



DoD CHESAPEAKE BAY PROGRAM JOURNAL

Edited by the DoD Chesapeake Bay Program Team

PROTECTING THE CHESAPEAKE BAY FOR MILITARY READINESS, FOR OUR COMMUNITY, FOR FUTURE GENERATIONS

New REPI Resilience Interactive Website

By Jessica Rodriguez, Department of Defense (DoD) Chesapeake Bay Program

Not sure how to tap into the Readiness and Environmental Protection Integration’s (REPI) authorities for climate resilience projects which were established in Fiscal Year (FY) 2019? Having difficulty trying to determine what steps to take to develop a successful REPI resilience project? Look no further than the recently released REPI resilience primer and interactive website, “Building Resilience to Climate Change Through Off-Base Natural Infrastructure Solutions”. This online resource defines climate impacts that threaten military readiness, connects those threats to REPI’s resilience authorities, and provides a step-by-step guide for installations and their partners to develop and apply for REPI program funding for a climate resilience project.

Within the Chesapeake Bay watershed, 13 installations maintain REPI program partnerships. In total, \$77.5 million (M) in REPI program funds have been matched by \$109.6M in partner contributions and \$41.7M in other Military Service Funds. Combined, they have conserved a total of 45,095 acres of land through FY2021. While REPI does not increase DoD acreage, it provides important funding for cost-share arrangements with partners (e.g., State or local governments and non-government organizations) who own land or hold easements and agree to manage land to preserve compatible land uses and/or natural habitats that sustain the mission. Therefore, installations should consider using this resource when developing REPI climate resilience projects.

If selected, projects can utilize REPI funding as a match for funds from any other federal program, such as the newly passed Federal Infrastructure Bill. Combining the resources of the federal government with those of state and local entities, REPI partnerships can provide an advantage for installations seeking to preserve their military mission through land conservation or climate resilience projects.

The REPI resilience primer website can be accessed here: <https://repiprimers.org/resilience/>.



Homepage of the REPI Resilience Website.

SCREENSHOT FROM [HTTPS://REPIPRIMERS.ORG/RESILIENCE/](https://repiprimers.org/resilience/)

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Commanders' Corner: New Authorities for Implementing Stormwater Resilience Projects in the FY2022 NDAA

By Gabrielle Bryson, Brown and Caldwell

The FY2022 National Defense Authorization Act (NDAA) includes new authorities found in Section 2815a, titled “stormwater management projects for installation and defense access road resilience and water and ecosystems conservation” which expands funding opportunities for stormwater resilience projects. The purpose is to expand existing DoD programs that can authorize DoD installations to fund stormwater management projects on or related to a military installation and prioritize projects that retrofit existing infrastructure with additional stormwater flood mitigation measures. In order to take advantage of these expanded funding opportunities when they become available, Commanding Officers can work with their environmental staff to identify applicable projects that could increase mission readiness and provide water quality and quantity benefits to their installation.

Stormwater management activities authorized under Section 2815a include stormwater ponds, permeable pavement, rain gardens, and other water-slowing retention measures that allows for the broad use of many common best management practice (BMP) types. These practices could be leveraged for Chesapeake Bay total maximum daily load (TMDL) credit, to support Municipal Separate Storm Sewer System (MS4) Permit compliance, and/or to help meet Installation Natural Resources Management Plan (INRMP) goals for projects with water quality benefits. Installations should be aware of opportunities in this section for implementing stormwater resilience projects in preparation of funding. Some existing DoD programs identified in the FY2022 NDAA that could be leveraged for financial support of these projects are included in Table 1 below.

Table 1. DoD Programs with Expanded Funding Opportunities for Stormwater Management Projects under the FY2022 NDAA

Funding Source/Program	Project Location	Types of Stormwater Projects Applicable	Other Requirements
Energy Resilience and Conservation Investment Program (ERCIP)	On-base	Activities which support an installation’s overall energy resilience, including projects which mitigate flood or weather-related vulnerabilities to avoid power outages or work stoppage	All projects must have a Measurement and Verification Plan
Military Installation Resilience Projects (under Title 10 U.S. Code Section 2815)	On- or off-base	Stormwater management projects can be submitted as part of an installation’s annual budget to Congress if the project would preserve or enhance military infrastructure resilience	Congressional defense committees must be notified of the request prior to the budget submittal
Defense Community Infrastructure Program (DCIP)	Off-base	Projects which address deficiencies in facilities or infrastructure owned by non-DoD entities in order to enhance military value and installation resilience	Non-DoD entity must be the applicant; 30% match share requirement
Defense Access Roads (DAR) Program	Off-base	Construction, reconstruction, maintenance, and enhancement of DARs and their stormwater infrastructure to reduce stormwater or other weather-related access limitations	DoD would be required to pay a share of the costs determined on a project-by-project basis

Depending on an installation’s goals, certain programs can be used to fund projects inside or outside the fenceline. Implementing new or enhancing existing projects that provide stormwater management on DoD-owned land and infrastructure (e.g., through ERCIP or the annual budget) can support an installation’s attainment and/or sustainment of TMDL or MS4 pollution prevention credit. Additionally, during project selection, installations should prioritize projects which provide not only stormwater quantity control but also water quality, natural resources, and climate resilience co-benefits.

While the FY2022 NDAA does not create any new funding programs, it opens up existing funding sources, such as those listed in Table 1, to implement stormwater management projects. Commanding Officers should be aware of these upcoming funding opportunities and communicate with their stormwater and natural resources staff to identify applicable stormwater management projects which can meet pollution prevention requirements and commitments, provide for installation climate resilience, and maintain or enhance the military mission.

For more information on new authorities for stormwater management projects in the FY2022 NDAA and the funding resources included in Table 1, review materials from the January 2022 Chesapeake Bay Action Team (CBAT) meeting at: <https://authoring.denix.osd.mil/chesapeake/dod-cbp-chesapeake-bay-action-team-cbat/cbat-meeting-minutes/>. In addition, this topic will be discussed at the upcoming 2022 virtual Commanders’ Conference scheduled for August.



Planting Trees for Urban Stormwater Management

By Gabrielle Bryson, Brown and Caldwell

Trees are known to provide many benefits for mission sustainment, including but not limited to flood and stormwater management through volume control and runoff pollution treatment, shade to reduce heat island effects and health impacts, and carbon sequestration to mitigate future climate impacts. Tree planting BMPs can not only be used for TMDL and MS4 credit but can also be leveraged to help meet INRMP goals and maximize the efficiency of existing BMPs, as described below. Understanding how trees' benefits are quantified and how they can be managed to maximize stormwater mitigation can help installation staff optimize their return on investment when planting trees to meet multiple objectives.

How trees provide stormwater management benefits and how they can be optimized is not commonly considered. To answer these questions, the U.S. Department of Agriculture (USDA) hosted a presentation by Dr. Trisha Moore and Eric Kuehler on "Urban Trees and Stormwater Management: Quantifying Impacts, Maximizing Benefits" in October 2021 (see link in "For More Information"). The following information summarizes their presentation.

How Does Tree Planting Provide Stormwater Management?

Trees facilitate several processes that provide stormwater quantity and quality regulation (Figure 1). Table 2 describes these processes.

Table 2. Stormwater Management Processes Associated with Trees

Process	Description	Water Quantity or Quality Control
Interception	Water is intercepted by the leaves of trees rather than falling to the ground, increasing the amount of precipitation that is evaporated	Quantity
Infiltration	Tree roots condition soils to increase the rate at which water enters soil and the soil's water storage capacity	Quantity
Uptake	Absorption of water and nutrients (including nitrogen and phosphorus) from the soil	Both
Nutrient Processing	In addition to nutrient absorption (uptake), root systems enhance microbial processing in soil systems, reducing the amount of nutrients released	Quality
Evapotranspiration	Water removed from the ground by the tree is released in the air as water vapor	Quantity

According to Dr. Moore's presentation on urban tree research, the combination of the water quantity control processes described above result in 17% to 30% reduction of runoff underneath a tree's canopy. This research also supports trees as providing greater control over nutrient release or runoff than turf grass.

Can Trees Increase BMP Performance?

If trees are planted in the drainage area of a stormwater control system (e.g., bioretention cell or treatment wetland), they can potentially increase that system's performance. This is a result of the decreased volume of stormwater and corresponding quantity of pollutants (nutrients) that would drain to the stormwater control system. Therefore, with added tree canopy, the chances of BMPs being bypassed, with a loss of stormwater treatment or flood control is reduced.

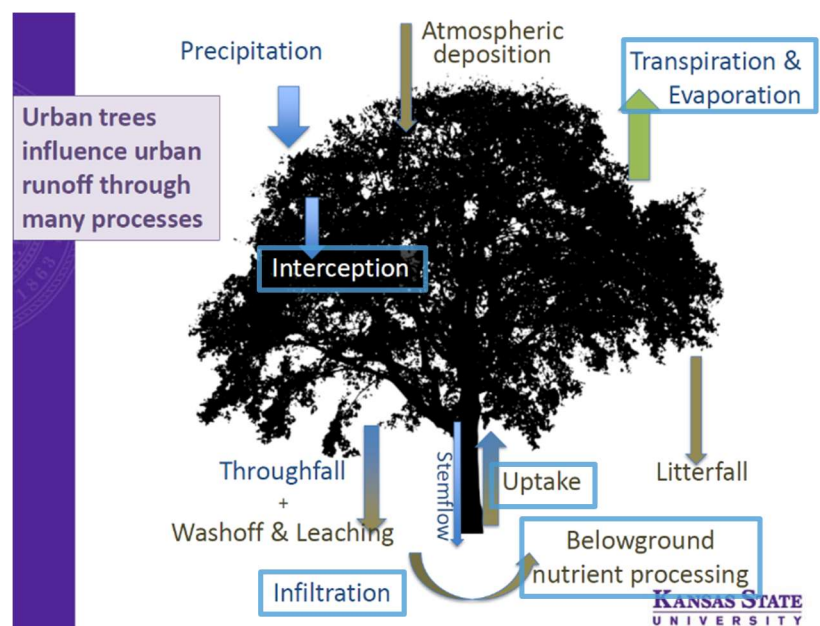


Figure 1: Urban tree process to regulate urban stormwater runoff.

OOPE'S PRESENTATION

What Factors Influence the Stormwater Management Capabilities of Trees?

Characteristics of the tree itself and where it is located influence how the tree mitigates stormwater runoff. These characteristics include:

- **Species type:** some trees have greater rainfall retention capabilities than others. For example, a University of Tennessee study found that pine can prevent the runoff of 50% of rainfall within its canopy, while deciduous trees prevent the runoff by 24-32%. This is a result of several factors such as leaf size, shape, and density and if the tree seasonally loses its leaves.
- **Age/size:** larger, older trees tend to be able to retain, uptake, and transpire more rainfall than smaller, younger trees due to increased tree canopy and water/nutrient demand. Therefore, extending a tree's lifespan by considering climate adaptation and maintenance needs increases the stormwater mitigation capabilities of an installation's overall tree canopy.
- **Soil conditions:** high soil aeration increases infiltration and tree uptake. Care should be taken so that soils are not compacted within the tree planting area as this would hinder stormwater's ability to infiltrate into the soil.
- **Location:** stormwater benefits are influenced by tree species and where the trees are planted to meet the desired outcomes. To reduce stormwater runoff into a retention structure, the installation should plant trees within the structure's drainage area. Tree species also influence optimal planting location. For example, species such as sycamore, yellow birch, and sugar maple should be planted in open areas with wet conditions, while oaks, elms, and mulberries should be planted in upland sites or surrounding bioretention practices that use high infiltration media.

What Management Strategies Optimize the Benefits of Urban Trees?

Thoughtfully selecting and planting resilient species and properly maintaining trees helps sustain mission requirements, meets multiple goals, and provides the greatest return on investment of an installation's urban tree canopy. Some practices that help urban trees most effectively perform their natural processes (Table 2) related to stormwater mitigation include:

- Encouraging crown growth over impervious surfaces (see image)
- Conducting routine tree litter (leaf and branch) cleaning practices for trees over impervious surfaces or near stormwater drains to reduce excess nutrient runoff
- Promoting soil aeration (e.g., through mulching or with spike aerators) so infiltration and uptake are not hindered
- Retaining tree canopy near stormwater infrastructure catchment basins.
- Preventing soil surface exposure (prevent erosion) through mulching or vegetation
- Retaining and planting a diversity of trees including species that do not seasonally shed leaves
- Prioritizing trees with a high leaf area index (total leaf surface area relative to canopy)
- Maintaining larger trees, where appropriate

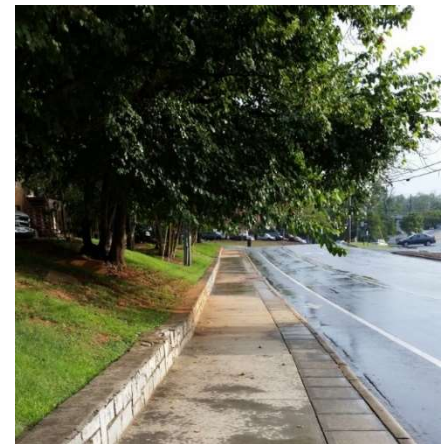


IMAGE FROM ERICK KUEHLER'S PRESENTATION

Tree canopy extending over a sidewalk to reduce rainfall intensity on impervious surfaces.

Takeaways for DoD Installations

Careful selection, planting and maintaining urban tree canopy at an installation not only provides valuable water quality and quantity benefits but also supports Chesapeake Bay TMDL Federal Planning Goals, maximizes the performance of existing BMPs, helps meet INRMP goals, and contributes to climate resiliency. To optimize tree planting practices to meet multiple goals, installation staff should understand how trees affect stormwater management and what methods enhance their stormwater mitigation benefits. This knowledge can be leveraged during the installation's planning processes to maximize the return on investment of tree planting activities.

For More Information:

USDA, "Urban Trees and Stormwater Management: Quantifying Impacts, Maximizing Benefits" webinar recording: <https://www.fs.fed.us/research/urban-webinars/urban-trees-stormwater-management.php>

USDA, "Urban Forest Systems and Green Stormwater Infrastructure" paper: https://www.fs.usda.gov/sites/default/files/fs_media/fs_document/Urban-Forest-Systems-GSI-FS-1146.pdf

Water Research Foundation (WRF), "Predicting Urban Tree Contributions to Urban Runoff Budgets with Statistical Models" fact sheet: <https://www.waterrf.org/system/files/resource/2020-01/PROJECTPAPER-4837-2.pdf>

WRF, "Incorporating Forestry into Stormwater Management Program" paper: <https://www.waterrf.org/system/files/resource/2020-01/DRPT-4837.pdf>



Success Story: Monitoring of Naval Air Station (NAS) Patuxent River Test Range

Adapted from a Tester article by Donna Cipolloni, NAS Patuxent River Public Affairs

Twice a year, staff from NAS Patuxent River Environmental Division have set out by boat to two Chesapeake Islands, Bloodsworth and Adam. These two islands are part of the Bloodsworth Island Range (BIR), which from the 1940s to 1996 served as a Navy Shore bombardment and bombing range for firing and dropping live ordnance from ships and aircraft. Staff have been conducting these visits since the early 1980s with the purpose of monitoring and management of habitat conditions, species, archeological sites, and shoreline erosion.

The team begins their journey at Fin Creek, an elevated ridgeline on the northern end of Bloodsworth, and records whatever species of birds, insects, mammals, or reptiles they see while walking along the entire ridge. Specifically, staff look for any proof of rare, threatened, or endangered species and record any evidence of bird nesting as part of their ongoing Atlas 3 survey for the State of Maryland.



U.S. NAVY PHOTO

Jackie Smith, NAS Patuxent River Natural Resource Specialist, stands below a Bald Eagle nest at BIR.

Since almost all of the trees on Bloodsworth have died off at this point due to saltwater encroachment, in order to promote nesting, the team built artificial structures over the years for heron nesting. There are only a few remaining heron nests in this Navy-built colony since many of these posts have been knocked down (e.g., from hurricanes) or fallen over at this point. However, Kyle Rambo, former NAS Patuxent River Environmental Planning and Conservation Director, believes the posts served their purpose as they have “produced thousands of young herons over the years” and now the herons have “moved on to the mainland or other islands”.

An eagle pair continues calling Bloodsworth their home, and animal remains collected by staffers from below the nest show they have quite a taste for Diamondback Terrapins. Another bird that has taken a liking to the island is the American Black Duck, a species of concern due to its plummeting population. Mr. Rambo explained that while these birds are “not endangered yet, [they are] a species of concern, and Bloodsworth Island seems to be a fantastic habitat”.

Before heading back to Pax River, the team also stops by neighboring Adam Island, once the location of a Navy spotting tower used to score impacts. The island's tower, now toppled, sits in water and provides an attractive colonial nesting site for Brown Pelicans, Cormorants and gulls, and another pair of Bald Eagles.

Though impact operations no longer occur, BIR is still an active range for testing and evaluation of aircraft. While sustaining the mission, NAS Patuxent River continues to recognize its responsibility to protect and preserve the ecological conditions of the islands. Efforts such as these highlight how DoD installations in the Chesapeake Bay watershed not only strive for sustained military mission but also help restore habitats and preserve natural resources in support of both EO 13508 and the goals and outcomes, such as the Black Duck outcome, in the 2014 Chesapeake Bay Watershed Agreement.

For more information, access Donna Cipolloni’s full article on Tester at: https://www.dcmilitary.com/tester/news/local/environmental-division-continues-monitoring-bloodsworth-adam-islands/article_57bcc8d9-ec10-585d-b325-e1ab2bb4e502.html.



Successful Community and Resilience Planning: Naval Support Activity (NSA) Annapolis and U.S. Naval Academy (USNA)

By Zoë Johnson, NSA Annapolis Installation Community Planning Liaison Officer

Every facet of the U.S. Navy is impacted by climate change, including the academic institution that trains the best and brightest to become officers in the U.S. Navy and Marine Corps. NSA Annapolis, home of the USNA, and the city of Annapolis are both undertaking extensive planning efforts required to prepare for this challenge. These efforts will identify specific actions that address individual as well as collective climate threats and serve as the foundation to undertake specific projects to improve overall resiliency.

NSA Annapolis, adjoining the city of Annapolis and Anne Arundel County, is located at the intersection of the Severn River and the Chesapeake Bay and includes:

- The USNA Main Campus (342 acres).
- The North Severn location (827 acres).

The installation and its surrounding community are vulnerable to storm surge associated with major weather events and

localized, high tide flooding that is primarily the result of high tides, and sustained easterly or southerly winds. Since 1928, the relative sea level in Annapolis has risen approximately 1.16 ft., which has significantly increased the occurrences of high tide flooding from 0-3 times per year to 30-40 times per year. Impacts from storm surges and high tide flooding affect daily operations through closures of flooded roads, sidewalks, and building entry points and these impacts are projected to increase due to projected sea level rise. In preparation, two comprehensive planning efforts are underway to address these challenges:

City of Annapolis Installation Resilience Review: In August 2020, the DoD Office of Local Defense Community Cooperation awarded the city of Annapolis a grant to assess resilience risks and vulnerabilities shared by the city, county, and NSA Annapolis. The city will, in turn, recommend specific mitigation strategies to avoid, prepare for, minimize the effect of, adapt to, and recover from extreme weather events. Risks associated with flooding, tidal surge and sea-level rise, wind, drought, wildfire, and earthquakes are being analyzed and assessed in terms of their impacts on water availability, storm water, waste water, energy supply, transportation, logistics, and communication infrastructure. Project recommendations will be published in an Installation Resilience Review Plan in July 2022; positioning the city to apply for funding through existing DoD programs, such as REPI or the DCIP.

Installation Resilience Planning: In September 2020, NSA Annapolis kicked off a major, long-term planning effort between the installation and the surrounding community to develop a Military Installation Resilience Plan. This pilot project is in accordance with the FY20 NDAA resilience planning requirements for installation master plans. The project, tracking for completion in March 2022, will result in a comprehensive plan with specific courses of action to cohesively address and mitigate the combined effects of land subsidence, sea-level rise, ground-water change, coastal flooding/storm surge, and inadequate storm water management at the USNA. Courses of action will likely include a combination of structural (e.g., seawalls, bulkheads, floodwalls, stormwater retrofits); natural (e.g., earthen berms/levees, rain gardens, living shorelines); and temporary solutions to immediate issues.

Past and current actions, as well as the strong engagement with the city of Annapolis, MD, demonstrate DoD's proactive approach to addressing issues and impacts associated with climate change. Following the completion of these efforts, USNA and its surrounding community will be better prepared and positioned to implement specific climate resilience projects that sustain the mission, meet the community's needs, and support the protection of the Chesapeake Bay.



Map of USNA Main Campus (left) and the North Severn location (right) of NSA Annapolis.

FIGURE PROVIDED BY NSA ANNAPOLIS



Chesapeake Bay Action Team Updates

By *Esmeralda Jones, Brown and Caldwell*

The first quarterly CBAT meeting for 2022 took place on 27th January. Natural resource staff from three installations shared insights on projects related to water quality, natural resource co-benefits through collaboration across environmental disciplines, and the importance of communication to leadership to optimize project success.

Success Story Panel Discussion: Prioritizing Projects with Co-Benefits

Naval Weapons Station (NWS) Yorktown. Mr. Thomas Olexa discussed the NWS Yorktown's efforts to protect 2,900 linear feet of heavily eroded shoreline and restore 4 acres of land along the York River. Through their collaboration with the Virginia Institute of Marine Science and the National Park Service, they were able to prepare a nearshore habitat restoration design and monitoring plan for the Cheatham Annex. Subsequent interest in ecological improvements of this area led to the submittal of a DoD REPI Challenge project focusing on oyster restoration, which has awarded \$1M in funding from the Chesapeake Research Consortium grant for upcoming creation of living shoreline oyster reefs.

Naval Support Facility (NSF) Indian Head. Mr. Seth Berry presented on NSF Indian Head's creation and enhancement of three areas of wetland habitat, designed as vernal pools in FY2019 and FY2020 to mimic beaver lands leading to the Matawan Creek. Since their creation, a greater presence of spotted turtles, an at-risk species, have been witnessed. NSF Indian Head has leveraged INRMP annual metrics meetings to expose installation leadership to the planned projects. These meetings also provide an opportunity for environmental staff to communicate to their leadership how these projects will help mitigate flooding, enhance wildlife habitat, restore wetlands, promote healthy watersheds, and provide stormwater treatment.

Fort Indiantown Gap. Mr. JD Lambrinos reviewed Fort Indiantown Gap's involvement in habitat enhancement using controlled burns and improvement plantings. Since 2018, Fort Indiantown Gap has planted about 55,000 new trees through their partnership with the Chesapeake Bay Foundation 1Million Tree initiative and the Pennsylvania Department of Conservation and Natural Resources lawn conservation committee. The installation hosts monthly Sustainable Range Program meetings which promote collaboration between key installation staff and leadership. These meetings help Fort Indiantown Gap to continue their success in implementing projects that enhance local habitat and provide crucial co-benefits for water quality, land use efficiency, and wildfire mitigation.

Funding Stormwater Resilience Projects Through New Authority in the 2022 NDAA

Ms. Gabrielle Bryson discussed opportunities for funding stormwater management or climate resilience projects through the new authorities in Section 2815a of the 2022 NDAA, which incorporates language of the recently passed EMBRACE Stormwater Management Act. This section of the 2022 NDAA supports Chesapeake Bay restoration goals by expanding the authorization within existing DoD programs and authorities to fund stormwater BMPs. This section prioritizes projects that retrofit existing infrastructure with additional stormwater flood mitigation measures.

These new authorities can help installations attain TMDL credit through BMP implementation or sustain existing credit through BMP retrofit, repair, and maintenance. Such funding may also be leveraged to support MS4 permit compliance and INRMP goals and objectives. Under these new authorities, funding sources with expanded applicability include the ERCIP, Military Installation Resilience, DCIP, and the DAR Program. Installations should prepare for when these new stormwater management funding resources become available. For more information, see the Commander's Corner article on Page 2 of this journal.

DoD Chesapeake Bay Program Updates

- Thank you to all participating installations for their support of the BMP and Progress and Indicators datacalls.
- The 2022 Virtual Chesapeake Bay Commanders' Conference will be held on August 17th from 1300 to 1700 and August 18th from 0800 to 1200 via Microsoft Teams. More details will be announced in the coming months.
- A new DoD CBP fact sheet titled "Climate Vulnerability Assessments for Mission Sustainment" was released in January.

The next CBAT meeting is scheduled for April 28, 2022.



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✓ Check it Out

The National Oceanic and Atmospheric Administration released a new resource for **State-level Climate Summaries** which cover historical climate trends and future climate model projections. Additional background information can be found at: <https://statesummaries.noaa.gov/>.

Nitrogen in the Chesapeake Bay watershed – A century of change, 1950-2050, a U.S. Geological Survey report, provides a unique, long-term perspective of the major drivers of nitrogen change from 1950 to present day. Read the full report at: <https://www.usgs.gov/publications/nitrogen-chesapeake-bay-watershed-century-change-1950-2050>.

View the Chesapeake Network's **Greener than Grass** workshop (23 January 2022) to explore the value of replacing turf grass with more sustainable and ecological alternatives: <https://www.chesapeakenetwork.org/event/sunday-january-23-2022-greener-than-grass-a-sustainable-landscaping-workshop/>.

REPI and the DoD Climate Adaptation Plan webinar, 8 October 2021. Learn about the REPI program and Sentinel Landscapes partnership to aid DoD's strategic climate adaptation planning at: <https://bah16f18.adobeconnect.com/p0zf8x10fjws/>.

Creating an Installation-wide Library of Improved Distribution Maps to Guide Stewardship of Priority Species, DENIX webinar. This presentation reviews the NatureServe Model, a tool that can be used to target species for conservation and habitat management efforts at installations in support of INRMP's biodiversity goals. Slide deck available at: https://www.denix.osd.mil/nr/resources/webinars/documents/jan-18-22/NatureServe%20DoD%20NR%20Program%20Webinar%20-%2018%20Jan%202022_508.pdf.

CBAT Quarterly Conference Call and Meeting. This meeting will be on April 28, 2022, 10:00 am to 12:00 pm. EDT.

MS Teams Conference Call Phone Number: (888) 404-2493

Conference ID: 153 325 85#

This newsletter is produced by Brown and Caldwell under NAVFAC Atlantic A-E Contract N62470-14-D-9022 for Support of Safe Drinking Water Act and Clean Water Act Environmental Compliance Program. For more information or to be added to the email distribution list, please contact the DoD Chesapeake Bay Program: <http://www.denix.osd.mil/chesapeake/home>.

