Delaware Department of Natural Resources and Environmental Control
Delaware Coastal Management Program

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11/5/2026
By DCMP

Initial Review: _____
Updated On: _____
Complete: _____
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Coastal Zone Management Act Federal Consistency Form

This document provides the Delaware Coastal Management Program (DCMP) with a Federal Consistency Determination or Certification for activities regulated under the Coastal Zone Management Act of 1972, as amended, and NOAA's Federal Consistency Regulations, 15 C.F.R. Part 930. Federal agencies and other applicants for federal consistency are not required to use this form; it is provided to applicants to facilitate the submission of a Consistency Determination or Consistency Certification. In addition, federal agencies and applicants are only required to provide the information required by NOAA's Federal Consistency Regulations.

Project/Activity Name:	Port Mahon Salt Marsh Hydrology Restoration

I. Federal Agency or Non-Federal Applicant Contact Information:

Contact Name/Title: Brian Marsh/Team Lead

Federal Agency Contractor Name (if applicable): _____

Federal Agency: USFWS Delaware Bay Coastal Program
(either the federal agency proposing an action or the federal agency issuing a federal license/permit or financial assistance to a non-federal applicant)

Mailing Address: Delaware Bay Coastal Program, 2591 Whitehall Neck Road, Smyrna, DE 19977

City: Smyrna State: DE Zip Code: 19977

E-mail: [redacted] Telephone #: [redacted]

II. Federal Consistency Category:

- (●) Federal Activity or Development Project (15 C.F.R. Part 930, Subpart C)
- ( ) Outer Continental Shelf Activity (15 C.F.R. Part 930, Subpart E)
- ( ) Federal Financial Assistance (15 C.F.R. Part 930, Subpart F)
- ( ) Federal License or Permit Activity (15 C.F.R. Part 930, Subpart D)
- ( ) Federal License or Permit Activity which occurs wholly in another state (interstate consistency activities identified in DCMP's Policy document)

III. Detailed Project Description (attach additional sheets if necessary):

See included project narrative and plans. To improve the hydrology, resilience, and habitat of the 114-acre targeted area at the Davey Crockett Tract of the Little Creek Wildlife Area in Kent County, Delaware, the USFWS proposes 2,993 linear ft of strategic, shallow, and partial reopening of ditches; 463 linear ft of runnels to connect saturated or inundated areas of marsh to tidal channels, and to connect areas of ditch maintenance to each other with approximately 800 linear feet of new shallow channel. The footprint of these three types of channels/modifications will be approximately 5,752 square feet. We expect the ditch maintenance, creation of the new channels, and runneling to create up to a maximum of 318 cyd of material (roots, rhizomes, and peat) to be beneficially placed on the marsh over a maximum area of 8,586 square feet. This maximum is conservatively calculated for permitting and assumes all the digging is to the maximum proposed, there are no pockets of water in the targeted areas, and all the material is solid.

IV. General Analysis of Coastal Effects (attach additional sheets if necessary):

The effects of the project will be beneficial to salt marsh and to resilience. We propose reducing inundation and saturation rates over approximately 114 acres to lead to preservation of existing high-quality vegetation and improvement to degrading vegetation. Healthier vegetation will increase biological accretion and help the marsh keep pace with sea level rise. Healthier vegetation will increase fish and wildlife habitat quality, including for avian nesters such as the State-listed (endangered) and federally at-risk saltmarsh sparrow (Ammodramus caudacutus). We want to maintain resilience of smooth cordgrass (Spartina alterniflora/Sporobolus alterniflorus) low marsh and prevent further and reverse degradation of saltmeadow cordgrass (Spartina patens/Sporobolus pumilus) high marsh with a conservative and strategic plan that will minimize disturbance.

V. Detailed Analysis of Consistency with DCMP Enforceable Policies (attach additional sheets if necessary)**:**

Policy 5.1: Wetlands Management

The project will restore, preserve, and protect the functions of these wetlands by reducing current degradation from high inundation and saturation rates that have reduced vegetation health. Restoring hydrology will halt some of the wetland degradation, stabilize the salt marsh platform, improve habitat, increase biological accretion (underground accretion) that is critical for elevation gains needed to keep up with SLR, as well as increase the likelihood that suspended sediments accrete.

Policy 5.2: Beach Management

Not applicable

Policy 5.3: Coastal Waters Management (includes wells, water supply, and stormwater management. Attach additional sheets if necessary)

The project will restore, preserve, and protect intertidal salt marsh. Without this project, we are concerned that the area will continue to lose high marsh vegetation, continue to have marsh platform breaking down and becoming unconsolidated sediment, continue to not gain elevation due to lost biological (underground) accretion and normal sediment accretion and therefore have relative elevation losses, continue to lose high quality habitat to salt marsh species, and to become more destabilized. Eventually, these areas could transition mostly to low marsh vegetation or bare sediment.

Policy 5.4: Subaqueous Land and Coastal Strip Management

The project will restore and protect the natural environment of salt marsh. The project will not have an adverse effect on economics, aesthetics, or neighboring land uses.

Policy 5.5: Public Lands Management

The project occurs on State public land being part of the Little Creek Wildlife Area. The project will not alter the use or potential use of the land and will not create a requirement for added land management. Access will not be changed through the project. The project will help with the Delaware Division of Fish and Wildlife's land management by maintaining the high marsh habitat they are interested in for the area.

Policy 5.6: Natural Lands Management

The project will help with the Delaware Division of Fish and Wildlife's land management goals for the area by helping to maintain the salt marsh present at the site, particularly high marsh habitat, which is used by saltmarsh sparrow and other birds of conservation concern. We have coordinated with Delaware Division of Fish and Wildlife since the project's inception.

Policy 5.7: Flood Hazard Areas Management

The project does not involve actions that may affect state or local flood hazard areas management.

Policy 5.8: Port of Wilmington

Not applicable

Policy 5.9: Woodlands and Agricultural Lands Management

Not applicable

Policy 5.10: Historic and Cultural Areas Management

The project area is of interest to the State and Tribes for cultural resources. Both have expressed concern that creating new channels, even shallow runnels, could expose pre-contact cultural resources. Therefore, following input from DE SHPO (see included letter), we will have SOI certified archaeological monitoring of the site while any runnel or new channel is created. Per our coordination with DE SHPO, they have said we will not need the monitors during ditch maintenance. We our coordinating with the Tribes to ensure they can have Tribal Monitors on site throughout the work.

Policy 5.11: Living Resources

The project will benefit living resources by slowing or halting the degradation of the salt marsh, restoring vegetation, restoring resilience, and restoring habitat. The project design will prevent adverse impacts to resources by concentrating much of the work in the footprint of existing salt marsh ditches, implementation will take place outside of the growing season, equipment use will be minimized and only involve low ground pressure equipment, and the project will not allow the loss of unconsolidated sediment from the system. The project will benefit nongame and rare and endangered State species that may increase nesting in the area such as saltmarsh sparrow.

Policy 5.12 Mineral Resources Management

Not applicable

Policy 5.13: State Owned Coastal Recreation and Conservation

The project will not change coastal recreation of the area. The area is salt marsh and limited to only passive recreation or hunting, neither of which will be changed by the work or access to either be changed. The project goal is conservation of salt marsh and has been developed in coordination with the Delaware Division of Fish and Wildlife who manages the property.

Policy 5.14: Public Trust Doctrine

The project does not increase limits on public access or use of the sites. The project will help maintain the area as salt marsh for the benefit of the public.

Policy 5.15: Energy Facilities

Not applicable

Policy 5.16: Public Investment

The project does not necessitate State public investment. The project proponent is a federal agency with NGO partners. The State's Mosquito Control Section will be helping with the ditch maintenance component of the work but through funding from the US Fish and Wildlife Service specific for the work.

Policy 5.17: Recreation and Tourism

The project area is not easily accessible to the public other than potentially hunting or passive recreation such as bird watching. The project will help maintain the natural salt marsh cover of the area and the recreation and ecotourism it offers.

Policy 5.18: National Defense and Aerospace Facilities

Not applicable. The project footprint does not include or impact in any way the fuel line where jet fuel is transferred from barge at Port Mahon to the tank farm on Port Mahon Road.

Policy 5.19: Transportation Facilities

Not applicable

Policy 5.20: Air Quality Management

Not applicable

Policy 5.21: Water Supply Management

Not applicable

Policy 5.22: Waste Disposal Management

Not applicable

Policy 5.23: Development

Not applicable

Policy 5.24: Pollution Prevention

Not applicable

Policy 5.25: Coastal Management Coordination

This project has potential value for elsewhere in the State on and off State lands for showing how subtle hydrological restoration may improve coastal resources. We welcome coordination on this project amongst agencies interested in coastal resource conservation and preservation.

VI. JPP and RAS Review (Check all that apply)**:**

Has the project been reviewed in a monthly Joint Permit Processing and/or Regulatory Advisory Service meeting?

☒ JPP ☐ RAS ☒ None

*If yes, provide the date of the meeting(s): On 6/20/24 we had a meeting on a separate but very similar project at Cedar Creek that we are now applying for as well. These other projects were briefly discusse

VII. Statement of Certification/Determination and Signature (Check one and sign below):

☒ **FEDERAL AGENCY CONSISTENCY DETERMINATION.** Based upon the information, data, and analysis included herein, the federal agency, or its contracted agent, listed in (I) above, finds that this proposed activity is consistent to the maximum extent practicable with the enforceable policies of the Delaware Coastal Management Program.

OR

☐ **FEDERAL AGENCY NEGATIVE DETERMINATION.** Based upon the information, data, and analysis included herein, the federal agency, or its contracted agent, listed in (I) above, finds that this proposed activity will not have any reasonably foreseeable effects on Delaware's coastal uses or resources (Negative Determination) and is therefore consistent with the enforceable policies of the Delaware Coastal Management Program.

OR

☐ **NON-FEDERAL APPLICANT'S CONSISTENCY CERTIFICATION.** Based upon the information, data, and analysis included herein, the non-federal applicant for a federal license or permit, or state or local government agency applying for federal funding, listed in (I) above, finds that this proposed activity complies with the enforceable policies of the Delaware Coastal Management Program and will be conducted in a manner consistent with such program.

Signature:	BRIAN MARSH Digitally signed by BRIAN MARSH Date: 2026.11.05 10:01:40 -05'00'		
Printed Name:		Date:	

Pursuant to 15 C.F.R. Part 930, the Delaware Coastal Management Program must provide its concurrence with or objection to this consistency determination or consistency certification in accordance with the deadlines listed below. Concurrence will be presumed if the state's response is not received within the allowable timeframe.

Federal Consistency Review Deadlines:

Federal Activity or Development Project (15 C.F.R. Part 930, Subpart C)	60 days with option to extend an additional 15 days or stay review (15 C.F.R. § 930.41)
Federal License or Permit (15 C.F.R. Part 930, Subpart D)	Six months, with a status letter at three months. The six month review period can be stayed by mutual agreement. (15 C.F.R. § 930.63)
Outer Continental Shelf Activity (15 C.F.R. Part 930, Subpart E)	Six months, with a status letter at three months. If three month status letter not issued, then concurrence presumed. The six month review period can be stayed by mutual agreement. (15 C.F.R. § 930.78)
Federal Financial Assistance to State or Local Governments (15 C.F.R. Part 930, Subpart F)	State Clearinghouse schedule

OFFICIAL USE ONLY:

Reviewed By:	Fed Con ID:	Date Received:
Public notice dates: to	Comments Received: ☐ NO ☐ YES *[attach comments]*	
Decision type: *(objections or conditions attach details)*	Decision Date:	

PROJECT NARRATIVE
Project title: Port Mahon Salt Marsh Hydrology Restoration

PROJECT PARTNERS

Delaware Division of Fish and Wildlife, U.S. Fish and Wildlife Service Delaware Bay Coastal Program, Ducks Unlimited, and Partnership for the Delaware Estuary

PROJECT LOCATION

Davey Crockett Tract, Little Creek Wildlife Area, Kent County, Delaware. The site is a 114-acre area of salt marsh west of Port Mahon Road.

Approximate project center is 39.182 N -75.409 E.

Parcel Number: 4-00-07000-01-0500-00001 and 4-00-07000-01-1100-00001

LANDOWNER

Delaware Division of Fish and Wildlife

PROJECT GOAL

Reducing inundation and saturation rates over approximately 114 acres to lead to preservation of existing high-quality vegetation and improvement to degrading vegetation. Healthier vegetation will increase biological accretion and help the marsh keep pace with sea level rise. Healthier vegetation will increase fish and wildlife habitat quality, including for avian nesters such as the State-listed (endangered) and federally at-risk saltmarsh sparrow (*Ammodramus caudacutus*). We want to maintain resilience of smooth cordgrass (*Spartina alterniflora/Sporobolus alterniflorus*) low marsh and prevent further and reverse degradation of saltmeadow cordgrass (*Spartina patens/Sporobolus pumilus*) high marsh with a conservative and strategic plan that will minimize disturbance.

PROJECT RATIONALE AND NEED

The project area has relatively healthy salt marsh and provides good habitat but some of the vegetation shows signs of stress that indicate the area is beginning to degrade. Degradation includes areas of both low marsh and high marsh. The likely cause for the degradation is water being unable to move off the site leading to higher saturation rates than desirable especially for high marsh vegetation. A site assessment has suggested that the primary cause of this trapped water is altered hydrology associated with a history of ditching creating too many channels, loss of natural channels, decreased microtopography, and ultimately ditches naturally filling back in leaving too few channels for what the altered marsh requires. Ditch maintenance and runneling are needed to enhance drainage and reconnection to the tides which will lead to decreased saturation rates and improved conditions for vegetation that will enhance the habitat and resilience of the site.

Without the project, the most likely trajectory is for the area of dense healthy *S. patens* to decrease, for more of the marsh to continue to convert to low marsh, unvegetated pools will begin to form, and small existing pools may expand leading to less resilience and lower habitat quality for species of conservation concern. The relative elevation capital of the project area compared to other areas of marsh and compared to sea level will likely decrease due to decreased rates of biological accretion (belowground growth)

making it even harder for water to move off the marsh either through sheet flow or channels (Turner et al. 2002). Data we have collected suggest the site is in early stages of degradation making it a good opportunity for relatively low-cost, low-tech, and low disturbance methods of restoration to have significant benefit. Without a project now, the marsh will become less likely to benefit from these simpler techniques of restoration in the future.

Any degradation of this salt marsh is concerning for a variety of reasons but especially because of the site's value to tidal marsh birds. The high marsh at Port Mahon is likely the most productive State-owned site for saltmarsh sparrow, a species which is State-listed (endangered) in Delaware and federally considered at-risk and under consideration for federal listing. Saltmarsh sparrow population declines range-wide are estimated at 9% per year and are associated with degrading salt marsh (Hartley et al. 2020). Delaware Division of Fish and Wildlife, the U.S. Fish and Wildlife Service, University of Delaware, Partnership for the Delaware Estuary, and others have data on saltmarsh sparrow at Port Mahon, including surveys using the Salt Marsh Habitat and Avian Research Program protocols, rapid assessment demographic protocols, and acoustic recording units. Public documentation through eBird and similar databases also show the site's importance to this species. The State-listed (endangered) and federally listed (threatened) eastern black rail (*Laterallus jamaicensis jamaicensi*) may use this site as well and would benefit from the same enhancement to hydrology and vegetation that saltmarsh sparrow benefit from. Virginia rail (*Rallus limicola*), a State species of conservation concern, is relatively abundant at Port Mahon compared to other Delaware Bay marshes and would also benefit from maintained and enhanced vegetation health at the site.

SITE CONDITIONS AND HISTORY

The project area is salt marsh that has been altered in a variety of ways to disrupt natural hydrology and vegetation patterns. Examples of hydrologic disruptions include the following.

- Port Mahon Road has altered and mostly removed tidal connections to Delaware Bay from the south and east. Originally some tidal connections were maintained under the road but these no longer functionally persist. The date the road was constructed is not known but was likely present to some extent during the 19th century to support a lighthouse and small commercial and recreational community once located at Port Mahon (Kardas and Larrabee 1981).
- The salt marsh began to be significantly ditched by at least sometime in the mid-1930s creating significantly more channels than the original marsh would have had. A 1936 topographic map does not yet show significant ditching, a 1937 aerial shows extensive ditching having recently occurred, and a 1949 topographic map shows the marsh fully ditched (see figures at end of narrative). Ditching would have drastically converted the hydrology of the marsh from very few but effective channels in equilibrium with the marsh and with subtle gradients and positive relief suited for moving water off the marsh to a condition with too many channels for the area, channels with low energy water flows, ineffective channel networks for moving water or sediment, and a very flat topography vulnerable to elevation loss and increased inundation rates (Bromberg Gedan and Silliman 2009, Smith et al. 2017).
- As marsh management practices changed over the course of the 20th century, the ditches across the marsh were generally not kept open and gradually began to fill in leaving too few functional channels. Most of the ditches across the project area have gradually completely or partially filled in with sediment and vegetation to either become no longer distinguishable or to be remanent ditches with minimal and constricted flow. Ditches naturally filling in can be a way for the marsh to heal. However, when the marsh has adapted to having the ditches and altered conditions and

then those ditches are lost, it exacerbates water staying on the marsh surface and sediment becoming too consistently saturated for healthy vegetation. Ditches created too many channels and when the ditches filled in the problem switched in some cases to having too few channels meaning problems such as the salt marsh platform experiencing flooding on spring and storm tides or precipitation events but with minimal corresponding ebbing.

- The salt marsh and beach on the east side of Port Mahon Road has been significantly eroding at times at the fastest rate known for eroding shoreline in Delaware. This may have resulted in more tidal water getting across Port Mahon Road into the site where it could not easily leave.
- Open Marsh Water Management (OMWM) was done in high marsh areas at the site sometime in the late 1980s to manage mosquitoes. The OMWM does not appear to be significantly impacting the marsh currently but some of the OMWM pools appear to have high levels of standing water that keep the surrounding marsh too saturated leading to degrading vegetation.

The entire project area is wetland. Vegetation in most of the project area is dominated by a mix of tall form *S. alterniflora* and *S. patens* with infrequent small patches of saltgrass (*Distichlis spicata*). Invasive common reed (*Phragmites australis*) occurs in small patches across the marsh but is prevalent in the highest elevations along Port Mahon Road. Elevations generally slope from the project area down towards the west and the middle of the salt marsh. Most tidal flow in and out of the ~1,000-acre marsh that the project site is a part of is through a large tidal creek that flows north and enters what is known as Kelly's Ditch, a channelized tidal creek that flows east into the Mahon River near its mouth with Delaware Bay. See figures, tables, and site photos at the end of the narrative for more explanation.

Port Mahon Salt Marsh Hydrology Restoration project area for 2026 and showing the area of salt marsh assessed during 2023 to 2025.

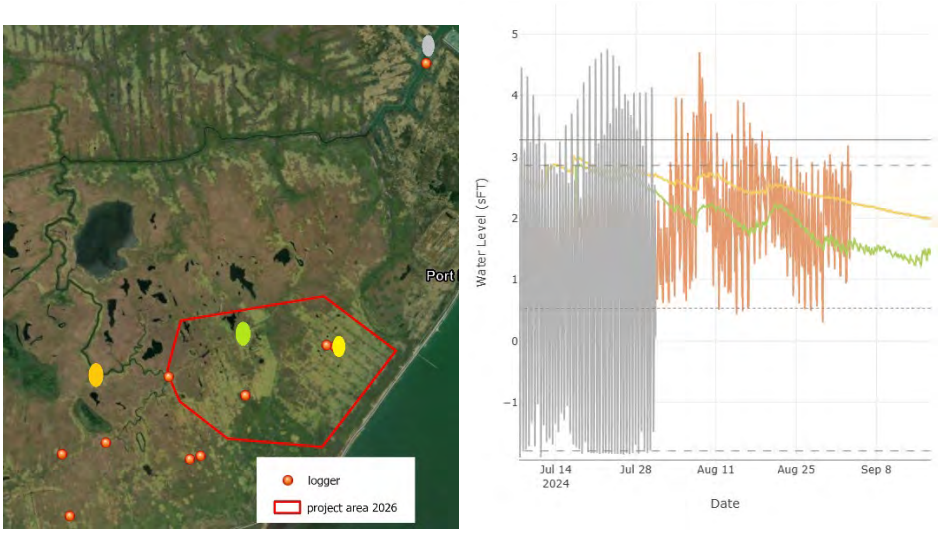


A low-cost/low-tech salt marsh restoration team comprised of project partners has been gathering data at Port Mahon since the summer of 2023 as well as at other sites in Delaware and New Jersey. Data collected to assess this and other sites for restoration need and appropriate design include elevation, hydrology, and the vegetation, nekton, and avian communities. The assessment site was a 210-acre area that includes most of the proposed project area. See figures at the end of the narrative for a map of data sampling points at Port Mahon for biological data and this data can be provided by request.

Elevation and hydrology are especially important for determining restoration potential and design at this site. RTK elevation data were obtained mostly in 2024. We compared 627 biobenchmark points where elevation and vegetation both were recorded. The data show that the project area has elevation capital (i.e., positive relief relative to the tideshed and local tidal datumns) and water will move off the site if select ditches are maintained. The data show that across the assessment site as a whole and when broken down into smaller areas, the high marsh showing signs of stress is lower than that for healthier looking high marsh by 0.31 ft for all the points combined and a mean difference of 0.11 ft (stdev 0.07) for the combined differences for seven smaller areas. Reducing standing water in these lower areas by improving the hydrology will improve vegetation. The data also show that *S. alterniflora* low marsh is consistently lower than the *S. patens/D. spicata* high marsh but not by a lot. Looking at all the points on the marsh the difference is 0.21 ft and the mean difference for the logger locations combined is only 0.14 ft (stdev = 0.05). Because of this small difference, some of this *S. alterniflora* marsh should revert to *S. patens* marsh with a small reduction in saturation rates through this project. Our observations of the site also show that despite relatively high elevations towards the north end of the site there are areas that remain saturated suggesting improving the areas is a matter of improving the hydrology more than there being an elevation deficit.

We have monitored the Port Mahon marsh with thirteen water level loggers (HOBO Water Level Data Logger MX2001 and Hyfi Logger) starting in July 2024 and continuing to some degree currently. The below map shows where these loggers were and highlights four with data in the graph in corresponding color for an example period of time. The water levels show the lack of tidal influence at the project site and indicate the need for ditch maintenance. The yellow and green loggers are in channels in the project area but the tidal influence has become minimal because filled parts of those channels as shown by almost no variation of water levels over the tidal cycles compared to the orange and grey colored data from loggers exposed to the tides elsewhere at the Port Mahon marsh.

Water logger locations on left and an example period of data from four of the loggers on the right showing the limited tidal influence in the project area.



PROPOSED PLAN

We propose conservatively and strategically implementing two restoration measures. First, sections of mosquito ditch will be partially and shallowly reopened (i.e., ditch maintenance) to create a more

functional channel network. This will allow spring tides, precipitation, or stormwater cresting over Port Mahon Road to more effectively drain off the site leading to reduced inundation/saturation rates that will be more favorable to the desired vegetation. Second, we propose to create runnels to connect areas beginning to pond to functional channels which will allow the water to move off the marsh platform leading to reduced inundation/saturation rates making conditions more favorable to the desired vegetation. A runnel is a shallow channel cut through marsh platform where typically there has not been a natural channel or ditch before. In three areas, sections of new ditch will be created to reconnect some of the areas targeted for ditch maintenance and runnels to tidal influence in a way that will reduce the overall footprint of the project's disturbance.

The proposed plan opens up/creates a conservative amount of channel area to reach the project goal. The proposed plan will minimize disturbance by opening up/creating the minimum number of channels we believe are necessary, by using low ground pressure equipment, or using hand tools in some areas. The plan minimizes sediment redistribution or sediment loss from the marsh by keeping the ditch maintenance shallow and by the natural isolation of the site.

We are also being conservative with the proposed design by keeping the ditch maintenance shallow which will decrease water levels only the minimum amount needed to benefit the marsh platform. We do not intend to allow OMWM or open ditch remnants acting as high marsh pools to completely drain on an ebb tide. Keeping water in these areas is important for marsh health and mosquito management. However, currently the water level in these sections is often too high leading to excessively saturated neighboring high marsh. A slight decrease in water levels in these sections would help the neighboring high marsh which we intend to do by reconnecting the areas by only shallow new channels or shallow ditch maintenance.

Ditch maintenance

As detailed in the plans (green linear features), we propose 2,993 linear ft of strategic, shallow, and partial reopening of ditches. Most of the remanent ditches are loosely or partly filled but conditions vary from foot to foot. Some areas are more completely filled in with more compact sediment and well rooted vegetation whereas others are barely filled and sometimes with only dense vegetation cover growing over the top of standing water (i.e., "zombie ditches" that look like solid marsh but are very soft). To connect areas of ditch maintenance to each other approximately 800 linear feet of new shallow channel (purple linear features on the plans) will be created. Without this new channel, the project would need to open up a much greater linear footage of remanent ditch resulting in more disturbance.

Ditch maintenance opens up upstream areas, marsh adjacent to the ditch maintenance, and also remanent perpendicular connecting ditches to more flow/drainage. Some of the perpendicular ditches appear entirely filled in but there can still be some flow including subterranean flow under an entirely vegetated surface. For now, we will not open the perpendicular channels with ditch maintenance, but they may be considered for future projects if needed. Because each perpendicular channel is filled unevenly along its length, it is difficult to predict how much they will lower water levels in the marsh above their footprints once they are connected to a more functional channel. Some of these remanent ditches service areas with extensive ponding whereas others are mostly in areas with healthy *S. alterniflora* marsh. Keeping the ditch maintenance shallow will limit the amount of unpredictable flow from the perpendicular ditches.

The depth of ditch maintenance will vary and will require some in-field determinations at the time of installation. However, in the larger central ditch, we proposed removing up to approximately 18 inches of depth relative to the surrounding marsh platform (i.e., not necessarily relative to the current ditch surface

which may be lower). This is enough depth to ensure flow is restored and is above the depth where unconsolidated sediment at the bottom of the original ditch profile could be mobilized. The material will be removed by a pontoon excavator operated by the Delaware Mosquito Control Section using a bucket approximately 18 inches wide or potentially a cutter head. Reopening the ditches to approximately 18 to 20 inches wide will create a functional channel not likely to quickly be reconstricted by *S. alterniflora*. The reestablished flows will also help keep these reopened areas from quickly becoming reconstricted. Wider widths would further prevent constriction but would also mean moving more sediment creating more disturbance and more cost for marginal benefit and also we prefer flow to be concentrated in a narrower area that will become more like a natural channel maintained by its own flow.

The new sections of channel will also vary in depth but will be approximately 10 to 12 inches deep in the southwestern half of the project area and shallower at 6-10 inches in the more northern half of the project area where we want to only slightly decrease water levels in the remanent ditches that are acting like pools or the OMWM that connects to them. In the southwestern areas, the excavating will be done by the Delaware Mosquito Control Section using a bucket approximately 18 inches wide or potentially a cutter head. In the northern half closest to the highest quality *S. patens* marsh some of the opening up of new channel may be done by project partners using hand tools to have more control over creating shallower depths and narrower widths compared to what equipment can do.

The proposed design for ditch maintenance and creation of channels minimizes the number of channels reopened. A section of tidal marsh being dominated by one main channel (i.e., single channel hydrology) is generally most effective at moving water, preventing revegetation within the channel footprint, and is what typically occurs on natural unaltered marshes. The proposed depth of ditch maintenance and resulting hydrology will not remove all water from the site. For example, the targeted depth of ditch maintenance is intended to leave much of the water in the linear pools in the northeast of the site. These linear features are acting somewhat like natural high marsh pools that can help maintain high marsh vegetation. We only want to remove enough water from them so that the bordering marsh is not too consistently saturated for maintaining high marsh vegetation.

Runnels

As detailed in the plans, we propose 463 linear ft of runnels. Approximately fourteen areas are proposed for short runnels averaging about 35 ft long. Runnel depths will vary based on the conditions as interpreted during installation but most of the runnels will be approximately 7 in below the surrounding platform elevation. Runnel depths correspond to the desired water elevation in the area being drained. Unlike other sites where we may want some water to remain in an area targeted for a runnel, for this project area, the runnels will have a depth at least as low as the invert elevation of the area being drained. The average width of runnels will be under 1 ft. Runnels will be level to slightly sloped away from the pockets of marsh being restored towards functional ditches (i.e., ditches that are lower in depth/elevation and/or connected to channels lower in the tideshed). Runnel edges will be vertical to slightly sloped towards the centerline. All runnels will likely be hand dug with spades to allow maximum control of depth and width and to minimize impacts to surrounding marsh. Locations of runnels will be flagged ahead of time and installed potentially by staff from the project partners, volunteers, American Conservation Experience interns, or others.

Habitat Mounds

We expect the ditch maintenance, creation of the new channels, and runneling to create up to a maximum of 318 cyd to be beneficially placed on the marsh. This maximum is calculated for permitting and

assumes all the digging is to the maximum proposed and all the material is solid. However, many pockets of water are in the ditches, many areas will be slightly sloped reducing volumes, and much of the material is loose roots and rhizomes that will immediately condense and settle. Therefore, we expect the actual volume of material to be well below this maximum of 318.

If material is removed by hand or using an excavator bucket for ditch maintenance or runneling, it will be used to create habitat mounds in the immediate vicinity in low depressions on the marsh where vegetation has been lost or is degraded. Material can be placed in these areas directly from the excavator bucket. For areas that are hand excavated, the material can be placed in marsh sleds hand pulled across the marsh surface to suitable areas for placement. The sediment will add to microtopography and marsh elevation. If a rotary cutter is used for the ditch maintenance, it would disperse excavated material uniformly across the adjacent marsh. Habitat mounds will be no more than approximately 1 ft high when placed, gently pressed flat to the degree possible, and will be expected to settle significantly with any underlying vegetation being able to grow through them. Much of the material put into the mounds is rooted plants that will grow once in the mounds. The mounds would cover a maximum of 8,586 square feet but we expect the volume and square area to be much less.

The areal size of the mounds will vary based on the amount of material being removed in the immediate area and the size of the degraded marsh area where the mound is being placed. Most mounds will be less than 100 ft^2. Mound locations depicted on the plans are approximate locations. Exact locations and dimensions will be determined as installation occurs based on volumes of material being removed and the location of the areas on the marsh platform best suited to receive the material.

Timeline

All work will be done outside of the growing and tidal marsh bird nesting season. We expect installation of the project would take place in February or March 2027. Late winter installation of projects such as this are preferred because the marsh quickly enters into the growing season and the new growth will help stabilize disturbed areas. All runnels and ditch maintenance would likely be implemented during one period to the degree resources allowed to prevent remobilization and added disturbance to the stie. However, of the two restoration measures, ditch maintenance is the priority because it will be the biggest factor throughout the site in improving hydrology. Scheduling will be highly dependent on weather and partner schedules; however, we expect the installation time for both runnels and ditch maintenance would together be over the course of approximately 1 week.

Minimizing impacts to the marsh

Impacts to the salt marsh will be minimized. Construction will take place outside of the growing season and nesting season. Some of the marsh platform is still firm and can be walked on with little threat of compaction. However, in some areas where the marsh is softer we will use established paths, single entry points to the site, and in soft areas on the marsh where people are repeatedly walking and working we will walk on planks where necessary. Any equipment used at the site will be low-ground pressure machines (e.g., pontoon based).

MAINTENANCE AND ADAPTIVE MANAGEMENT PLAN

We do not expect extensive maintenance but do think the project will have greater success with some occasional maintenance by hand to remove mobilized sediment that has accreted in constriction points in runnels or ditch maintenance sections and potentially to remove new *S. alterniflora* re/growth (vertically

or horizontally) in these areas where it causes restrictions. As tidal influence is restored, the flows in the reopened channels will alter channel size some to fit the flow in them. This will be natural and expected leading to a new and more stable state closer to equilibrium for the project area.

MONITORING

The four variables listed below will demonstrate success for the project. Numbers one through three will begin to happen within one tidal cycle of implementation and can be measured by continuing to have water level loggers at the site at least during the growing season. Loggers may be temporarily removed during mid-winter to reduce ice formation that alters the data or damages the loggers. Number four will begin to be seen after one growing season but will likely take three growing seasons. Number four will be monitored with the least disturbance and cost by observing the areal extent of vegetation as evidenced by drone imagery from set x, y, and z coordinates during low tides after the growing season for at least 3 years, by images taken on the ground from set photo points, and by visual observation.

1) Reduced water levels on the marsh soon after implementation.
2) Reduced inundation rates of water on the marsh and saturation rates soon after implementation.
3) Increased agreement between the tidal patterns in the main tidal creek and the reopened ditches.
4) Increased vegetation density to areas of degraded vegetation.

REFERENCES CITED

Bromberg Gedan, K., and B.R. Silliman. 2009. Patterns of salt marsh loss within regions of North America. In Human Impacts to Salt Marshes: A Global Perspective. Ed. B.R. Silliman, et. al. (editors). Pp 253-265. University of California Press, Berkeley.

Hartley, M.J. and A.J. Weldon, eds. 2020. Saltmarsh Sparrow Conservation Plan. Atlantic Coast Joint Venture, Hadley, Massachusetts.

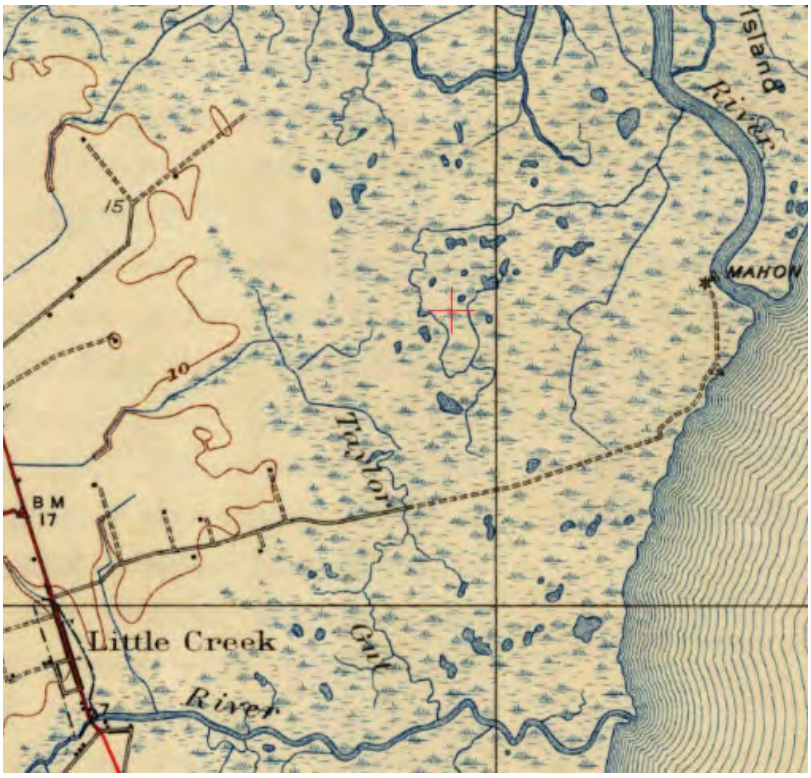
Kardas, S. and E. Larrabee. 1981. Cultural resource reconnaissance of Port Mahon, Delaware. Report prepared by Historic Sites Research, Princeton, New Jersey for the Department of the Army Philadelphia District Corps of Engineers. July 1981.

Smith, J.A.M., S. F. Hafner, and L. J. Niles. 2017. The impact of past management practices on tidal marsh resilience to sea level rise in the Delaware Estuary. Ocean & Coastal Management 149: 33-41.

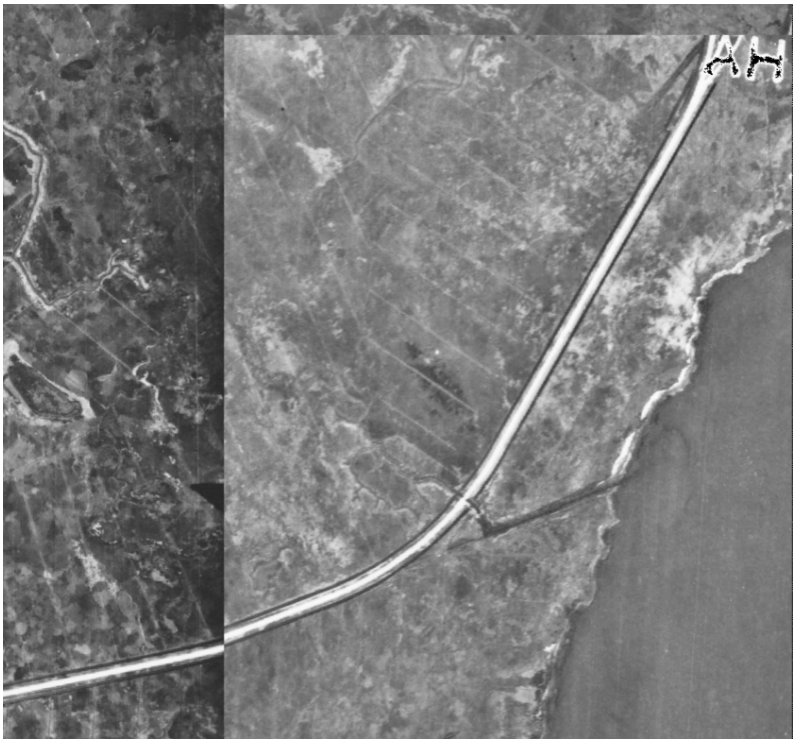
Turner, R.E., E.M. Swenson, and C.S. Milan. 2002. Organic and inorganic contributions to vertical accretion in salt marsh sediments. In: Weinstein, M.P., Kreeger, D.A. (eds) Concepts and Controversies in Tidal Marsh Ecology. Springer, Dordrecht.

TABLES AND FIGURES

1936 topo likely showing marsh just before ditching



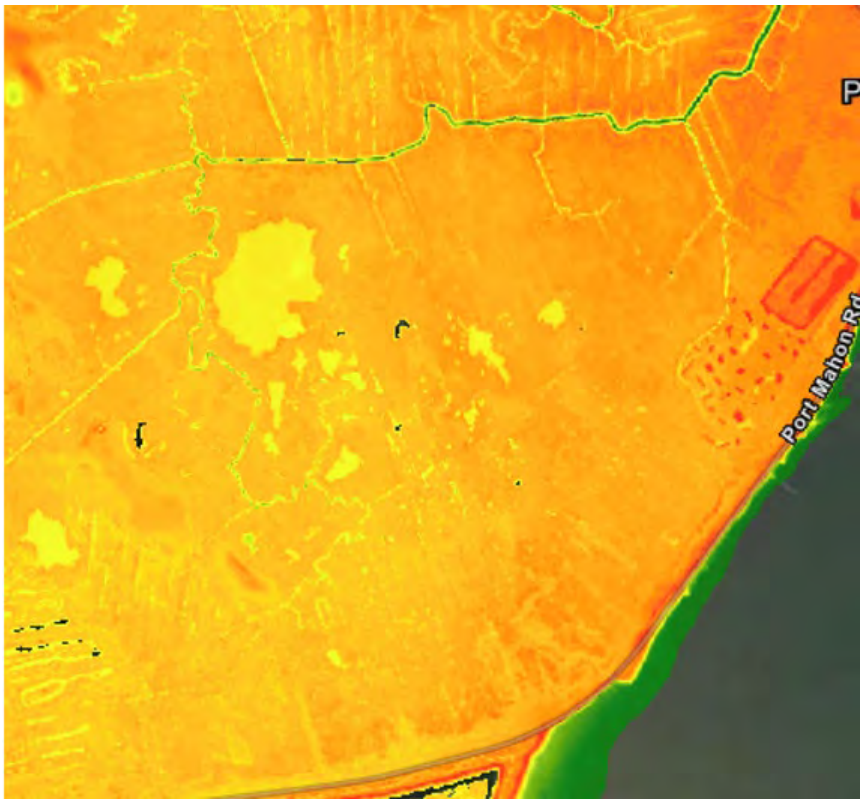
1937 aerial showing ditching



1949 topo showing the extensive ditching was done by 1949



2014 LiDAR showing how the project area slopes from the right to the left. Lower elevations are lighter/yellower in color and higher locations are redder.



Map of data sampling points for vegetation (yellow), nekton (green), and avian (maroon) communities.



Table comparing mean elevations of vegetation at Port Mahon. The data are grouped by locations where the elevation and hydrology are somewhat consistent around different water level logger locations.

S. alterniflora vs S. patens/D. spicata									
	tall/med alternif (healthy)			**patens/spicata (stressed)**			**patens/spicata (healthy)**		
	n	**x̄ ft**	**stdev**	**n**	**x̄ ft**	**stdev**	**n**	**x̄ ft**	**stdev**
PM_Ch1	19	2.43	0.14	5	2.48	0.06	3	2.53	0.01
PM_Ch2	13	2.30	0.09	3	2.34	0.07	8	2.48	0.10
PM_Ch3A	11	2.14	0.10	8	2.13	0.07	6	2.35	0.06
PM_Ch3B+Ch3C	18	2.25	0.09	19	2.26	0.07	6	2.30	0.07
PM_Ch4A	23	2.64	0.11	6	2.76	0.06	22	2.79	0.12
PM_Ch4B	16	2.47	0.06	11	2.43	0.07	9	2.59	0.06
PM_Ch4C+Sur4	2	2.75	0.01	15	2.80	0.09	17	2.96	0.08
all points	212	2.56	0.35	67	2.46	0.25	152	2.77	0.28

* “Healthy” only means the vegetation is robust, at least some thatch layer is present, and the platform is generally solid and level. Salt marsh vegetation can appear healthy for several years after hydrologic conditions start to become unfavorable before the patches of vegetation begin to show signs of stress such as reduced vigor, lower density, bare sediment, and an uneven platform.

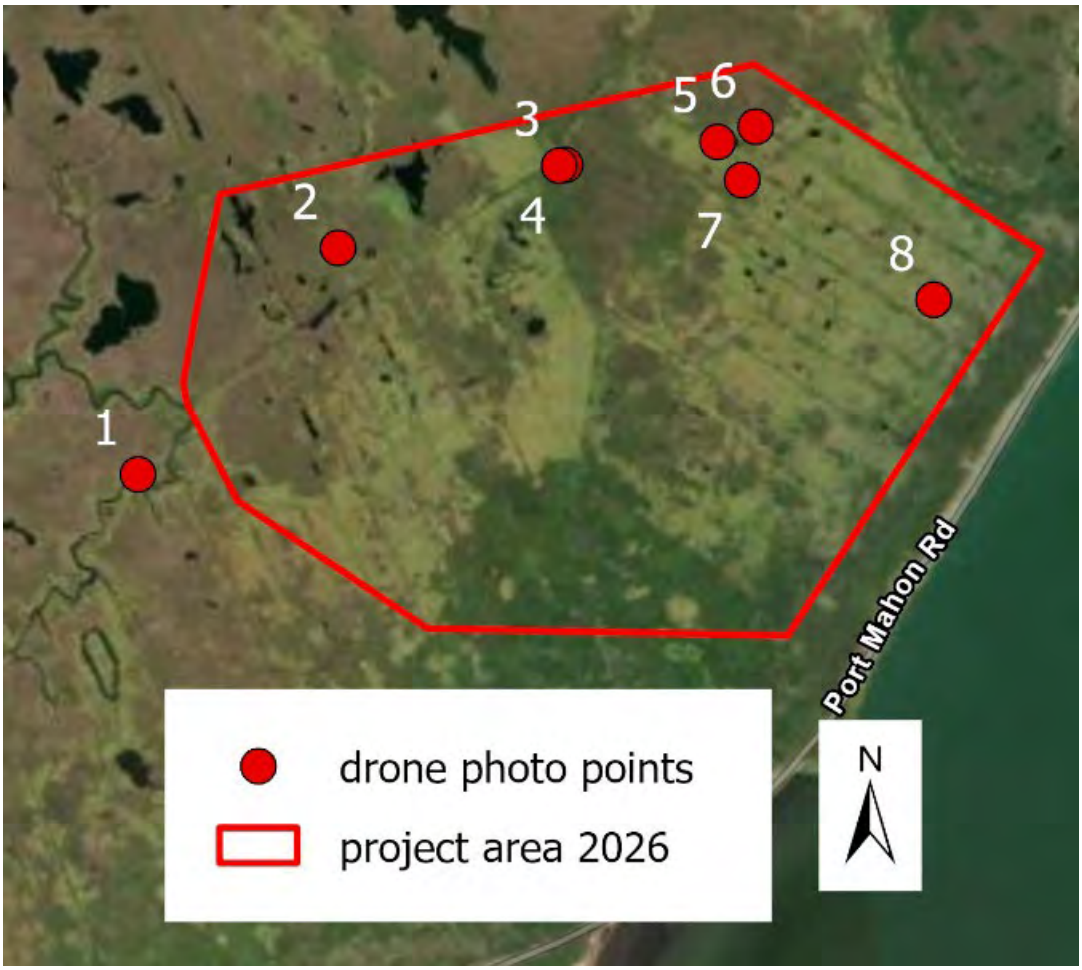
Table showing tidal datumns compared to mean elevation of different types of vegetation (alt = S. alterniflora), p/D_h (S. patens and D. spicata that is relatively healthy), and p/D (S. patens and D. spicata that is relatively stressed). S. alterniflora is above MTL and S. patens and D. spicata are above MHW in most cases but many of the bio-benchmarks are still relatively low compared to the datumns and what would be ideal. Decreasing water levels on stressed marsh will decrease the higher datumns and/or decrease the time the marsh is at those water levels with corresponding benefits to the vegetation.

	MLW	**MTL**	**MHW**	**x̄ ft alt**	**x̄ ft p/D_h**	**x̄ ft p/D_s**
PM_Ch1	1.64	2.26	2.88	2.43	2.53	2.48
PM_Ch2	1.18	1.86	2.55	2.30	2.48	2.34
PM_Ch3A	1.79	1.95	2.11	2.14	2.35	2.13
PM_Ch3B	1.82	1.92	2.02	2.25	2.30	2.26

Ch3C	1.72	1.75	1.78	2.25	2.30	2.26
PM_Ch4A	1.74	1.81	1.87	2.64	2.79	2.76
PM_Ch4B	2.36	2.36	2.36	2.47	2.59	2.43
PM_Ch4C	2.51	2.54	2.56	2.75	2.96	2.80
Sur4	2.89	2.91	2.93	2.75	2.96	2.80
ref	-1.49	1.01	3.52	-	-	-
All points	-	-	-	2.56	2.77	2.46

SITE PHOTOS - DRONE IMAGES

Image locator



Drone photo 1: Looking to the northeast towards the project area with the central ditch targeted for ditch maintenance extending off to the northeast off of the tidal creek in the foreground that goes west of the image then north up to Kelly's Ditch which goes out to the Mahon River. Remanent perpendicular ditches can be seen branching off of the central ditch. 11/21/2025



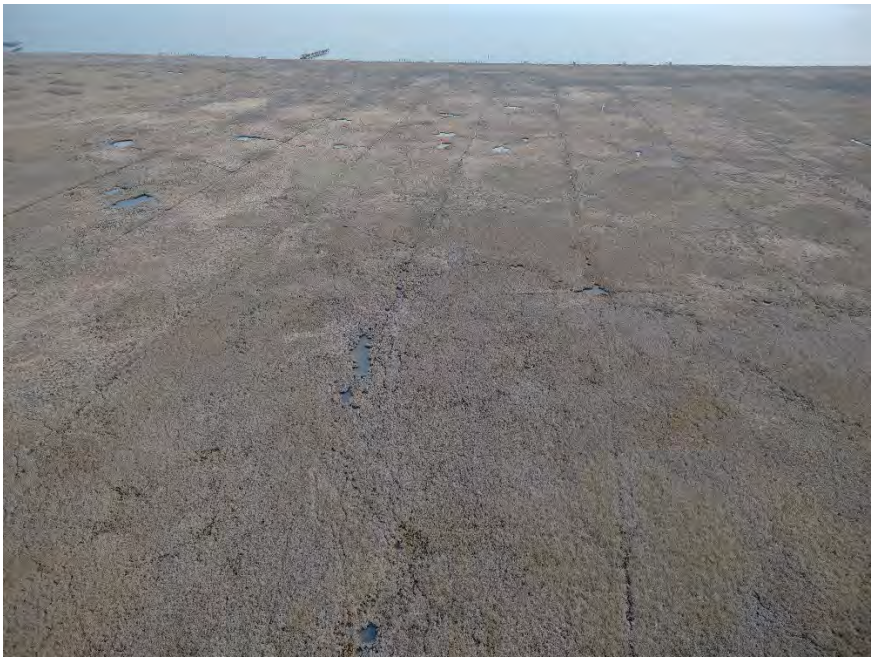
Drone photo 2: Looking southwest showing the central ditch targeted for ditch maintenance towards the left and examples of remanent ditches and ponding to the right that will receive better tidal connection with the project. 11/21/2025



Drone photo 3: Looking southwest showing the central ditch targeted for ditch maintenance towards the right with remanent perpendicular ditches branching off of the central ditch to the left and right. The second nearest perpendicular ditch on the left will be opened with ditch maintenance. The portion of the central ditch nearest in the foreground will be left as is. 11/21/2025



Drone photo 4: Looking east over area in the background that has some of the best high marsh and will benefit from the ditch maintenance and runneling. None of the remanent ditches seen in the image have significant tidal influence. 11/21/2025



Drone photo 5: Looking straight down on an area that is mostly *S. patens* with several areas showing signs of stress. Project intent is not to remove the water from the OMWM or remanent ditch but to slightly decrease the water levels so the surrounding marsh does not stay consistently saturated. 11/21/2025



Drone photo 6: Looking straight down on an area that is mostly *S. patens* on the right and *S. alterniflora* on the left with several areas showing signs of stress. The remanent ditch shown has no tidal influence and cannot drain. Project intent is not to remove the water from the OMWM or remanent ditch but to slightly decrease the water levels so the surrounding marsh does not stay consistently saturated. 11/21/2025

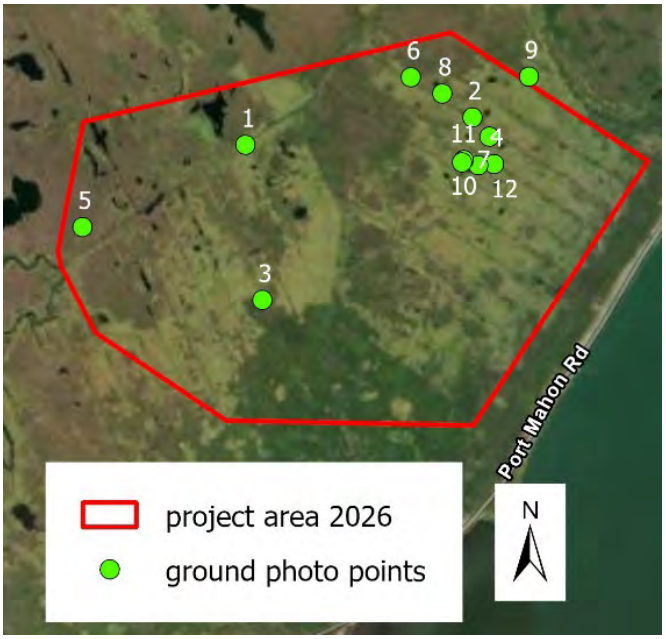


Drone photo 7: Looking straight down on an area that is predominantly *S. patens* but at increasingly low density towards the left as it transitions into *S. alterniflora*. The remanent ditch shown has no tidal influence and cannot drain. 11/21/2025



SITE PHOTOS - GROUND IMAGES

Image locator



Ground photo 1: A water level logger placed in the central ditch targeted for ditch maintenance and looking southwest. The ditch allows almost no tidal ingress or egress. Some areas are somewhat open while others areas are nearly filled in with vegetation. 2/28/2025



Ground photo 2: Looking northwest with high quality *S. patens* in the foreground but with pockets where it is stressed and the vegetation is beginning to convert to *S. alterniflora*. The ditch on the left is beginning to close and is not connected to the tide as is typical for most of this section of marsh. 12/20/2022



Ground photo 3: Looking northwest showing a water level logger in a ditch that is beginning to fill in in this area and completely filled in elsewhere. 6/24/2024



Ground photo 4: Looking northeast showing a water level logger in one of the ditch remanents that is acting as a high marsh pool bordered by mostly healthy *S. patens*. 6/24/2024



Ground photo 5: Looking northwest at a barely perceptible ditch remanent extending from the foreground into the background. 12/20/2022



Ground photos 6, 7, 8, and 9: Showing examples of stressed *S. patens* characterized by patches of bare ground, uneven surface, and ponded water. These are the areas we most want to improve. ~10/7/2024






Ground photos 10 and 11: A water logger on the surface in an area where the *S. patens* is stressed. 10/30/2024 and 6/24/2024




Ground photo 12: Showing an area of healthy *S. patens* near an OMWM pool. 6/24/2024

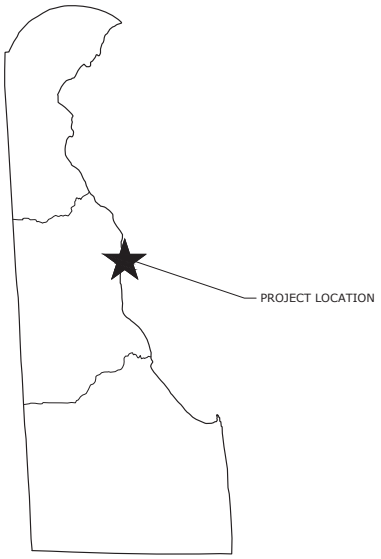


PORT MAHON
SALT MARSH RESTORATION

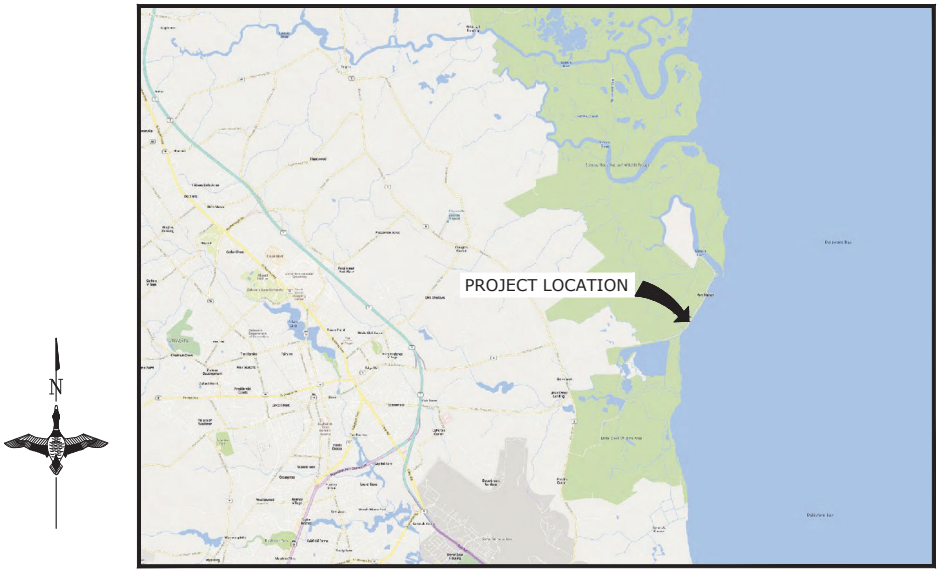
LITTLE CREEK WILDLIFE AREA
DOVER, KENT COUNTY, DELAWARE

IN COOPERATION WITH

U.S. FISH AND WILDLIFE SERVICE



DELAWARE



PROJECT LOCATION MAP

SCALE: NOT TO SCALE

SHEET LIST TABLE	
SHEET NUMBER	SHEET TITLE
C001	COVER SHEET
C101	OVERALL SITE PLAN
C102	SITE PLAN 1
C103	SITE PLAN 2
C301	DETAILS

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ON:

COVER SHEET
PORT MAHON
DOVER
KENT COUNTY, DE

Revision	Sheet	Revisions	Date	By

CAD FILE:
NJ-100-5 PORT MAHON COVER
DESIGNED BY: LL
DRAWN BY: ZB / JB
SURVEYED BY:
BIOLOGIST: JF
DATE:
8/12/26
PROJECT NUMBER:
US-NJ-100-5
C001

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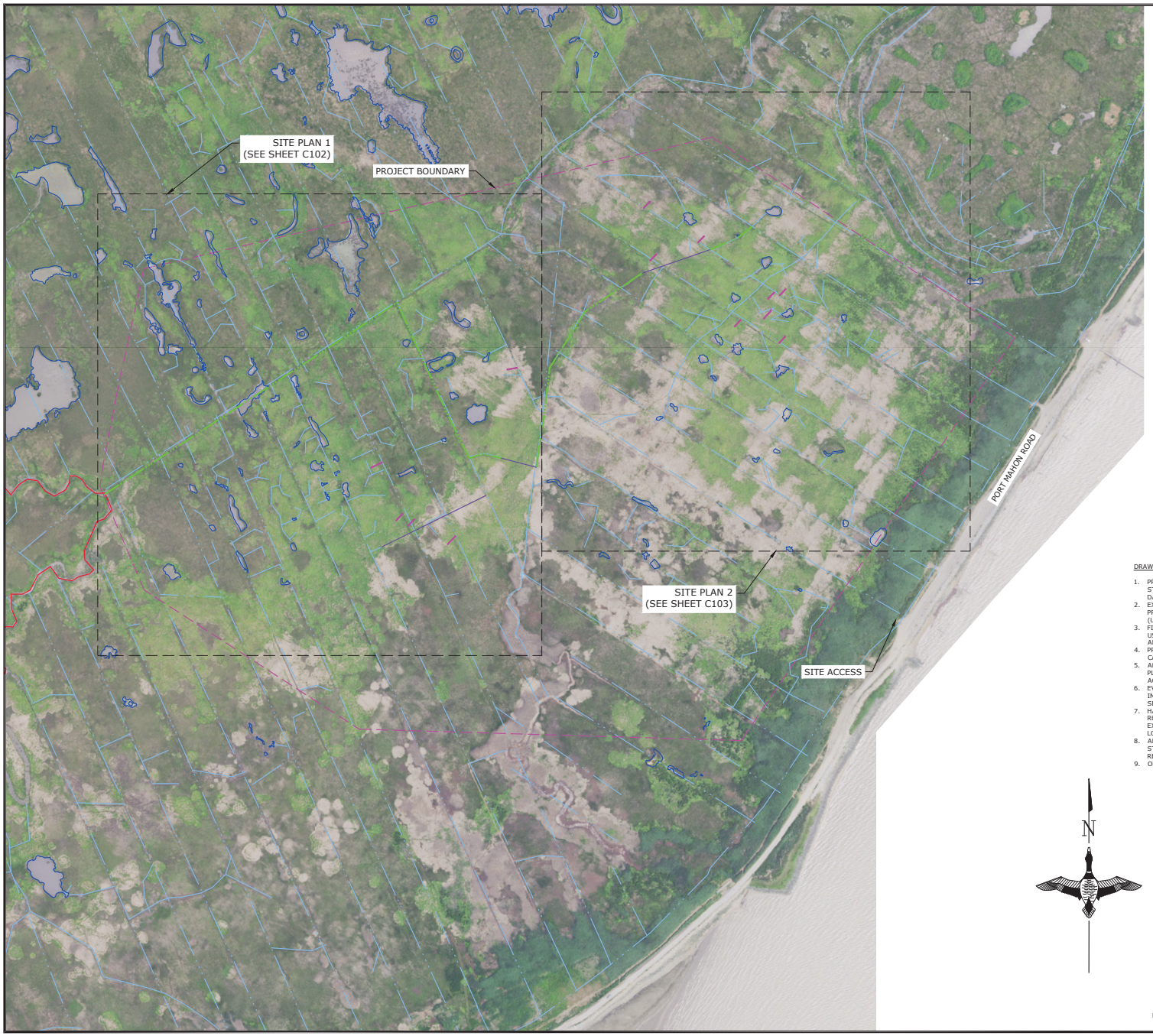

LEGEND

- PROJECT BOUNDARY
- PROPOSED RUNNEL
- PROPOSED DITCH MAINTENANCE
- PROPOSED DITCH CREATION
- EXISTING OPEN WATER
- EXISTING DITCHES
- EXISTING TIDAL CHANNELS

TIDAL PARAMETERS	
	PM_CHANNEL_2
MHHW	2.69
MHW	2.55
MSL	1.85
MTL	1.86
DTL	1.84
MLW	1.18
MLLW	0.99

NOTES:

1. SURFACE, GROUND WATER AND CHANNEL LOGGER DATA WAS PROVIDED BY UNITED STATES FISH AND WILDLIFE SERVICE (USFWS) STAFF.
2. ALL VALUES SHOWN ARE IN US SURVEY FEET NAVD88.
3. DATA WAS COLLECTED FROM JUNE 2024 THROUGH MARCH 2025.

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N

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ON:

OVERALL SITE PLAN
PORT MAHON
DOVER
KENT COUNTY, DE

By	Date	Revisions	Sheet	Revision

CAD FILE:

NJ-100-5 PORT MAHON SITE PLAN

DESIGNED BY: LL

DRAWN BY: ZB / JB

SURVEYED BY:

BIOLOGIST: JF

DATE:
8/12/26

PROJECT NUMBER:
US-NJ-100-5

C101

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LEGEND

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80 0 40 80 160 320

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ON:

SITE PLAN 1
PORT MAHON
DOVER
KENT COUNTY, DE

By	Date	Revisions	Sheet	Revision

CAD FILE:
NJ-100-5 PORT MAHON SITE PLAN
DESIGNED BY: LL
DRAWN BY: ZB / JB
SURVEYED BY:
BIOLOGIST: JF
DATE:
8/12/26
PROJECT NUMBER:
US-NJ-100-5

C102

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LEGEND

- PROJECT BOUNDARY
- PROPOSED RUNNEL
- PROPOSED DITCH MAINTENANCE
- PROPOSED DITCH CREATION
- EXISTING OPEN WATER
- EXISTING DITCHES
- EXISTING TIDAL CHANNELS

TIDAL PARAMETERS	
	PM_CHANNEL_2
MHHW	2.69
MHW	2.55
MSL	1.85
MTL	1.86
DTL	1.84
MLW	1.18
MLLW	0.99

NOTES:

1. SURFACE, GROUND WATER AND CHANNEL LOGGER DATA WAS PROVIDED BY UNITED STATES FISH AND WILDLIFE SERVICE (USFWS) STAFF.
2. ALL VALUES SHOWN ARE IN US SURVEY FEET NAVD88.
3. DATA WAS COLLECTED FROM JUNE 2024 THROUGH MARCH 2025.

DRAWING NOTES:

1. PROJECT COORDINATES AND THIS DRAWING ARE NAD83 2011, DELAWARE STATE PLANE COORDINATES SYSTEM, UNITS U.S. SURVEY FEET. THE VERTICAL DATUM IS NAVD88 (NORTH AMERICAN VERTICAL DATUM OF 1988).
2. EXISTING FEATURES SUCH AS OPEN WATER, DITCHES, TIDAL CHANNELS, AND PROPERTY LINES SHOWN WERE PROVIDED BY U.S. FISH AND WILDLIFE SERVICE (USFWS), DUCKS UNLIMITED (DU), AND OTHER EXTERNAL SOURCES.
3. FIELD OBSERVATIONS AND SITE RECONNAISSANCE WAS CONDUCTED BY USFWS, DU, PARTNERSHIP FOR THE DELAWARE ESTUARY (PDE), ENTOSTAT, AND OTHER PARTNERS.
4. PROJECT AND DESIGN GOALS WERE SET BY USFWS. IMPLEMENTATION SHALL BE CARRIED OUT BY USFWS STAFF.
5. ALL LOCATIONS FOR PROPOSED ITEMS ARE APPROXIMATE AND THE FINAL PLACEMENT SHALL BE DETERMINED IN THE FIELD BY THE USFWS STAFF ACCORDING TO EXISTING SITE CONDITIONS.
6. EVERY EFFORT SHALL BE MADE TO MINIMIZE IMPACTS TO THE SITE. IMPLEMENTATION SHALL BE DONE BY HAND OR BY MACHINERY. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE USED WHERE POSSIBLE.
7. HABITAT MOUNDS WILL BE CREATED FROM SIDE CAST MATERIALS FROM RUNNELING, DITCH CREATION AND DITCH MAINTENANCE AND WILL NOT EXCEED LOCAL MHW TO MHHW ELEVATIONS AFTER SETTLING. FINAL LOCATIONS WILL BE DETERMINED AND RECORDED DURING CONSTRUCTION.
8. ALL PROPERTY LOCATED WITHIN THE PROJECT BOUNDARY BELONGS TO THE STATE OF DELAWARE OR THE DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL.
9. ONLY LARGER, MORE PROMINENT OPEN WATER FEATURES ARE DELINEATED.

N

GRAPHIC SCALE

80 0 40 80 160 320

1 inch = 80 feet

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DUCKS UNLIMITED

AFFIX SEAL: DUCKS UNLIMITED, INC.

ON:

SITE PLAN 2
PORT MAHON
DOVER
KENT COUNTY, DE

By	Date	Revisions	Sheet	Revision

CAD FILE:
NJ-100-5 PORT MAHON SITE PLAN
DESIGNED BY: LL
DRAWN BY: ZB / JB
SURVEYED BY:
BIOLOGIST: JF
DATE:
8/12/26
PROJECT NUMBER:
US-NJ-100-5

C103

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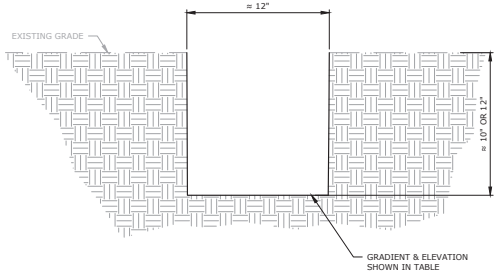
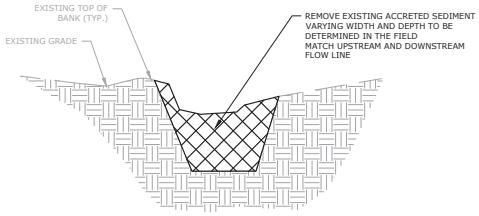
C:\Users\zbarnard\OneDrive - Ducks Unlimited Incorporated\GIS\ARC3D - Documents\NJ\NJ0100008 Port Mahon\C3D_DRAWINGS\NJ-100-5 PORT MAHON SITE PLAN.dwg, 8/11/2026 7:13 PM, Zarryn Barnard, SITE PLAN 2, None



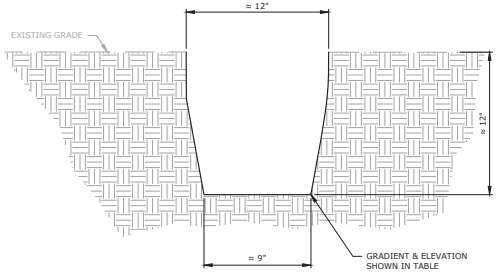
TYPICAL DITCH CROSS SECTION

NOT TO SCALE



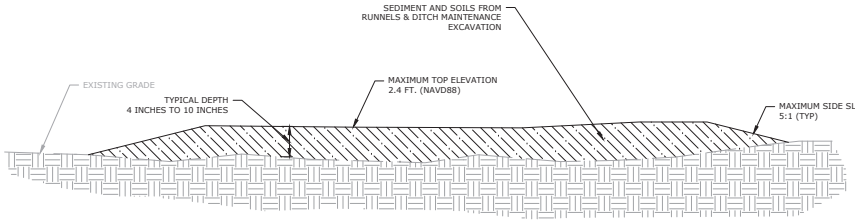
TYPICAL DITCH MAINTENANCE CROSS SECTION

NOT TO SCALE



TYPICAL RUNNEL EXCAVATION CROSS SECTION

NOT TO SCALE

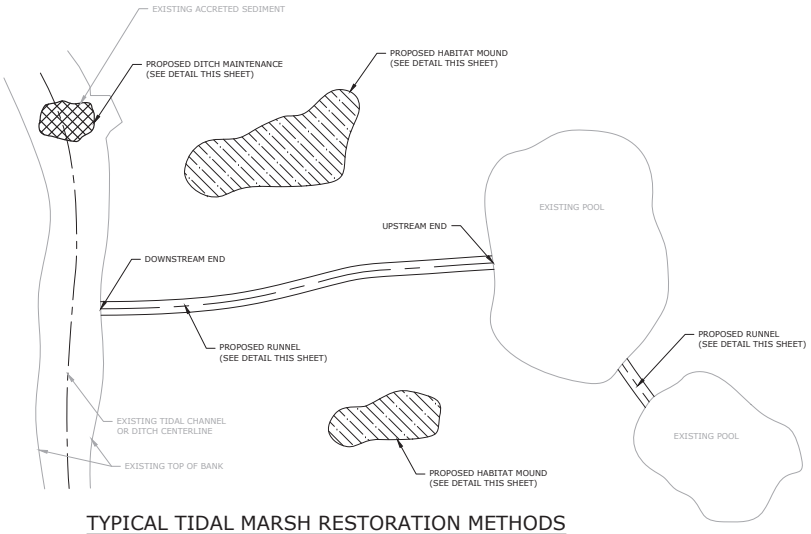


TYPICAL HABITAT MOUND CROSS SECTION

NOT TO SCALE

RUNNEL, DITCH MAINTENANCE AND HABITAT MOUND NOTES:

1. MATERIAL EXCAVATED FROM THE DITCH MAINTENANCE AND RUNNELS SHALL BE USED FOR THE HABITAT MOUNDS. THE LOCATION FOR THE HABITAT MOUNDS WILL BE UP TO THE DISCRETION OF THE FISH AND WILDLIFE FIELD STAFF.
2. HABITAT MOUNDS SHALL BE PLACED IN SUCH A MANNER THAT WILL NOT PREVENT THE DRAINAGE OF WATER FROM THE MARSH SURFACE TO THE PROPOSED RUNNELS.
3. ALL MATERIAL EXCAVATED WILL REMAIN ONSITE AND NO MATERIAL SHALL BE PLACED ABOVE ELEVATION 2.4 FEET (NAVD88).
4. DOWNSTREAM END OF RUNNEL SHALL DAYLIGHT INTO EXISTING TIDAL CHANNEL OR DITCH AND UPSTREAM END OF RUNNEL SHALL BE CUT INTO EDGE OF EXISTING POOL OR OVERLY SATURATED AREAS WHERE WATER IS REPEATEDLY INUNDATING THE MARSH (SEE TYPICAL RUNNEL CROSS SECTION).
5. THE AREAL SIZE OF THE HABITAT MOUNDS WILL VARY BASED ON THE AMOUNT OF MATERIAL BEING REMOVED IN THE IMMEDIATE AREA AND THE SIZE OF THE DEGRADED MARSH AREA WHERE THE MOUND IS BEING PLACED. MOST MOUNDS WILL BE LESS THAN 100 SQFT.



TYPICAL TIDAL MARSH RESTORATION METHODS

NOT TO SCALE

RUNNEL ID	UPSTREAM ELEVATION	DOWNSTREAM ELEVATION	SLOPE (%)	APPROX. LENGTH (FT)	UPSTREAM NORTHING	UPSTREAM EASTING	DOWNSTREAM NORTHING	DOWNSTREAM EASTING	QTY OF MATERIAL (CY)
R-1	2.8	2.8	0.0	44	127647.26	233381.79	127666.16	233421.79	1.6
R-2	3.0	2.9	0.2	35	127458.01	233470.64	127482.93	233495.14	1.3
R-3	3.0	2.9	0.3	33	127462.99	233536.76	127439.60	233513.75	1.2
R-4	3.0	2.8	0.5	41	127373.6	233654.97	127402.91	233683.92	1.5
R-5	3.3	3.2	0.3	37	127997.88	233867.33	128003.74	233903.72	1.4
R-6	3.5	3.4	0.3	33	128597.84	234378.03	128574.45	234355.03	1.2
R-7	3.3	3.2	0.2	33	128409.98	234401.45	128386.59	234378.44	1.2
R-8	3.2	3.1	0.3	33	128474.58	234572.3	128451.22	234549.23	1.2
R-9	3.2	3.1	0.3	33	128151.6	234679.66	128174.99	234702.67	1.2
R-10	3.4	3.1	0.7	42	128179.61	234784.3	128211.00	234811.50	1.5
R-11	3.3	3.2	0.3	33	128250.25	234799.56	128273.64	234822.56	1.2
R-12	3.1	2.9	0.6	33	128285.86	234863.8	128262.47	234840.79	1.2
R-13	3.0	2.9	0.3	33	128115.87	234862.08	128092.48	234839.08	1.2

RUNNEL LAYOUT TABLE

NOTE: ALL ELEVATIONS SHOWN ARE IN NAV88

DITCH MAINTENANCE ID	APPROX. LENGTH (FT)	UPSTREAM NORTHING	UPSTREAM EASTING	DOWNSTREAM NORTHING	DOWNSTREAM EASTING	QTY OF MATERIAL (CY)
DM-1	1861	127680.56	233732.97	127552.85	232431.06	172.7
DM-2	118	127680.73	233847.69	127681.88	233734.16	9.8
DM-3	841	128341.86	234350.12	127648.65	233971.85	70.1
DM-4	173	128508.41	234742.77	128425.69	234592.28	6.4

DITCH MAINTENANCE LAYOUT TABLE

NOTE: QUANTITY OF MATERIAL ASSUMES DITCHES ARE EXCAVATED USING A BUCKET 18-20" IN WIDTH OR CUTTER HEAD, AND DITCHES ARE RECTANGULAR IN SHAPE.

DITCH ID	APPROX. LENGTH (FT)	UPSTREAM NORTHING	UPSTREAM EASTING	DOWNSTREAM NORTHING	DOWNSTREAM EASTING	QTY OF MATERIAL (CY)
D-1	416	127363.67	233419.19	127547.91	233792.40	23.1
D-2	128	127648.65	233971.85	127680.73	233847.69	7.1
D-3	256	128425.69	234592.28	128341.86	233381.79	11.9

DITCH LAYOUT TABLE

NOTE: QUANTITY OF MATERIAL ASSUMES DITCHES ARE EXCAVATED USING A BUCKET 18" IN WIDTH OR CUTTER HEAD, AND DITCHES ARE RECTANGULAR IN SHAPE.

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ON:

DETAIL SHEET 1
PORT MAHON
DOVER
KENT COUNTY, DE

By	Date	Revisions	Sheet	Revision

CAD FILE:

NJ-100-5 PORT MAHON SITE PLAN

DESIGNED BY: LL

DRAWN BY: ZB, JB

SURVEYED BY:

BIOLOGIST: JF

DATE: 8/12/26

PROJECT NUMBER: NJ-100-4

C301

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INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

Project Name:	Salt Marsh Hydrological Modification at Delaware Salt Marshes: Port Mahon, Murderkill, Cedar Creek, and Buckaloo	**Originating Person:**	Brian Marsh
Landowner:	Delaware Division of Fish and Wildlife	**Telephone number:**	[redacted]
Project Address:	Multiple sites	**Email:**	[redacted]
County:	Kent and Sussex Counties, DE	**Date:**	5/11/2026

I. Region: R5 - Northeast

II. Service Activity (Program): The Delaware Bay Coastal Program (DBCP) proposes to restore the hydrology of salt marsh at four State-owned sites in Delaware: Davey Crockett Tract (aka Port Mahon site) of the Little Creek Wildlife Area, Kent County; Hall Tract (aka Murderkill site) of the Milford Neck Wildlife Area, Kent County; Cedar Creek Tract (aka Cedar Creek site) of the Milford Neck Wildlife Area, Sussex County; and Buckaloo Tract (aka Buckaloo site) of the Ted Harvey Conservation Area, Kent County (an adjoining private property may be hydrologically affected too but not require access). The work proposed primarily involves doing ditch maintenance to partly clear out old mosquito ditches and to create runnels. Improved hydrology will reduce excessive saturation and inundation on the marsh that is causing ongoing vegetation loss, habitat loss, and resilience loss. For the Cedar Creek site, we also propose to move accumulated peat-like material from Cedar Beach (north end of Slaughter Beach) and place it on the marsh to restore elevation and high marsh substrate while temporarily improving horseshoe crab spawning and shorebird foraging habitat on Cedar Beach.

DBCP will do some of the work ourselves and we propose to partly do the implementation of this work through a Cooperative Agreement with American Conservation Experience and likely a Cooperative Agreement with the Delaware Mosquito Control Section. We will also be submitting to the Corps for either use of one Nationwide 27 approval to cover the four projects or submitting for four separate uses of Nationwide 27.

III. Pertinent Species and Habitat:

A. Listed species and/or their critical habitat within the action area:

- eastern black rail (*Laterallus jamaicensis ssp. jamaicensis*)
- rufa red knot (*Calidris canutus rufa*)

B. Proposed species and/or proposed critical habitat within the action area:

- monarch (*Danaus Plexippus*)
- tricolored bat (*Perimyotis subflavus*)

C. Candidate species within the action area:
none

D. Include species/habitat occurrences on a map. see attached plans

IV. Description of proposed action (attach additional pages as needed): See attached plans and project summaries for more detail.

We propose to improve the hydrology at four salt marsh sites that have limited tidal connection during most tidal conditions which results in ponding marsh, vegetation loss, resilience loss, elevation loss, and habitat degradation. By restoring intertidal character through strategically clearing out portions of salt marsh ditches (i.e., ditch maintenance) and creating runnels, we plan to reduce inundation/saturation rates which will lead to vegetation recovery that will in turn improve the sites' resilience and habitat value.

As material is removed during ditch maintenance and runnel creation, it will be used beneficially on the surrounding marsh by being placed in low habitat mounds in relatively low areas where vegetation has died or become stressed due to unnatural persistent saturation or inundation.

The problems at these sites are mostly caused by the history of ditching which causes leveling of the marsh surface, lower tidal energy, sediment deposition leaving low berms along ditch edges, loss of biological accretion (i.e., belowground growth), oxidation of peat, loss of natural tidal channels, and ditches that fill in leaving areas of the marshes without tidal connection during much of the tidal cycle. Typically, the highest tides reach these sections of marsh but the water is not able to ebb leaving marsh too inundated or at least too saturated for vegetation.

The priority for our work at Cedar Creek is the restoration of the hydrology. However, we are proposing to include an additional component to the project. Peat-like material accumulates on Cedar Beach throughout the year likely coming mostly from salt marsh vegetation or edge erosion of salt marshes throughout the bay. The amount and exact location varies by season and storms but can at times be several feet thick. The community had wanted to remove this material from the beach as a waste product to improve the accessibility and recreational use of the beach. We propose removing the material to improve horseshoe crab spawning habitat and shorebird habitat and then using the material beneficially at the Cedar Creek site to improve high marsh habitat. This will be a pilot effort to test the feasibility and benefits of this kind of action based on recent success seen at EBF NWR using compost in a similar manner. The use of this peat material is a secondary priority. We are pursuing it for permitting but, if funding and partner support is limited, we may only do the ditch maintenance and runneling work at Cedar Creek. More material will likely return to the beach within a season after we remove it so the benefits to the beach will be temporary. The north end of Cedar Beach is eroding towards the Mispillion Inlet so we are not certain the currents will maintain this pattern of deposition of material on Cedar Beach.

V. Determination of effects:

A. Explanation of effects of the action on species and critical habitats in items III. A, B, and C (attach additional pages as needed):

- Eastern black rail: May Affect but Not likely to Adversely Affect. We have done two years of surveys at the four sites using the SHARP protocol and we have not seen or heard black rail and we have not heard black rail while in the areas doing other work throughout the year. However, a partner on the project heard a black rail at Port Mahon outside of a survey. That rail was not picked up on ARUs that have also been in use at the site for two seasons. Of the four sites, Port Mahon is most likely to have black rail and there are at least limited records of them in the general area such as along Port Mahon Road to the south of our proposed area. Cedar Creek and Murderkill are mostly low marsh but Buckaloo and especially Port Mahon do have high marsh where black rail could be present. The intent of the proposed work is to improve the health and cover of the vegetation which includes high marsh vegetation at Port Mahon and Buckaloo. The proposed work will have positive effects on the habitat for black rails by improving vegetation and maintaining high marsh. Very limited patches of high marsh at Cedar Creek and Murderkill could also benefit but would not be expected to significantly add to black rail habitat. The work at Cedar Creek and Port Mahon will include some work done by pontoon excavator. All work at Buckaloo and Murderkill and part of the work at Cedar Creek and Buckaloo will be by hand but involve crews of up to ten people on the marsh at a time.

- Rufa red knot: May Affect but Not likely to Adversely Affect. We have not seen evidence of red knot using any of the salt marsh at these four sites for roosting and would not expect it due to a mix of ponding, low elevations, and some of the vegetation being too high for roosting habitat in areas where ponding does not occur. Removal of the peat-like material from Cedar Beach could affect red knot by temporarily improving foraging habitat. Currently, horseshoe crabs get stranded in the material, little spawning occurs, and shorebirds avoid the peat-like material likely due to the lack of spawning and egg availability. Even shorebird species, such as short-billed dowitchers and dunlin, that are typically more often found in peat and mud areas do not forage in this material. Red knot generally do not favor the other areas of Cedar Beach where the material has not accumulated but occasionally they may occur in the area and therefore could benefit from the project by having improved foraging opportunities. The benefits will only be temporary assuming more of the material will likely begin to deposit within the area within months of our project. The material will be taken off the beach using equipment such as a skidsteer loader and dumptruck.

- Monarch: May Affect but Not likely to Adversely Affect. The sites are predominantly low marsh vegetation and ponded salt water not likely providing monarch habitat. However, at Buckaloo and particularly at Port Mahon, high marsh vegetation will benefit from the project. This may include some of the highest areas of the marsh where plants beneficial to pollinators could benefit such as seaside goldenrod (*Solidago sempervirens*) and perennial salt marsh aster (*Symphyotrichum*

tenuifolium). However, benefits to these plant species is not a goal of the project and any positive effect on pollinators, such as monarch butterfly, would be minimal.

- Tricolored bat: No Effect. No trees will be removed or otherwise disturbed. The sites are open salt marsh and one beach and all will be accessed through open areas without needing to disturb tree cover.

B. Explanation of actions to be implemented to reduce adverse effects:

Impacts to salt marsh habitat: Work will take place outside of the growing season, likely in February or ideally March. No installation work will take place between April 1 and September 15.

We do propose using a pontoon excavator at Port Mahon but only in areas of low marsh. We will also use a pontoon excavator at Cedar Creek but outside of the small remanent areas of high marsh. The work in the large area of high marsh at the north end of our Port Mahon site will only be by hand to prevent damage to the existing cover such as from the pontoon excavator turning and tearing up the *Spartina patens*. By using only hand tools in the most sensitive areas of the marsh where high marsh vegetation is present, we can control the depth and width of ditch work and runneling far better than the large bucket of an excavator.

We will limit field crew time on the marsh, have them avoid unnecessary walking in healthy areas of salt marsh, and they will use planks to cross some of the softest degrading areas.

We propose to place the peat-like material from Cedar Beach onto the marsh at Cedar Creek. We will likely to do this using an airboat to minimize impact to the marsh surface. If we use a Marshmaster and sled to move the material which is unlikely, we would use single points of entry, minimize trips, travel over areas of intact but unvegetated platform, and repair areas damage from the Marshmaster tracks by placing more of the peat material and planting it. The material will be spread by hand. We will favor placement sites that require the least passage time over the salt marsh of the airboat.

Habitat mounds of the spoil material from ditch maintenance and runneling will be placed in degraded marsh to gain elevation not areas where good high marsh habitat already exists and could be used by black rail.

Impacts to beach habitat: Work will take place outside of the horseshoe crab spawning season or shorebird migratory stopover period. Work will likely take place in February or ideally March.

We do not propose removing sand below the accumulated material on the beach. We do not expect a change in beach profile. If the beach profile does change, we would add sand. We would use mined sand of the largest grain size available and spread it on the beach using a skidsteer loader or similar equipment.

VI. Effect determination and response requested: [* = optional]

A. Listed species/designated critical habitat:

Determination	**Response requested**
no effect/no adverse modification (species: *tricolored bat*)	X Concurrence
may affect, but is not likely to adversely affect species/adversely modify critical habitat (species: *rufa red knot, eastern black rail, monarch*)	X Concurrence
may affect, and is likely to adversely affect species/adversely modify critical habitat (species:_____)	____ Formal Consultation

BRIAN MARSH Digitally signed by BRIAN MARSH Date: 2026.05.11 12:09:44 -04'00'

_____ _____

Project Biologist (Requestor), Delaware Bay Coastal Program Date

VII. Reviewing ESFO Evaluation:

A. Concurrence X

B. Formal consultation required_____

C. Conference required_____

D. Informal conference required_____

E. Remarks (attach additional pages as needed):

JULIE SLACUM Digitally signed by JULIE SLACUM Date: 2026.05.12 12:47:01 -04'00'

_____ _____

Endangered Species Biologist (Reviewer), Chesapeake Bay Field Office Date

_____ _____

Endangered Species Biologist (Reviewer), Chesapeake Bay Field Office Date

Outlook

[EXTERNAL] Re: EFH and FWCA consultation for four salt marsh sites in Delaware

From Robert Bourdon - NOAA Federal <[redacted]
Date Wed 6/10/2026 11:08 AM
To Marsh, Brian [redacted]
Cc Ripple, Kaitlyn (Kaity) [redacted]

This email has been received from outside of DOI - Use caution before clicking on links, opening attachments, or responding.

Hi Brian,

Thank you for providing these consultation materials for our review. We view these proposed marsh modifications as minor and temporary disturbances to essential fish habitat that will result in net biological uplift. Therefore, we have no comment on the proposed actions.

Good luck with the project. If you ever need an extra hand in the field, keep me in mind. I'd be interested in helping out and seeing a few of the sites you are working on.

Thanks,
Rob

On Wed, May 13, 2026 at 4:14 PM Robert Bourdon - NOAA Federal [redacted] wrote:

> Hi Brian,
>
> Thanks for providing this information. I think it will be fine for us to consult on all of these locations at once even if you end up having to split them for USACE permitting. I'll review these materials soon and let you know if I need more information.
>
> Regards,
> Rob
>
> On Wed, May 13, 2026 at 1:30 PM Marsh, Brian [redacted] wrote:
>
> > Hi Rob -

We are proposing to do work at four salt marsh sites in Delaware. The sites are on the same planned timeline, all on DE Division of Fish and Wildlife lands, and mostly involve the same work so we've been thinking of them as a single project.

We plan to submit an application to the Corps for NWP27 approval around the end of June or early July so therefore are providing the attached materials to you for consultation on EFH and for FWCA. The EFH Mapper suggests a lot of EFH in the general project area but a review of the species habitat needs didn't suggest to us that EFH is present in the immediate areas we're working in.

We are planning on one application to the Corps. If for some reason we end up needing to submit separate applications to the Corps, let us know if consulting with you on them together is a problem.

Attached are project summaries of each site with site photos, monitoring plan, location maps, and plans. Also attached are the EFH list and EFH form. The EFH list showed the same list of species regardless of which of the four sites was used as the center point.

We have somewhat longer project narratives that provide more information than the attached summaries especially on the hydrology if you'd like more info.

The projects all involve two main actions. Ditch maintenance by shallow partial clearing out of select mosquito ditching that was created in the 1930s, or later in some cases. This would be done by hand for the smallest ditches or where the marsh surface is especially vulnerable. For larger ditches at two of the sites (Port Mahon and Cedar Creek), we propose using a pontoon excavator. Runneling is creating shallow channels between areas on the salt marshes that have started to pond water or remain saturated and ditches or other channels that are open to the tide. A third action is proposed just at Cedar Creek where we propose to remove accumulated peat like material from the north end of Slaughter Beach (aka Cedar Beach) and place it in low areas on the salt marsh. A study on that material was done in 2021 and also attached.

Happy to provide more info or we could show you these sites or the Prime Hook NWR site where the runneling and ditch maintenance were done this past winter.

-Brian

Brian Marsh
USFWS - Delaware Bay Coastal Program
2591 Whitehall Neck Road
Smyrna, DE 19977
mobile: [redacted]

Brian Marsh
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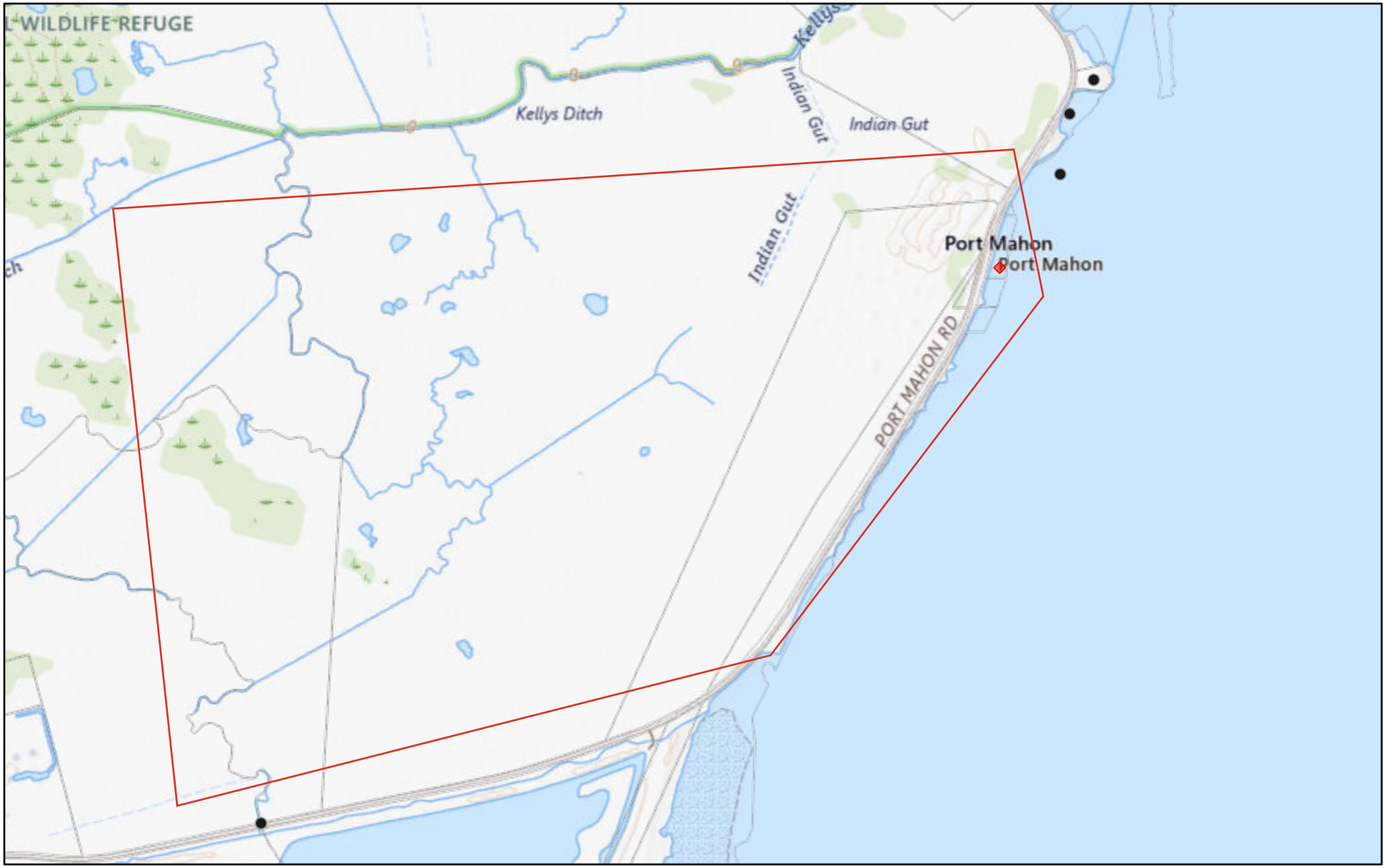
--

Robert Bourdon
Marine Habitat Resource Specialist
Greater Atlantic Regional Fisheries Office
NOAA Fisheries | U.S. Department of Commerce
Office: [redacted]
www.fisheries.noaa.gov



Research/Edit Map (Basemap - USGS National Map)



September 8, 2026

HistoricPropertySync

- National Register-listed
- other surveyed, assigned CRS inventory #
- State Parcels

1:18,056

0 0.1 0.2 0.4 mi

0 0.17 0.35 0.7 km

USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography

HCA
DELAWARE HISTORICAL & CULTURAL AFFAIRS

Delaware Division of Historical & Cultural Affairs
29 N. State St., Dover, Delaware 19901
Tel. (302) 736-7400 | Fax. (302) 739-5660
history.delaware.gov

October 28, 2026

Brian Marsh, Wildlife Biologist
US Fish and Wildlife Service – Delaware Bay Coastal Program
2591 Whitehall Neck Rd, Smyrna, DE 19977
Sent via email to: [redacted]

Subject: Salt Marsh Hydrological Modification, Buckaloo, Cedar Creek, Murderkill, Port Mahon
DE SHPO Project Review #2026.07.02.02, 2026.07.02.03, 2026.07.02.04, 2026.07.02.05

Dear Brian Marsh,

In response to the letter sent, the staff of the Delaware State Historic Preservation Office (DE SHPO) has reviewed the material submitted regarding the above cited project by the US Fish and Wildlife Service (FWS). The undertaking has been described to include the clearing of pre-existing ditches and excavation of new ditches and runnels in four locations in Delaware's salt marshes to improve natural hydrology. This undertaking is subject to compliance with Section 106 of the National Historic Preservation Act of 1966 (as amended).

The DE SHPO and FWS agreed to split the four locations that are part of this project as four separate projects for the DE SHPO's records. However, as the recommendations and conditions for these projects are connected, we are addressing all four undertakings in a single letter.

The four locations being considered for the undertakings described are Buckaloo Marsh north of Bowers Beach, a portion of marshland just south of Bowers Beach alongside the Murderkill River, an area just south of the town of Port Mahon, and an area just south of Cedar Beach alongside Cedar Creek. These areas are in the jurisdiction of the Delaware Department of Natural Resources and Environmental Control (DNREC).

At all four sites, older ditches that have not been maintained since approximately the mid-20th century are to be cleared of organic material and returned to their original dimensions, and new runnels of no deeper than six to twelve inches will be dug in strategic locations to improve water flow. At Cedar Creek, peat-like material from the nearby Cedar Beach will be harvested and placed within the Cedar Creek project area for beneficial habitat creation. The material grows over a large area, so the final collection locations will be selected based on where the material is concentrated and will be determined closer to the time of the undertaking. At Port Mahon, some new ditches will be dug to similar dimensions as the extant ditches. Heavy machinery will be used only at Cedar Creek and Port Mahon for these extra undertakings. The soil and other material collected from the project will be used within the project areas as beneficial habitat creation. The Areas of Potential Effect (APEs) for the four sites will include the area where the channels are being modified and runnels are being dug, along with any other ground disturbing work being done, as well as any access, staging, or stockpiling.

The extant ditches are mosquito and drainage ditches from approximately the 1920s and 30s and, based on archival research, most were dug by the Civilian Conservation Corps (CCC). There are also more modern ditches in the vicinity from the Delaware Open Marsh Water Management (OMWM) program that were mainly dug in the 1980s and 90s, but these are not being modified and thus are not being considered in this project. After consultation with the DE SHPO, DNREC, and FWS, all parties agreed that so long as the improvements to the ditches do not purposely change the original dimensions of the ditches, our Office has no concerns with this portion of the undertaking.

American Alliance of Museums Accredited Museum

All four project areas have a high potential for precontact archaeological resources. All four project areas are in the larger coastal salt marsh region which is known for both precontact and historic settlement and use. Three of the project areas have known archaeological sites within the APE or in the vicinity: The Buckaloo APE is in the vicinity of a known precontact site (7K-F-164). The Murderkill project area is in the vicinity of a large archaeological complex with mainly precontact but some historic components, and a site that is listed on the National Register for Historic Places (NR). There is a known archaeological site within the Cedar Creek APE (7S-A-012) and there is a known archaeological site in the vicinity of the wider location proposed for peat collection at Cedar Beach (7S-A-005).

Our Office has archaeological concerns about the ground disturbing work within the four project areas. However, due to the limited but widespread nature described for the undertakings, archaeological monitoring during work on portions of all four project areas shall be a condition of our concurrence. After consultation, our Office provided maps showing the loose areas of highest archaeological potential for the four sites. An SOI qualified archaeological monitor must be on site during any work in those areas. The SOI qualified archaeologist will sample portions of the soil excavated from digging the channels at Port Mahon and the runnels on all four sites as needed. If archaeological resources are identified during work, all work must stop and our Office and DNREC's cultural resource office are to be notified immediately. Once work has been completed, the monitor shall submit a report on their findings for the DE SHPO.

For Cedar Creek, as the archaeological site at Cedar Beach is only in the vicinity of a small portion of the overall potential collection area, please contact our Office once the peat collection locations have been determined to consider the need for further monitoring.

FWS has informed our Office that they are in the process of consulting with the Federally Recognized Tribes on their concerns and conditions.

So long as the conditions laid out in this letter are followed, our Office finds there to be No Adverse Effect to historic properties from the proposed undertaking. If you have any other questions at this time, please feel free to contact me at (302)-736-7437 or at Hannah.lewis@delaware.gov.

Sincerely,

Hannah Lewis

Hannah Lewis, Archaeologist, SHPO

cc: Gwen Davis, Deputy SHPO
Sarah Carr, Archaeologist, SHPO
Amy Wood, FWS
Esther Westfall, FWS
Kaitlyn Ripple, FWS
Taylor Reynolds, DNREC
Linda Seminario, DNREC

DELAWARE DEPARTMENT OF
NATURAL RESOURCES AND
ENVIRONMENTAL CONTROL

89 Kings Highway
Dover, DE 19901
302-739-9000
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September 15, 2026

Brian Marsh

USFWS – Delaware Bay Coastal Program

2591 Whitehall Neck Road

Smyrna, DE 19977

Re: USFWS 2026 Port Mahon Salt Marsh Hydrological Modification Tax Parcel # 4-00-07000-01-0500-00001 and 4-00-07000-01-1100-00001

Dear Brian:

Thank you for contacting the Species Conservation and Research Program (SCRP) about information on rare, threatened and endangered species, unique natural communities, and other significant natural resources as they relate to the above referenced project.

State Natural Heritage Site

A review of our database indicates that the following state-rare or federally-listed plants, animals or natural communities occur at or adjacent to the project site:

Scientific Name	Common Name	Taxon	State Rank	State Status	SGCN Tier or Global Rank	Federal Status

Laterallus jamaicensis jamaicensis	Eastern Black Rail	Bird	S1B	E	Tier 1	T

State Rank: **S1** – Extremely rare within the state (typically 5 or fewer occurrences); **S2** – Very rare within the state (6 to 20 occurrences); **S3** – Rare to uncommon in Delaware; **S4** – Apparently secure, at fairly low risk of extinction or extirpation due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors; **S5** – Demonstrably secure, at very low risk of extinction or extirpation due to a very extensive range, abundant populations or occurrences, or little to no concern from declines or threats; **SX** – Extirpated or presumed extirpated from the state. All historical locations and/or potential habitat have been surveyed; **SH** – Historically known, but not verified for an extended period (usually 15+ years); there are expectations that the species may be rediscovered; **SE** – Non-native in the state (introduced through human influence); not a part of the native flora or fauna; **SNR** – Not yet ranked in Delaware; **SN** – Occurrences in DE of limited conservation value, **of concern due to a restricted range; **SU** – Status uncertain within the state. Usually, an uncommon species which is believed to be of conservation concern, but there is inadequate data to determine the degree of rarity; **B** – Breeding; **M** – Migratory; **N** – Nonbreeding.

State Status: E – Endangered, i.e., designated by the Delaware Division of Fish and Wildlife as seriously threatened with extinction in the state pursuant to State of Delaware Code (7 Del. §601 *et seq.*) and implementing regulation (Title 7, 3900, 16.0 Endangered Species); **NA** – Plants are not included in Title 7; **NL** – Not listed.

SGCN Tiers: Tier 1 – Species of Greatest Conservation Need (SGCN) that are most in need of conservation action in order to sustain or restore their populations. They are the focus of the Delaware Wildlife Action Plan (DEWAP), which is based on analyzing threats to their populations and habitats, and on developing conservation actions to eliminate, minimize, or compensate for these threats; **Tier 2** – SGCN that are also in need of conservation action, although not with the urgency of Tier 1 species. Their distribution across the landscape will help determine where DEWAP conservation actions will be implemented on the ground; **Tier 3** – These species are for the most part still relatively common in Delaware, but are listed as SGCN for various reasons, including documented population declines, high responsibility of the Northeast region for the global population, or continued need for monitoring and/or management. This tier also includes non-breeding species that are uncommon in Delaware. **NA** – Plants are not addressed in DEWAP.

Federal Status: E – Endangered, i.e., designated by the U.S. Fish and Wildlife Service as being in danger of extinction throughout its range; **T** – Threatened, i.e., designated by USFWS as being likely to become endangered in the foreseeable future throughout all or a significant portion of its range; **C** – Candidate, i.e., taxa for which the U.S. Fish and Wildlife Service has on file enough substantial information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened species. NOAA Managed Candidate: **SC** – Species of Concern, i.e., species about which NOAA's National Marine Fisheries Service (NMFS) has some concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the ESA; **NL** – Not listed.

While one or more state-rare species were identified near the project location, at present, this project does not lie within a State Natural Heritage Site, nor does it lie within a Delaware National Estuarine Research Reserve, which are two criteria used to identify “Designated Critical Resource Waters” in the U.S. Army Corps of Engineers (USACE) Nationwide Permit General Condition No. 22. A copy of this letter shall be included in any permit application or pre-construction notification submitted to the USACE for activities on this property.

Delaware Ecological Network

Habitat on this parcel has been identified as ecologically important by the Delaware Ecological Network (DEN) and is classified as a core area. DEN, although non-regulatory, is a statewide conservation network developed using GIS and field collected datasets that help to identify and prioritize ecologically important areas for natural resource protection. The DEN includes ecologically important areas such as forests, wetlands, streams, and habitats that supports rare species and areas of especially high quality. The DEN includes the following key elements: 1) Core areas – which contain relatively intact natural ecosystems, and provide high-quality habitat for native plants and animals, 2) Hubs – which are slightly fragmented aggregations of core areas with contiguous natural cover and 3) Corridors – which link core areas together, allowing wildlife movement and seed and pollen transfer between them. The DEN can be accessed through First Map: Delaware Ecological Network 2.0 | Delaware Ecological Network 2.0 | State of Delaware (arcgis.com). We recommend that this DEN designated area be protected to the fullest extent possible.

State Wildlife Management Area

The proposed project is within ½ mile of the boundary of Little Creek Wildlife Area, a State Wildlife Area managed by the Division of Fish and Wildlife, DNREC. The State is concerned that the quantity and quality of wildlife habitat in the State Wildlife Area, particularly near the border, might be negatively affected by development activities, or by permanent land use changes, on the property in question. The developer should consult with the Regional Wildlife Biologist, Sean O'Connor (302-284-4795), to minimize potential negative impacts of the proposed project on State Wildlife Area lands. Additionally, the developer should be aware that people using the property in question could be subject to the effects of legal hunting activities in the Wildlife Area, such as firearm noise or dogs barking when pursuing game.

State Natural Area

The proposed project area occurs within Delaware's Natural Areas Inventory. State Natural Areas are composed of areas of land and/or water, whether in public or private ownership, which have retained or reestablished its natural character (although it need not be undisturbed), has unusual flora or fauna, or has biotic, geological, scenic, or archaeological features of scientific or educational value. If you require further information about this area for your planning, please contact Benjamin Schlusser at 302-739-9039 or Benjamin.Schlusser@delaware.gov.

Wetland restoration activities (e.g., beneficial use of dredge material)

Tidal wetland restoration activities, such as through the beneficial use of dredge material, can negatively affect marsh vegetation necessary for breeding marsh birds in the short-term, even if these activities aim to improve wetland condition in the long-term. Sediment application to the marsh surface, or associated construction activities, may also destroy marsh bird nests. Therefore, we recommend a time of year restriction of **April 1st to July 31st** to avoid impacts to marsh nesting birds.

Migratory Shorebirds (incl. Red Knot)

To date we have no recent records of migrating shorebirds using the wetlands at this site. However, prior research indicates federally protected red knot (*Calidris canutus*), may roost in marsh habitat behind the Delaware Bay shore beaches, including this site. We recommend avoiding work between **April 15th – June 7th** to mitigate disturbance to such species during their brief migration stopover in the Delaware Bay.

Fisheries

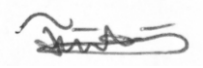
American Eel

Kelly's Ditch is used by large numbers of American eel (*Anguilla rostrata)*. We request that in-stream work not take place from **March 1st to May 15th** to allow upstream passage of elvers (young eels).

We are continually updating our records on Delaware's rare, threatened and endangered species, unique natural communities and other significant natural resources. If the start of the project is delayed more than a year past the date of this letter, please contact us again for the latest information.

Please feel free to contact me with any questions or if you require additional information.

Sincerely,



Faith Garcia

Environmental Review Coordinator

Phone: (302) 735-8665

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