



# Runnels as a Marsh Restoration Strategy in Maryland – Marshes for Tomorrow

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DAVID CURSON, AUDUBON MID-ATLANTIC

Maryland has 172,000 acres of salt  
and brackish tidal marsh



## Priority bird species entirely endemic to high salt marsh

Saltmarsh Sparrow (*Ammodramus caudacutus*)

*Federal status:* Candidate for ESA listing

Maryland supports 25% global population

Rapidly declining - extinction possible by 2060



Eastern Black Rail (*Laterallus jamaicensis jamaicensis*)

*Federal status:* Threatened

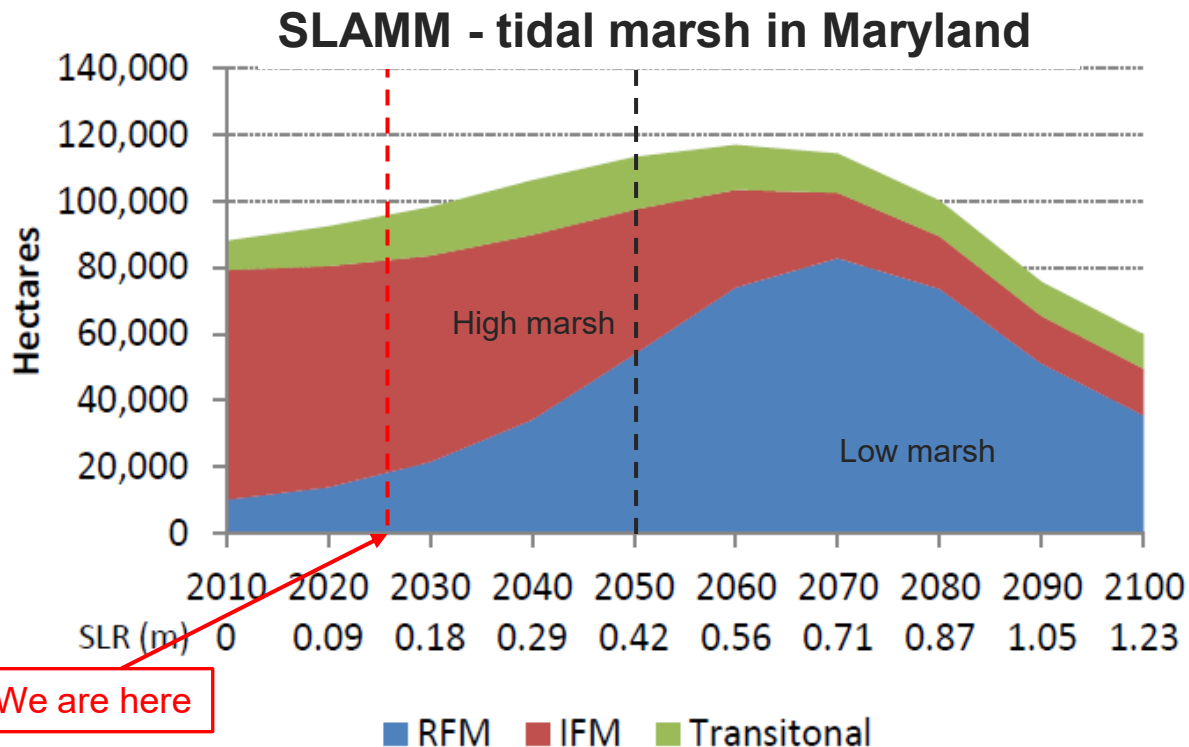
Maryland supports 2-8% of east coast population

Rapidly declining – almost disappeared from Maryland



## Tidal Marsh Trends in MD

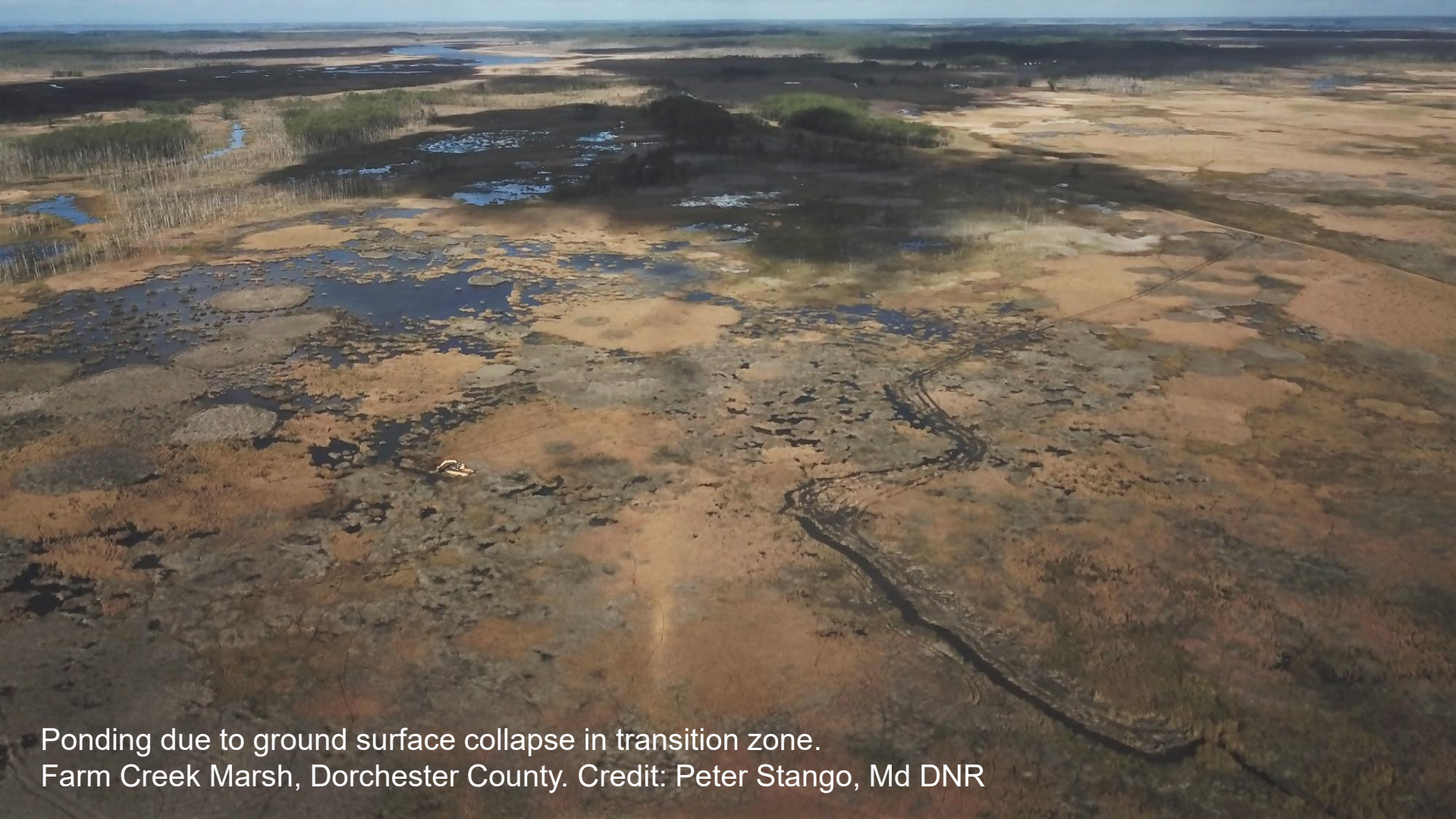
- Historically:
  - 78% high marsh
  - 22% low marsh
- SLAMM: High marsh zone in MD will decline >33% by 2050 - converts to low marsh.
- SLAMM underestimates marsh erosion - does not account for soil degradation and elevation collapse



“Upper limit of likely range” SLR scenario, 2010–2100 = +1.23 meters (TNC, 2021).



Most marsh loss is from interior ponding.  
Rapid ponding in Worcester County. Credit: Hailey Glasko



Ponding due to ground surface collapse in transition zone.  
Farm Creek Marsh, Dorchester County. Credit: Peter Stango, Md DNR

# Both rising tides and trapped floodwaters can cause interior marsh erosion

## Example 1

- Marsh elevation becomes too low to drain, due to SLR
- Transition from high marsh -> low marsh -> ponding
- SLAMM models as high marsh -> low marsh



Blackwater NWR



Blackwater NWR. Credit: Matt Whitbeck

# Both rising tides and trapped floodwaters can cause interior marsh erosion

## Example 2

- Marsh elevation still high enough to drain (high marsh), but floodwaters trapped on surface.
- Waterlogging causes vegetation dieback, biogeochemical soil degradation and ponding.
- SLAMM does not account for this.



# Marshes for Tomorrow GIS Experience Builder

<https://experience.arcgis.com/experience/0d1703e972c849bf88acd6cd7026b50c/page/Marshes-for-Tomorrow/>

## Marshes for Tomorrow

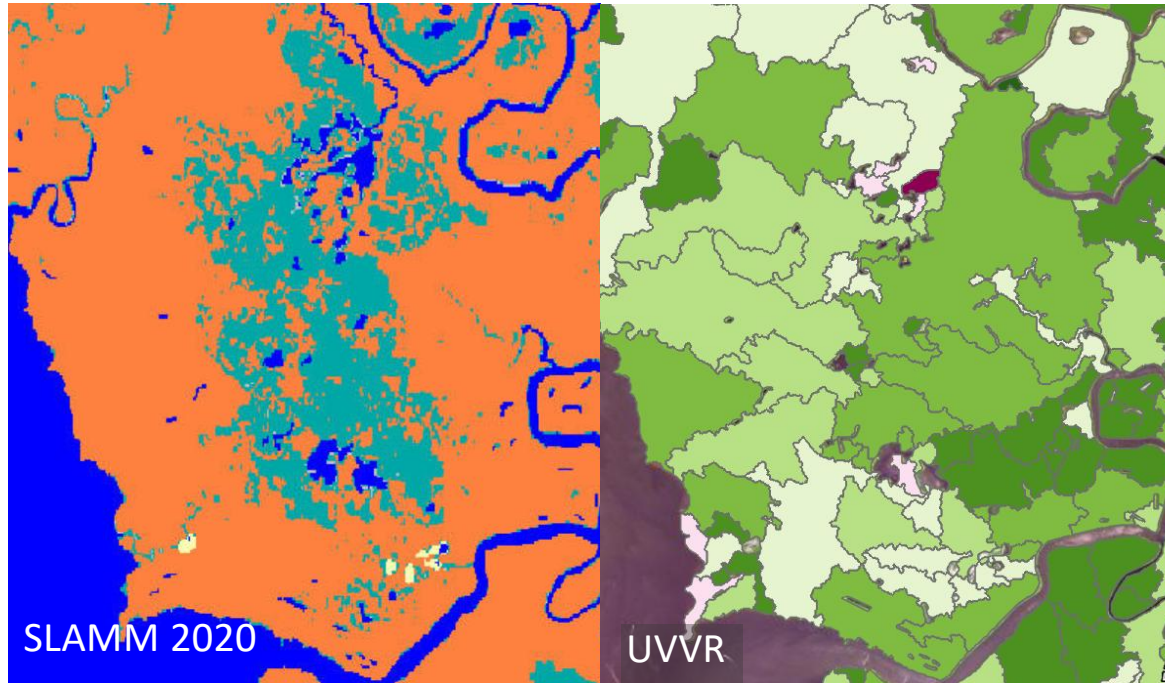
A Strategic Plan for the Restoration and Resiliency of Maryland's Tidal Marshes



# MfT Restoration Decision Model

Includes marsh health (Unvegetated-Vegetated Ratio-**UVVR**) and future resilience to SLR (elevation, from **SLAMM**).

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- Analysis Conducted for all Marsh Units in the Chesapeake and Coastal Bays
  - Marsh Unit – small scale drainage systems within a Marsh
  - [USGS Coastal Wetland Synthesis](#)
  - Landscape Scale Approach

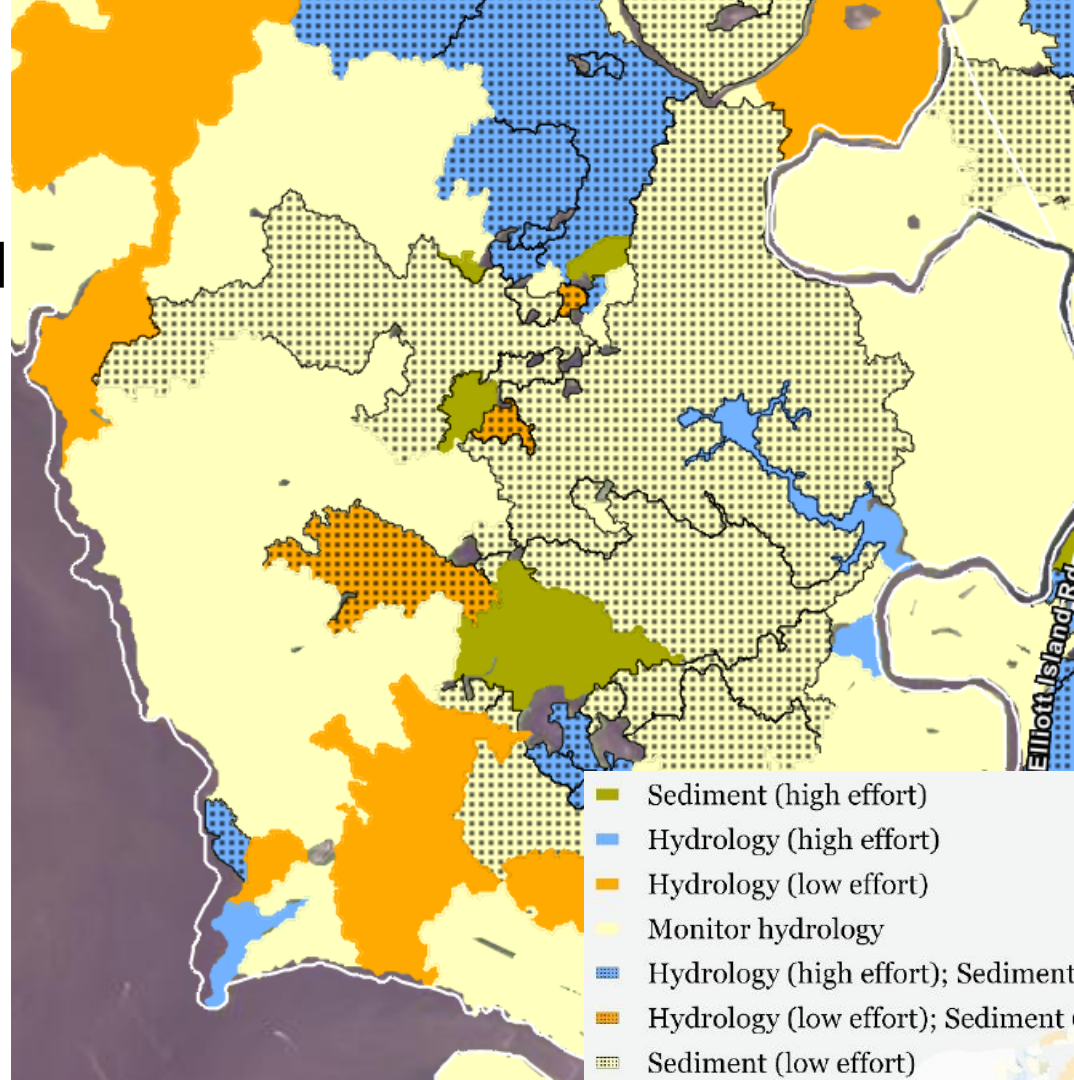


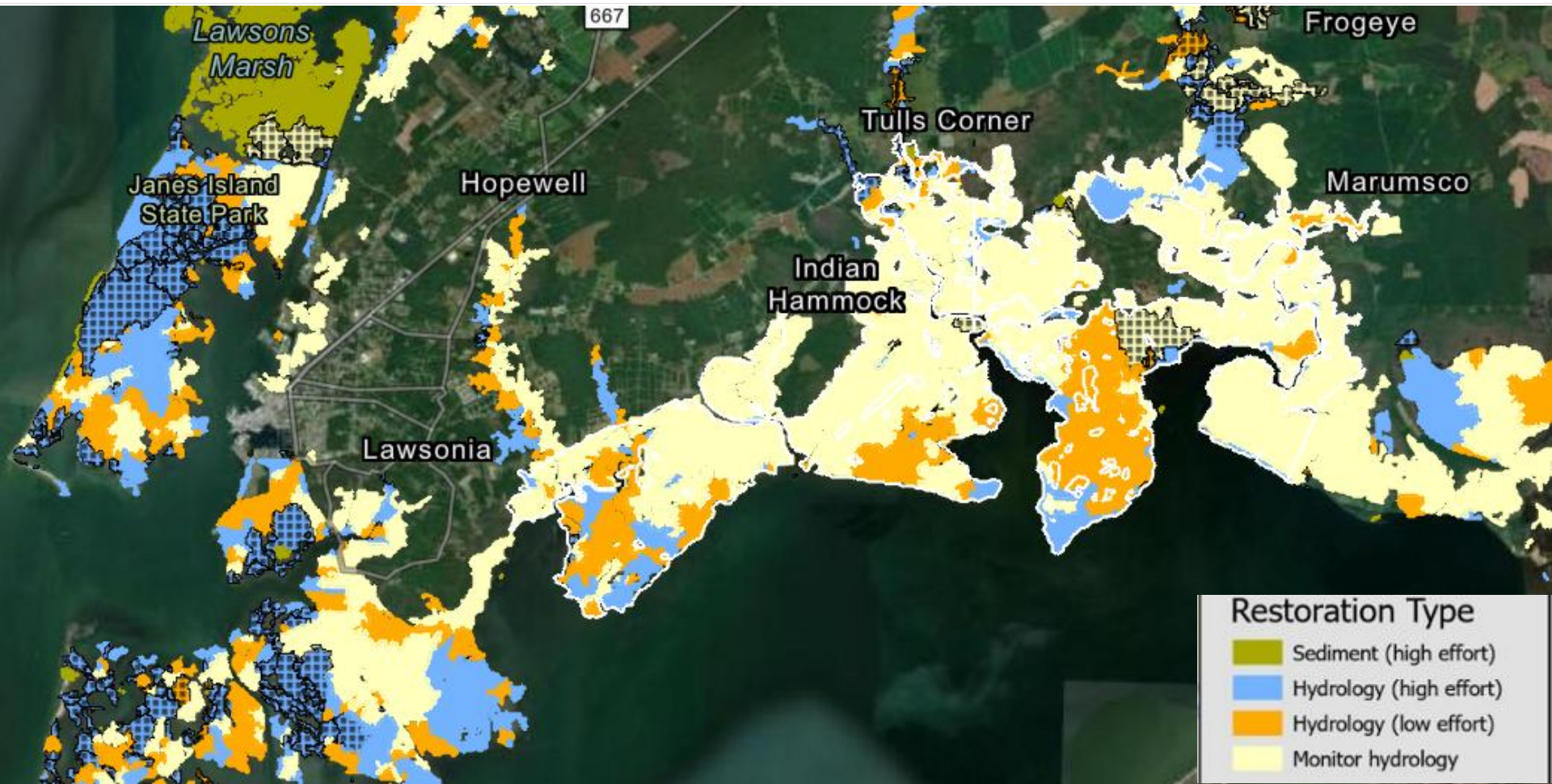
# Restoration Decision Model

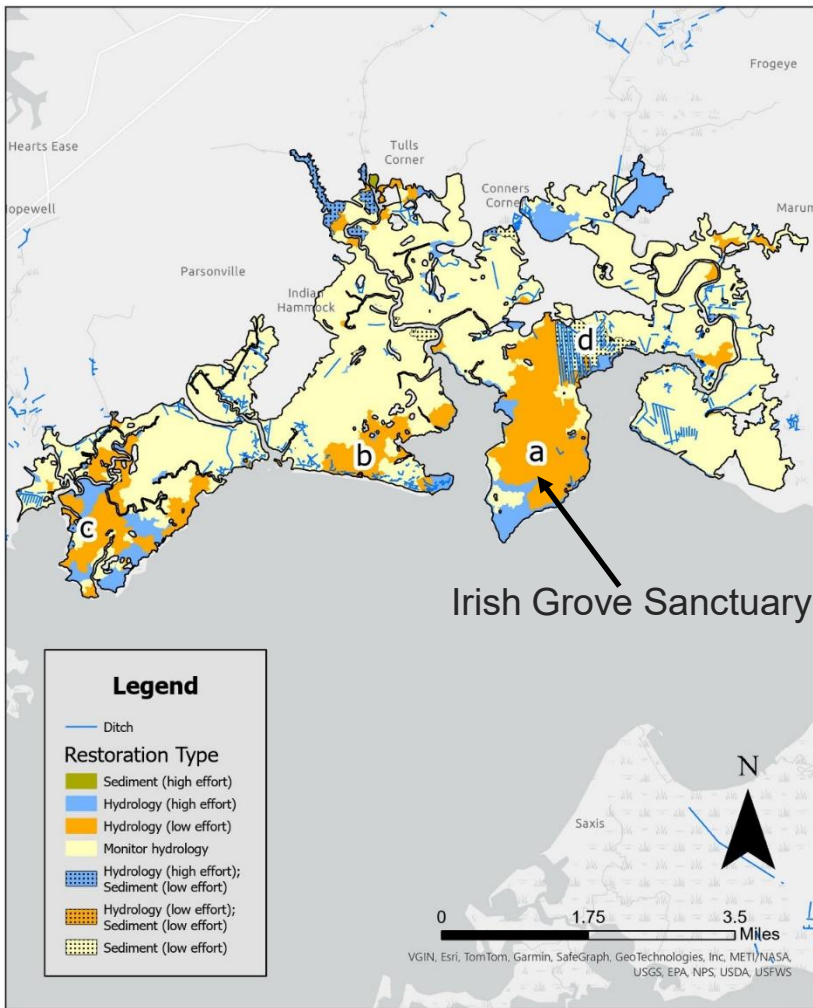
Based on UVVR and SLAMM

Designated outcomes for

- Hydrological repair (runnels, other)
- Sediment placement







## Priority Marsh Areas: a strategic approach to long-term marsh conservation

- Recognize that we cannot save all of today's marshes.
- Prioritize the most resilient marshes and best quality habitat – most feasible marsh landscapes to maintain long-term.
- 29,140 ac of PMAs identified in MD.
- Identify marsh areas needing restoration within PMAs (*letters on map*).
- Begin with “low-hanging fruit” – low-cost, low-tech hydrologic repair (runnels)



## Hydrological Repair (Runnels) at Irish Grove Sanctuary

Project goals:

1. Reduce the extent of impounded water on the marsh.
2. Re-establish healthy native marsh vegetation in areas that have experienced die-off.
3. Increase use by Saltmarsh Sparrow and other high marsh birds and wildlife.



# Hydrological Repair (Runnels) at Irish Grove Sanctuary

## Partners

- USFWS (funder and team member)
- Alice Besterman lab, Towson University
- Andy Baldwin lab, University of Maryland
- Maryland Ornithological Society (landowner)
- Sustainable Science, LLC

MDE, USACE permits in hand  
Construction – Fall 2026

## Irish Grove is an ideal site for runnels. Why?

1. High quality high marsh habitat – dense *Spartina patens* vegetation.
2. Recent deterioration of habitat due to pool and panne expansion.
3. Pools are high enough in the tidal prism to lower water levels with runnels without introducing excessive tidal scouring.
4. Many pools and pannes are isolated from tidal drainage and can be connected with short runnels.

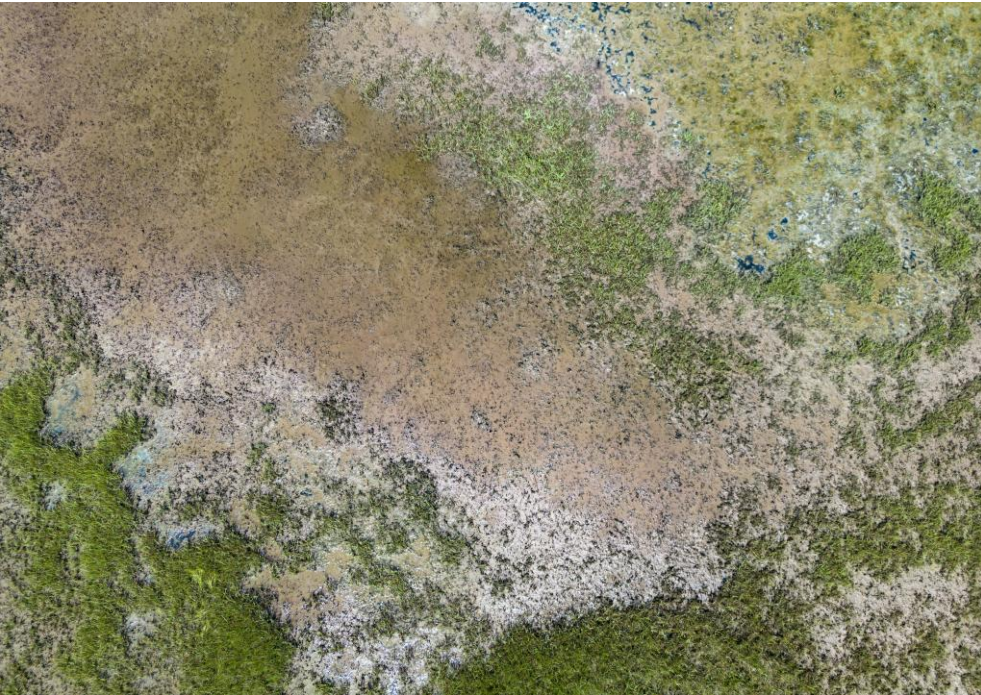


## Irish Grove is an ideal site for runnels. Why?

1. High quality high marsh habitat – dense *Spartina patens* vegetation.
  - To restore lost vegetation, we need enough remaining vegetation (biomass and rhizome “capital”) to facilitate rapid spread into treated areas.

## Irish Grove is an ideal site for runnels. Why?

2. Recent deterioration of habitat due to pool and panne expansion.



## Pool expansion at Irish Grove Pool P3, 2013 - 2023



Oct 2013

Google Earth

Nov 2023

## Irish Grove is an ideal site for runnels. Why?

3. Pools are high enough in the tidal prism to lower water levels with runnels without introducing excessive tidal scouring.

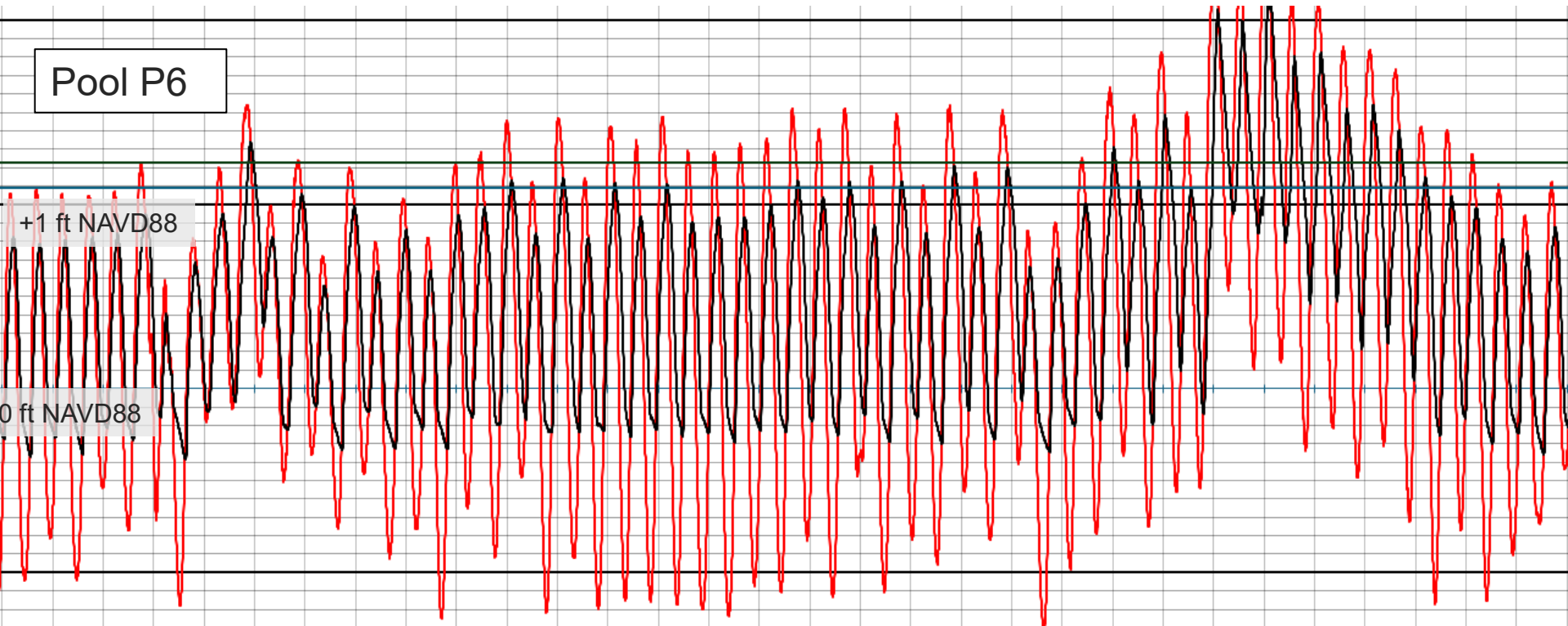


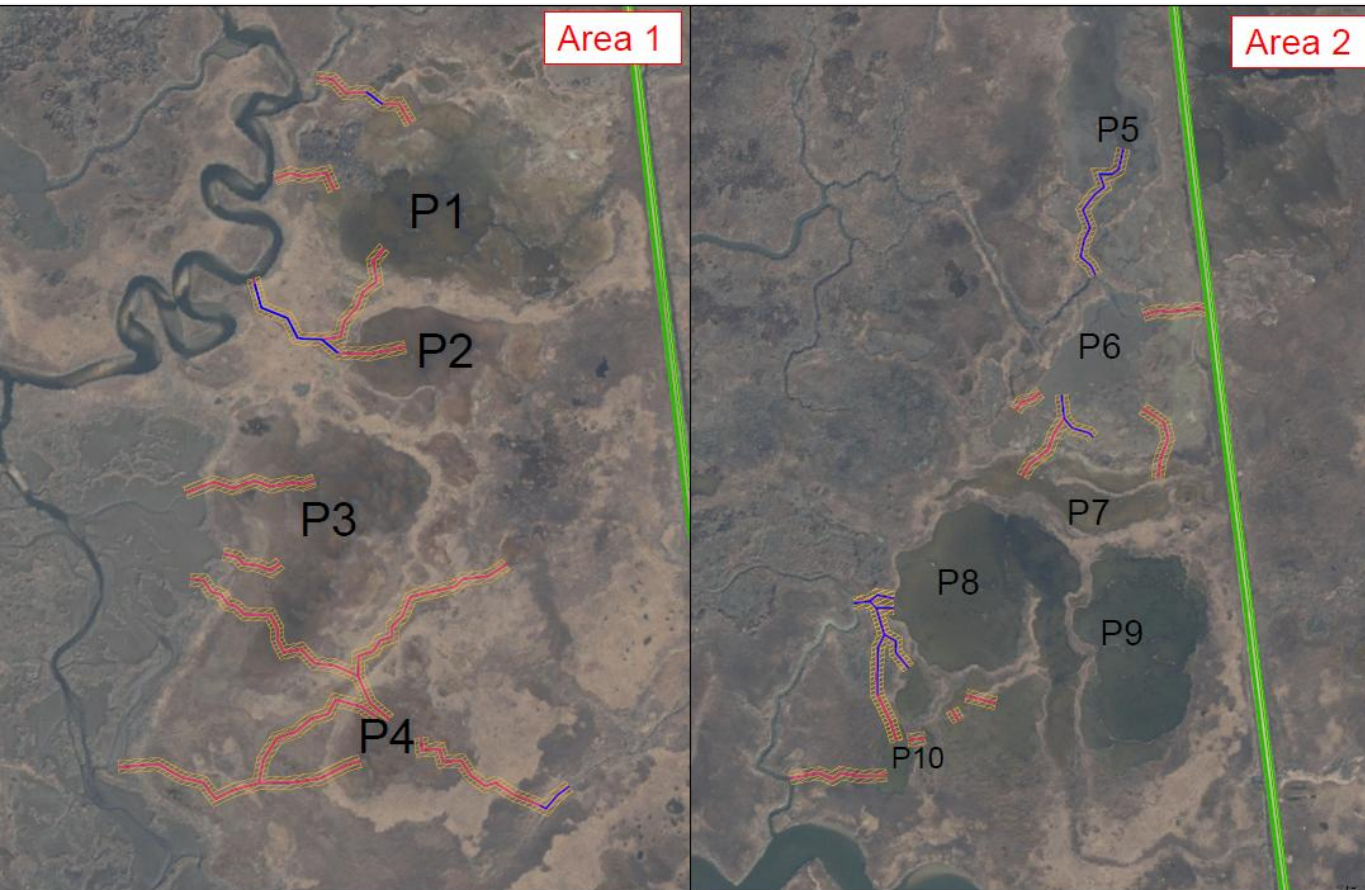


## **Irish Grove is an ideal site for runnels. Why?**

4. Many pools and pannes are isolated from tidal drainage and can be connected with short runnels.
  - The goal is not only to lower water levels in the pools but also to relieve waterlogging in pannes on the adjacent marsh platform before soil collapse occurs.
  - The goal is not to drain pools completely, but to lower water level enough to drain adjacent pannes.

In contrast to pool P3, P6 would not benefit from runnels because it is significantly tidal.





## Original runnel design at Irish Grove (currently [April 2026] under revision)

- Area 1 + Area 2 = 73 acres
- Being revised for fewer, shorter runnels
- Adaptive, phased approach to construction.

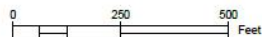
Proposed Runnel Locations  
Existing Feature - Cleaning



Pool Label P#

Rumbly Point Road

Hummock Placement Zone (see pg. 4)



## Excavated soil used for hummocks (“marsh pancakes”)

**Purpose:** Create slightly raised areas (12 inches) as nest sites for Saltmarsh Sparrow.

- Nests on hummocks will have reduced flood risk.
- Hummocks will naturally vegetate with *S.patens*/*Distichlis* vegetation (or could be planted).
- Hummock profile is low, smooth and flat.....hence the term “pancakes”
- Should not create a conspicuous feature that could attract nest predators.



Galilee Marsh, RI (April 2025)