

Thin Layer Placement of Dredged Material

Website and Map-based Portal - Recognition
and resources in a growing field of dredge
material management

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Engineer Research and Development Center

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Joint DOTS, EWN, RSM effort





Outline

- Definition
- Project Need
- Project Objectives
- TLP Website
- TLP Map-based Portal
- Future Actions





What is thin layer placement?

- Purposeful placement of dredged material for functional/ecological benefit
- Thin layer thickness - centimeters vs. meters
- Definition depends on project objectives
- Many possibilities for environmental enhancement
 - Habitat Restoration
 - Marsh Restoration
 - Sediment Budgeting
 - Thin Layer Capping/Sediment Remediation

Photo from Kirk Gilligan, Seal Beach NWR Manager

TLP Website and Map-based Portal Project Need



- Information and case studies for TLP not well documented
- Little or no technical guidance available for TLP design or implementation
- Multiple knowledge gaps
- An accessible, consolidated, living information resource is needed

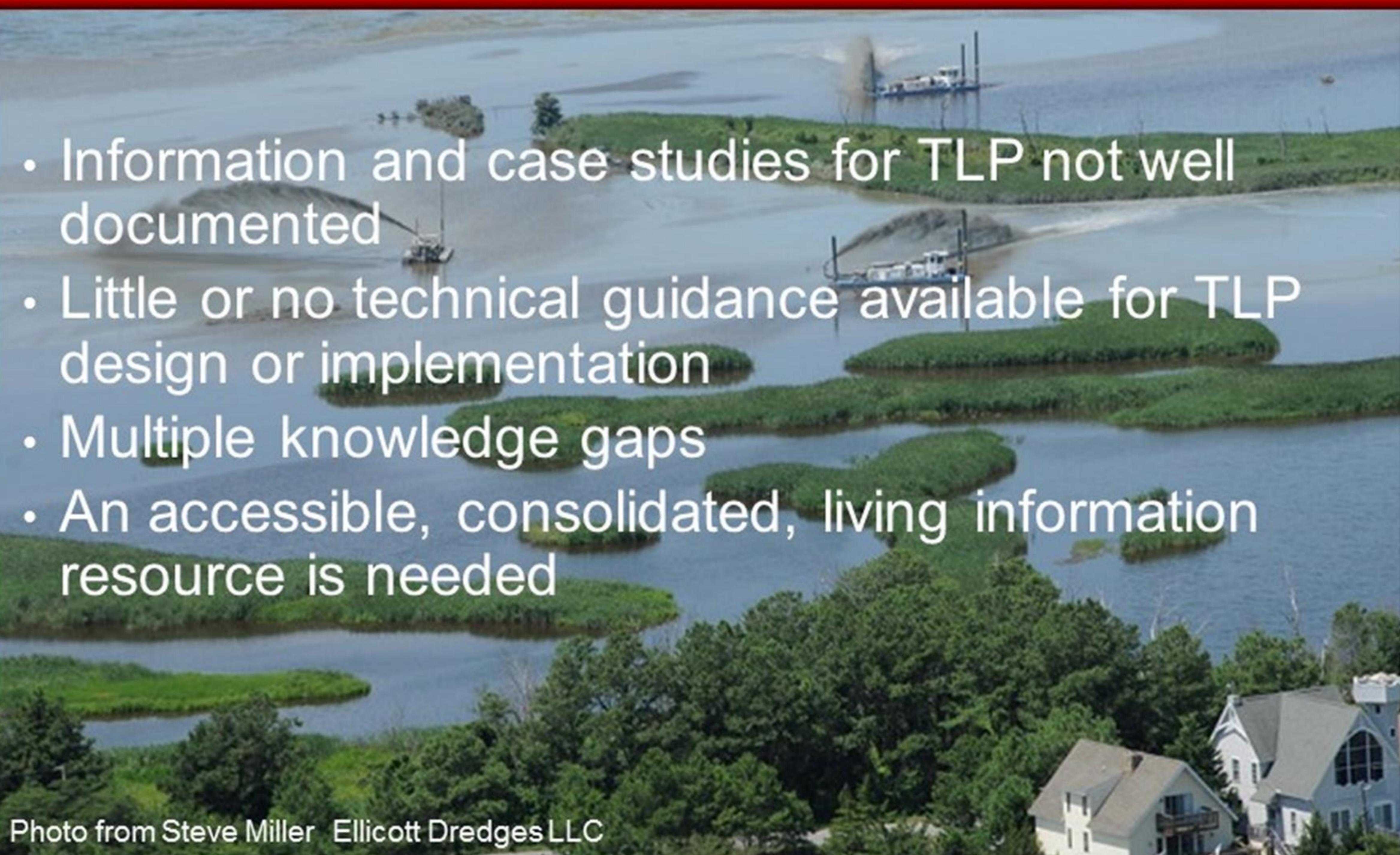
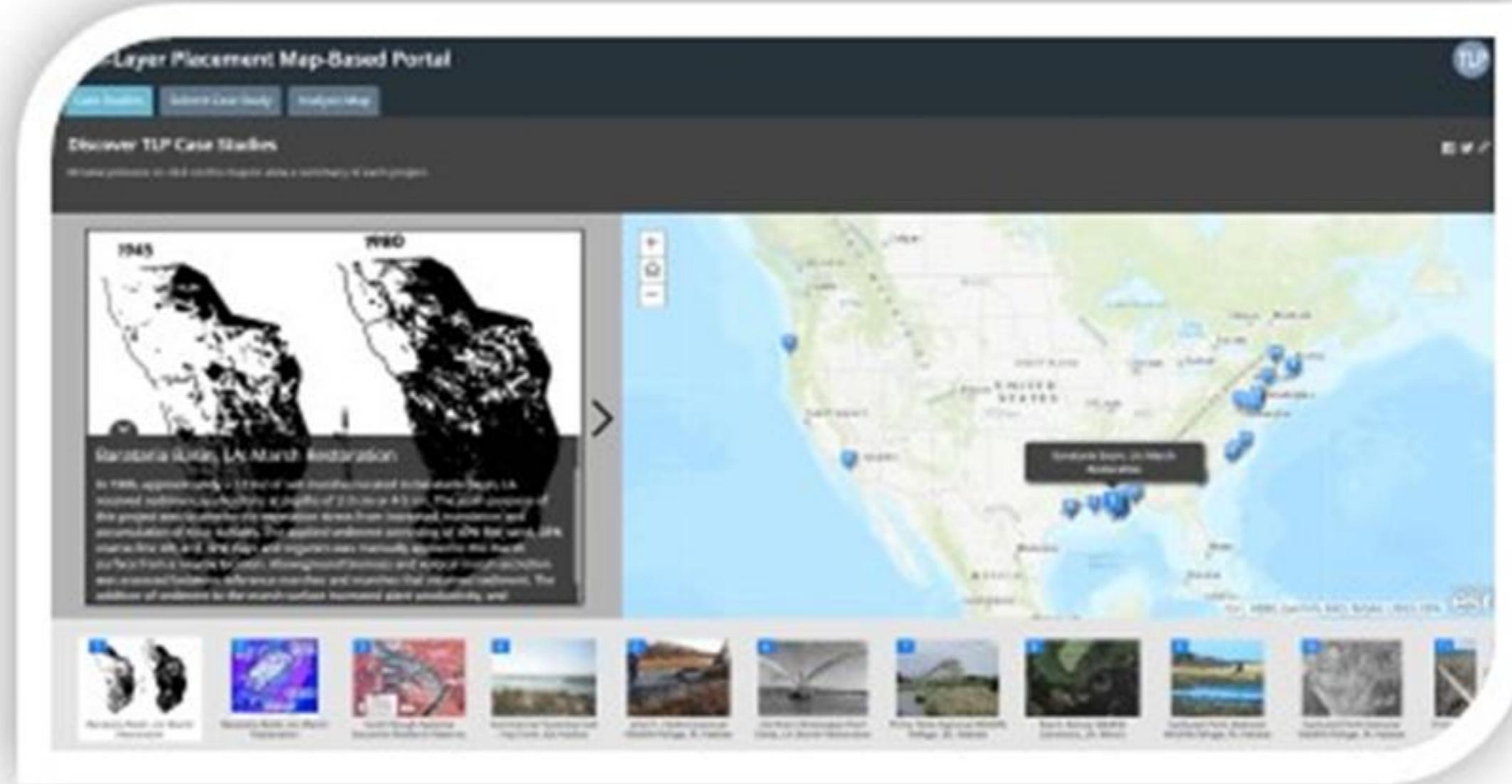
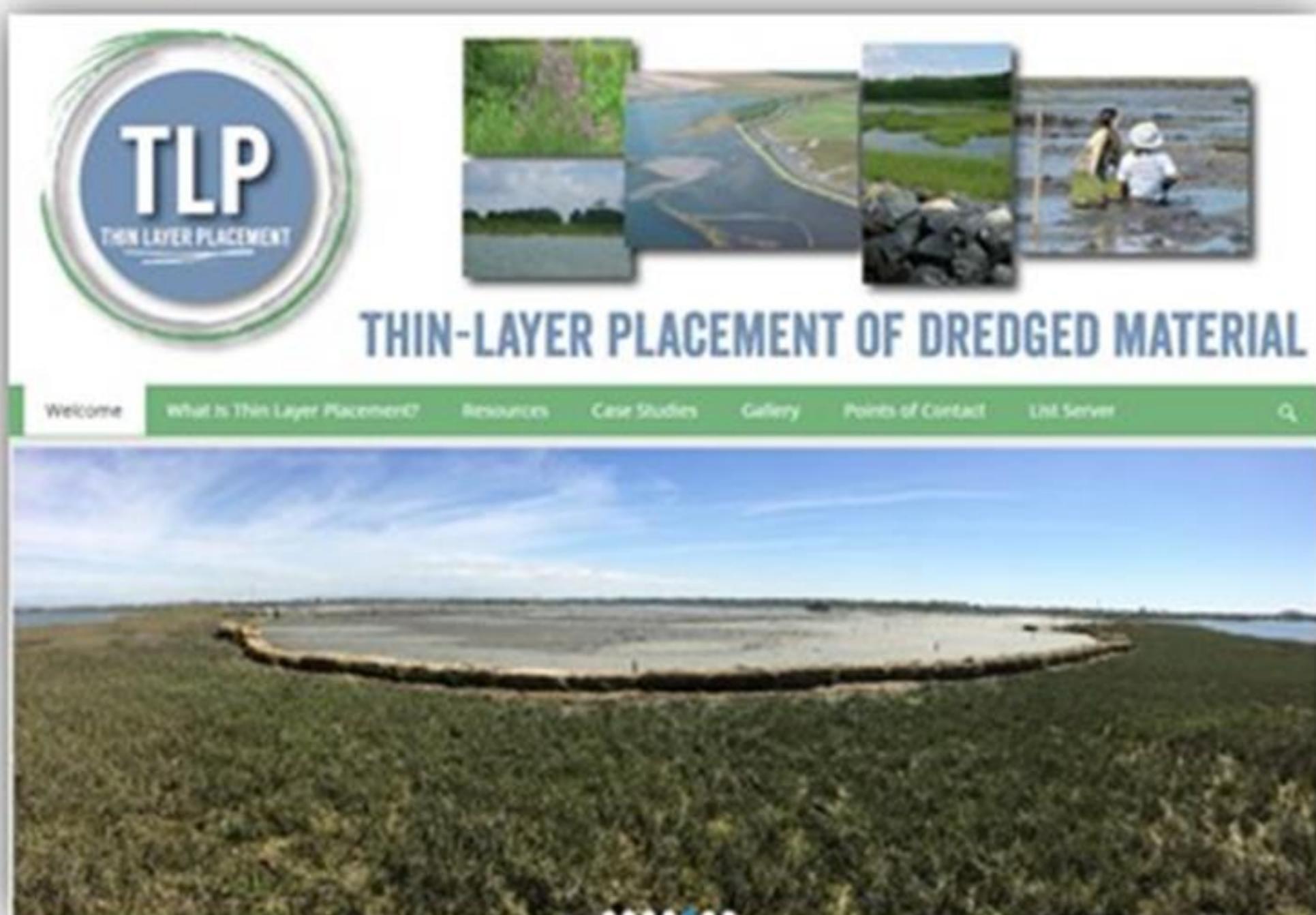


Photo from Steve Miller Ellicott Dredges LLC

Website and Database Primary Objectives



- Aggregate the current state of knowledge regarding thin layer placement of dredged material
- Consolidate literature/references pertaining to all project phases – from design to post-construction monitoring
- Provide centralized, accessible, and consolidated resource for case studies

Website and Database Secondary Objectives

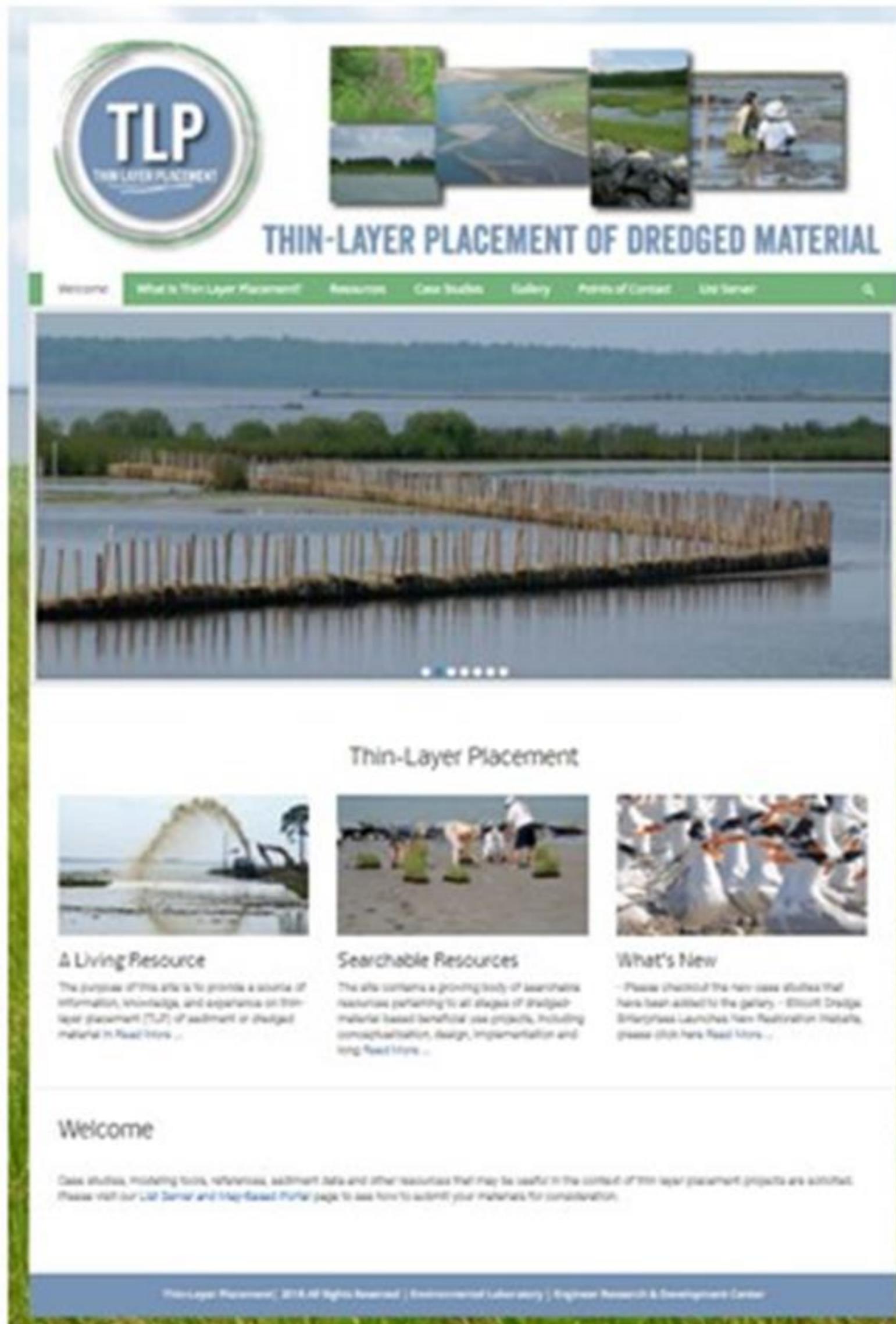


- Provide a vehicle for collection of case studies worldwide
- Create an engaging and user friendly product
- Create a database that was compatible with the USACE data integration initiative



TLP Website

<https://tlp.el.erdc.dren.mil/>



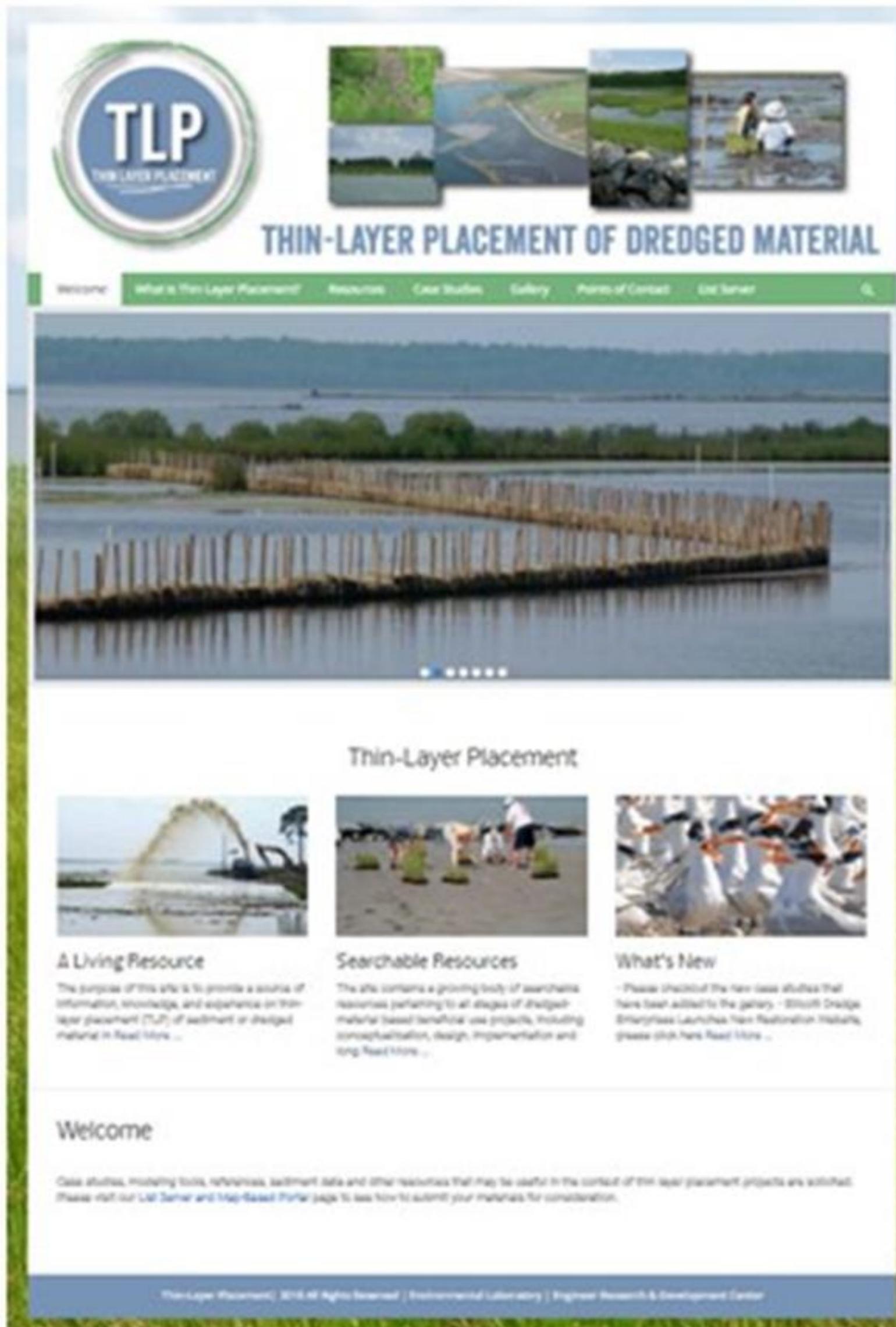
Current features:

- Relevant literature
- Case studies – fact sheets, photo galleries, project documentation/data
- Event tracker
- List server



TLP Website

<https://tlp.el.erdc.dren.mil/>



Future features:

- Ongoing literature and case study capture
- Other features being considered:
 - TLP project type definitions
 - ERDC TLP research projects
 - Future workshops, conferences, etc.
 - Newsletter
 - Online guidance tool
 - Forum



TLP Website Demo

<https://tlp.el.erdc.dren.mil/>

A screenshot of the TLP website homepage. At the top left is the TLP logo. To its right are four small images: a green field, a winding waterway, a body of water, and two people working in a marsh. Below these images is the text "THIN-LAYER PLACEMENT OF DREDGED MATERIAL". A navigation bar below the images includes links for "Welcome", "What Is Thin Layer Placement?", "Resources", "Case Studies", "Gallery", "Points of Contact", "List Server", and a search icon. A large photograph of a coastal or riverine landscape with wooden pilings in the water and a forested shoreline is centered on the page. A horizontal navigation bar at the bottom of the page has several small blue dots.



TLP Map-based Portal

- <https://usace.maps.arcgis.com/apps/MapSeries/index.html?appid=a731fd32f85c44109b9269e7c8d9c68f>
- The map portal is a GIS-based tool for submittal of case studies and for displaying data and resources associated with each submitted case study.



TLP Map-based Portal Demo

- Access through website list server

Thin Layer Placement Map-Based Portal

Case Studies Submit Case Study Analysis Map

Discover TLP Case Studies

Browse pictures or click on the map to view a summary of each project.

Barataria Basin, LA: Marsh Restoration

In 1986, approximately ~17 m² of salt marshes located in Barataria Basin, LA received sediment applications at depths of 2-3 cm or 4-5 cm. The main purpose of this project was to ameliorate vegetation stress from increased inundation and accumulation of toxic sulfides. The applied sediment consisting of 40% fine sand, 28% coarse-fine silt, and 32% clays and organics was manually applied to the marsh surface from a nearby location. Aboveground biomass and vertical marsh accretion was assessed between reference marshes and marshes that received sediment. The addition of sediment to the marsh surface increased plant productivity, and

1945 1980

A map of North America with a callout box highlighting the Barataria Basin area in Louisiana. The map shows coastlines, major cities like New Orleans, Mobile, and Pensacola, and state boundaries. The callout box contains the project name and a brief description.

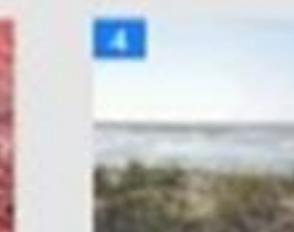
Barataria Basin, LA: Marsh Restoration



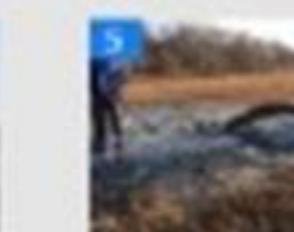
Barataria Basin, LA: Marsh Restoration



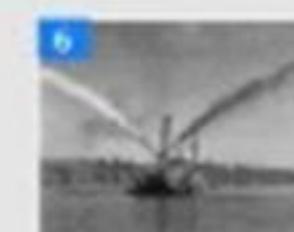
South Slough National Estuarine Research Reserve



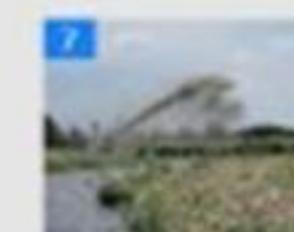
Commercial Township Salt Hay Farm, NJ: Habitat



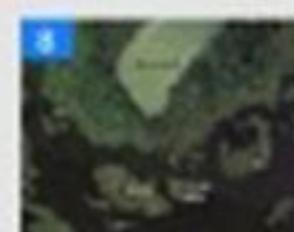
John H. Chafee National Wildlife Refuge, RI: Habitat



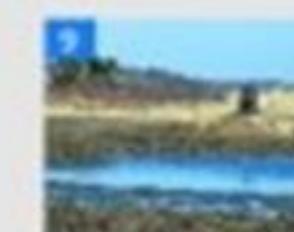
Northern Mississippi River Delta, LA: Marsh Restoration



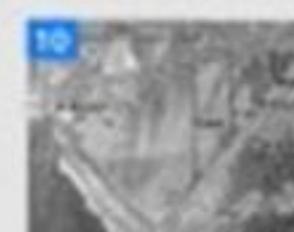
Prime Hook National Wildlife Refuge, DE: Habitat



Paul J. Rainey Wildlife Sanctuary, LA: Marsh



Sachuest Point National Wildlife Refuge, RI: Habitat



Sacramento Point National Wildlife Refuge, RI: Habitat

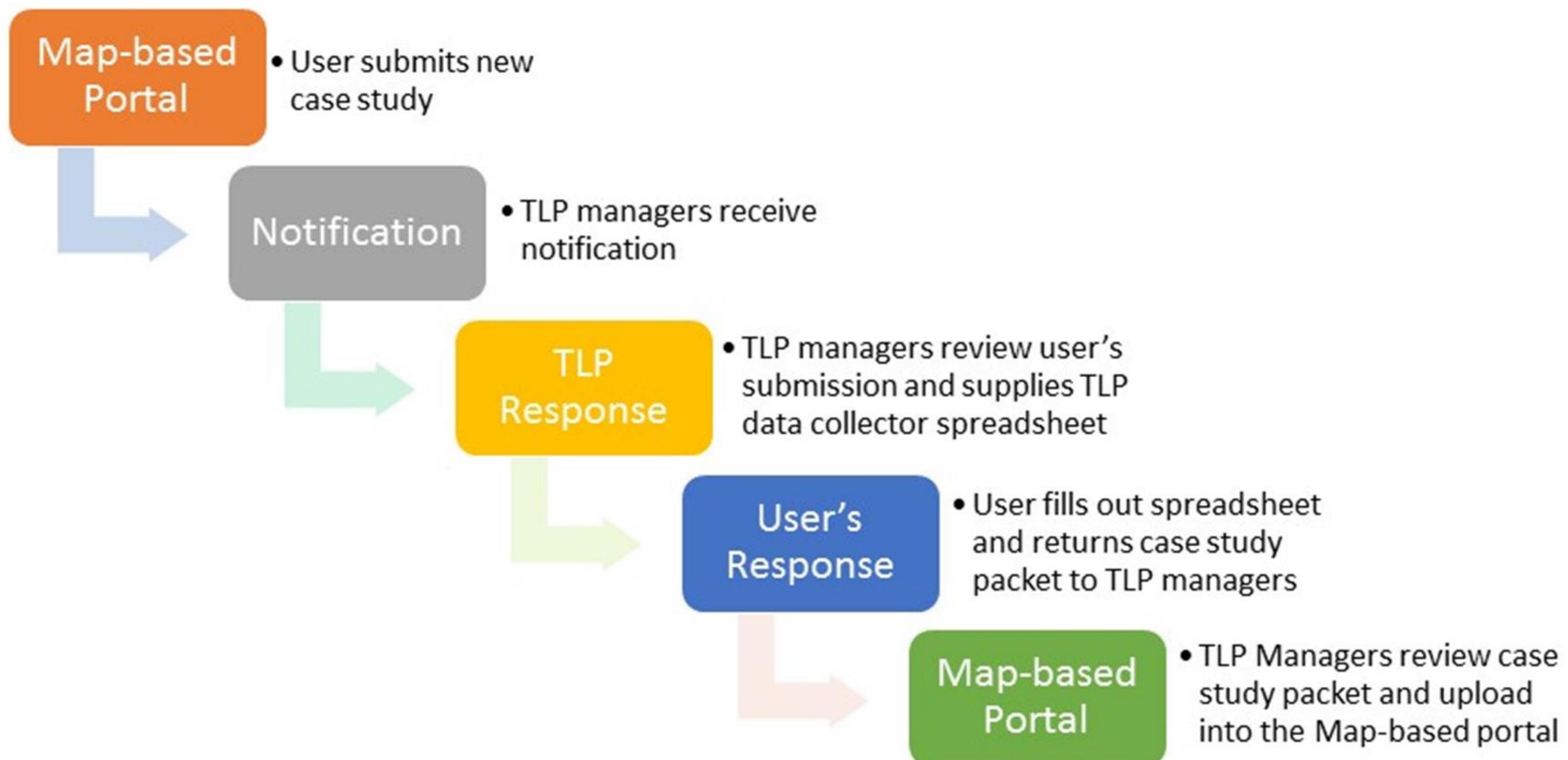


Fraser



TLP Map-based Portal

- Case study submission - How does it work?





Summary

- Consolidates all available reference materials on a publicly accessible platform, supported by a map based database for collection of case studies and supporting data.
- The site will facilitate planning and design efforts, broaden the exchange of information between private and public sector.



How can I contribute to the site?

- Please share your case studies with us
 - Contribute with **factsheet** development
 - **Submit** your case studies through the **map portal**
<https://usace.maps.arcgis.com/apps/MapSeries/index.html?appid=a731fd32f85c44109b9269e7c8d9c68f>
 - Fill out the **TLP Data Collector spreadsheet**
- TRs, TNs, JAs, models, construction methods and other relevant information that may be useful to practitioners are solicited.
- Sign up on our **List Server**
<https://tlp.el.erdc.dren.mil/list-server-and-map-portal/>
- Help us making these tools **better** - open for suggestions to improve our tools



Why should I contribute?

- Increase **visibility** of your projects
- Enhance **communication** across the community of practice
- **Learn** from other projects
- Increase **collaboration** and **contribution**
- **PROMOTE** successful TLP projects
- Help us **improve** our tools





TLP website statistics

| April statistics | Visitors | Visits |
|------------------|---------------|------------------|
| Today | 12 | 139 |
| Yesterday | 17 | 4,661 |
| Last 7 days | 149 | 5,368 |
| Last 30 days | 635 | 21,652 |
| Last 365 days | 11,202 | 958,597 |
| Total | 11,875 | 1,010,179 |



TLP website statistics

| Rank | Flag | Country | Visitor Count |
|------|------|---------------|---------------|
| 1 | 🇺🇸 | United States | 8,524 |
| 2 | ❓ | Unknown | 1,469 |
| 3 | 🇳🇱 | Netherlands | 626 |
| 4 | 🇸🇬 | Singapore | 341 |
| 5 | 🇯🇵 | Japan | 294 |
| 6 | 🇨🇳 | China | 121 |
| 7 | 🇸🇪 | Sweden | 98 |
| 8 | 🇩🇪 | Germany | 52 |
| 9 | 🇨🇦 | Canada | 47 |



| Rank | Flag | Country | Visitor Count |
|------|------|---------|---------------|
|------|------|---------|---------------|



Please contact us!

- Website registration and contributions
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 - Dr. Burton Suedel
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- EMRRP program manager
 - Dr. Trudy J. Estes
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Questions



Photo from Kirk Gilligan, Seal Beach NWR Manager



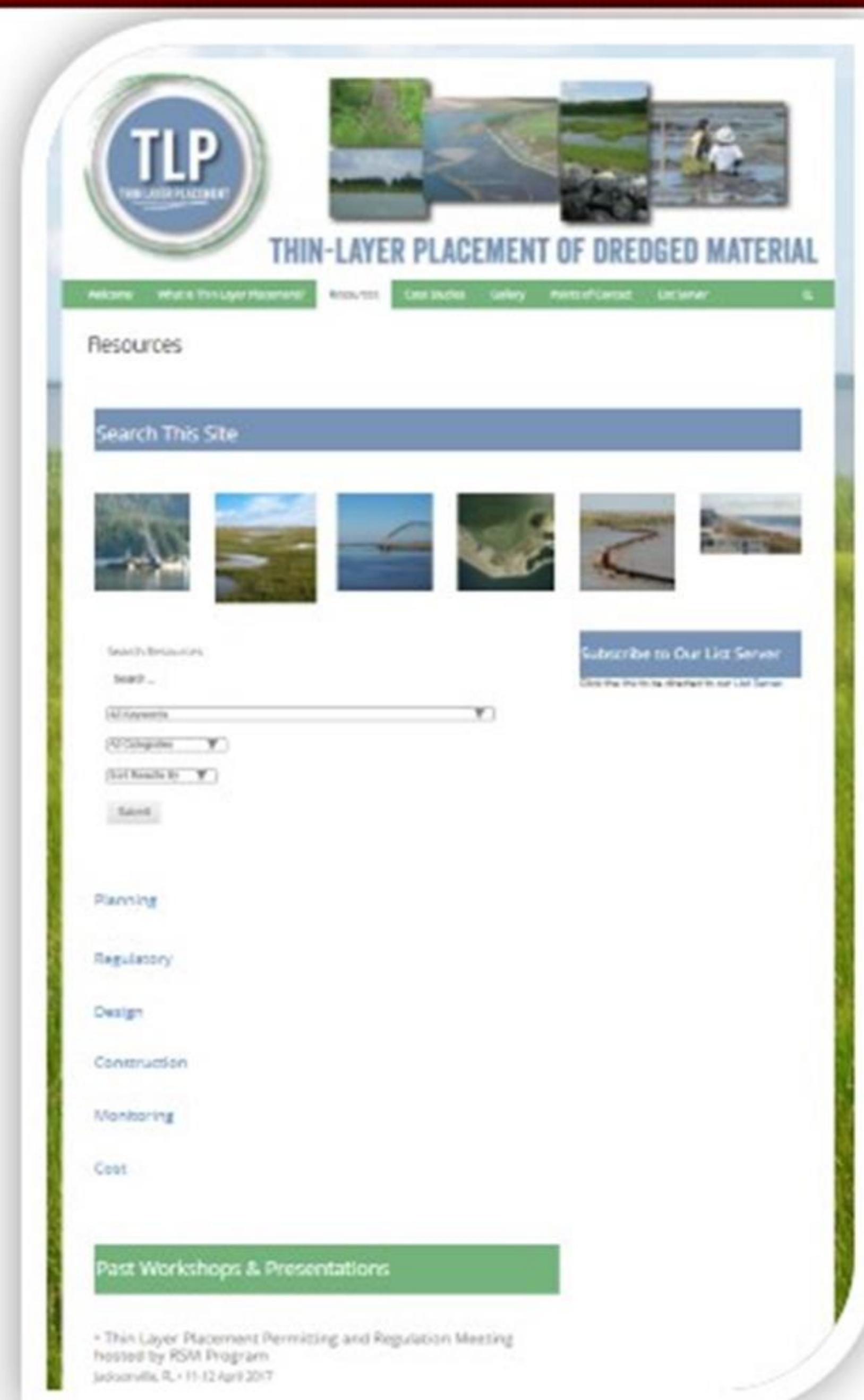
Supplemental Slides





TLP Website - Resources

- ~240 resources (40% summarized)
- Resources summaries
 - How does it apply to TLP?
- Search feature
 - Keywords, literature category, sort results
- Quick category searches
 - Organized by different categories
- Past workshops and presentations





TLP Website - Resources

- Example:

The screenshot shows the TLP website's search results page. A red arrow points from the search term 'wetlands' in the search bar on the left to the search results list on the right. The results list includes a thumbnail image of a wetland scene, the title 'Wetlands Engineering Handbook', and a brief description of the document.

Search This Site

wetlands

All Keywords

All Categories

Sort Results By

Submit

← Previous
Functional assessment of differential sediment slurry applications in a deteriorating brackish marsh

Next →
Thin Layer Disposal of Dredged Sediment

Welcome What is Thin Layer Placement? Resources Case Studies Gallery Points of Contact List Server

Wetlands Engineering Handbook

August 29, 2017 • TLP

Authors: Hayes, D. F., Olin, T. J., Fischerich, J. C., and Palermo, M. R.

Year: 2000

Reference: Hayes, D. F., Olin, T. J., Fischerich, J. C., and Palermo, M. R. (2000). "Wetlands Engineering Handbook," ERDC/EL TR-WRP-RE-21, U. S. Army Engineer Research and Development Center, Vicksburg.

Summary: This handbook discusses engineering procedures for establishing necessary hydrologic conditions, geotechnical design, and soils handling for site modification, selecting appropriate vegetation and planting schemes, and establishing substrate conditions conducive to the desired functions. Soil handling includes: loosening or compaction to control soil density, protection of the soil structure, and creating layers with scarification techniques. Substrate conditions include: texture, structure, density, compaction, fertility, salinity, pH, and permeability. The document also discusses baseline assessments of existing site conditions, monitoring strategies to determine long term success, and contracting considerations.

What You Will Find Here: Planning p. 1-ii, site investigation p. 2-ii, design p. 3-ii, p. 4-ii, p. 5-ii, p. 6-ii, Construction p. 7-ii, Monitoring p. 8-ii,

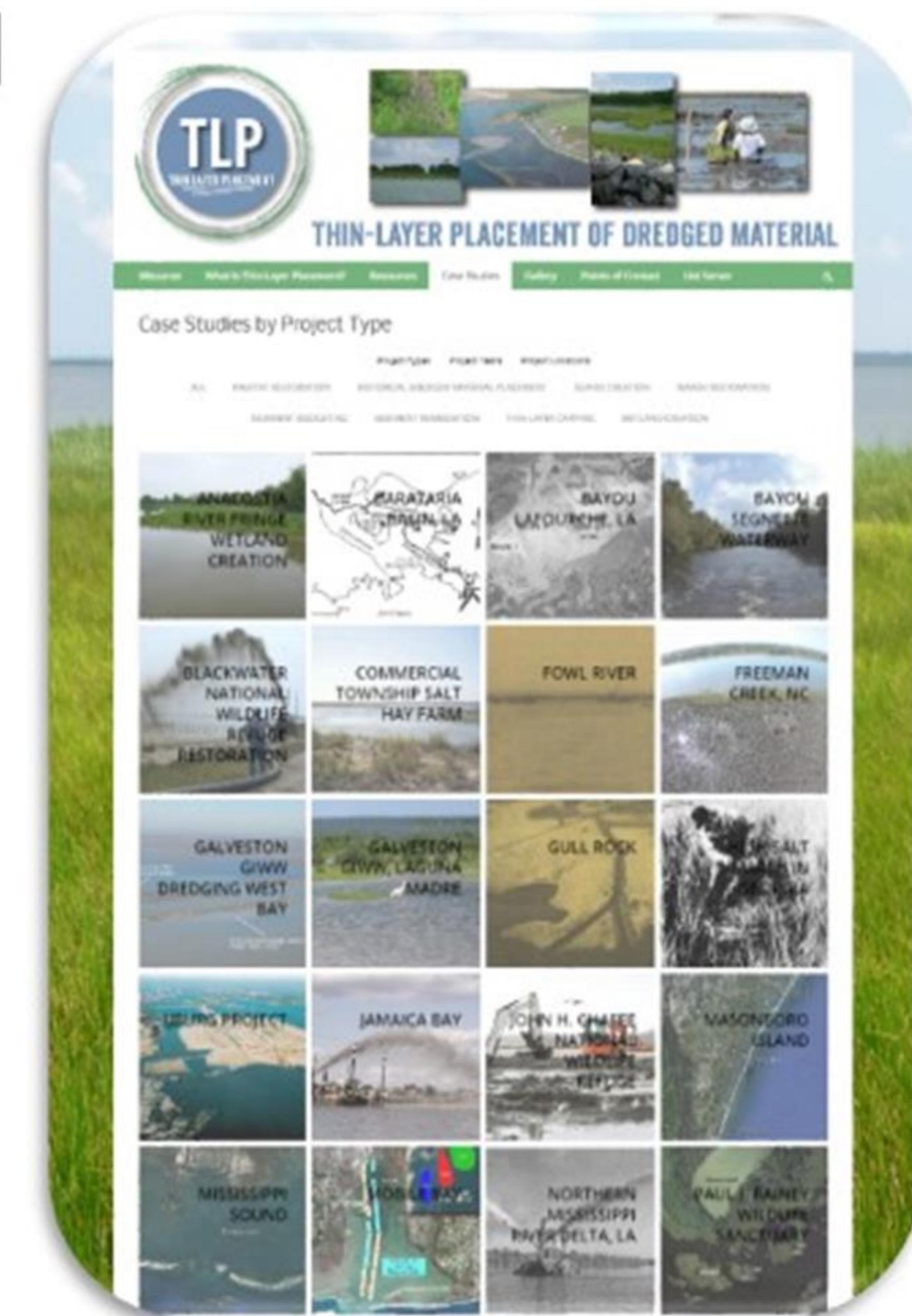
Link: <http://www.csr.usace.army.mil/reports/documents/WetlandsEngineeringHandbookUSACE2000.pdf>

► Construction, Design, Monitoring, Planning ▲ Construction, Design, Monitoring, Planning, Site Investigation



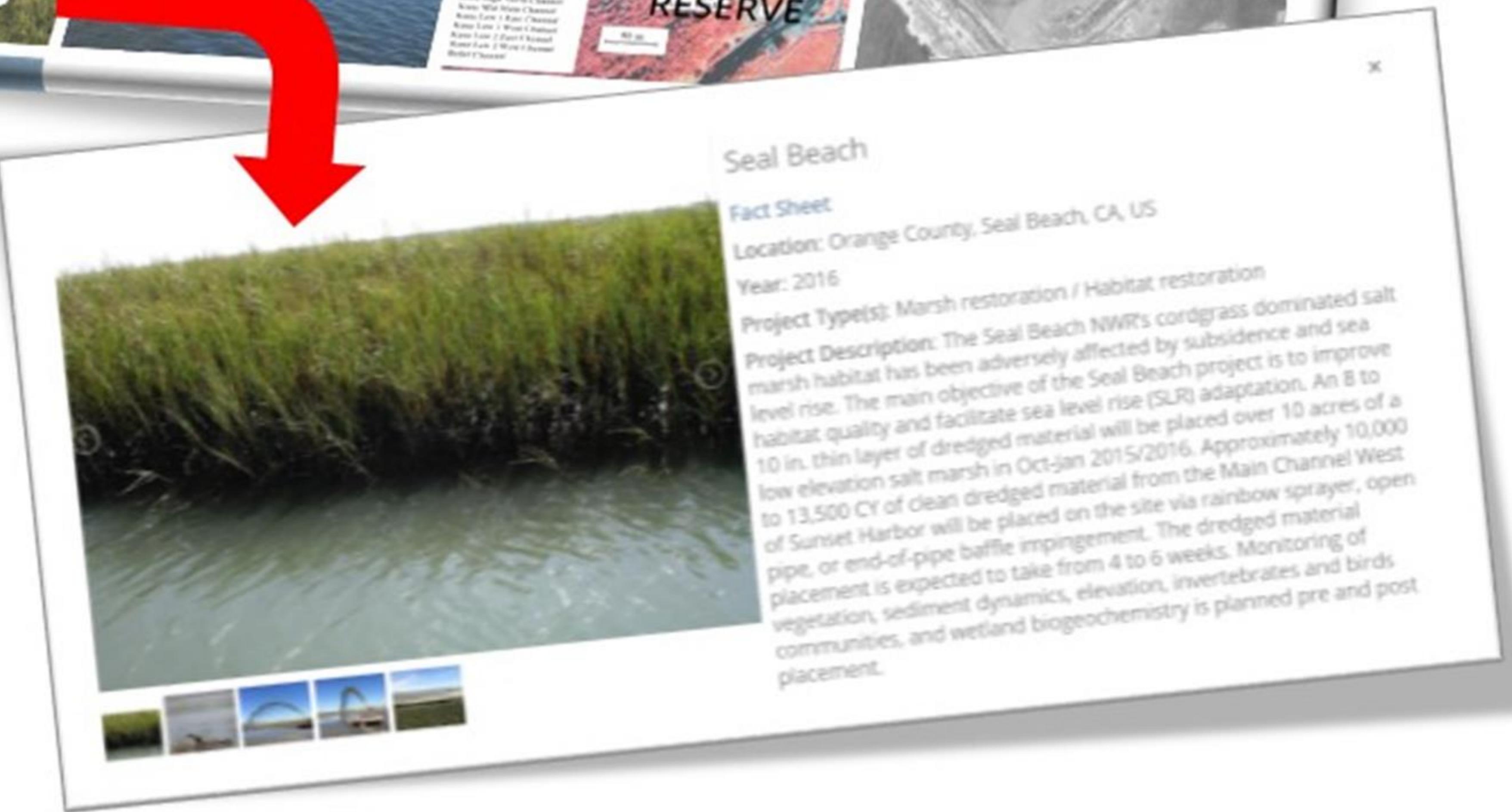
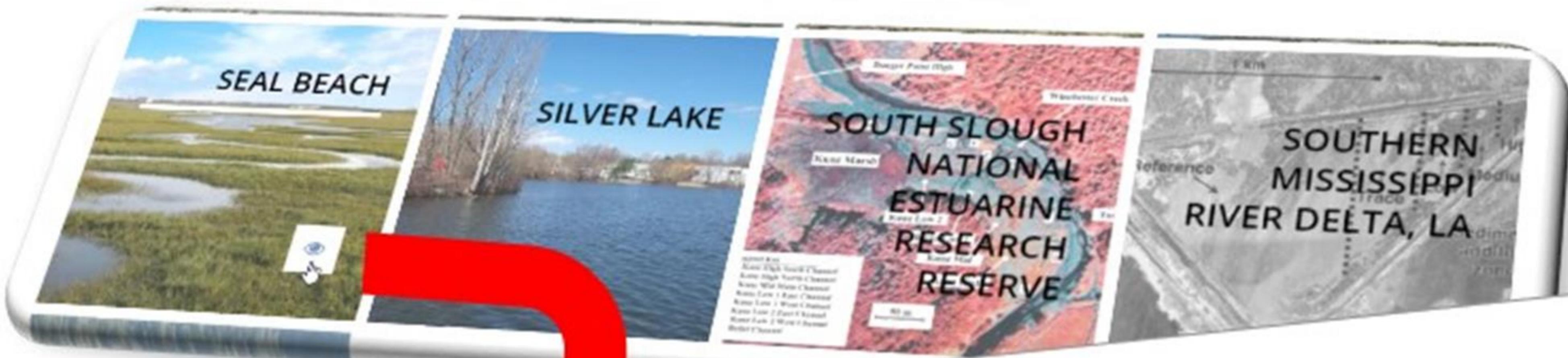
TLP Website – Case Studies

- Filter by project type, year and location
- ~28 case studies
- Factsheets
 - Background
 - Project Description
 - Findings
 - References
 - Add your agency/company logo and authorship
- Project Gallery





TLP Website – Case Studies



Seal Beach

Fact Sheet:
Location: Orange County, Seal Beach, CA, US
Year: 2016

Project Type(s): Marsh restoration / Habitat restoration

Project Description: The Seal Beach NWR's cordgrass dominated salt marsh habitat has been adversely affected by subsidence and sea level rise. The main objective of the Seal Beach project is to improve habitat quality and facilitate sea level rise (SLR) adaptation. An 8 to 10 in. thin layer of dredged material will be placed over 10 acres of a low elevation salt marsh in Oct-Jan 2015/2016. Approximately 10,000 to 13,500 CY of clean dredged material from the Main Channel West of Sunset Harbor will be placed on the site via rainbow sprayer, open pipe, or end-of-pipe baffle impingement. The dredged material placement is expected to take from 4 to 6 weeks. Monitoring of vegetation, sediment dynamics, elevation, invertebrates and birds communities, and wetland biogeochemistry is planned pre and post placement.





TLP Website – Case Studies

THIN-LAYER PLACEMENT FACTSHEET

Seal Beach National Wildlife Refuge

August 2016

Location: Seal Beach National Wildlife Refuge

Type: Habitat restoration

Area: 8 acres of TLP plus 8 acres of "buffer" in a 965-acre marsh site

City: Seal Beach

County: Orange

Main Agencies: USFWS, OC Parks, CA Dept. of Fish and Wildlife, California Coastal Conservancy, USACE, Naval Weapons Station Seal Beach, CA State Lands Commission, UCLA, USGS, CSULB, Chapman University

State/Province: California

Country: United States

Value from USFWS presentation

Project Description

A 10 inch (plus minus) average of 2 inches, thin layer of dredged material was placed over 8 acres of low elevation salt marsh from Dec 2015 to Mar 2016. This site has the lowest mean elevation (1.34 m relative to NAVD88) and mean elevation relative to MHW (0.01 m relative to NAVD88) of 8 CA marshes where survey-grade elevations were conducted by USGS (Takakawa et al. 2013). Approximately 17,000 CY of clean dredged material from the Main Channel West of Sunset/Huntington Harbour was placed on the site via rainbow sprayer, and end-of-pipe baffle impingement. A hay bale barrier and a 6-acre vegetated buffer was maintained between the TLP site and adjacent channels in order to reduce

Engineer Research and Development Center
Dredging Operations Technical Support Program

August 2016

Seal Beach National Wildlife Refuge

The Seal Beach National Wildlife Refuge (NWR) is administered by the U.S. Fish and Wildlife Service as part of the National Wildlife Refuge System and is collocated within the boundaries of Naval Weapons Station Seal Beach. This 965-acre refuge is dominated by tidal salt marsh that supports the third largest breeding population of the federally endangered light-footed Ridgway's rail.

The thin-layer Salt Marsh Sediment Augmentation Pilot Project encompasses an area of 8 acres of low salt marsh in the center of the refuge. It is the first known application of TLP on the west coast of the US (Coastal Conservancy 2014). The site's cordgrass-dominated salt marsh habitat has been adversely affected by subsidence, sea level rise, and alteration of natural sediment inputs. The site is experiencing a relative sea level rise (SLR) of 6.23 mm/yr, a rate three times higher than that of similar southern California marshes not affected by subsidence. The main objective of the project is to improve habitat quality by raising the marsh elevation and improving cordgrass heights, and to determine the effectiveness of TLP as a regional SLR adaptation strategy.

Findings

Please visit the Seal Beach NWR Thin-layer Salt Marsh Sediment Augmentation web site which is updated regularly with quarterly reports, annual reports, lessons learned documents, and time lapse videos of construction and recovery: https://www.fws.gov/refuge/seal_beach/what_we_do/resource_management/sediment_pilot_project.html

References

California State Coastal Conservancy and U.S. Fish and Wildlife (2014) Memorandum of Agreement Between the State Coastal Conservancy, Orange County and the U.S. Fish and Wildlife Service Regarding the Seal Beach National Wildlife Refuge Thin-layer Salt Marsh Sediment Augmentation Pilot Project.

California State Coastal Conservancy and U.S. Fish and Wildlife (2014) Final Mitigated Negative Declaration for the Seal Beach National Wildlife Refuge Thin-layer Salt Marsh Sediment Augmentation Pilot Project (Orange County, California).

Coastal Conservancy (2014) Seal Beach National Wildlife Refuge Thin-Layer Salt Marsh Sediment Augmentation Pilot Project, Staff recommendation.

Takakawa, J.Y., K. M. Thorne, K. J. Buffington, C. M. Freeman, and G. Block, 2013. Downscaling climate change models to local site conditions: San Diego National Wildlife Refuge Complex. Unpubl. Data Summary Report, U.S. Geological Survey, Western Ecological Research Center, Vallejo, CA.

U.S. Department of the Interior Fish and Wildlife Service (2014) Finding of No Significant Impact (FONSI) for the Seal Beach National Wildlife Refuge Thin-layer Salt Marsh Sediment Augmentation Pilot Project Orange County, California.

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Dredging Operations Technical Support Program

August 2016

Seal Beach National Wildlife Refuge

Points of Contact

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Or

Victoria Touchstone
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619-476-9150 Ext. 103

Main Agencies:

Funding for this project has been provided by:

U.S. Fish & Wildlife Service - 2015 Cooperative Recovery Initiative Grant
California Coastal Conservancy Grant
Orange County, OC Parks - Sediment and Application Contract
California Department of Fish and Wildlife - Greenhouse Gas Reduction Program
U.S. Army Corps of Engineers - Ecosystem Management & Restoration Research Program

Information on thin layer placement (TLP) case studies has been compiled as part of a DOTS/EWN project to provide a source of information, knowledge, and experience on TLP of sediment or dredged material in aquatic environments. The Thin Layer Placement Website and Map-Portal are funded by the US Army Engineer Research and Development Center (ERDC). POCs for the Thin Layer Placement Website and Map-Portal are:

- Damarys Acevedo-Mackey, PE
Damarys.Acevedo-Mackey@usace.army.mil, 801-634-4845
- Trudy J. Estes, Ph.D., PE
Trudy.J.Estes@usace.army.mil, 801-634-2125

Engineer Research and Development Center
Dredging Operations Technical Support Program

US Army Corps of Engineers

August 2016



TLP Map-based Portal

- Publicly accessible
- Shows reviewed case studies

The screenshot displays the TLP Map-based Portal interface. At the top, a navigation bar includes links for Welcome, What is Thin Layer Placement?, Resources, Case Studies, Gallery, Points of Contact, and List Server. A red arrow points from the "List Server" link to the "Map-Based Portal" link in the dropdown menu. The main content area shows two case study cards: "Barataria Basin, LA: Marsh Restoration" (left) and "Seal Beach: Habitat Restoration" (right). Each card includes a thumbnail image, a project title, a brief description, and a horizontal scrollable gallery of related images at the bottom. A large map of the United States is positioned between the two cards, with a specific location highlighted in California. A red arrow points from the "Discover TLP Case Studies" header to the Seal Beach restoration card.



TLP Map-based Portal

- Any user can submit a new case study
- Case study submission form
- Please share your case studies with us!

Thin-Layer Placement Map-Based Portal

Case Studies Submit Case Study Analysis Map TLP

Submit TLP Case Study

Thin Layer Placement broadly encompasses the purposeful placement of sediment or dredged material in a manner that produces a specific disposal layer thickness or ground surface elevation necessary to achieving the overall project objectives. In thin layer placement projects, disposal layer thickness typically ranges from a few centimeters to some fraction of a meter, depending upon the variation in ground surface or water levels at the site, and the functional objectives the placement is intended to achieve.

Today's Date*

Name of Case Study*

Case Study Description*
Please describe briefly the project and its purpose i.e. habitat creation, marsh restoration, etc.



TLP Map-based Portal

- Comprehensive data collector – spreadsheet
- Shorter version

THIN-LAYER PLACEMENT OF DREDGED MATERIAL

| | # of Fields | # Priority Fields | Fields Submitted |
|--|-------------|-------------------|------------------|
| Project Overview | 13 | 13 | 0 |
| Attachment Description | 4 | 0 | 1 |
| Cost | 13 | 1 | 0 |
| Pre-Construction | 66 | 30 | 0 |
| Containment | 5 | 5 | 0 |
| Water Control | 4 | 4 | 0 |
| Design | 4 | 4 | 0 |
| Construction | 23 | 23 | 0 |
| Post-Construction | 57 | 13 | 0 |
| Monitoring | 5 | 5 | 0 |
| Regulatory | 2 | 2 | 0 |
| Lessons Learned | 3 | 3 | 0 |
| Contacts | 5 | 0 | 0 |

THIN-LAYER PLACEMENT OF DREDGED MATERIAL

Thank you for submitting a Case Study in the TLP Map Portal. This Excel workbook is designed to capture Case Study specific details to be used in different stages of thin layer placement (TLP) projects to help promote successful TLP projects.

Instructions:
Complete each worksheet tab to the best of your ability. When complete, include all attachments and this workbook into a single zip file ("Project Case Study Packet") and email to Damarys.Acevedo-Mackey@usace.army.mil.

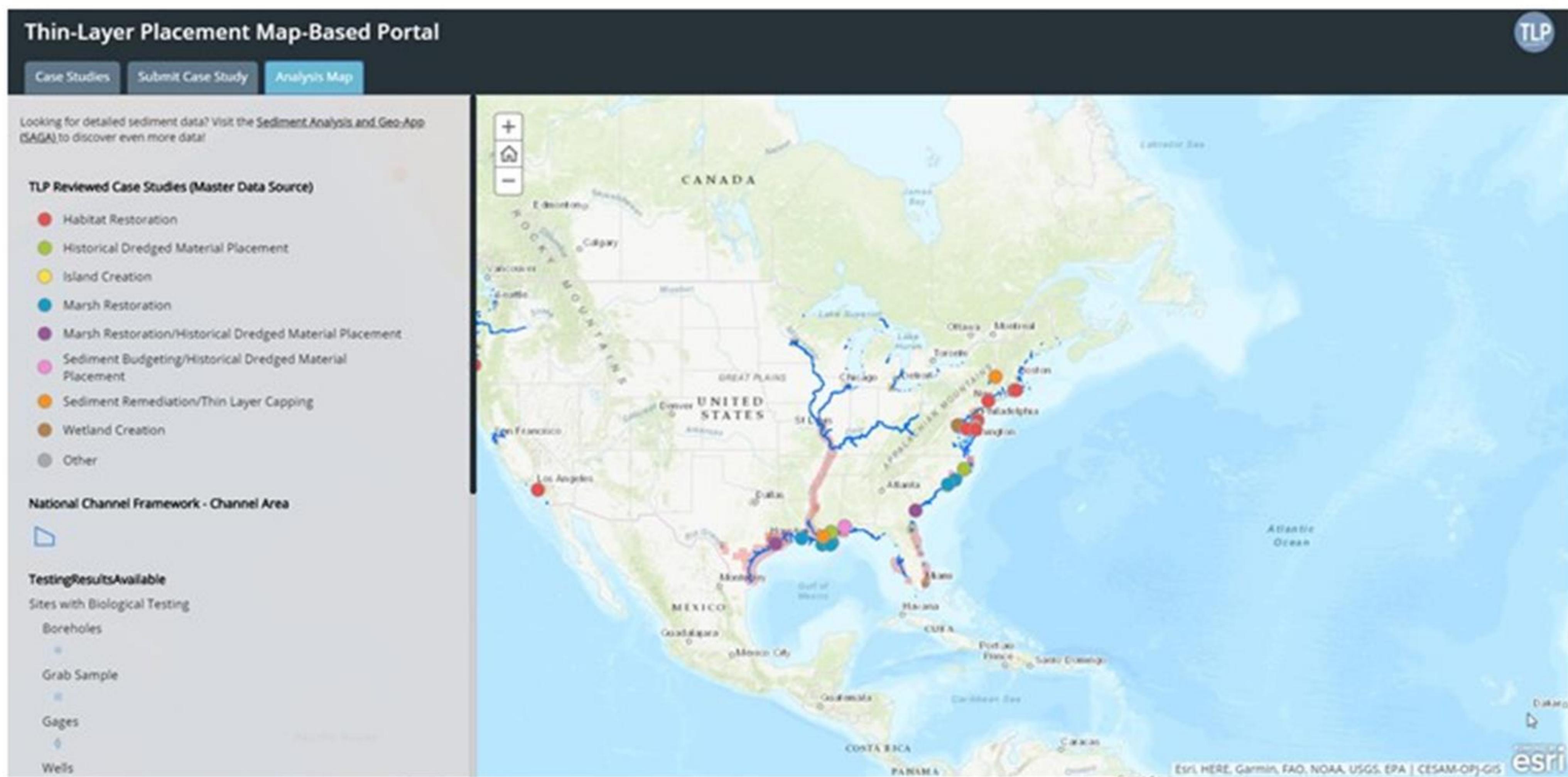
Data Collector Worksheet Descriptions

| Worksheet Description | Description |
|---|--|
| Project Overview | This sheet keeps track of the completeness of your submission. Worksheets with Red Flags require additional information for a more complete survey. |
| Attachment Descriptions | Verify content on this form is correct. Update values as necessary. This information is displayed for each project point in the map displayed in the main page of the TLP Map Portal. |
| Available Sediment Data | Use this form to describe all files included in the Project Case Study packet. |
| Cost | Access to sediment sampling details pulled from the USACE Sediment Analysis and Geo-App (SAGA). Use these hyperlinks (if available) to discover more details about sediment within 5 miles of this case study. |
| Pre-Construction | Provide project cost breakdown if available. |
| Containment | Provide pre-construction sediment characteristics details. |
| Water Control | Fill out this form if containment was utilized at this project. |
| Design | Fill out this form if water control was utilized at this site. |
| Construction | Describe what models, engineering manuals, engineering procedures, planning basis were used for the project. |
| Post-Construction | Provide details on the construction phase. |
| Monitoring | Provide details on the post-construction, including consolidation rates. |
| Regulatory | Describe monitoring plan and practices. |
| Lessons Learned | Describe regulatory aspects considered for this project (e.g. project authorization, limitations). |
| Contacts | Provide significant lessons learned during each of the project phases. |



TLP Map-based Portal

- Analysis map with multiple layers
 - Sediment Analysis and Geo-App - SAGA
 - National Channel Framework - NCF





TLP Map-based Portal

- Click on a case study
- View project detail
- Access case study packet
- Attachments
 - Photos
 - Figures
 - TR, JAs, TN
 - Links
 - TLP Data Collector

Thin-Layer Placement Map-Based Portal

Case Studies Submit Case Study Analysis Map

Looking for detailed sediment data? Visit the [Sediment Analysis and Geo-App \(SAGA\)](#) to discover even more data!

TLP Reviewed Case Studies (Master Data Source)

- Habitat Restoration
- Historical Dredged Material Placement
- Island Creation
- Marsh Restoration
- Marsh Restoration/Historical Dredged Material Placement
- Sediment Budgeting/Historical Dredged Material Placement
- Sediment Remediation/Thin Layer Capping
- Wetland Creation
- Other

The map displays a portion of North America, specifically the western coast of the United States and parts of Canada and South America. A red dot marks the location of Seal Beach, California, which is situated along the Pacific Ocean coastline. The map includes labels for the Pacific Ocean, Canada, the USA, Mexico, and South America. A legend in the bottom right corner provides information about the Seal Beach project.

Seal Beach: Habitat Restoration

Seal Beach, CA
Orange USA
Habitat Restoration

The Seal Beach NWR cordgrass dominated salt marsh habitat has been adversely affected by subsidence and sea level rise. The main objective of the Seal Beach project is to improve habitat quality and facilitate sea level rise (SLR) adaptation. An 8 to 10 in. thin layer of dredged material will be placed over 10 acres of a low elevation salt marsh in Oct-Jan 2015/2016. Approximately 10,000 to 13,500 CY of clean dredged material from the Main