nature	Prantitionaria Tooliki for Marina Conservation Agreements, Bearfagants	Environ, Krask, Manufacture Vora	Autors avues Paulos Survers	
Pierceinel Print Nettino			Constitues,	
Outinization of a conservation pateout		Naturafarva Vata	Manan with Jonas, Zonaton	
Atomation development and assessment	Saufaatrit	Einernanning von Einernannin Masturantearver Vone	Contractivation Robotivision, Ecological Danign and Spe Assessment Youter, #Babb	
Fredwater anadis maranetari siamining	ANYES, SANTON	Assurations Visio Program Aquatic Prioritization and Mapping Yost, BBV75	Booton, Evanor, FLAWS, JOnard VI, Dear Hollow, VI, Boar Houton, March Marken, Schwart, March Marken, Schwart,	

# How to make sense of it all?

A Toolkit Approach: A group of tools *interoperated* to perform a workflow

Workflows diagram the flow of information from source data, through analytical processes, to decision products





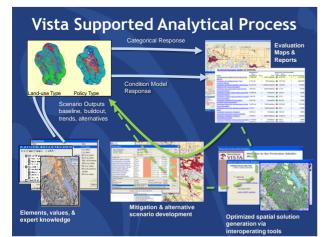
#### On the land, in the water, NatureServe anywhere on the globe

Luxie Packard .....<sup>2</sup>...... 🦛 GEORGIA

- the period ton into
- ~\$4M investment in development with endowment for ongoing maintenance and development
- . Free extension to ESRI's ArcMap 10.x with spatial analyst
- Provides automation, documentation, & repeatability of the planning process
- Supports both conservation experts & planners/managers
- Full integrated help manual, live technical support, available training in person or by web

# What Does Vista Help You Do?

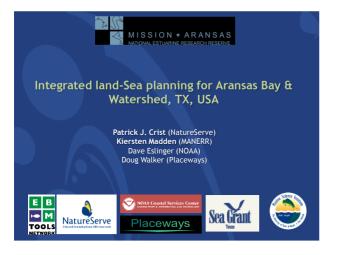
- Helps you organize and visualize spatial data
- Incorporate expert knowledge: about species/habitat requirements and sensitivities is the scientific backbone that drives Vista analyses and good planning
- . Apply well-vetted concepts from scenario-based planning, cumulative effects assessment, mitiaation hierarchy, systematic conservation planning, and ecosystem-based management & climate adaptation
- Define a variety of scenarios that incorporate unlimited issues and evaluate their ability to support species and ecosystems
- . Create alternatives at a site specific level or systematically across the planning region
- Support ongoing monitoring and adaptive management



#### **Example Toolkit for Conservation** Data & Modeling Tools Planning Process Tools "Development" Planning Tools Planning Process & Geophysical Process Tools Civic Engagement Planning, Miradi, Anyware Land Use Planning ina Tools Co Ecological Process Tools Habitat Priority P ape, VDD Energy and Infrastructure Planning Framework Biodiversity Tools Integration Tool Tools QuantM and Distribution Tools – e.g. Rand Forestry Tools Ecosystem Services InVEST Conservation & Mitigation Tools Mitigation Planning Vista Site Explorer, Mitigati Land Allocation/ Optimization Tools

Query Tool

### 3





# **Project Concepts**

- Land uses impact freshwater and marine aquatic habitats and biodiversity
- Analytical feedback loops that predict aquatic outcomes of different land use scenarios can be used to inform appropriate type and placement of land uses
- We can ID parcels that cause disproportionate impacts for conservation



MANERR Integrated Land Sea Planning

# **Defining Conservation Elements**

- Elements are the features of conservation interest
   Can include also competing land/water use for multiobjective planning
- A key activity is to capture expert knowledge in the database about element responses to threats & conservation practices
  - E.g., what is the range of turbidity levels compatible with sea grass habitat health.

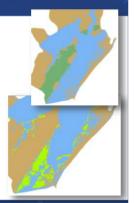
MANERR Integrated Land Sea Planni



4

## **Defining Conservation Elements & Goals**

 Element information is comprised of spatial occurrence data, expert-derived parameters, and values such as representation goals



#### Characterizing Scenarios

#### rent Condition Scenario Euture Trend Scenari



Scenarios are used to assess

Scenarios can be:

Current situation

conservation goal achievement

Plan/policy based future scenario
 Trend future scenario

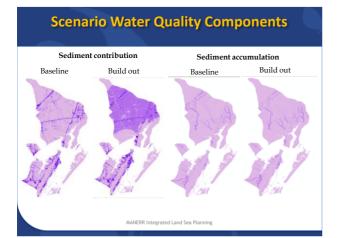
Alternative plans, proposals, mitigations

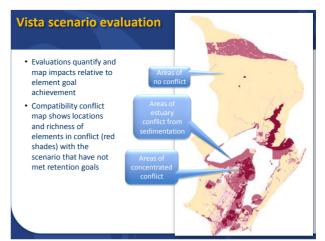




Alternative from Toolkit

- Scenario features can be anything mappable, e.g.,:
  - Land/water use & management
  - Infrastructure, energy
  - Invasives, fire
  - SLR, storm surge



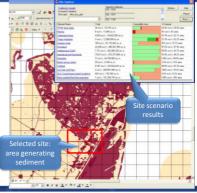


cenario Evaluation Report : Traditional_Terrestrial		
🚓 🔘 Fannand 💽 Stop 😰 Refeath 📾 Print. 💽 Expant		
	QBack O Farward 💽 Stop 😰 Rebeath @Print 🔂 Export	Show/ME, 😤 Custonize
Overall Scenario Performance		
Il Elements (50 Total)	Element Evaluation : Whooping Crane	
an greateries (or room)		
Goals Net Fer	<u>Settings</u>	
Compatible 13 elements	<ul> <li>Element evoluation details</li> <li>Mag</li> </ul>	
tank fix his	Settings	
Goal Performance by Element	Element	Wheeping Crane
	Evaluation:	Traditional Terrestrial
Elements (50 elements)	Filter:	stanikered s
	Scenario cell size:	30 eq. meters
intre	Element cell size:	30 sq. meters
arinas	Goal:	100 percent of area
PAD sostramps	Dank In Ann	
lational Register of Historic Places		
Yeland	Element evaluation details	
ireated	Element	http://wido/Elements/Whooping
Neiter machaeranthera		Crane0216780.html? name=Whosping Crane
fud and Tidal Flats	Name	Whosping Crane
Rubmenaed Areas	Total	1 ecc/s.; 205,409,510 sq. m.
heach access o cints	Selection	1 pcc/s.; 205,488,510 sp. m.
Personne faicon	Selection Average CV	0.205
	Selection Minimum CV	0.564
Yelland Inst.CCAP)	Selection Maximum CV	0.464
laguarundi (low practicion)	Goal	100% of sq. meters
bister beds	Response Viable	Mixed 1 ece's.; 205,488,510 sp.m.
Back-spotted Newf Row arecision)	Viable Sta Viable	1 0005-1 205,409,510 SQ. m. 100% 000's; 100% area
leagrain beds	Selection Viable	1 000's.; 205,489,510 sp.m.
Texas Boarlet Shake (low precision)	Selection Selection	100% occ's: 100% eres
fananse	Chart: Viable Occurrences	
spicultural and Orasslands	Chert: Viable Area	
Constal one-Seafrer (high precision)	Compatible	1 pcc/s.; 133,759,260 sp. m.
Coastal gav feather dow precision)	to Compatible	200% occ's: 65.3% area
hreeflower brochnweed	to of Goal: Compatible	45.0Ph
Seacoast Blustern OutFidure Paspalum series	Selection Compatible	1 occ's.; 133,750,260 sq. m.
Julf Sattmarsh Snake (low precision)	Selection % Compatible	100% occ's; 65.1% area
Texas Diamonduack Terrapin	Selection % of Goal,	65.03%
Tall dodder	Compatible Chart: Compatible	
In owy Player	Occurrences	
Nhospine Crane	Chart: Compatible Area	
looketies	Bank in Jap	
lamarundi thish precision)		

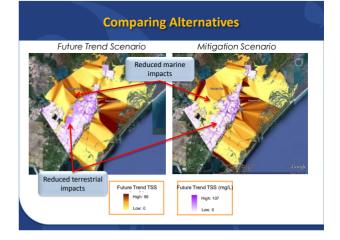
Vista scenario evaluation: terrestrial

# Assessing Results, Identifying Opportunities

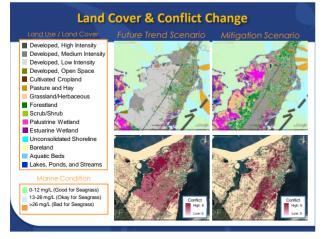
Site Explorer (Vista) provides context for site to determine mitigation need and opportunity



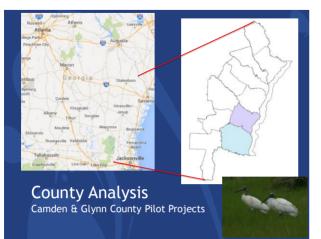
# <text><complex-block>

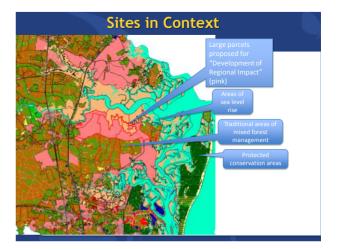


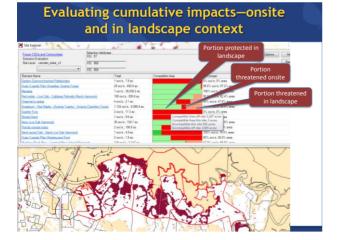
## 6



Local scale planning in a regional context Coastal Georgia, USA







## Conservation/mitigation planning



# Implementation & Adaptive Management

- Update scenarios as decisions are made
- Update data and scientific knowledge
- Re-evaluate for wins and losses to always know where you stand against goals
- Apply adaptive management given changes and new opportunities

# Conclusion

- Site decisions benefit from landscape context
- Plenty of tools exist for most problems and situations
- Data typically exist to allow multi-scale analyses and planning
- A collaborative approach to applying tools and decisions works best

# Acknowledgements

NatureServe Vista endowment for support for this presentation

# Questions, comments?

patrick\_crist@natureserve.org

Learn more or download Vista at www.natureserve.org/vista