

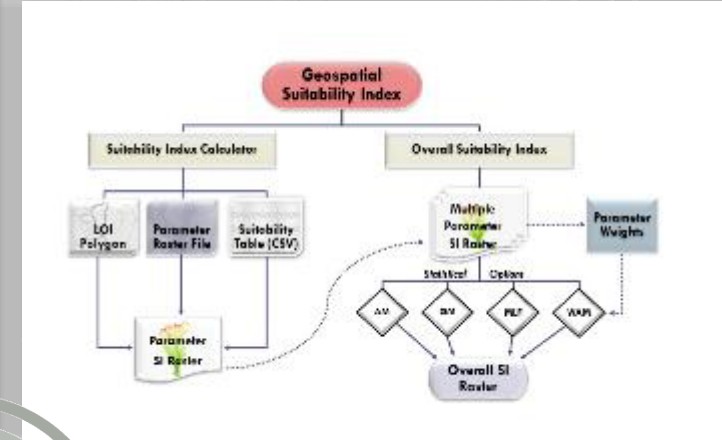
# OVERVIEW OF THE: ECOSYSTEM MANAGEMENT AND RESTORATION RESEARCH PROGRAM

Brook Herman, Ph.D.  
Program Manager

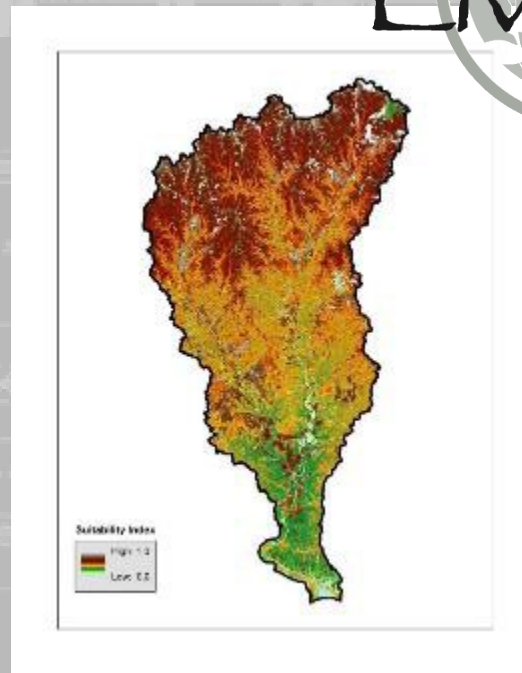
Planning Community of Practice  
Date: January 27, 2022



US Army Corps  
of Engineers®

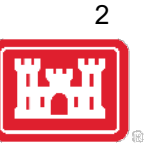


EMRRP



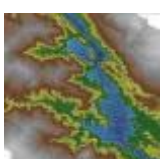


# ECOSYSTEM MANAGEMENT AND RESTORATION RESEARCH PROGRAM (EMRRP)



## Outline:

1. Program Background – Funding
2. Purpose/Focus Areas
3. How are Projects Funded
4. Website(s)
5. Examples Past and Ongoing Projects
6. Questions





# ECOSYSTEM MANAGEMENT AND RESTORATION RESEARCH PROGRAM (EMRRP) – BACKGROUND

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## ❖ Civil Works ENV Business Line: General Investigations (GI)

- Mindy Simmons – Business Line Manager (HQ)
- Jen Seiter-Moser – Technical Director (CEERD-EL)
- Brook Herman – Program Manager (CEERD-EL)



## ❖ Aquatic and Floodplain Ecosystem Restoration and Management

- ±\$4M
- Decision/planning support
- ~14-20 Ongoing research projects

## ERDC Locations

SEVEN LABORATORIES MAKING AN IMPACT ON THE NATION AND WARFIGHTERS

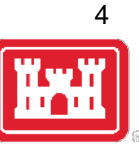
ERDC Laboratory	Location
ERDC Headquarters	Vicksburg, Mississippi
Coastal and Hydraulics Laboratory (CHL)	
Environmental Laboratory (EL)	
Geotechnical and Structures Laboratory (GSL)	
Information Technology Laboratory (ITL)	
Cold Regions Research and Engineering Laboratory (CRREL)	Hanover, New Hampshire
Geospatial Research Laboratory (GRL)	Alexandria, Virginia
Construction Engineering Research Laboratory (CERL)	Champaign, Illinois





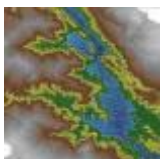


# ECOSYSTEM MANAGEMENT AND RESTORATION RESEARCH PROGRAM (EMRRP)



## PURPOSE:

Provide support to planning, design, construction and monitoring and adaptive management of aquatic ecosystem restoration projects through improving our fundamental understanding of the physical and biological processes and interactions within ecosystems, developing tools and guidelines to inform decision-making.



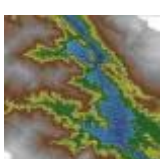


# ECOSYSTEM MANAGEMENT AND RESTORATION RESEARCH PROGRAM (EMRRP)



## FOCUS AREAS:

- Multi-objective Restoration
- Integrity & Sustainability
- Inland Resource Management
- Coastal Resilience & Function
- T&E and Invasive Species Management
- Modeling & Decision Making Tools
- Ecological Infrastructure





# STATEMENT OF NEED (SON) PROCESS

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## ❖ Tactical R&D Ideas & Opportunities

- ❖ Ground (bottom) - up
- ❖ Short to Mid-Term Needs: 3-5 years
- ❖ Submitted to BL: ENV, NAV, FRM
- ❖ Reviewed and Ranked
- ❖ Project Starts ~2-3 Years

*"So - fill me in.  
Where are you running  
into a problem? What do  
you think would really  
help with that?"*



- ❖ The **SON form** is available online, accessible from all three (ENV, FRM, NAV) Gateways
- ❖ <https://gateway.erdc.dren.mil/son/index.cfm?Cop=Env&Option=Start>

## ❖ **FY22 SON DEADLINE DEC 01**

- ❖ Update and resubmit SONs annually Dec 01 submission deadline, for reconsideration
- ❖ Sometimes highly ranked, but unfunded, SON will be automatically reconsidered next FY.



# STATEMENT OF NEED (SON) PROCESS



## ❖TIPS and TRICKS

- ❖Work with other Districts, Divisions and HQ personnel to fully capture breadth of problem and opportunity.
- ❖Coordinate with CoP Leads and Research Area Review Group (RARG) Proponents to garner support during review and ranking.
- ❖Link R&D ideas to multiple regions (e.g., LRD and MVD) or nation-wide application and multiple mission areas. EMRRP – specifically Eco Restoration.

## ❖Brief is Best

- ❖Accurate title.
- ❖Description of the problem, including list of applicable or related guidance or policy.
- ❖Envisioned product.
- ❖Value Added
- ❖BL, CoP, Length of Effort, Type of Work (modeling, software, training, physical model, field experiment)

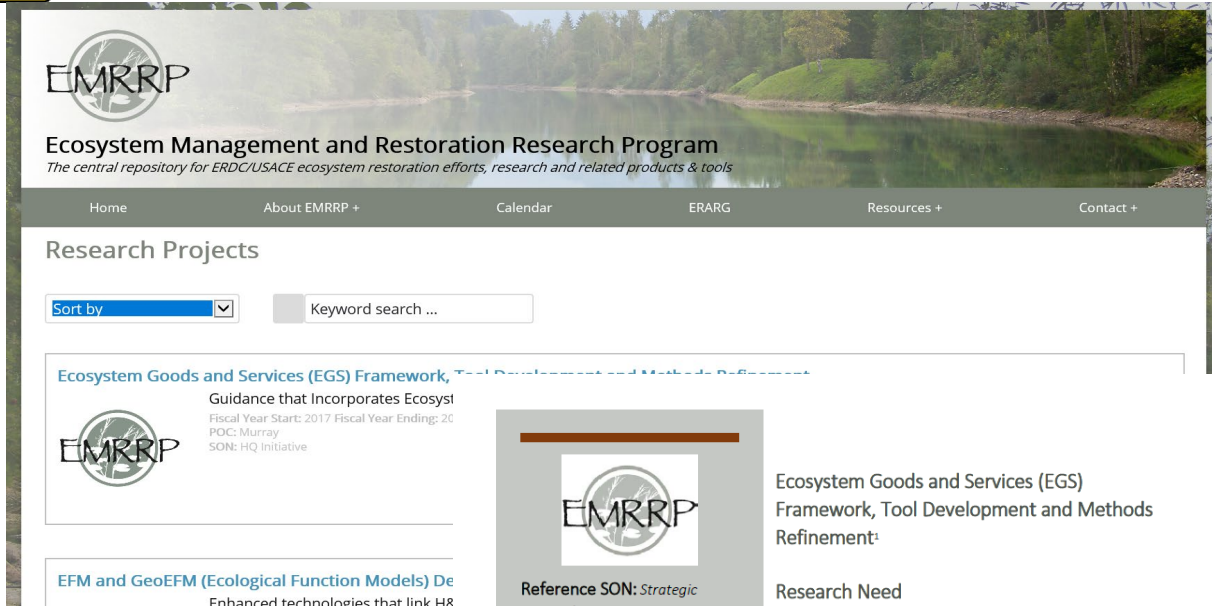




# EMRRP WEBSITE:

<https://emrrp.el.erdc.dren.mil/programs.html>

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Searchable project archive – developing a program history, connecting the SONs to R&D efforts and products – creating visibility throughout R&D process



**Reference SON:** *Strategic Research HQ Initiative*

**Lead PI:** *Elizabeth O. Murray (ERDC)*

**Project Development Team (PDT):** *Shawn Komlos (IWR, USGS), Jeanette Gallihugh, Chad Markin, Forrest Vanderbilt (IWR), Tim Lewis (ERDC), Lisa Wainger, Anna McMurray, Kim Gazenski (U of Maryland), Chuck Theiling (MVR, ERDC), Frank Casey, Janet Cushing (USGS)*

**Reviewers:** *Maria Wegner (HQ), Paul Scodari, Brian Harper, Dick Cole (IWR), Kelly Keefe (SAJ), External Reviewers: Carl Shapiro (USGS), Lydia Olander (Duke Univ/EAB), Greg Arthaud (USDA FS), Jim Boyd (RFF)*

**Funded:** *2017, 2018*

**Keywords:** *Ecosystem Goods and Services, USACE planning tools, SMART Planning, EGS tools*

[Wiki](#)

## Ecosystem Goods and Services (EGS) Framework, Tool Development and Methods Refinement:

### Research Need

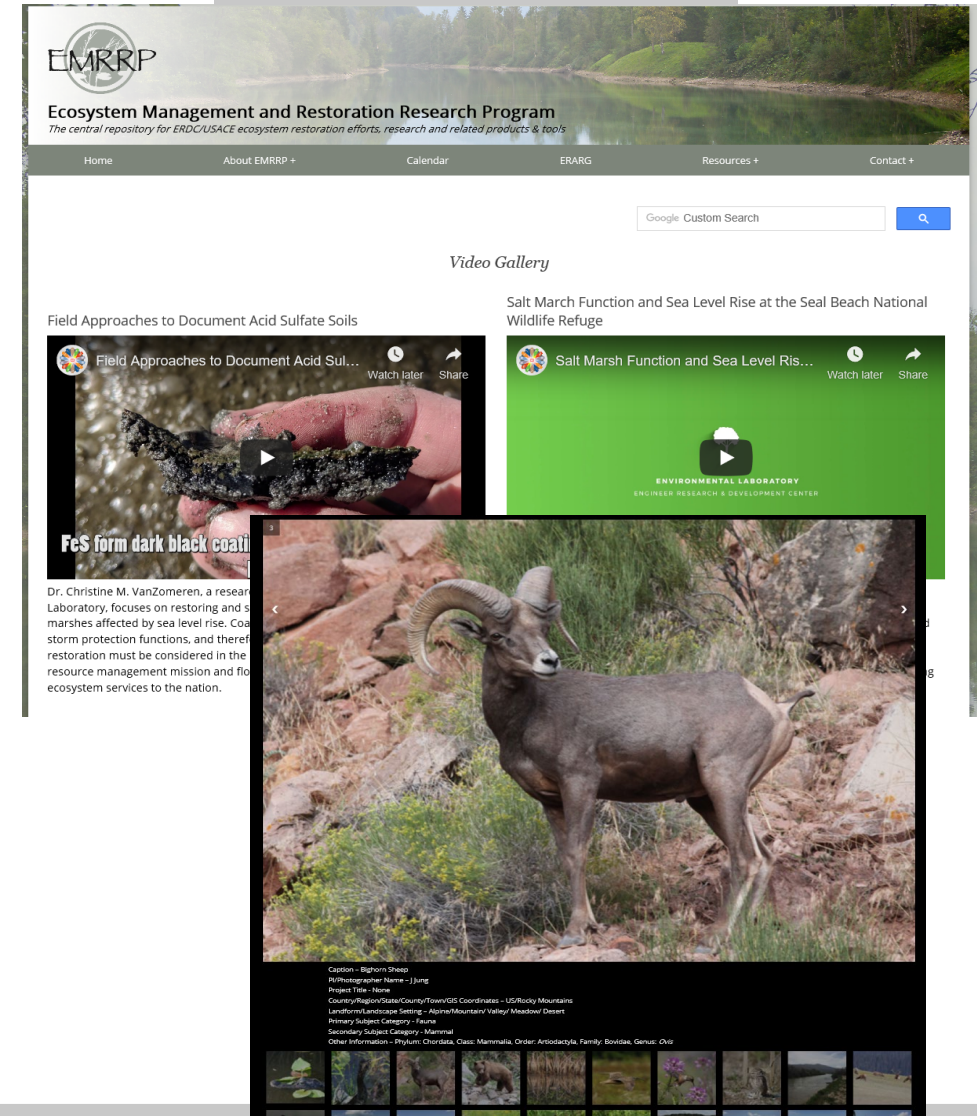
Many Federal agencies are beginning to formally recognize and consider, in their decision-making processes, services yielded by ecosystems that benefit humans. The Corps is lacking a structured approach to adequately consider appropriate ecosystem services in a manner scalable to its disclosure and decision-making contexts. The general purpose of this project is to improve our understanding and ability to incorporate consideration of EGS in Corps planning, including the development of new tools that would make the implementation of EGS assessment in Corps Planning easier and more consistent.

### Project Objectives & Plan

We'll use the expertise of Corps Planners and academics working in the EGS field to test, develop example applications, and potentially refine the Proposed Framework developed in Phase I. We'll also provide Districts with tools to more consistently address elements of non-use services that address societal preferences - without attempting to monetize the benefits of those services - using the best available science, in a systematic and repeatable way. This will include:

- Multiple case studies testing the Proposed Framework in different types of projects and different parts of the country, and a write up of each as a chapter in a technical report.
- Three integrated EGS tools (Blue Carbon, Connectivity, and Scarcity/Restorability) in a GIS-based web platform, plus technical notes on each, and a technical note on the

## Video and image galleries







# WEBSITE: MODELS AND APPLICATIONS



<https://emrrp.el.erdc.dren.mil/models.html>

## Ecosystem Management and Restoration Research Program

*The central repository for ERDC/USACE ecosystem restoration efforts, research and related products & tools*

[Home](#)

[About EMRRP +](#)

[Calendar](#)

[ERARG](#)

[Resources +](#)

[Contact +](#)

## Models and Applications

\* Model is certified.

[National Ecosystem Planning Center of Expertise \(ECO-PCX\)](#)

### ecorest: Conducts Analyses Informing Ecosystem Restoration Decisions

**Purpose/Objectives:** Three sets of data and functions for informing ecosystem restoration decisions, particularly in the context of the U.S. Army Corps of Engineers. First, model parameters are compiled as a data set and associated metadata for over 500 habitat suitability models developed by the U.S. Fish and Wildlife Service (USFWS 1980). Second, functions for conducting habitat suitability analyses both for the models described above as well as generic user-specified model parameterizations. Third, a suite of decision support tools for conducting cost-effectiveness and incremental cost analyses (Robinson et al. 1995).

**Platform/Program:** R-package (web application in development).

**Applications/Considerations:** Over 500 suitability models are preloaded, but users may also specify a model in a different format.

Contact Information for ecorest

**Type:** Index

**Certification:** Pending. National.

**Users:** USACE planners and engineers, consultants, other habitat applications.

**Domain:** All ecosystems.

**POC:** Kyle McKay,

[kyle.mckay@usace.army.mil](mailto:kyle.mckay@usace.army.mil)

**POC:** Darixa Hernandez-Abrams

<https://cran.r-project.org/web/packages/ecorest/index.html>



# EXAMPLE: ECOREST: CONDUCTS ANALYSES INFORMING ECOSYSTEM RESTORATION DECISIONS

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<https://cran.r-project.org/web/packages/ecorest/index.html>

## Package 'ecorest'

June 26, 2020

**Title** Conducts Analyses Informing Ecosystem Restoration Decisions

**Version** 1.0.0

**Description** Three sets of data and functions for informing ecosystem restoration decisions, particularly in the context of the U.S. Army Corps of Engineers. First, model parameters are compiled as a data set and associated metadata for over 500 habitat suitability models developed by the U.S. Fish and Wildlife Service (USFWS 1980) <<https://www.fws.gov/policy/ESMindex.html>>. Second, functions for conducting habitat suitability analyses both for the models described above as well as generic user-specified model parameterizations. Third, a suite of decision support tools for conducting cost-effectiveness and incremental cost analyses (Robinson et al. 1995) <<https://www.iwr.usace.army.mil/Portals/70/docs/iwrreports/95-R-1.pdf>>.

**Depends** R (>= 3.5.0)

**License** CC0

**Encoding** UTF-8

**LazyData** true

**Imports** viridis, stats, graphics, grDevices

**RoxygenNote** 7.0.2

**NeedsCompilation** no

**Author** S. Kyle McKay [aut, cre] (<<https://orcid.org/0000-0003-2703-3841>>),  
Darixa D. Hernandez-Abrams [aut]

**Maintainer** S. Kyle McKay <kyle.mckay@usace.army.mil>

**Repository** CRAN

**Date/Publication** 2020-06-26 10:50:03 UTC

### R topics documented:

annualizer	2
BBfinder	3
CEfinder	4
CEICApplotter	5

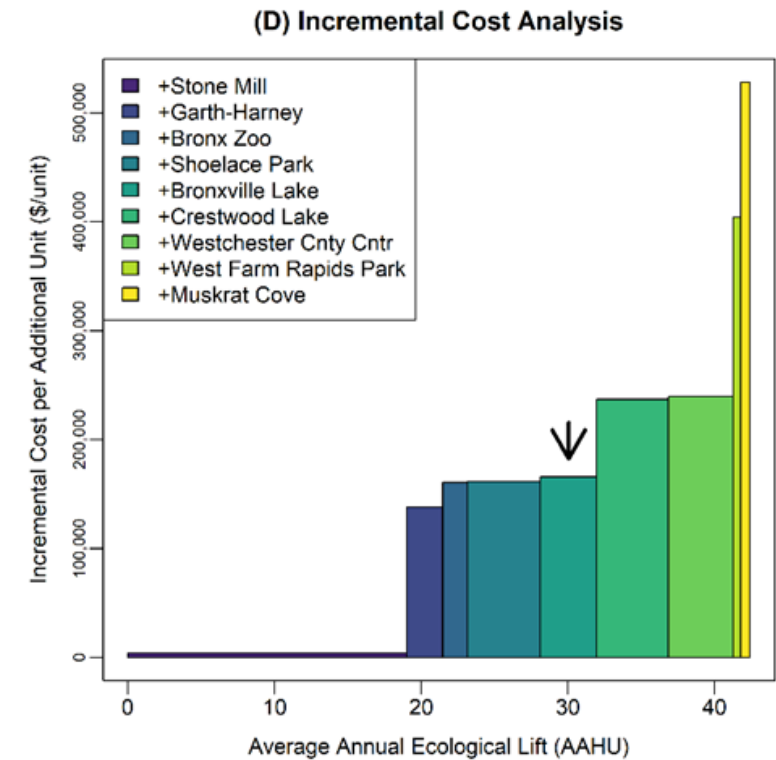
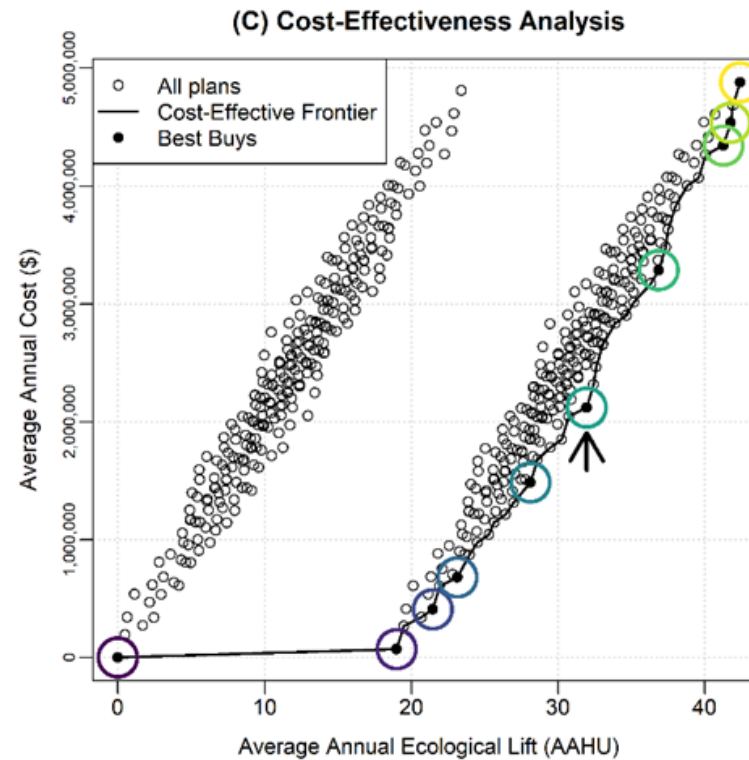


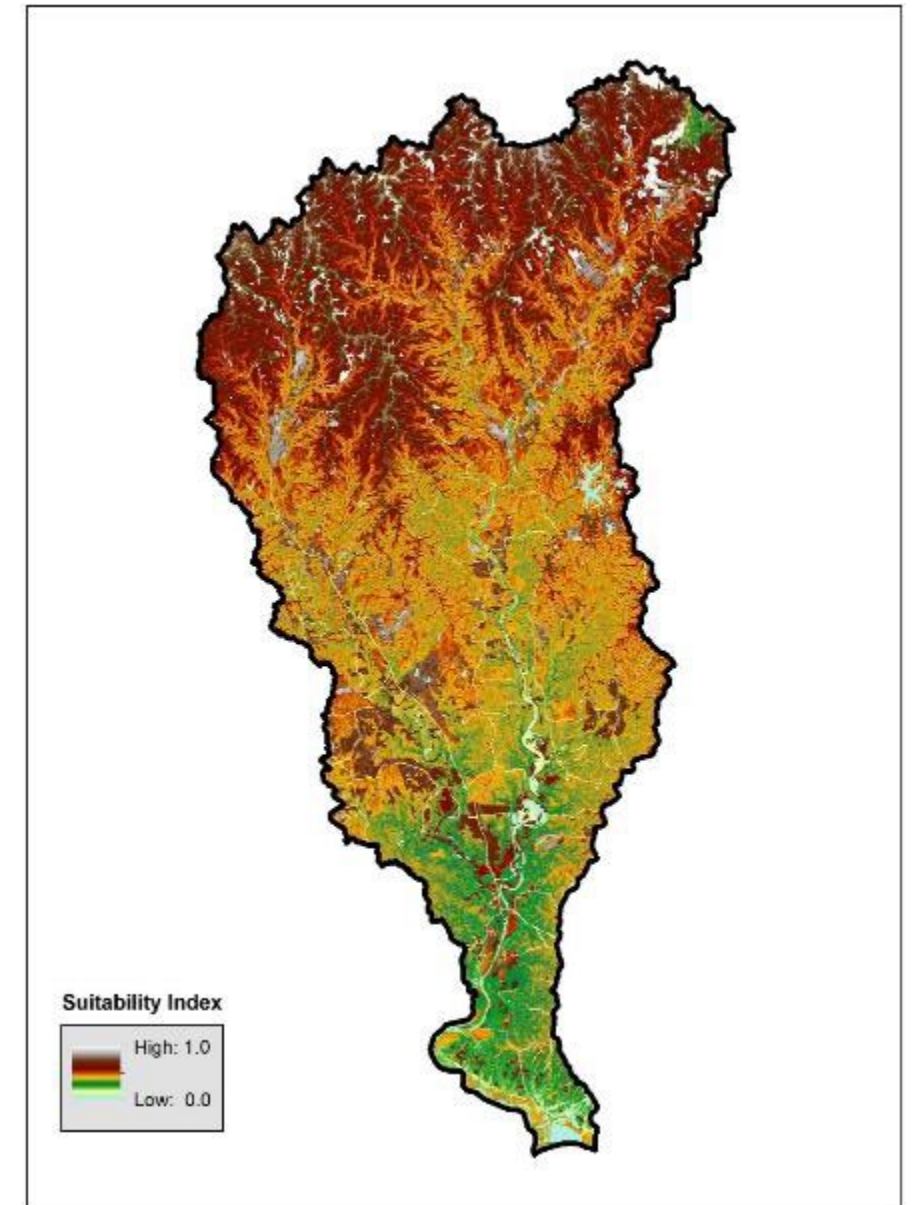
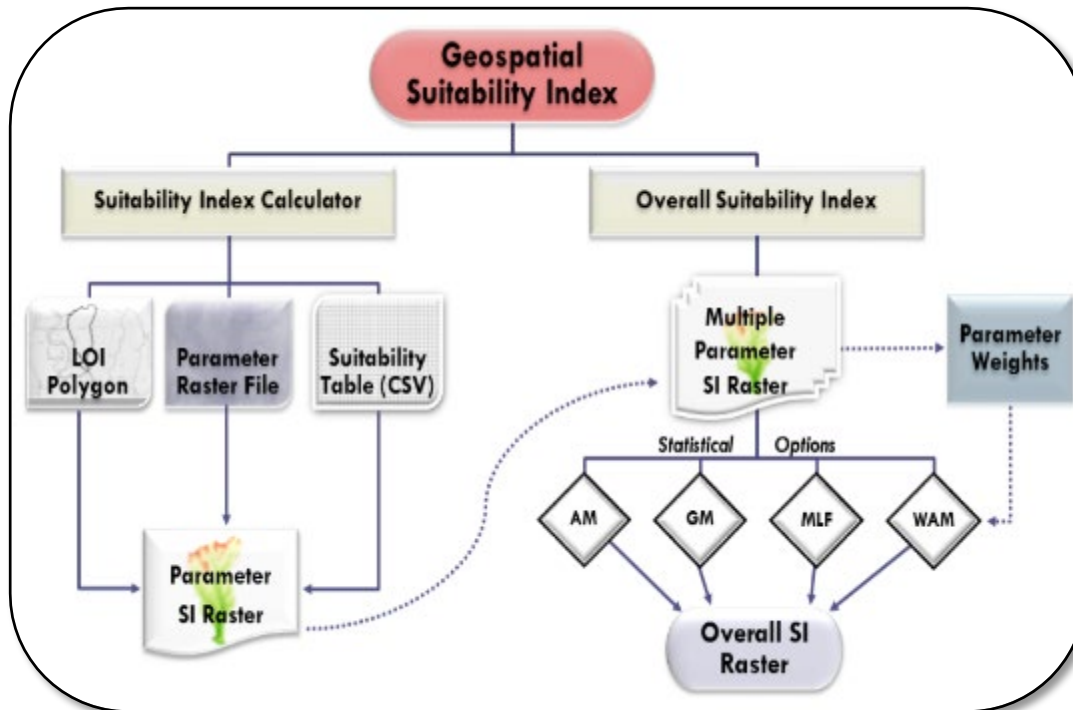
Figure Unpublished: McKay et al. 2021



# EXAMPLE: GEOSPATIAL SUITABILITY INDICES TOOLBOX (GSI TOOLBOX)

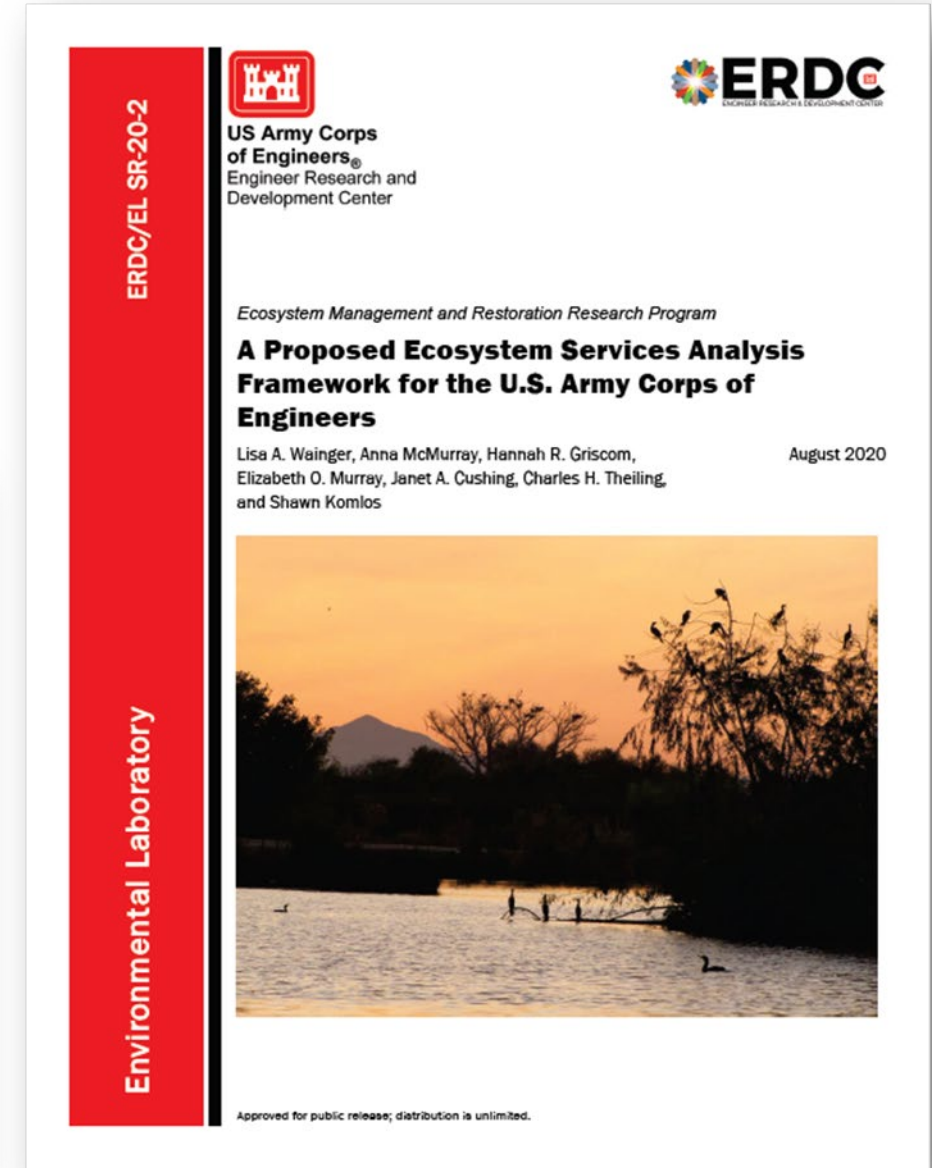
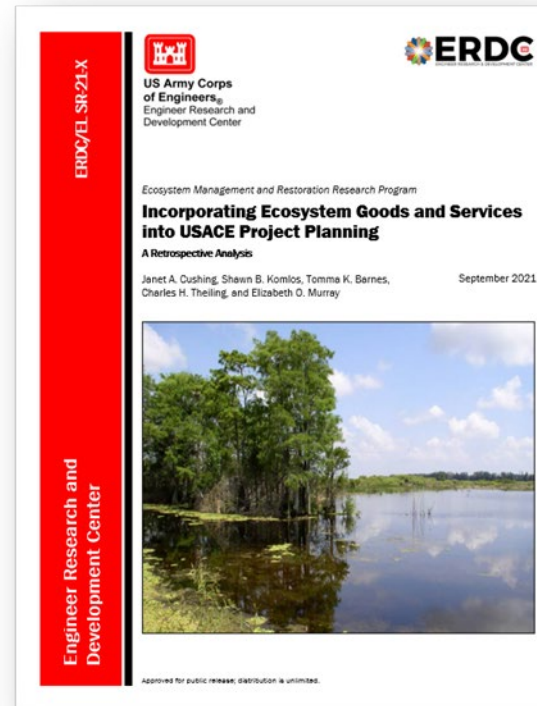
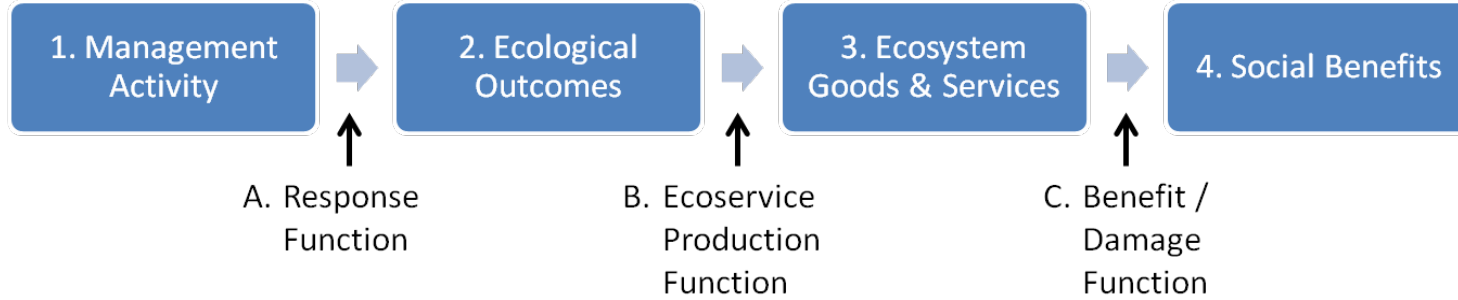
Geospatial Suitability Indices Toolbox (GSI Toolbox) and User's Guide: Saltus

Developed for planners, biologists, and engineers involved in ecosystem restoration projects, who already have familiarity with ArcGIS software, GIS analyses, and habitat suitability models.



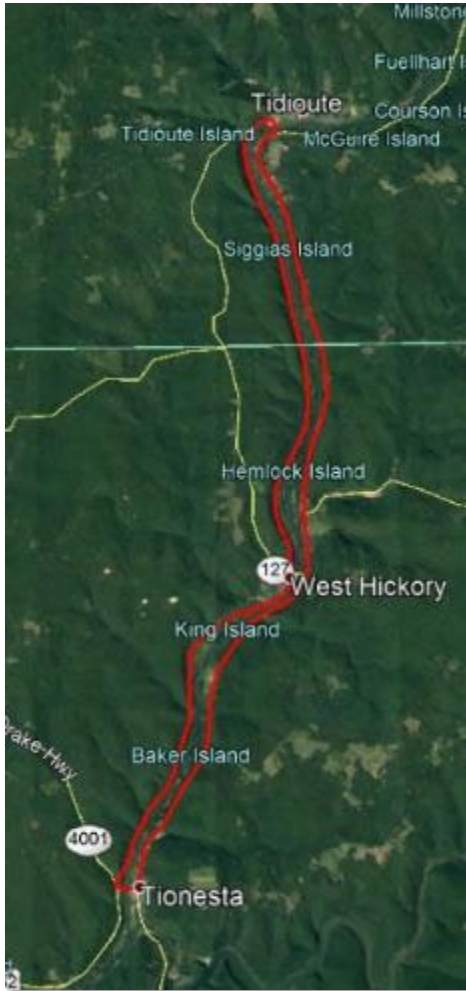


# EXAMPLE: ECOSYSTEM GOODS AND SERVICES





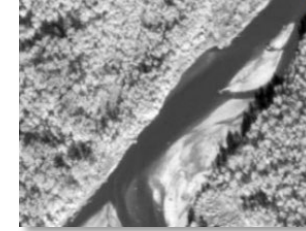
# EXAMPLE: INTEGRATING FIELD AND REMOTE SENSING METHODS TO IMPROVE RIPARIAN AND AQUATIC VEGETATION MAPPING



Allegheny River Reach



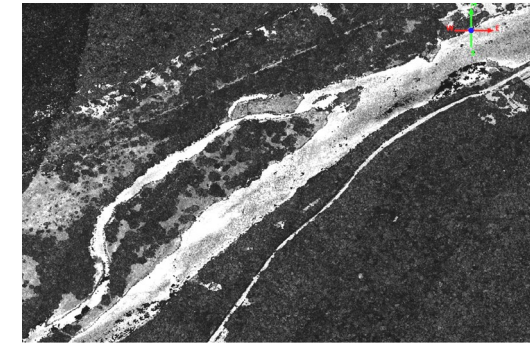
Satellite and Airborne Data Resources



Satellite Imagery



Riparian Forest Type  
Density  
Abundance  
Snags



Airborne Lidar Reflectance

SAV Presence  
Density



# QUESTIONS?

Brook Herman, PhD.  
Program Manager – EMRRP



<https://emrrp.el.erdc.dren.mil/index.html>

<https://gateway.erdc.dren.mil/son/index.cfm?Cop=Env&Option=Start>

