

Healthy Waters in the Coastal Zone

FY20 Task 8 Final Report

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Virginia Department of Conservation and Recreation,

Program of Natural Heritage

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Executive Summary

The Environmental Scientist/Analyst with the Virginia Commonwealth University (VCU) Department of Life Sciences (LS), Rice Rivers Center (RRC), was retained by the Virginia Department of Conservation and Recreation (DCR), Natural Heritage Program (NHP), served as the Program Manager of the Virginia Healthy Waters Program (HWP). The HWP Manager maintains access to the facilities and expertise of the DCR and continued to integrate the skills and abilities of the VCU LS/RRC. The position serves as a liaison between DCR and the VCU LS/RRC to promote a coordinated, collaborative approach to integrating field capacity, applied research and outreach to inform the protection of ecologically healthy aquatic systems. This includes the oversight of programs, projects, grants and grant budgets, providing technical support to the DCR NHP and the Virginia Coastal Zone Management Program (CZM), as it relates to coastal zone ecology, management, and restoration. Additionally, this grant supported the VA Oyster Shell Recycling Program (VOSRP) at the VCU RRC as an effort of Healthy *Estuarine* Waters to reclaim waste oyster shell and return it to the Chesapeake Bay as part of habitat restoration activities. Despite the impacts associated with the COVID-19 pandemic altering the ability to implement on-site, in-person activities, considerable effort was made to meet and exceed progress on the advancement of the HWP and the complete the work on time, as per the contract.

Product #1: Program Growth and Administration Report

The HWP is supported through funding from several grant sources including the CZM Section 306, United States Environmental Protection Agency (EPA) Section 319 Nonpoint Source Program, and the EPA Chesapeake Bay Implementation Grant (CBIG). These sources fund various aspects of the Program including the administration and oversight, Program growth and expansion, improvement in capacity, acquisition and analysis of new data and data integration.

The HWP, at the DCR Natural Heritage Program was challenged with limited capacity to realize significant growth during the reporting period. Programmatically, this is the greatest hurdle and has been an ongoing process of discussions regarding staff resources with senior staff. Additionally, inadequate data collection and development, which is the foundation of the program, is hindering the potential to develop a statewide expansion and with no dedicated field staff, the ability to implement measures, models or tools are toothless. However, through efforts to leverage other resources from diverse funding sources and the staff at DCR and VCU, data gaps and data integration continue to be the priorities of the program. The ultimate goal is to integrate existing VCU collected Interactive Stream Assessment Resource (INSTAR) data into the NHP data explorer with the creation of new Element Occurrences (EOs) and Stream Conservation Units (SCUs) and advance to conservation actions to ensure long-term protections of ecologically healthy aquatic systems are maintained.

Meetings with senior and staff level management were executed to outline CBIG funding for FY21-24. Project descriptions were developed, specifically since guidance was provided outlining that all tasks must directly advance the Chesapeake Bay Watershed Implementation Plan Phase 3. The HWP is identified in the FY20-23 CBIG Workplan as Objective 9 with the output: *Provide information to facilitate improved resource protection in the Commonwealth, and to advance the identification and protection of those ecologically healthy sites, referred to as: Healthy Waters.*

Develop technical assistance tools and publications regarding the health and restoration of the Chesapeake Bay.

The HWP Manager also continued to participate in the Chesapeake Bay Program, Goal Implementation Team (GIT) for Healthy Watersheds. As part of this GIT, the HWP Manager put considerable effort toward the Chesapeake Bay Management Strategy development process, including coordination with DCR and DEQ. The HWP Manager continued to advance Healthy Waters Bay Agreement Goal of 100% protection of the 2014 HW sites in the Chesapeake Bay by 2025. The HWP Manager continued to staff the HW GIT remaining consistent in the approach that the Commonwealth will set their own course for long-term protection action. This outcome will provide the basis for strongly *guiding* how the Commonwealth advances conservation, but will not likely be used as more than suggestions since Virginia will be advancing an approach that integrates the proximity to ecologically valuable terrestrial features, as identified by NHP, in the weighting of criteria. The HWP Manager and NHP Landscape Ecologist provided a presentation to the HW GIT on the HW conservation efforts. The modeled approach seeks to identify those lands and areas needed to ensure protection of aquatic ecological health. Feedback from the representative states in the GIT was strong and supported the approach employed as it utilizes a refined approach focusing on state assessments for vulnerabilities and priorities. In addition, the NHP approach will be integrated into the ongoing targeting of conservation and preservation as it relates to those needs under DCR.

Product #2: Program Capacity Development Report

Programmatically, the development of models and tools continued to be the focus of efforts during the reporting period. As mentioned above, the focus is the ongoing data integration, geographic expansion, data re-sampling and the continued integration of existing INSTAR data into the DNH data explorer and the creation of new EOs and SCUs. VCU field team continued to collect data in coastal sites including, Tuckahoe Creek (Henrico County), Polecat Creek (Caroline County), the Lower Rappahannock River, and in non-tidal James River basin streams. A few photos from field sampling results are included below:



Figure 1. Torrent Sucker (*Thoburnia rathoecca*)



Figure 2. Longnose Dace (*Rhinichthys cataractae*)



Figure 3. Alewife (*Alosa pseudoharengus*)



Figure 4. Pirate Perch (*Aphredoderus sayanus*)

Ongoing discussions evaluating the long-term funding for the HWP had been one of the main foci during the reporting period. The allocation and identification of outcomes for each was undertaken with effort shared by DEQ and DCR and the NHP and VCU have continued to identify a watershed scale approach to protect ecologically healthy waters.

Furthermore, the *ConserveVirginia* tool was identified to be used to maximize the benefits derived

from land conservation efforts within the State and is designed to include regular updates as new data are available and priorities refined, such as the inclusion of ecologically healthy waters. DCR/VCU coordinated with DEQ to resolve the integration of water quality and ecologically healthy data into the *ConserveVirginia* tool. Through funding from CZM, DEQ, and CBIG, NHP completed the enhancement of the *ConserveVirginia* tool to include the healthy waters data as a new input and to provide guidance on the implementation of agricultural BMPs and conservation of HWs as informed by the healthy waters data. More specific outcomes associated with the *ConserveVirginia* tool refinement as documented in the data analysis section below.

Product #3: Healthy Waters Data Analysis, Evaluation and revision of models relevant to interpreting Healthy Waters data

The administration of the HWP, as stated above, is cobbled together by including CZM funding which allows the HWP Manager to oversee the integration and development of data products from INSTAR data collected through funding from EPA Section 319 and CBIG. The *ConserveVirginia* tool was identified to be used to maximize the benefits derived from land conservation efforts within the State and is designed to include regular updates as new data are available and priorities refined, such as the inclusion of ecologically healthy waters. Through support from CBIG, NHP completed the enhancement of the *ConserveVirginia* tool to include the healthy waters data as a new input and to provide guidance on the implementation of agricultural BMPs and conservation of these water bodies. These new HW inputs were then used to model *ConserveVirginia*'s Healthy Waters Conservation Opportunity Areas (under the Water Quality Improvement Category). Specifically, the INSTAR data was used to identify areas for conservation as well as those agricultural areas that would benefit from additional protections (based on INSTAR characterization of being Restoration Candidates or Compromised). The *ConserveVirginia* tool will continue to be used to maximize the benefits derived from land conservation efforts within the State and include regular updates as new data become available and priorities refined, such as the inclusion of newly identified ecologically healthy waters. An example of this data integration into the *ConserveVirginia* tool is shown in the image below.

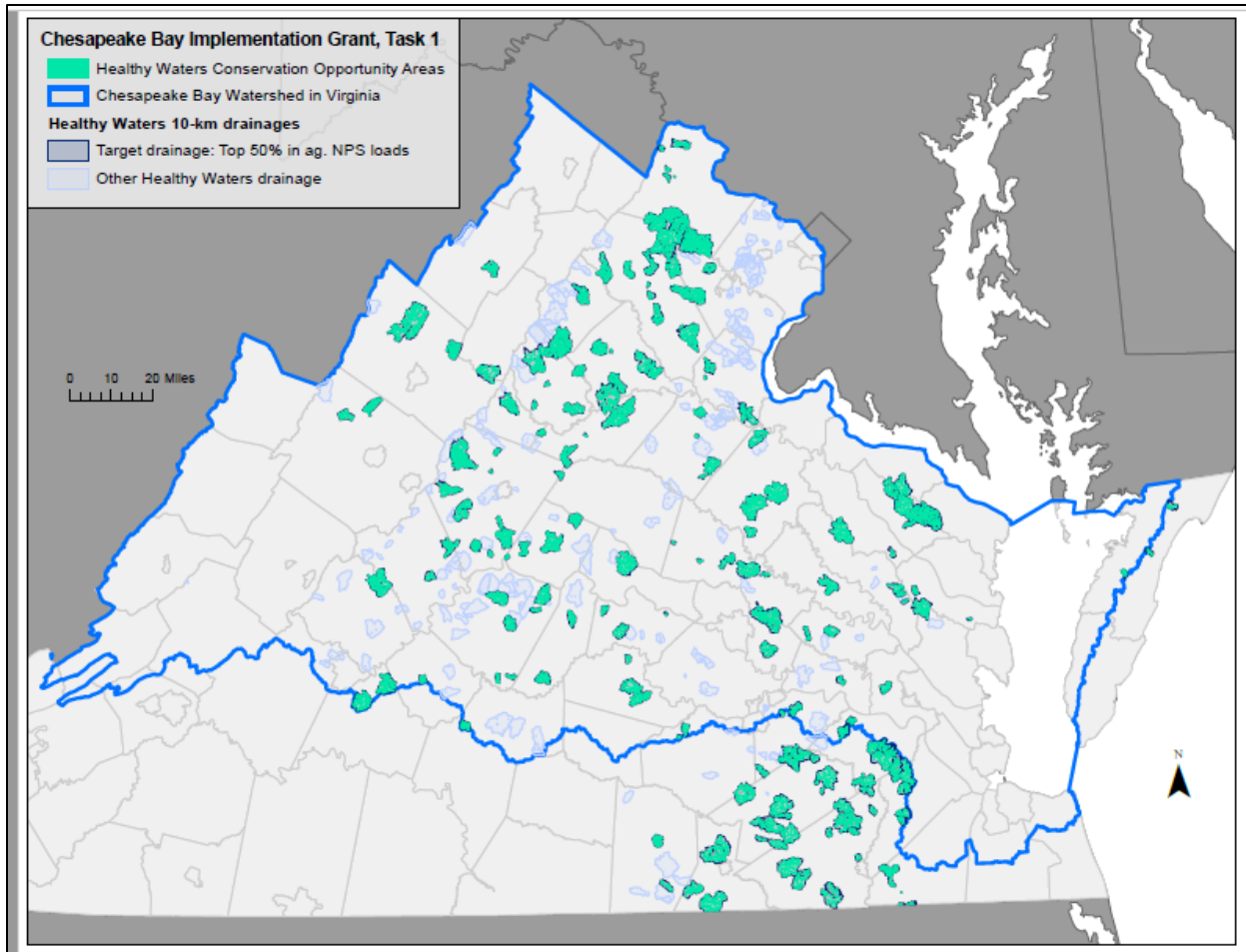


Figure 5. Integration of Healthy Waters Data into *ConserveVirginia* Modelling of Conservation Opportunity Areas

With support from CZM, EPA CBIG, and EPA Section 319 monies, NHP and VCU have also continued to identify a watershed scale approach to protect ecologically healthy waters. Those sites have unique characteristics for each watershed that are relative to slope, soils, cover type and proximity to terrestrial heritage resources. Using the NHD+HD catchments and models produced at the NHP, the HWP is advancing the development of conservation planning tools that will ensure HWs. The HWP Manager continued to work with the NHP staff refine the prioritizing of statewide SCUs and the possible redefinition of those areas draining to aquatic and riverine EOs. The proposed approach, as outlined above, uses a hydraulically connected approach instead of a linear buffer as currently employed for SCUs. The process has broadened the consideration of the identification of SCUs and the suggested protection area and may be based on new characterizations and evaluated as a stream conservation area. Conservation planning on a watershed basis would be a divergent from the opportunistic approach under which some conservation actions are achieved. The challenge posed by such a change is the increase in projects that would be included as part of Environmental Review for the Division. Images capturing the watershed model from a statewide view as well as individual planning district commissions (PDCs) are shown below:

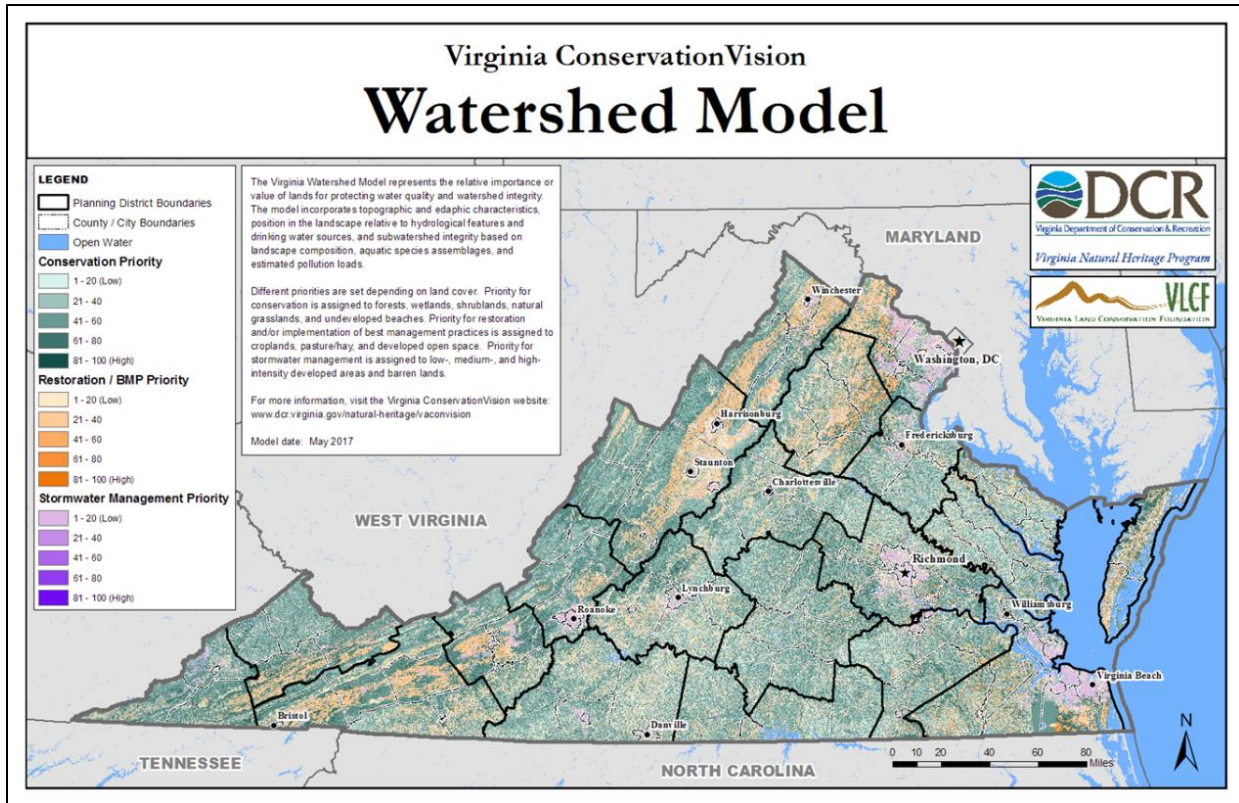


Figure 6. Revised Watershed Model

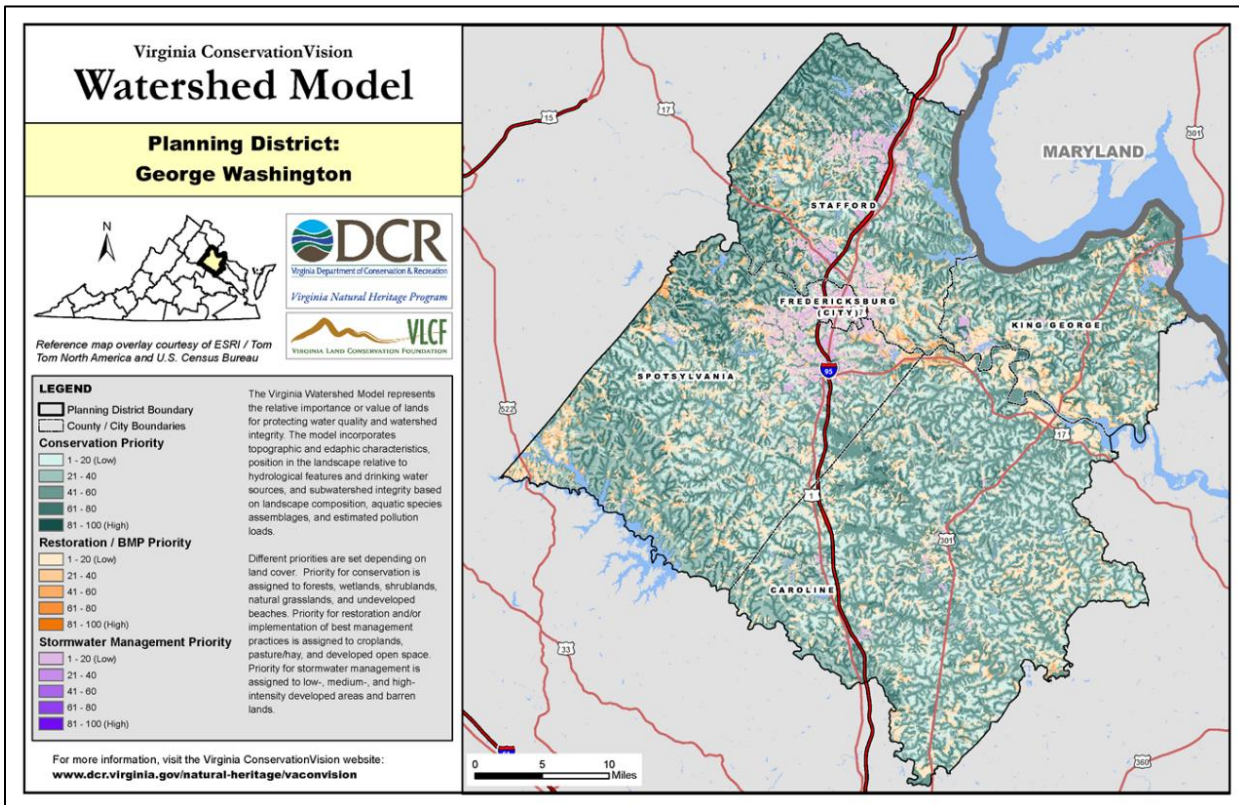


Figure 7. George Washington Regional Commission Example of Output

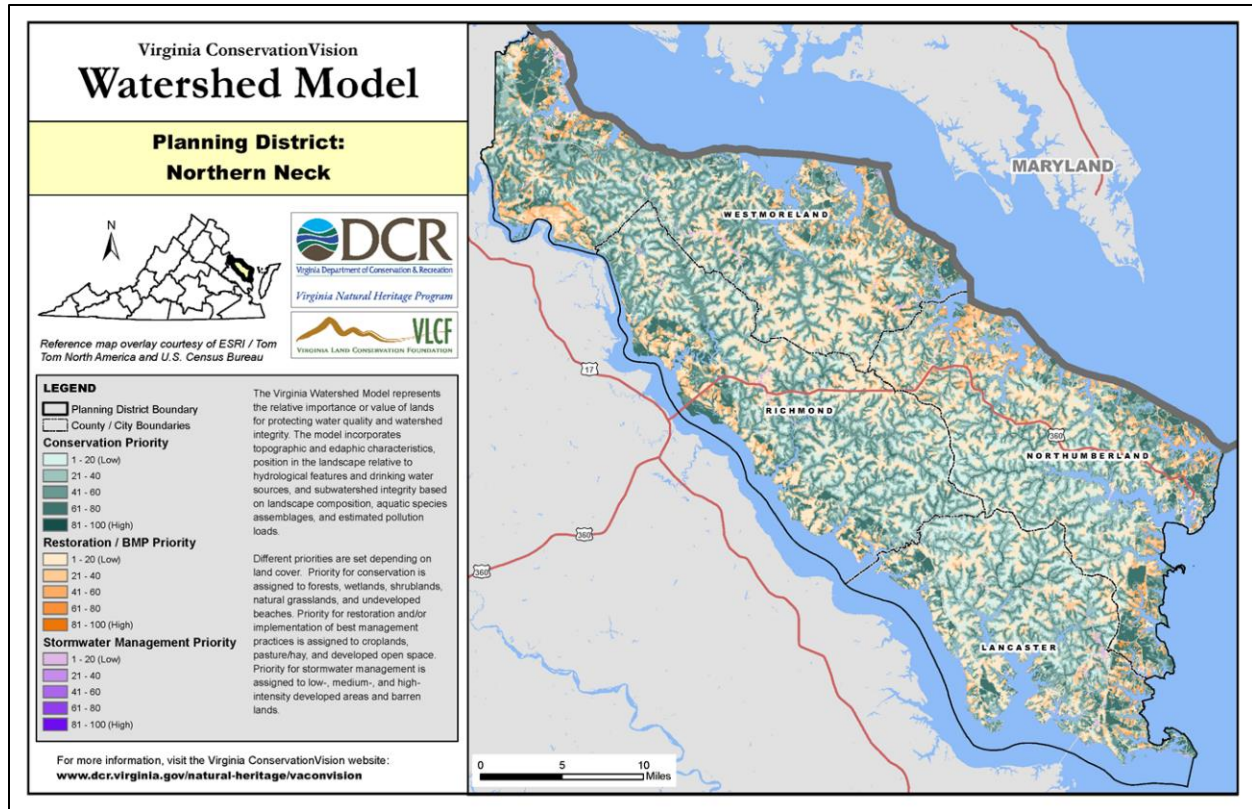


Figure 8. Northern Neck Planning District Commission Example of Output

Product #4: Estuarine Healthy Waters, Oyster replenishment in the Coastal Zone

A small portion of this grant from CZM directly supports VOSRP. The goals are to reclaim waste oyster shell and return it to the Virginia portion of the Chesapeake Bay. Effort was placed during the reporting period to expand the geographic reach of VOSRP and develop additional communication materials for public outreach. The majority of support sustaining the VOSRP is from an anonymous charitable contribution, but also is supported through assistance from the VCU Foundation, Keep Virginia Beautiful, Virginia Green Travel Alliance, Universal Leaf, and other small donations.

VOSRP’s partnerships with the commercial fishing industry continues to realize benefits to collecting and returning shell to the ecosystem. The partnership with J&W Seafood continues to include support from EJ Wade Construction to assist in bulk movement of shell from the RRC to Gwynn’s Island. The 2021 field season permitted three hands-on field activities in the middle peninsula. This increase in capacity permitted hands-on educational and experiential opportunities for the public. The COVID-19 pandemic continued to impact the 2021 field season, but the ability to implement safety best practices allowed near normal scheduling of events of processing and bagging shells at the RRC. The VORSP program was able to haul significant volumes of shell in 2021 and conduct three shell setting events including one utilizing fossil shell. Of those three setting events, nearly 20 million spat on shell were applied to existing sites in the Piankatank River through funding from sources outside this grant from CZM except for the amount identified in the approved workplan. The larvae purchased was obtained from three hatcheries due to the variability

in product: Cherrystone Aquafarm, Bevans-Cowart's Oyster Company, and Oyster Seed Holdings. Quantities obtained ranged from 8-20 million larvae per setting event, again not paid for with CZM monies. CZM funds support the purchase of 8.5 million wild strain, diploid, eyed larvae that was used in the special study on fossil shell, outlined below.

During the reporting period, the Virginia Marine Resources Commission (VMRC) approached VOSRP with the opportunity to compare the larval strike rate on fossil shell, shuck-house and recycled shell. The study evaluated the strike success by analyzing if there was variability in setting based on a random, stratified design. Both the fossil shell and the shuckhouse shell was stratified and randomly collated into the recycled shell. Only one tank was used with 230 bags of recycled shell, 10 bags of fossil and 10 bags of shuckhouse shell. Methods were developed and a QA/QC process was identified to permit the process to have precision, accuracy, repeatability and consistency. An entire weeklong field event was based around the quantification of strike success on the types of shell. The conclusion from that study has not yet been published nor made publicly available at the time of grant reporting. However, statistical significant differences were noted between the type of shell and rate of success. The VMRC requested the analysis be summarized in strike per liter of shell material but the analysis included strike per shell material and by surface area. The opportunity for the volunteers to participate in the research aspect was an additional benefit from this year's efforts. The hands-on experience with fossil shell was recognized as a special event for all participants.

The wholesale seafood industry continued to dispose of massive volumes of oysters and sought the VOSRP as a recipient of that material. This provided for a significant volume of shell during a time when no other shell was being recycled. During the grant cycle, significant funding to support the VOSRP was due to the opportunity for non-competitive, unspent, NOAA habitat restoration monies as reported in the CZM FY18, Task 89.02 grant final report. The NOAA funding was passed through CZM providing the opportunity for VOSRP to create a proposal and implement the project. Therefore, during COVID-19 while most funding sources were closed, this generous support assisted maintaining momentum of the recycling of shell in Richmond, and included geographic expansion into northern Virginia, and a focused outreach into the Middle Peninsula region. Great care has been taken to delineate the individual accomplishments for each CZM grant (Task 8 and Task 89.02) so to avoid the perception of duplicative efforts. However, both grants are connected by their overall goals to expand VOSRP's public outreach effort, engage the restaurant and seafood industries, provide oyster larvae for other restoration projects, and collect field data to improve restoration techniques. Photos of several of these activities along with copies of outreach materials funded by this grant are included below.



Figure 10. Delivery of recycled shell during the reporting cycle

Field activities with volunteers resulted in additional material prepared for the summer field season. Volunteers moved cured shell, bagged and stacked that material in preparation for hauling.



Figure 9. Shell bagging activities

During the grant period, volunteers were also asked to assist with recruitment of new restaurants. Materials communicating the program, activity, responsibilities have been developed to help with the conversation. Those materials include logos recognizing CZM. Examples of these materials are shown below.



Virginia Oyster Shell Recycling and Restoration Program

The Virginia Oyster Shell Recycling and Restoration Program (VOSRP), is a collaborative, community-based, oyster restoration program of the Virginia Commonwealth University (VCU) Rice Rivers Center (RRC), which began in 2013 to redirect waste oyster shell from the landfill into Chesapeake Bay oyster restoration projects. The VOSRP aligns with the VCU focus of education, research and community engagement and utilizes applied restoration as a means to bridge those focal areas. While the program was initiated on the principle of recycling, the program has evolved into a full-service restoration effort creating and seeding oyster reefs with spat on recycled shell.



Volunteers and students bagging shells at the VCU Rice Rivers Center

Supported by an extensive volunteer network and student involvement, VCU has facilitated significant volunteer supported outreach and community engagement to advance the restoration of the Piankatank which includes hands-on, water-based, reef construction. The VOSRP collects shells statewide from participating restaurants, businesses, oyster roasts and festivals. Oyster shell recycling provides local businesses and general public with the opportunity to

participate in the restoration, protection and remediation of the Chesapeake Bay by becoming involved in the restoration of wild, native oysters with little effort. Recycled shells are reused to create a natural hard substrate for new oysters to attach.



Aerial view of oyster reef restoration

Through an authentic relationship with the seafood industry and restoration partners, the program has returned nearly 80 million, diploid,

wild-strain, oysters to the Piankatank River. The VOSRP engages with the public through its presence at community events such as oyster roasts and festivals, educational presentations, monthly public bagging events at the RRC and by offering hands-on reef construction on the Piankatank River in Mathews, VA.

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Figure 10. VOSRP Educational Flyer - Overview



THE VIRGINIA OYSTER SHELL RECYCLING AND RESTORATION PROGRAM

Who We Are

A statewide, collaborative, community-based initiative of the VCU Rice Rivers Center, the Virginia Oyster Shell Recycling and Restoration Program (VOSRP) bridges the strengths of VCU—education, research and community engagement—with applied restoration.

The goal of the program to collect and recycle waste oyster shells, seed them with baby oysters and then construct oyster reefs in the Virginia portion of the Chesapeake Bay. The VOSRP also offers educational outreach and opportunities for the public, students and corporations that want to be involved in oyster restoration. The program's strength comes from its partnerships with businesses, commercial seafood industry, corporate partners, and a robust volunteer network.



Photo credit: Ron Lopez, VCU

Want to get involved? Follow us to learn about volunteer and education opportunities.

Facebook: Virginia Oyster Shell Recycling Program Instagram @vaoystershell

Twitter @VCURiceRivers

For more info, contact Todd Janeski, Director, tvjaneski@vcu.edu, or Cindy Andrews, Program Coord, candrews@vcu.edu



Figure 11. VOSRP Educational Flyer – Who We Are

This grant also funded the replacement of VOSRP logo stickers, which do not include CZM and NOAA logos, but CZM is listed under Program Supporters and Partners on the VCU Oyster Shell Recycling webpage (<https://ricerivers.vcu.edu/community-engagement/oyster-shell-recycling/>).

The HWP Manager has also discussed with CZM the inclusion of funds in future Healthy Waters grants to ensure that CZM and NOAA are accredited by placing logo stickers on equipment used by volunteers such as plastic oyster baskets. Efforts will continue to be made to increase public awareness of CZM's funding through discussion of partners and sponsors at VOSRP events.