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

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By DCMP

Initial Review: _____
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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:	Buckaloo Tract Hydrological Modification

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. We propose to improve salt marsh hydrology by enhancing tidal ebb and flow during normal tidal cycles over a 17-acre area at the Buckaloo Tract of the State-owned Ted Harvey Conservation Area in Kent County, Delaware. We propose to do this by doing ditch maintenance on 402 ft of remnant ditching by partly clearing them out and creating 960 ft of runnels which are shallow channels connecting low areas of the salt marsh to tidal channels. Material (up to 29.4 cyd) removed from the ditches and by creating the runnels will be used beneficially at the marsh by being placed in relatively low areas where vegetation has died or become stressed due to unnatural persistent saturation or inundation created by the history of the site being ditched and then those ditches having filled without leaving a complete channel network.

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

The effects of the project will be positive. Our goal is to make the area more resilient by reducing inundation rates which will lead to revegetation and increased health of existing vegetation which in turn will increase biological and sediment accretion that will help decrease degradation and help the marsh keep pace with sea level rise. Improved vegetation will increase overall productivity of the area and provide better habitat for avian nesters, forage fish, and other groups of species.

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, help 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 as it converts to low marsh vegetation, continue to have marsh platform breaking down and becoming bare sediment and eventually 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 for salt marsh species such as the saltmarsh sparrow, 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 Ted Harvey Conservation 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 mix of high and low 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, including 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 for the southeastern part of the site (see included map) while any runneling 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 avoided, and the project will not involve 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 which will not 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. The area is not easily accessible by foot and boat or easily viewable so current and future recreational use is expected to be minimal.

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 although access to the area is and will remain difficult.

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 work is being done by the US Fish and Wildlife Service and their NGO partners and through US Fish and Wildlife funding.

Policy 5.17: Recreation and Tourism

The project area is not easily accessible to the public other than potentially for limited 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

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. During that meeting these other sites were

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 08:46:40 -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: Buckaloo Tract Hydrological Modification

PROJECT SUMMARY

Install 960 linear feet of runnel and do 402 linear feet of ditch maintenance to improve salt marsh hydrology.

PROJECT PARTNERS

Delaware Division of Fish and Wildlife, U.S. Fish and Wildlife Service Delaware Bay Coastal Program, American Conservation Experience

PROJECT LOCATION

Buckaloo Tract of the State-owned Ted Harvey Conservation Area, Kent County, Delaware with some of the hydrological effects extending to less than 1 acre of the adjoining private property. The site is a 17-acre area of salt marsh north of the community of Bowers Beach and south of the St. Jones River. Project center is at approximately 39.0629 N -75.4066 E.

PROJECT GOAL

Make the area more resilient by reducing inundation rates which will lead to revegetation and increased health of existing vegetation which in turn will increase biological and sediment accretion that will help decrease degradation and help the marsh keep pace with sea level rise. Improved vegetation will increase overall productivity of the area and provide better habitat for avian nesters, forage fish, and other groups of species.

SITE CONDITION AND HISTORY

In 2022, we identified the approximately 400 acres of salt marsh on the Buckaloo Tract as having potential to benefit from restoration. In 2023, we selected a 29-acre portion of the site to assess for appropriate restoration designs by primarily looking at hydrology and elevation but also examining the avian, plant, and nekton communities from 2023 to 2025. In 2026, we selected a 17-acre project area within the assessment area. All work proposed is on the State-owned land but the hydrologic benefits will extend into approximately 1 acre of the private property to the west. We still may assess and pursue restoration of other areas of the tract's 400 acres of salt marsh as future separate actions.

The Buckaloo project area is near the mouth of the St. Jones River and connected directly to the river by a large channelized tidal creek. The project area is entirely salt marsh and entirely surrounded by salt marsh. The platform across the site is mostly intact and mostly walkable. Some ditches have mostly filled in while others have naturalized into effective tidal creeks.

The site was ditched extensively. Large ditches or channelized creeks were in place by the mid-1920s. More extensive ditching was done later, potentially in the 1930s although the historical aerials are not clear on when it happened. A 1926 aerial attached at the end of the narrative suggests the project area may have been mostly high marsh, potentially used for hay or pasture. A 2002 aerial at the end of the narrative shows the ditch network well. A variety of long narrow

open marsh water management (OMWM) features were installed in the project area likely sometime around 2000.

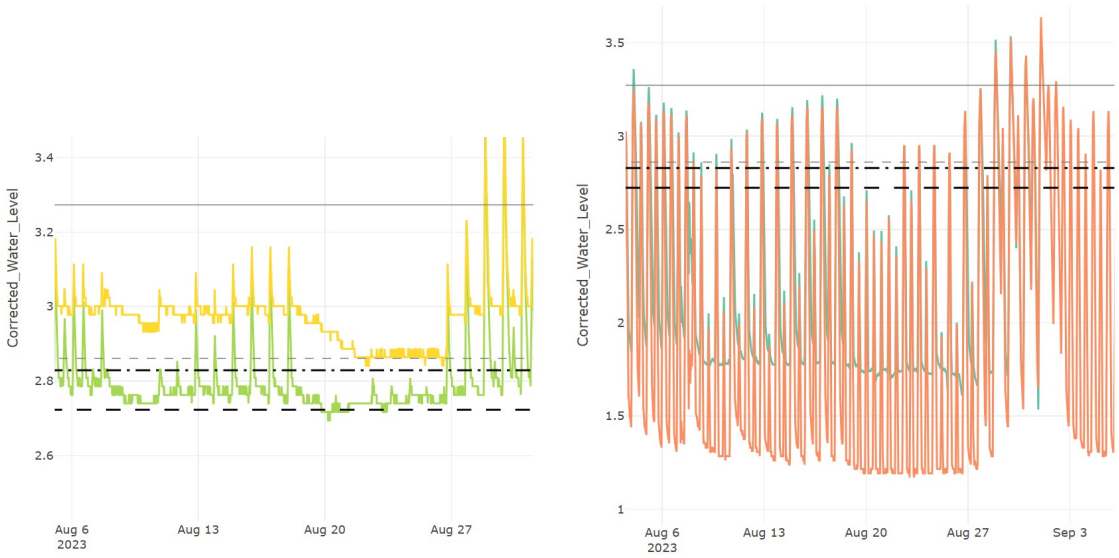
Much of the Buckaloo project area is exposed to higher tides and the water ebbs from the site. However, there are also many areas where some of this water remains on the platform throughout the tidal cycle leaving inundated or at least saturated surfaces that have resulted in stressed and dying vegetation.

Vegetation type is very patchy across the site including *Distichlis spicata* (saltgrass), *Spartina patens* (syn *Sporobolus pumilus*, salt meadow cordgrass, or salt hay), and tall and short form *Spartina alterniflora* (syn *Sporobolus alterniflorus* or smooth cordgrass). Most high marsh appears to remain saturated and often shows signs of degradation such as an uneven platform, pockets of exposed sediment, and sparse weak growth. Low marsh also shows signs of degradation such as very short, sparse *S. alterniflora* growth and extensive bare patches.

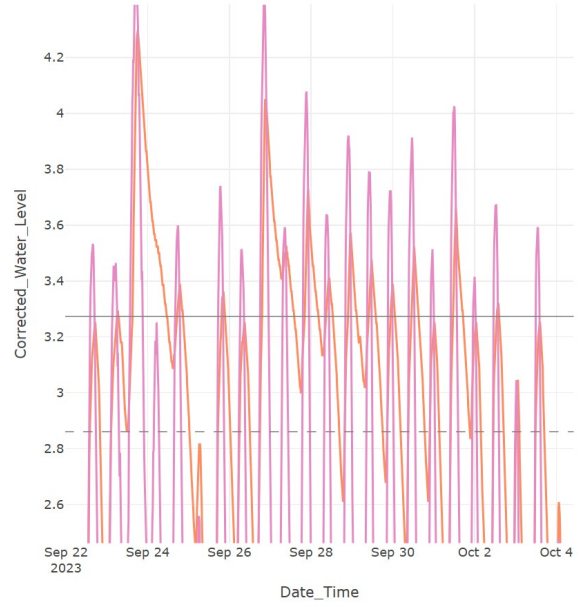
The marsh platform should be less inundated and saturated than it is based on tidal datums we calculated from water level data from the site. Our assessment indicates water remains on the surface due to four main reasons. First, the site has likely become flatter due to the history of ditching causing a loss of the subtle gradients that allow an unaltered marsh to drain despite unaltered marshes having fewer channels. Second, high tides can flood the marsh but do not completely ebb from the marsh during each tidal cycle because pockets of platform have lower elevations than the marsh edges between them and the ditches. The edges of channels in a salt marsh often have subtle microberms along them because sediment in tidal water drops out in these areas before getting onto the marsh platform. Microberms are enhanced in a salt marsh that has been ditched because the ditches increase the channel density which decreases tidal energy and causes the sediment to be less likely to be pushed further onto the marsh platform. Third, as marsh in between channels becomes more saturated or inundated throughout the tidal cycle, vegetation health decreases causing a reduction in belowground growth (i.e., biological accretion) that is particularly important in Mid-Atlantic salt marsh for gaining elevation. As the marsh between ditches loses accretion abilities, the elevation deficit relative to the ditch edges gets increased causing more ponding, further vegetation stress or loss, further relative negative accretion compared to the ditch edges, and so on. Fourth, the marsh hydrology is reliant on sections of remanent mosquito ditches that have begun to fill in. Many ditches tend to fill in because the relatively lower energy flows that occur in them compared to natural tidal creeks that are fewer in number and therefore have more flow, more energy, and better ability to move sediment. Ditches filling in can be a beneficial part of the marsh naturally healing from the past alterations but in spots it leaves the altered marsh system with fewer channels than needed because all the ditches fill in at the same time. Our assessment data provide evidence of the degraded condition on the marsh.

The yellow (Buck_surface_2) and green (Buck_surface_1) lines in the graph on the left below show an example period of water levels at two Hobo water level loggers we had on the marsh surface. The dark dashed lines are the elevation of the platform corresponding to where the water loggers were lying. The graph shows the surface consistently being inundated. However, the graph on the right shows the same time period for data from two Hobo water level loggers (blue line = Buck_channel_01 and orange line = Buck_channel_02) in channels next to the location of the surface loggers and the dashed lines are again the elevations of the two loggers on the surface. The graphs show that the tide ebbs from the channels to an elevation well below the

platform but the platform does not fully drain. This can be addressed by runnels, shallow hand dug channels that enhance the connection between the platform and the existing channels. A map at the end of the narrative shows the logger locations.



The below graph compares peak water level data from one of the channels on the marsh which is a mosquito ditch that is beginning to fill (shown in orange and from data from logger Buck_channel_2) compared to the channelized tidal creek along the north edge of the site shown in purple (logger Buck_reference) for an example time period. The graph shows the mosquito ditch is not able to fully ebb before the next rising tide in contrast to the tidal creek. This is partly due to the channels being constricted by sediment and vegetation. This can be addressed by strategic ditch maintenance which involves partially cleaning out select ditches to facilitate a more natural tidal hydrology on both the flood and ebb tides.



The below table shows tidal datums we calculated from the water level data of the project area compared to the elevation of the Hobo water level loggers on the surface and their calculated current inundation rates. The inundation rates are close to 100% despite the loggers being at elevations close to the corresponding mean high water of the nearby channels. The site is a good candidate for hydrological restoration because this elevation capital (i.e., positive relief relative to the tideshed and local tidal datumns) provides evidence that runnels and ditch maintenance will be effective.

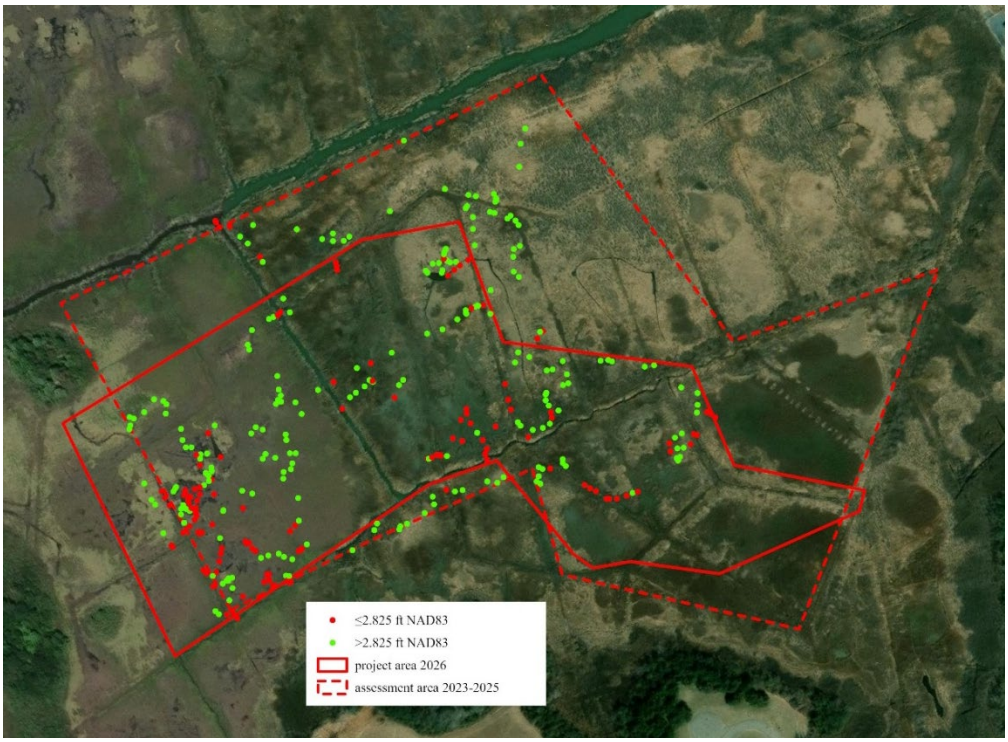
Logger name	MLW	MTL	MHW	MTR	logger elev	inundation*
Buck_reference	-1.42	0.72	2.87	4.28	-2.50	
Buck_channel_1	1.84	2.33	2.82	0.98	1.38	
Buck_channel_2	1.54	2.18	2.83	1.30	1.05	
Buck_surface_1	2.76	2.83	2.90	0.14	2.72	96%
Buck_surface_2	2.92	2.96	3.00	0.08	2.83	98%

*Percent of 15 minute intervals that the logger collected data showing inundation

The below table shows inundation rates that would be predicted on the marsh platform at different marsh elevations based on water levels in nearby channels. The elevations where the surface water loggers are at are inundated nearly 100% of the time but should be closer to inundated 30% of the time. The loggers are in areas with bare sediment but a 30% inundation rate is ideal for *S. alterniflora* growth. Although the tides on the marsh surface will always be somewhat different than nearby channels, runnels and ditch maintenance will allow the tidal datums on the marsh surface and inundation rates to approach those suggested by the channel data.

elevation ft NAVD88	predicted % inundated based on Buck_reference	predicted % inundated based on Buck_channel_1	predicted % inundated based on Buck_channel_2	Actual current inundation based on Buck_surface_1	Actual current inundation based on Buck_surface_2
1.75	47%	84%	54%		
2.0	44%	54%	49%		
2.25	40%	44%	45%		
2.5	36%	38%	39%		
2.75	31%	32%	34%	96%	98%
3.0	25%	20%	24%		
3.25	18%	6%	7%		
3.5	9%	3%	3%		

The map below shows elevation points taken at the site that are above (green dots) and below (red dots) the average MHW of the two onsite channel loggers (2.825 ft). Despite most of these points being above MHW, most are at marsh that is usually saturated if not inundated and some are bare sediment. Runnels and ditch maintenance would allow the hydrology of many of these points to revert back to vegetation more characteristic of elevation near MHW.



The table below shows biobenchmarks that include most of the points in the above map. These are points where both the elevation and type of vegetation cover are recorded. Biobenchmarks are not taken at random points but instead are taken at representative areas of the particular type of cover and usually where at least two square contiguous meters around the point are predominantly that kind of cover. With the installation of runnels and ditch maintenance, we would expect many of the areas of bare sediment to revert to healthy cover and many of the points showing stressed vegetation to revert to healthier vegetation.

BIO-BENCHMARKS					
Type	**n**	**$\bar{X}$ ft**	**min**	**max**	**stdev**
S. patens/D. spicata	15	3.23	3.04	3.50	0.14
S. patens/D. spicata_stressed	67	3.17	2.83	3.56	0.18
S. alterniflora-short	10	2.91	2.76	3.09	0.11
S. alterniflora-short_stressed	38	2.82	2.58	3.05	0.10
S. alterniflora-medium	36	3.01	2.86	3.32	0.11
S. alterniflora-medium_stressed	2	2.81	2.80	2.83	0.02
S. alterniflora-tall	52	2.92	1.92	3.58	0.33

PROPOSED PLAN

A limited amount of strategic ditch maintenance and runneling at this site will help the hydrology and allow the vegetation to improve which will increase resilience and habitat value. This project will restore more effective tidal influence on the flood and especially ebb tides and reduce platform inundation rates.

Ditch maintenance

Ditch maintenance that the project area requires is limited to an estimated 402 linear ft in three sections. Most of the areas needing clearing are partly open and mostly only closed by vegetation growing in from the sides and only limited sediment accretion. Some flow currently gets through these areas but they are very constricted. Targeted depth would be approximately 1 ft to 1.8 ft below the marsh platform which would be enough depth to ensure restored flow. This depth would be below the invert elevation of the most degraded areas on the marsh platform ensuring water will have a sufficient gradient and open flow to move off the marsh platform where needed during ebb tide. To obtain depths of 1 to 1.8 ft below the platform, the average amount of material to remove is about 0.8 ft because the platform in most places is already higher than the current top of sediment or vegetation restriction in the ditches.

The average width of ditch maintenance will be approximately 1.5 ft. Less width than this would create channels likely to more quickly fill in by *S. alterniflora* whereas wider widths would further prevent these constrictions but would also mean moving a lot more sediment creating more disturbance and more cost for marginal benefit.

We expect the amount of material to be removed during ditch maintenance to be at most 12.3 cyd. Ditch maintenance will be done by hand using serrated shovels and marsh sleds to move the material as needed.

The proposed design for ditch maintenance will maintain the current condition that has formed where one main channel through the center of the project area leads to the channelized tidal creek. 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. At low tide, the OMWM features and other lowest parts of the marsh will still contain water which will provide refugia for nekton that are forage fish or mosquito larvae predators.

Runnels

Runnels are shallow channels cut through marsh platform where there is typically not evidence of previous ditches or natural channels. Runnels connect existing negative relief to regain tidal influence and may or may not be to the invert elevation or below of the area they target for increased drainage.

We plan an estimated 19 sections of runnel for an estimated 960 linear ft. The depth of runnels will vary but average approximately 0.6 ft below the surrounding platform elevation. The width of runnels will also vary but the average will be approximately 0.8 ft or less. We expect the amount of material to be removed during runnel creation to be at most 17.1 cyd. All runnels will be hand dug.

Habitat Mounds

Material removed from ditch maintenance or runnels will be placed into habitat mounds. Mounds will be placed mostly in low unvegetated areas on the marsh platform and close to where the material will be removed from. Material will be shoveled directly from the runnel or ditch maintenance area to the mound areas or conveyed a short distance using a hand-pulled marsh

sled. Mounds will be approximately 0.5 ft high. We will gently press the mounds flat so they create a surface for *S. patens* or other vegetation to grow, so they do not have small pockets that will produce mosquitoes, and so that high uneven areas are avoided that would quickly break down (i.e., oxidize). The maximum of 12.3 cyd from ditch maintenance and maximum of 17.1 cyd from runneling will mostly be saturated vegetation, peat, and limited sediment that will quickly be reduced in volume due to dewatering, settling, and breaking down.

The diameter of the mounds will vary based on the amount of material being removed in the immediate area. Mound locations are depicted on the plans as approximate. Exact locations will be determined at the time of placement based on marsh condition. Mound sizes will vary but average approximately 16 ft^2 and contain approximately 0.3 cyd. Based on a maximum of 29.4 cyd of material coming from runnels and ditch maintenance, we expect the total number of mounds may be up to approximately 98 and cover up to 1,579.1 ft^2 or less than 0.04 acres. Based on our recent experience creating runnels and doing ditch maintenance at Prime Hook National Wildlife Refuge in Delaware, we expect much less material than these estimates once placed in mounds because the material is predominantly water and loosely consolidated roots and rhizomes.

Timeline

All work will be done outside of the growing and nesting season approximately in early March 2027. All runnels and ditch maintenance will likely be implemented during one scheduled effort to the degree resources allow.

Minimizing impacts to the marsh

Impacts to the salt marsh will be minimized. The proposed plan involves doing only a limited amount of runneling and ditch maintenance to minimize disturbance and to ensure the desired changes happen without unintended effects on the marsh. Construction will take place outside of the growing season and nesting season. Most of the marsh platform at the Buckaloo project area is still firm and can be walked on with little threat of compaction. We will use established paths, single entry points to the site, and walk on planks across the softest areas to further reduce disturbance. We do not propose using equipment. The work can be done more efficiently and effectively at a lower cost by hand than with equipment. The plan minimizes sediment redistribution or sediment loss because we will keep the ditch maintenance and runnels shallow, most of the ditch maintenance will be removing vegetation growing in the ditches not sediment, and most of the runnels will be dug into peat rather than unconsolidated sediment.

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 by the Service 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 may alter channel size 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 five variables listed below will demonstrate success for the project. One through three will begin to happen within one tidal cycle of implementation and can be measured by continuing to have water level loggers in the current locations at least during the growing season. Four and five will begin to be seen after one growing season but will likely take three growing seasons. Four and five will be monitored with the least disturbance and cost by observing the areal extent of vegetation as evidenced by ground and drone imagery from set x, y, and z coordinates during low tides at the end of the growing season for at least 3 years.

1) Reduced water levels on the marsh soon after implementation.
2) Reduced inundation rates of water on the marsh soon after implementation.
3) Increased agreement between the tidal patterns on the marsh surface and channel network.
4) Reduced loss in vegetation from horizontal expansion of pools and bare areas.
5) Return of vegetation and increased vegetation density that are currently bare sediment or mostly bare sediment.

FIGURES

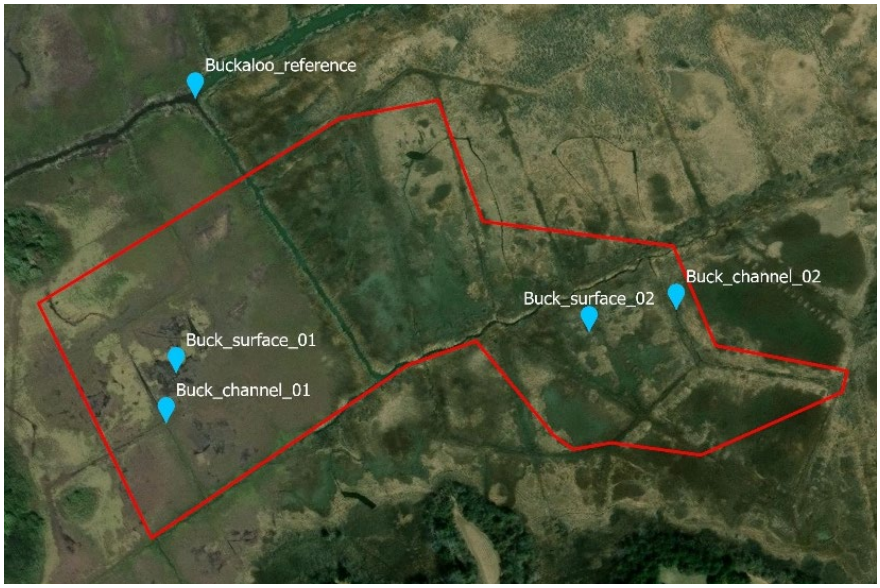
1926 aerial of the project area showing larger ditches or channelization of existing creeks was already in place but the grid of smaller ditches was not yet created. Lighter colored areas were likely high marsh used for hay or pasturage and many of the darker areas were likely shrubs.



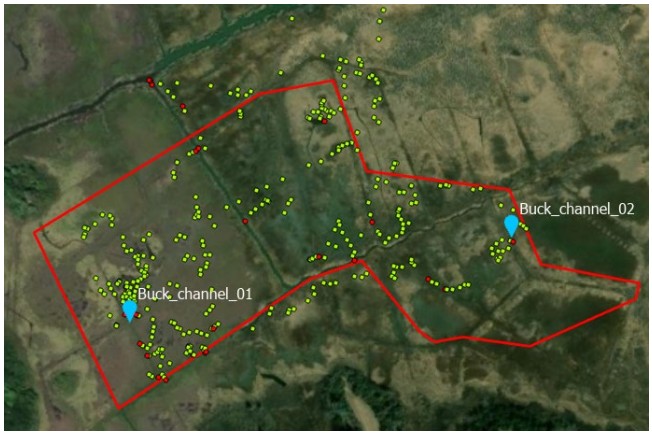
2002 aerial that shows the ditch network well. Unlike the above 1926 aerial, here lighter areas are likely high marsh and darker areas are mostly low marsh and lesser amounts of shrubs. In addition to the ditches, long ditch like OMWM features can be seen that were likely installed a few years before the image.



Locations of water level loggers in place during 2023

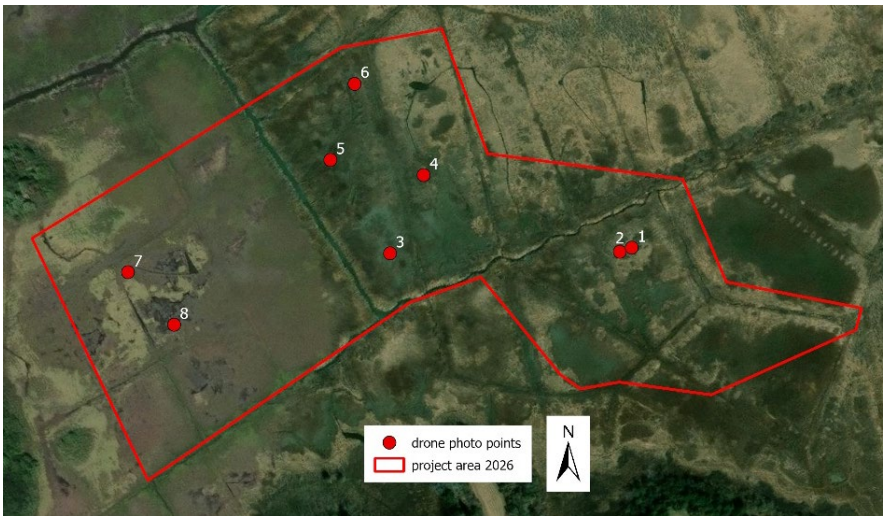


Elevations recorded at the site using RTK. The mean tide level calculated from the two loggers shown was 0.72 ft. The red points are elevations below this MTL and all the green points are above. On marsh protected from wave energy, we would expect points above MTL to increasingly be vegetated at least with healthy S. alterniflora but here many of these areas are beginning to show stressed vegetation or bare sediment due to the hydrology.



SITE PHOTOS - DRONE IMAGES

Image locator



Drone photo 1: Looking west over most of the site. Areas where ponding is starting to become a problem can be seen. 3/31/2026



Drone photo 2: Looking approximately straight down showing areas needing runnels and ditch maintenance mostly on the right side of the image. 3/31/2026



Drone photo 3: Looking straight down at an area needing runneling and showing an example of ponding on the left and a tidal ditch on the right separated by an area of slightly higher elevation and more dense vegetation that contributes to keeping water ponded. 3/31/2026



Drone photo 4: Looking to the southwest over an area that would benefit from runneling. 3/31/2026



Drone photo 5: Looking south southeast over the same area as photo 4. 4/9/2026



Drone photo 6: Looking southeast over the same area as photos 5 and 6. 4/9/2026



Drone photo 7: Looking south southeast over an area that would benefit from runneling and some minor ditch maintenance. 4/9/2026

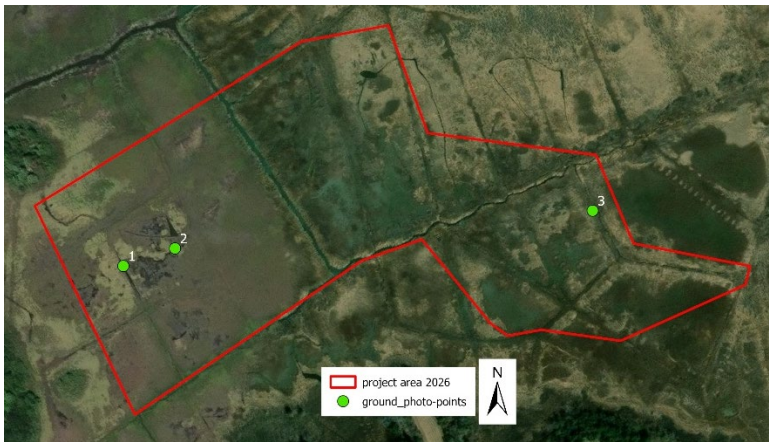


Drone photo 8: Looking south southeast over an area that would benefit from runneling. 4/9/2026



SITE PHOTOS - GROUND IMAGES

Image locator



Ground photo 1: Looking to the northeast over an area targeted for runnels. The area drains to the southeast through an area needing ditch maintenance.



Ground photo 2: Looking southwest over an area targeted for runnels. The area drains to the south through an area needing ditch maintenance.



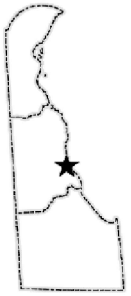
Ground photo 3: Looking west over a fairly typical mix of vegetation for the site showing some tall form S. alterniflora in the near foreground, S. patens in the foreground, and short form S. alterniflora in the background. The S. patens closer to the foreground is stressed but transitions into healthier S. patens characterized by the denser growth and "cowlick" appearance.



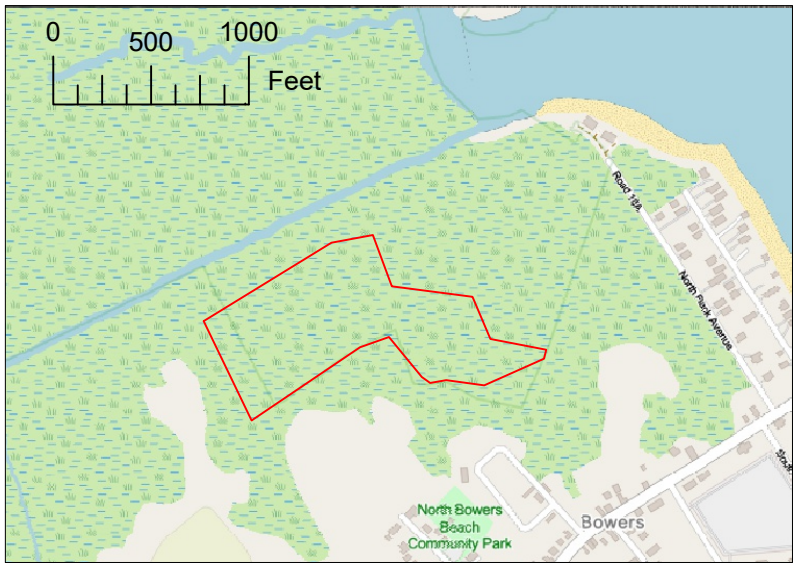
PROJECT LOCATION 39.063 N -75.406 E

Ted Harvey Conservation Area - Buckaloo Tract, Kent County, Delaware

project area that contains all work proposed and all area hydrologically affected by the work









Project Name	Buckaloo Tract Hydrological Modification
Landowner	Buckaloo Tract Ted Harvey Conservation Area Delaware Division of Fish and Wildlife Primary contact: Sean O'Connor Kent County Regional Wildlife Manager 750 Kersey Road, Viola, DE 19979 302-284-4795 sean.oconnor@delaware.gov
Plans prepared by and project point of contact	Delaware Bay Coastal Program U.S. Fish and Wildlife Service 2591 Whitehall Neck Road Smyrna, DE 19977 Brian Marsh 302-242-7067 brian_marsh@fws.gov Kaity Ripple: 302-242-7066 kaitlyn_ripple@fws.gov
Plans date	7/2/2026
Sheets	1/3

Revisions	Date
Issue	

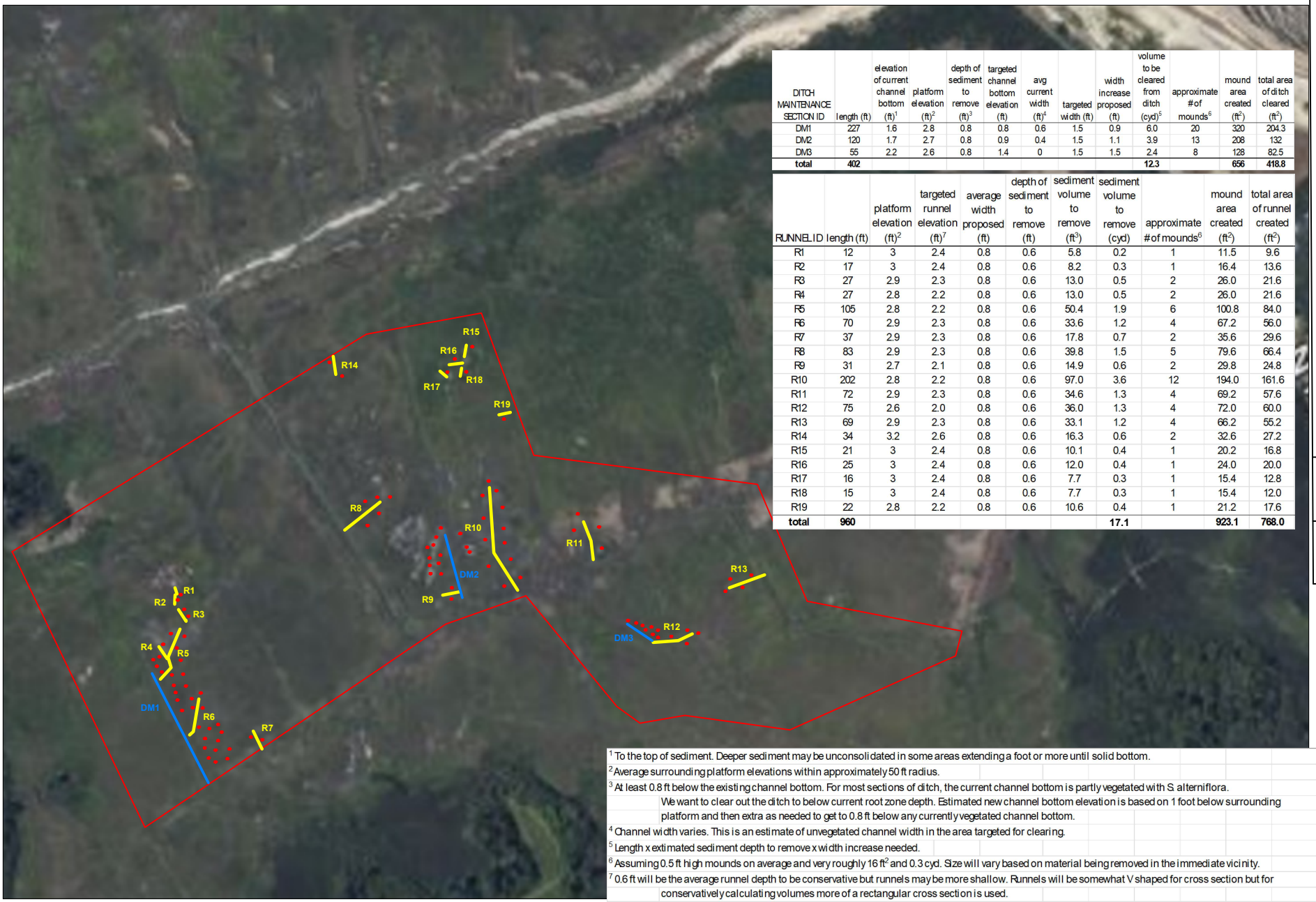
PLAN

0 250 500 Feet

Proposed Ditch Maintenance

Proposed Runnel

Habitat Mound (approximate placement)



DITCH MAINTENANCE SECTION ID	length (ft)	elevation of current channel bottom (ft)[1]	platform elevation (ft)[2]	depth of sediment to remove (ft)[3]	targeted channel bottom elevation (ft)	avg current width (ft)[4]	targeted width (ft)	width increase proposed (ft)	volume to be cleared from ditch (cyd)[5]	approximate # of mounds[6]	mound area created (ft^2)	total area of ditch cleared (ft^2)
DM1	227	1.6	2.8	0.8	0.8	0.6	1.5	0.9	6.0	20	320	204.3
DM2	120	1.7	2.7	0.8	0.9	0.4	1.5	1.1	3.9	13	208	132
DM3	55	2.2	2.6	0.8	1.4	0	1.5	1.5	2.4	8	128	82.5
total	**402**								**12.3**		**656**	**418.8**

RUNNEL ID	length (ft)	platform elevation (ft)[2]	targeted runnel elevation (ft)[7]	average width proposed (ft)	depth of sediment to remove (ft)	sediment volume to remove (ft^3)	sediment volume to remove (cyd)	approximate # of mounds[6]	mound area created (ft^2)	total area of runnel created (ft^2)
R1	12	3	2.4	0.8	0.6	5.8	0.2	1	11.5	9.6
R2	17	3	2.4	0.8	0.6	8.2	0.3	1	16.4	13.6
R3	27	2.9	2.3	0.8	0.6	13.0	0.5	2	26.0	21.6
R4	27	2.8	2.2	0.8	0.6	13.0	0.5	2	26.0	21.6
R5	105	2.8	2.2	0.8	0.6	50.4	1.9	6	100.8	84.0
R6	70	2.9	2.3	0.8	0.6	33.6	1.2	4	67.2	56.0
R7	37	2.9	2.3	0.8	0.6	17.8	0.7	2	35.6	29.6
R8	83	2.9	2.3	0.8	0.6	39.8	1.5	5	79.6	66.4
R9	31	2.7	2.1	0.8	0.6	14.9	0.6	2	29.8	24.8
R10	202	2.8	2.2	0.8	0.6	97.0	3.6	12	194.0	161.6
R11	72	2.9	2.3	0.8	0.6	34.6	1.3	4	69.2	57.6
R12	75	2.6	2.0	0.8	0.6	36.0	1.3	4	72.0	60.0
R13	69	2.9	2.3	0.8	0.6	33.1	1.2	4	66.2	55.2
R14	34	3.2	2.6	0.8	0.6	16.3	0.6	2	32.6	27.2
R15	21	3	2.4	0.8	0.6	10.1	0.4	1	20.2	16.8
R16	25	3	2.4	0.8	0.6	12.0	0.4	1	24.0	20.0
R17	16	3	2.4	0.8	0.6	7.7	0.3	1	15.4	12.8
R18	15	3	2.4	0.8	0.6	7.7	0.3	1	15.4	12.0
R19	22	2.8	2.2	0.8	0.6	10.6	0.4	1	21.2	17.6
total	**960**						**17.1**		**923.1**	**768.0**

[1] To the top of sediment. Deeper sediment may be unconsolidated in some areas extending a foot or more until solid bottom.

[2] Average surrounding platform elevations within approximately 50 ft radius.

[3] At least 0.8 ft below the existing channel bottom. For most sections of ditch, the current channel bottom is partly vegetated with S. alterniflora. We want to clear out the ditch to below current root zone depth. Estimated new channel bottom elevation is based on 1 foot below surrounding platform and then extra as needed to get to 0.8 ft below any currently vegetated channel bottom.

[4] Channel width varies. This is an estimate of unvegetated channel width in the area targeted for clearing.

[5] Length x extimated sediment depth to remove x width increase needed.

[6] Assuming 0.5 ft high mounds on average and very roughly 16 ft^2 and 0.3 cyd. Size will vary based on material being removed in the immediate vicinity.

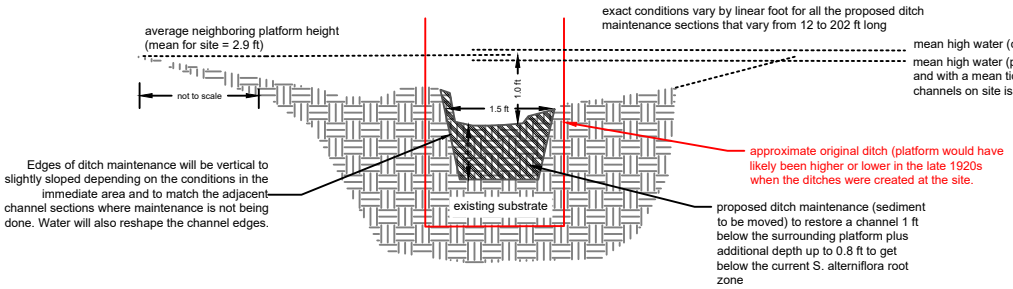
[7] 0.6 ft will be the average runnel depth to be conservative but runnels may be more shallow. Runnels will be somewhat V shaped for cross section but for conservatively calculating volumes more of a rectangular cross section is used.

Project Name: Buckaloo Tract Hydrological Modification

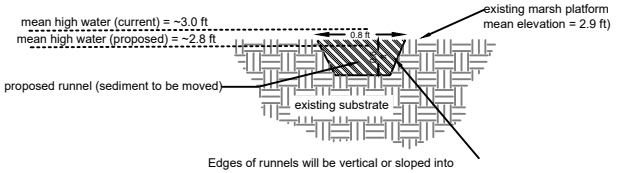
Plans date: 7/2/26

Sheets: 2/3

TYPICAL DITCH MAINTENANCE CROSS SECTION



TYPICAL RUNNEL EXCAVATION CROSS SECTION



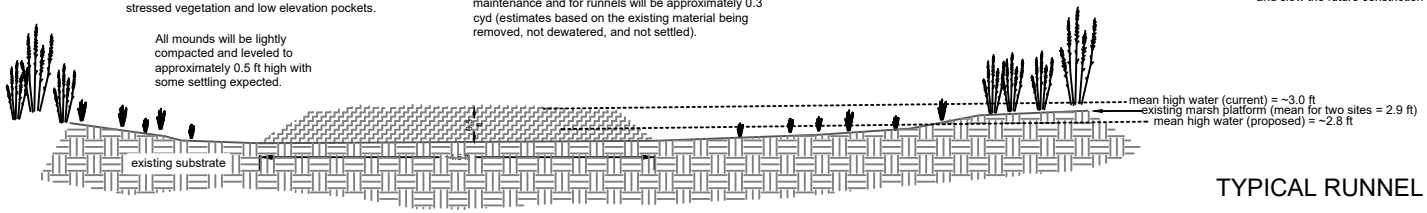
Edges of runnels will be vertical or sloped into more of a V shape depending on the conditions in the immediate area and to match the adjacent channel sections where runnels will flow into. Water will reshape the channel edges. Generally, we want some width at the bottom instead of a perfect V cross section to help the flow of water and slow the future constriction by new vegetation.

TYPICAL HABITAT MOUND PROFILE

Material removed during ditch maintenance or runnel construction will be placed in habitat mounds on the marsh in areas where there is bare sediment or short low density stressed vegetation and low elevation pockets.

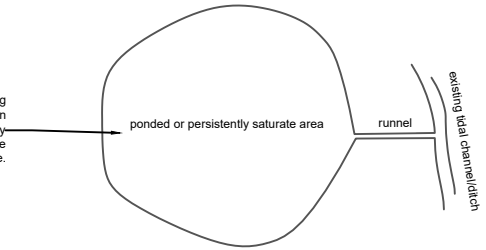
Volume of material will vary based on material available from the immediate area. Mounds from ditch maintenance and for runnels will be approximately 0.3 cyd (estimates based on the existing material being removed, not dewatered, and not settled).

All mounds will be lightly compacted and leveled to approximately 0.5 ft high with some settling expected.

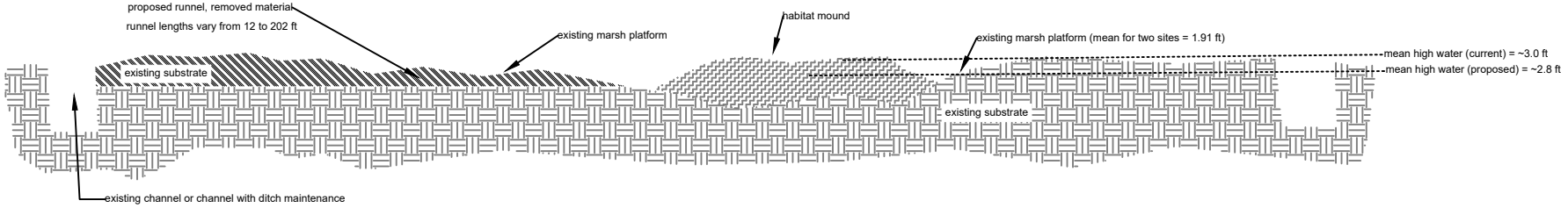


TYPICAL RUNNEL PLAN VIEW

Intent with runnel is to reduce water on the marsh during low tide. This can include reducing saturation rates in areas not currently ponded, allowing ponded areas to fully drain on the ebb tide, or causing ponded areas to be reduced and or shallower but still present at low tide.



TYPICAL RUNNEL EXCAVATION PROFILE



Project Name

Buckaloo Tract Hydrological Modification

Plans date	7/2/2026
Sheets	3/3

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]

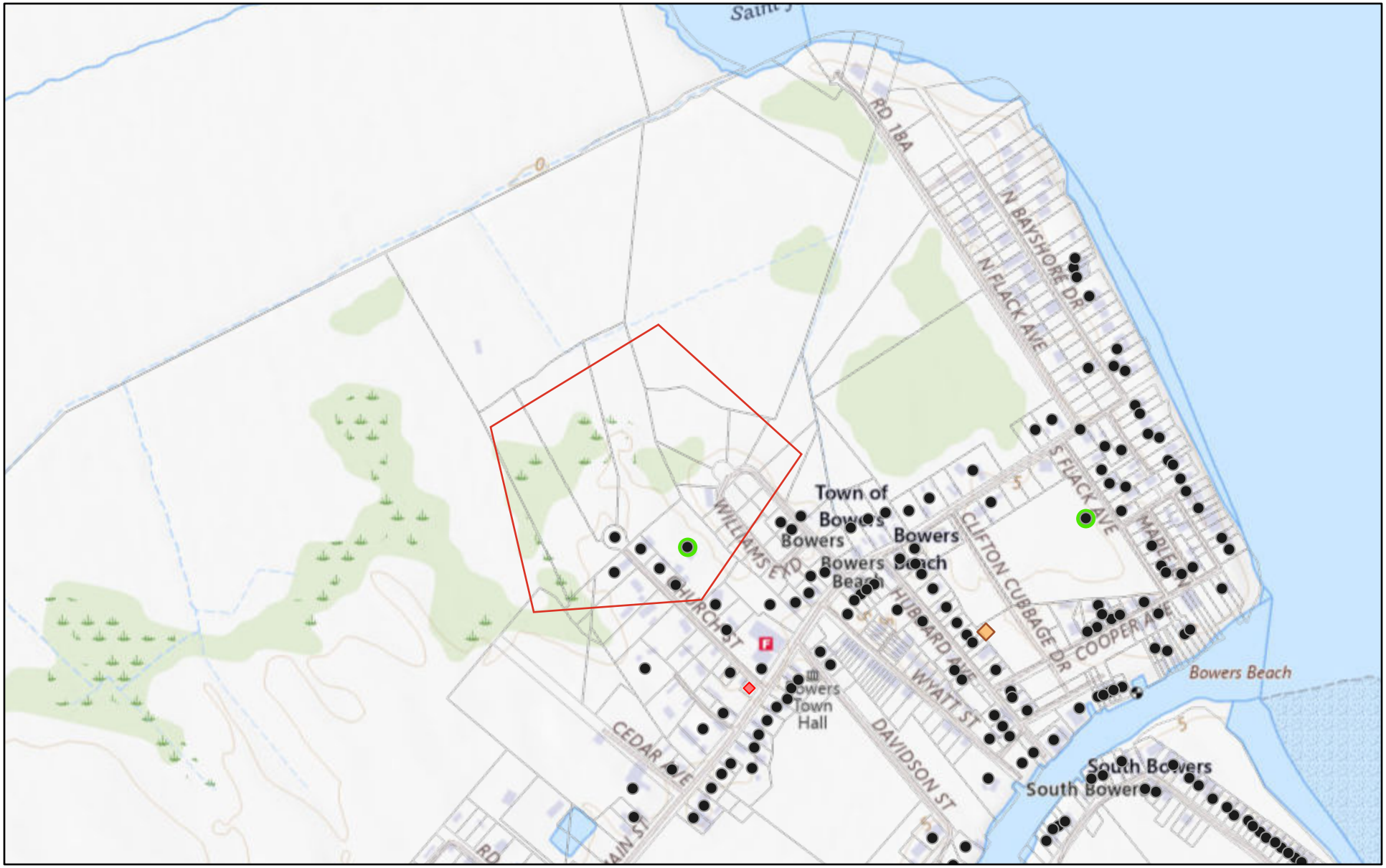
Brian Marsh
USFWS - Delaware Bay Coastal Program
2591 Whitehall Neck Road
Smyrna, DE 19977
mobile: [redacted]

--

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

- Other Proposed Properties
- HistoricPropertySync
- National Register-listed
- other surveyed, assigned CRS inventory #
- HistoricProperty_Archaeo
- State Parcels

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 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
dnrec.delaware.gov

July 28, 2026

Brian Marsh

USFWS – Delaware Bay Coastal Program

2591 Whitehall Neck Road

Smyrna, DE 19977

Re: USFWS 2026 Buckaloo Tract Tax Parcel # 8-00-11400-01-0403-00001 & 8-01-11416-01-0300-00001

Dear Kenneth:

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 there are currently no records of state-rare or federally listed plants, animals or natural communities at this project site. As a result, 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 Army Corps of Engineers (ACOE) 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 Army Corps of Engineers for activities on this property.

State Wildlife Management Area

The proposed project is within ½ mile of the boundary of Ted Harvey Conservation 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 restoration activities, on the property in question. The contractor should consult with the Regional Wildlife Biologist, Sean O'Connor (Sean.OConnor@delaware.gov or 302-284-4795) to minimize potential negative impacts of the proposed project on State Wildlife Area lands. Additionally, the contractor 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 Bejamin.Schlusser@delaware.gov.

Key Wildlife Habitat

The wetland block on this property is mapped as Key Wildlife Habitat (KWH) in the Delaware Wildlife Action Plan (DEWAP) because:

- it is part of a large wetland complex that can support an array of plant and animal species across the landscape.

Although designation as KWH is non-regulatory, these maps are intended to help guide site-specific conservation planning efforts. Impacts to KWH should be minimized to the greatest extent practicable.

The DEWAP is a comprehensive strategy for conserving the full array of native wildlife and habitats, common and uncommon, as vital components of the state's natural resources. This document can be viewed via the Division of Fish and Wildlife's website.

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. The 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.

Marsh Work Behind Delaware Bay Shore Beaches

To date we have no 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. We recommend avoiding work between **April 15th – June 7th** to mitigate disturbance to such species during their brief migration stopover in the Delaware Bay.

Wetland Restoration Activities

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.

Wetlands

Wetlands are perhaps Delaware's most significant natural feature, covering one-fourth of the state, with a total of approximately 320,000 acres. An estimated 47 percent of wetlands are located in Sussex County, 38 percent in Kent County, and 15 percent in New Castle County. Wetland habitats include a wide range of types – tidal, nontidal, freshwater, brackish, and saltwater, and include coastal wetland impoundments, vernal pools, Coastal Plain seasonal pond wetlands, peat wetlands, and Piedmont stream valley wetlands. Wetlands are found along the shores of the Delaware Bay and Inland Bays,

along rivers, streams, and ponds, and in forests and fields throughout the state. Delaware is one of only 16 U.S. states with greater than 50% loss of wetlands. The majority of these were freshwater wetlands that were lost to ditching, stream channelization, conversion to ponds, and filling for development. Tidal wetlands were also lost to filling for development, shoreline hardening, conversion to impoundments, and ditching for mosquito control or agricultural drainage. Fortunately, wetland regulations at both the state and federal levels have greatly curtailed these losses in the last several decades. Tidal wetland losses have slowed dramatically, but protection of isolated freshwater wetlands remains insufficient.

Many wetlands in the state suffer from degradation caused by sedimentation, nutrient enrichment, and invasive plant species. These problems are exacerbated by insufficient natural buffers around many wetland blocks. Tidal wetlands, which constitute the great bulk of wetland blocks, are almost all threatened by sea level rise, especially given the lack of buffers to accommodate migration. Although there are no records of rare species or natural communities at this location, the cumulative impacts of projects such as this could lead to the long-term degradation of the marsh habitat through fragmentation and disturbance.

Wetland Buffer

Buffers are an integral component of aquatic and wetland habitats, reducing the amount of sediments, pollutants, and other non-point source material that may affect the function and integrity of habitat and the condition and survivability of aquatic organisms. Forested buffers serve as habitat for many terrestrial species that are dependent on aquatic and wetlands habitats for a portion of their annual life cycle.

In the interest of water quality and wildlife habitat, we recommend maintaining an upland buffer of at least 100 ft along rivers, streams and wetlands. This recommendation is based on peer reviewed research that suggests that buffer values increase noticeably with widths of 100 ft or more. This buffer should *not* be a maintained lawn area and should *not* contain lot lines or infrastructure. We recommend the buffer area be comprised of the existing vegetation or planted with Delaware native species of trees, shrubs, grasses or wildflowers.

Soil Disturbance and Phragmites

Soil disturbance within the project boundaries will likely result in the establishment of the non-native invasive grass – European reed (*Phragmites australis*), as well as other potentially invasive, non-native plant species. We recommend that, as a condition of the permit, the applicant revegetate the area using native plant species that are indigenous to the state of Delaware and are appropriate for the site. Our staff can provide guidance in selecting plant material suitable for replanting at this site (302-735-3600 or

DNREC_EnvReview@delaware.gov). In addition, we also recommend that the applicant commit to a two-year monitoring and management plan that would include the removal of non-native invasive plants and additional plantings of native species as necessary.

Fisheries

The Division of Fish and Wildlife does not have fish community data for the project location. However, it is unlikely that habitat occurs in the project site that would support anadromous fish species. No time of year restrictions or other measures are requested for these species or for resident gamefish species.

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,



Matthew Young

Environmental Review Coordinator

Phone: (302) 735-8677

Cell: (302) 382-8468

Email: matthew.young@delaware.gov

89 Kings Highway

Dover, DE 19901