NC Marine Fisheries Commission

Fishery Management Plans

February 2026 Quarterly Business Meeting

Documents

Eastern Oyster DORA Enhancement Report

Exploring the Viability of Cultch Over-Planting on MFC Designated DORA Natural Oyster Reefs

February 4, 2026

I. SUBJECT

Division exploration of permitting and operational considerations pertinent to over-planting of oyster cultch material on natural reefs found within the MFC designated Deep-Water Oyster Recovery Areas.

II. ORIGINATION

Marine Fisheries Commission

III. BACKGROUND

At the conclusion of the November Marine Fisheries Commission (MFC) meeting, a commissioner requested a report on the viability of obtaining permit authority from the US Army Corps of Engineers (USACE) to enable the planting of vertical reefs on the MFC designated Deep-Water Oyster Recovery Areas.

In the adoption of Amendment 5 to the Eastern Oyster FMP, the MFC designated Deep-Water Oyster Recovery Areas (DORAs) at the mouths of the Neuse and Pamlico Rivers. The MFC's designation of these areas as DORAs closes them to mechanical oyster harvest. Oyster Species Leads presented this as an option to prioritize the habitat value provided by these natural subtidal reefs and to align with goals defined within the Coastal Habitat Protection Plan. The designated areas primarily include oyster reefs occurring at depths below 18 feet, which are susceptible to seasonal hypoxic and anoxic events that result in high oyster mortality. Ultimately, the aims of the DORAs are to understand the natural rate of recovery (vertical growth via oyster shell accretion), to determine natural capacity for resilience to hypoxic events in the absence of harvest pressure, and to evaluate the potential for sustainable fishery management via temporary closure.

The MFC's approval of Amendment 5, including establishing the DORAs and a Rotational Harvest Cultch network, required the Division to take on many additional implementation responsibilities to ensure proper management of these sites. Division staff already oversee all the necessary steps for planning, construction, and scientific monitoring of Oyster Sanctuaries, Cultch Sites, and Artificial Reefs. Implementation items absorbed by the Division include: the purchasing, permitting, and deployment of marker buoys; developing a 10 year plan for the rotational cultch sites to meet management objectives; an assessment of the rotational harvest sites to determine opening & closure status for 2025-2026; a redesign of the in-season management survey with sound protocols and database design; oyster condition assessments; and initial DORA assessments including bathymetric survey and oyster demographic survey via SCUBA. The Division had to determine how to best absorb these implementation needs within a limited timeframe, without additional funding or staffing, and without risking the responsibilities and deadlines in place for already existing programs.

The Division's oyster and fishing enhancement activities fall under the Clean Water Act Section 404, the Coastal Zone Management Act Section 303, the Rivers and Harbors Act of 1899 Section 10, the NC Coastal Area Management Act, the NC Dredge and Fill Law, and the NC Coastal Resources Commission's Rules. The authority derived from these Federal and State regulations falls upon the USACE and the Division of Coastal Management (DCM). To enable an efficient and expedited permitting process, the USACE has developed a series of general permits issued on a nationwide, regional, or state basis for categories of common dredge and fill activities with only minimal adverse effects. The Nationwide Permit 27 (NWP 27)—Aquatic Habitat Restoration, Enhancement, and Establishment Activities—enables the Division's cultch planting efforts to be reviewed and approved with significantly less time by prescribing general and regional conditions all activities must follow. One aspect of this consideration includes the USACE determination of "functional uplift," or the confirmation that operations reviewed and permitted will restore, enhance, or establish habitat benefits in the project area. Applications that the USACE cannot confirm would have no or minimal impacts to natural resources within their jurisdiction may require informal, formal, or programmatic consultation with the National Marine Fisheries Service (NMFS) Protected Resources Division. Consultation with

NMFS can include an extended timeline (up to multiple years, including significant work from Division staff) and requirements to amend or deny the application.

The NWP 27, along with all the nationwide permits, is renewed on a five-year basis—the renewal period enables the USACE to amend, add, or remove general and regional conditions from their general permits. The nationwide permits are scheduled for renewal on March 25, 2026. The NWP 27's renewal will change the method by which cultch planting operations are approved. The current process includes initial approval of authorized areas which cultch planting must occur within, and the post-renewal process will require review and approval of individual projects with specific plans. As a result, cultch planting operations can be applied for in areas outside of the current authorized areas but will also incur more scrutiny on an individual project basis.

The DCM determined, and relayed to Division staff in 2010, the need for a CAMA Major Permit for oyster sanctuaries and artificial reefs, but an exemption from the CAMA process for cultch planting operations. This exemption was primarily due to the small material size—generally shell and ASTM #4 limestone marl—and low relief design for cultch reefs. A departure from these accepted materials would require consultation with the DCM and the USACE and may require individual permitting similar to that of oyster sanctuaries and artificial reefs (through a CAMA-Corps Programmatic Permit process) or permitting outside of an expedited form (CAMA Major Permitting; USACE Regional General Permitting or USACE Individual Permitting).

IV. AUTHORITY

United States Code
16 U.S.C § 1452 Coastal Zone Management Act Section 303
33 U.S.C. § 1344 Clean Water Act Section 404

Code of Federal Regulations
33 C.F.R. § 320.2 Rivers and Harbors Act of 1899 Section 10

North Carolina General Statutes
G.S. § 113A-118 Coastal Area Management Act
G.S § 113-229 Dredge and Fill Law

North Carolina Coastal Resources Commission Rules
15A NCAC 07H .0201 Estuarine and Ocean System Categories
15A NCAC 07H .0206 Estuarine Waters
15A NCAC 07H .0207 Public Trust Areas
15A NCAC 07H .0208 Use Standards

V. DISCUSSION

To explore the possibility of regulatory allowance for over-planting on MFC designated DORAs, Division staff met with members of the USACE Wilmington District in December of 2025. Discussions during this meeting revolved around the current regulatory structure under the NWP 27 and the upcoming structure changes following the March 2026 renewal of the nationwide permits with this request in mind. From this meeting, Division staff were able to determine the initial biological and logistical constraints regarding federal permitting. The Division's ability to obtain regulatory approval and conduct supplementary over-planting is contingent upon variables that can be grouped into two categories: permitting requirements and the resources needed to support these efforts.

As the NWP 27 is moving to an individual project approval basis upon renewal, enhancement operations will be open to more potential locations but also require more individual assessment as a result. The individual assessment of enhancement operations means that prior approval is not needed on a permit renewal basis but would require more stringent review of many key variables, most notably: evaluation of oyster populations on individual oyster reefs within the MFC's DORAs; confirmation of limiting factors on oyster growth; determination and expression of functional uplift from over-planting efforts; design of effective reef enhancement to address limiting factors; potential additional permitting dependent upon design; and development of monitoring protocols to include a pilot program for over-planting efforts.

Evaluation of existing oyster populations on an individual reef within a designated DORA is the primary step to move towards the permitting of over-planting efforts because of the determination of impact on natural resources the USACE must conduct in their application review. In order to prove that the operations would provide a functional uplift for the habitat, a baseline comparison of existing shellfish populations in the project area is needed to confirm operations wouldn't have a detrimental impact on existing oysters with only the possibility of improvement. This process is inherently complex as the evaluation of existing populations would require: adequate sampling replication to ensure statistically powerful estimates of reefs on the size scale of acres; estimates to be reef specific within a designated DORA; and comparison to an agreed upon threshold for productive natural oyster reefs. This process would require significant additional effort that is likely well beyond what the Division is able to complete, especially considering the Division is already stretched thin conducting annual operations and attempting to add in a viable DORA monitoring effort.

In addition to gathering population estimates for designated DORA reefs, the Division would need to confirm that these operations would actually address the factors prohibiting successful oyster reef rebuilding. While we know that water quality effects (namely, hypoxic and anoxic events) lead to major die-offs in the designated DORAs—among other non-DORA designated deep-water areas of the State—it may not be the only factor preventing restoration. A major step in evaluation would be continuous water quality monitoring at all, or a strategic sub-sample of, reefs within each designated DORA. This monitoring would need to determine not only the presence and temporal variation of water quality impacts, but also the likely cause, in terms of what water quality factor is correlated with the impacts, so that events can be predicted and addressed. Even when given the scenario that water quality effects are the primary or only driver of reef degradation, other strategies of addressing these drivers would also need to be evaluated. The monitoring of water quality effects needed to complete this step may also fit better with alternative strategies to supplement designated and non-designated deep-water area rebuilding such as continued or increased monitoring along with development or driving of policy to improve the correlated water quality factor. Effective water quality policy from other agencies or commissions combined with the MFC's designation of DORAs is likely the most cost-effective, straightforward, and holistic approach to widespread subtidal oyster recovery in the Sound. Before the Division could commit to over-planting, an understanding of the likely outcome of the effort would need to be developed to enable Division management to evaluate the best use of its resources.

Following a proper understanding of the growth limiting driver and a management decision to move forward with over-planting, the next step would be determination and expression to the USACE of functional uplift to the habitat in the individual project area. This would require a design that addresses the limiting factor (theoretically water quality issues at depth) by enabling oyster populations to overcome this factor while still meeting the goals of DORA designation in Amendment 5 of restoring and reopening for mechanical harvest. The resulting need of elevation—given water quality as the driver of loss—and future harvestability would imply some novel design that combines the design of oyster sanctuaries and cultch reefs. Oyster sanctuaries, being closed to harvest, are most effective with a design of ridges made from piling NCDOT Class B rock (~12 inches long) the length of a deployment barge to near the maximum allowable height for navigation. The size of Class B rock provides the most elevation and surface area for maximum oyster growth but prevents harvesting as the size is unmanageable by mechanical oystering methods. Cultch planted reefs follow a design of low relief flat reefs consisting of ASTM #4 rock (most often marine limestone marl, ~2 inches long) to enable harvest of shellfish from the reefs.

Over-planting would likely require some hybrid form of these methods. An example would be utilizing Class B rock to provide elevation with Number 4 marl planted overtop. This type of design would aim to address the limiting factor for the natural reefs while still enabling future mechanical harvest once a DORA designation was removed. The effectiveness of this novel design would take significant evaluation to determine its success both ecologically and from a harvest perspective and may require construction methodology changes as evaluations occur.

Additionally, the novel design needed for over-planting may no longer be compliant with the NWP 27 and may incur different and more cumbersome Federal and CAMA permitting. Currently, oyster sanctuary and artificial reef operations are functioning under a Biological Opinion from 2019 that was conducted by NMFS as a part of a formal programmatic consultation to enable efficient permitting through the USACE. Because this Biological Opinion was completed, the permitting of oyster sanctuary or artificial reef projects can occur through the CAMA-Corps Programmatic Process and would, generally, fall under the CAMA 75-day permit evaluation timeline. These operations must remain within the constraints of the Biological Opinion—most notably, the projects are enhancing

previously built or newly permitted areas that were originally devoid of natural protected habitats, including oyster reefs. An over-planting project on a DORA with existing natural oysters may be outside the consideration of the Biological Opinion and may require a separate formal review and a separate Biological Opinion (generally a multi-year process) or an informal consultation with NMFS (project specific; potentially less than a year). If deemed not suitable under the NWP 27, an over-planting project may require an Individual Permit (18 month review).

Prior to execution of any construction operations, the Division would also need to develop a pilot monitoring protocol for over-planting. This protocol would serve to evaluate the effectiveness of over-planting to ensure that construction operations both meet the USACE's functional uplift requirement and are the most effective use of the Division's resources. To accomplish this, Division staff would need to design a statistically valid survey comparing over-planting on designated DORA reefs, untouched but designated DORA reefs, and non-designated deep-water reefs in both the Neuse and Pamlico regions of the Sound. This monitoring would require significant additional effort by those conducting it along with other Division staff in the creation and verification of a new sampling program. As previously mentioned, Division staff are already attempting to add a viable designated DORA monitoring effort into field operations, though, this effort could currently only result in anecdotal evidence at best without significant yearly replication. Such monitoring may also require confirmed extension or expansion of DORA designation to limit additional confounding factors.

All the considerations enumerated would ultimately be severely limited or entirely prevented due to the Division's lack of additional resources to take on this work. Current Division staff operations include extensions of existing effort with the passing of Amendment 5, such as designated DORA and Rotational Harvest site marking, additional rotational harvest site construction, and DORA monitoring, among other oyster restoration operations already being conducted. The considerations for permitting, monitoring, and construction logistics would require a separate team to complete in an effective and timely manner.

Currently the Division's cultch planting operations are completed by the Division's industrial class fleet of self-propelled barges—these barges are primarily used for their lower cost and ability to construct cultch style flat reefs in shallower waters than contracted construction barges. Oyster sanctuaries must rely on the latter due to their construction out in deeper waters of the Pamlico Sound and the precision needed to construct ridges. As mentioned, the design of over-planting would require a novel engineering method, potentially some form of combination of construction methods. The novel engineering and construction guarantee logistic complexities in avenues such as stockpile site leasing and space limitations, contracted and Division-owned barge coordination, and an ability to shift construction methodology based on effectiveness.

The methodology of construction would also be an inherently greater expense compared to current oyster restoration work due to the hybrid need. Aggregate material deliveries for current oyster restoration work generally ranges from $50-$62 per ton delivered. Oyster sanctuaries are then constructed at an average material usage of ~2,000 tons per acre, whereas cultch sites are constructed at an average material usage of ~360 tons per acre. Considering cultch operations are conducted on mostly flat substrate, a hybrid method to plant on designated DORA reefs could easily surpass the material need of these two categories combined because of the increased volume and rugosity from sanctuary style material utilized for height. As a result, the Division would need to consider if the expense of over-planting would produce the greatest ecological impact for funding when compared to an alternative of additional cultch or sanctuary construction.

As a result of the complexities in permitting and logistics, the Division would need to secure additional funding and full-time employees for this process to be feasible. Even given funding and staff acquisition, Division management would need to evaluate the funding and workforce cost of these operations compared to alternatives (listed here and not) to determine the best ecological use for resources. Additionally, reallocation of existing resources (including the heavy equipment and barges needed) would not be possible due to requirements of the State appropriated funds, federal grants, and FMP obligations of the Division.

VI. SUMMARY FINDINGS

The upcoming regulatory process through the USACE NWP 27 potentially provides a method by which the Division could continue exploring augmented operations, possibly including over-planting on designated DORAs. However, further exploration would need to come only after the Division is able to resolve the necessary considerations outlined

and secure additional funding and workforce. The Division will continue to assess the designated DORAs and the Enhancement Programs to evaluate if, and when, effort should be devoted to over-planting or other projects.

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