

CCMP Strategy and Performance Measures & Key Deliverables with summary of corresponding entries received for 2019 and 2020 CCMP reporting

Performance Measures & Key Deliverables highlighted in red are CCMP sections where little to no information was submitted through the CCMP tracking and collection process in 2019 and 2020. Column titled 'CCMP Entries Received' provides total number of entries reported for the CCMP strategy by the corresponding performance measures and key deliverables with summary of projects received.

CLEAN WATERS

Clean Waters Goal 1: Reduce Nutrient Pollution and Its Impact

W1.1: Promote infrastructure-related improvements to reduce pollutants from point sources

Performance Measures & Key Deliverables	CCMP Entries Received (# of entries and summary of activities)
New tools and techniques developed and demonstrated	6 (Green Infrastructure (GI) plans and treatment plant expansion (3 - CCMUA), Engineering Evaluation and Cost Estimate for Nutrient Reduction (DRBC, Kleinfelder, UDel), Dissolved Oxygen Partnership meetings (quarterly), Camden Labs stormwater assessment (EPA))
Track number and results of innovative infrastructure and nature-based projects	8 (Rain gardens, stormwater management projects and green stormwater infrastructure installed (190,000+ gallons of stormwater prevented from entering the watershed, 85+ acres of BMPs and GI))

W1.2: Support innovative planning and design practices to reduce nutrients from stormwater and agricultural runoff through promotion, education, and implementation

Performance Measures & Key Deliverables	CCMP Entries Received
Ability to measure nutrient reductions in at least two to three key locations	23 (Nutrient management activities and related BMP installations (18 in PA, 3 in NJ, 2 in DE, total of ~6,012 acres)

Track number and results of nature-based infrastructure projects, practices, and workshops on riparian buffers, stormwater, agriculture, and stream restoration	10 related outreach and technical assistance programs and coordination/committee activities
Produce and disseminate materials to promote nutrient-reducing BMPs in print and online	

W1.3: Promote land use planning by local municipalities that prevents, reduces, and/or more efficiently manages stormwater runoff to prevent pollution

Performance Measures & Key Deliverables	CCMP Entries Received
Examples of successful outcomes from municipal assistance in DE, NJ, and PA	16 Planning and installation of stormwater management tools and projects (GI, stream buffers, other BMPS, etc)., including 6,720 sq. ft. of nature-based infrastructure installed, ~54 acres of GI for stormwater runoff and erosion control projects, 1012 LF of BMPs installed, 4.04 million gallons infiltrated to reduce stormwater runoff)
Tracking numbers and results of technical assistance projects on municipal outreach, stormwater, and planning/zoning	20 (Municipal ordinance reviews in NJ – 24 technical assistance programs total, DVRPC tech assistance requests – 10, 5 related meetings, related workshop, meeting, info session attendance – ~6,800 total)
Producing and disseminating materials for MS4 outreach (in print and online) and educational signage for BMP demonstrations	3 (Creek Friendly materials (~220 brochures, 1280+ post cards distributed – PPA/ANJEC), stormdrain marking art contest entries -250)

W1.4: Provide outreach and information to property owners to assist in reducing non-point sources of nutrients

Performance Measures & Key Deliverables	CCMP Entries Received
Continuous increase in Estuary News and delawareestuary.org newsletter subscribership, website traffic, and press hits	<i>(This seems vague. Subscribership related specifically to non-point sources of nutrients?)</i>
Track number and results of outreach programs and projects on nutrients, including publication, newsletter, website, and social media content	Stream Smart House Call Program (150+ homeowners), Master Watershed Steward Program Activities (30+ rain barrels distributed), related brochures disseminated on yard care, stream care, rain gardens, etc to municipalities and residents, promotion of

	rain gardens materials and activities, stormdrain marking materials, group education site visits, cleanup meetings
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W1.5: Conduct research and monitoring on nutrient impacts in the Delaware Estuary for biological and ecological endpoints

Performance Measures & Key Deliverables	CCMP Entries Received
Development of the Delaware Estuary eutrophication mode	DRBC eutrophication model development (reported annually, and includes EPA, States, and other WQAC members)
Track numbers and results of research projects on nutrients	10 (DRBC nutrient management activities (Algal Speciation Study / Dissolved Oxygen Survey, Light Extinction Monitoring, Primary Productivity Monitoring, Tributary Nutrient Monitoring, Expanded Boat Run Monitoring – 22 stations, WQAC results, including Revised Aquatic Life Uses and Dissolved Oxygen Criteria)

Clean Waters Goal 2: Reduce Other Pollutants and Their Impacts

W2.1: Conduct outreach and technical assistance programs to reduce nonpoint sources of contaminants

Performance Measures & Key Deliverables	CCMP Entries Received
Continuous growth/improvement of cleanup activities throughout the Estuary (Schuylkill Valley, Upper Estuary, Lower Estuary, Bayshore)	8 (Cleanup activities reported (400+ volunteers), trash cans installed (20), microplastics project & research)
Track number and results of outreach programs and projects on contaminants, including materials for storm drain marking and pollution prevention on the part of households and businesses	20 Outreach programs and activities (storm drain marking and art installations (207 participants), school stormwater restoration projects, related forums/meetings/workshops/campaigns (16,228 participants)

W2.2: Promote the identification, cleanup, and revitalization of contaminated sites

Performance Measures & Key Deliverables	CCMP Entries Received
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Examples of successful outcomes in each state (DE, NJ, PA) by tracking reductions	21 Superfund site treatments and contamination removal, landfill cleanups (projects reported in DE, PA, and NJ), including ~550,000,000 gallons of groundwater treated (VOC, chlorinated solvents, arsenic, leachate), ~157,000 cubic yard of soil treated, ~19,000 tons of contaminated soil removed, brownfields meetings (29 meetings total), Christina River Benthic mapping on legacy contamination cleanup
Track number and results of contaminated site cleanups	<i>All contaminated site cleanups and related activities listed above</i>

W2.3: Support adaptive management and reporting of pollution reductions

Performance Measures & Key Deliverables	CCMP Entries Received
Track PCB reductions and assessing current/emerging pollutants	2 (reported annually) DRBC database of PCB loadings to Delaware Estuary (spanning 97 facilities)
Track management coordination projects and activities on toxics' number and results, including reporting PMPs, impaired waters, pollution load reductions as required	2 (reported annually) DRBC database used to assist co-regulators to implement minimization programs, Stage 2 Delaware PCB TMDL (EPAR2 & 3, DRBC, DE, NJ, PA)

W2.4: Coordinate and promote research and monitoring efforts (chemical, physical, biological) associated with the causes of water quality impacts throughout the Delaware Estuary

Performance Measures & Key Deliverables	CCMP Entries Received
New data/outcomes shared and considered in decision-making	8 (DRBC's Monitoring Advisory and Coordination Committee (MACC) on monitoring coordination, Toxics Advisory Committee (TAC) activities on monitoring and managing toxics, and Water Quality Advisory Committee (WQAC) on monitoring and managing water quality)
Track number and results for research projects on toxics	2 (Watershed Approach to Toxics Assessment and Restoration (WATAR) program progress report - DNREC, DRBC enhanced bacterial monitoring)

W2.5: Conduct and coordinate (where appropriate) education, research, monitoring, and communication about fish and shellfish consumption to protect human health

Performance Measures & Key Deliverables	CCMP Entries Received
Evidence of reaching key audiences in each state and decreases in number/extent of advisories and closures	
Track number and results for consumption advisories projects and programs, including issuing/re-issuing advisories	<i>Annual consumption advisories for each of the three states (DNREC, PADEP, NJDEP) available on agency sites</i>

W2.6: Improve, sustain, and enhance spill communication and response with Delaware Estuary partners

Performance Measures & Key Deliverables	CCMP Entries Received
Develop inventories or other tools	
Track number and results of spill communication response projects and tools	5 (Meetings and events related to environmental incident impacts, oil and hazards response planning and preparedness, spill communication and response (EPA, USCG Sector Delaware Bay Area Committee))

Clean Waters Goal 3: Sustain Flow for Drinking Water and Ecosystems

W3.1: Inform and collaborate with decision-makers and water resources managers to ensure that main-stem Delaware River flow meets the needs of the Delaware Estuary

Performance Measures & Key Deliverables	CCMP Entries Received
New data/outcomes shared and continued improvement in flow management to meet the Estuary’s human and ecological needs	14 (DRBC Regulated Flow Advisory Committee (RFAC) activities and Subcommittee on Ecological Flows (SEF), including committee meetings and forum for public discussion, USFWS coordinating Delaware River Fish and Wildlife Management Cooperative, DRBC weekly hydrologic reporting, PWD salinity water supply planning and model analysis, USACE dam operations and maintenance, PADEP surveys and assessments of dam impacts and impaired stream alignment)

Track number and results of management coordination and research projects/activities to address flow needs	<i>Management coordination and research through activities listed above</i>
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W3.2: Conduct research and monitoring on water quality and habitat requirements of estuary dependent species

Performance Measures & Key Deliverables	CCMP Entries Received
Research priorities identified and outcomes produced/shared for two to three key species	7 (Freshwater mussel monitoring & caging experiments, FWW mussel hatchery meetings and planning)
Track number and results of research projects on flow/salinity needs of Estuary species	8 (Water quality enhancements through shellfish filtration projects, NJ Coastal Resiliency Collaborative Ecological Restoration and Science Workgroup activities, fw mussel monitoring activities, NJDEP shellfish sanitation program)

W3.3: Promote water conservation and water efficiency by utilities and industrial water users

Performance Measures & Key Deliverables	CCMP Entries Received
Examples of successful outcomes in each state, including information or materials to promote infrastructure investment and/or tools for utilities' conservation efforts	5 (DRBC annual water audits for public water supply systems (~300/yr), DRBC water conservation survey for Public Water Supply systems ~300, Berks County Source Water Protection Program through collaboration with county water suppliers, orgs., and conservation partnerships (PA), EPA WaterSense program partnership through water-efficient products and practices)
Track number and results of water conservation projects/utilities	<i>All activities listed above related to water conservation projects/utilities</i>

W3.4: Provide outreach and technical assistance to promote water conservation and infiltration by residential and commercial users and communities

Performance Measures & Key Deliverables	CCMP Entries Received
Examples of successful outcomes in each state	NJ - 4 rain garden projects at libraries and community centers (6720 foot (sq.), PA - Wissahickon Sustainability Council Schoolyard

	Greening (stormwater controls and native plantings – 1 acre)
Track number and results of water conservation programs, including materials for homeowners, businesses, and/or farmers promoting water conservation	PEC informational brochures to municipalities and residents (1000 copies) on yard waste, streamside care, rain gardens, etc.

W3.5: Promote and assist in implementing Regional Sediment Management

Performance Measures & Key Deliverables	CCMP Entries Received
Development of registry/inventory and 2-3 research/demonstration projects	
Track number and results of RSM projects (demonstration, research, inventory)	9 (Regional sediment management, beneficial use of dredged material, and dredge maintenance activities, dredge materials utilization studies)

STRONG COMMUNITIES

Strong Communities Goal 1: Increase Community Resilience and Access

C1.1: Restore working waterfronts

Performance Measures & Key Deliverables	CCMP Entries Received
Improve resilience in at least 2-3 key locations	5 (Upgrade of Water Pollution Control Facility to be resilient to power outages from extreme weather –CCMUA, Waterfront revitalization of Trenton Marine Terminal through maintenance – USACE, beach restoration & protection projects – NJDEP (3))
Improve access in at least 2-3 key locations	1 (Redevelopment and restoration of Delaware River Waterfront Pier Analysis Planning Assistance to States – USACE)
Track number and results of nature-based infrastructure projects/practices in waterfront communities	3 (beach restoration, protection, shoreline stabilization projects - NJDEP)

C1.2: Provide tools and technical assistance to waterfront communities & partners to improve economic and environmental resilience

Performance Measures & Key Deliverables	CCMP Entries Received
Improve resilience and/or access in at least 5 communities	0 (<i>How do we measure/quantify resilience?</i>)
Convene practitioners conducting outreach on climate adaptation annually	12 events/meetings (RASCL summit & associated meetings, DVRPC climate adaption forums, other related events & meetings (decision tool, brownfields roundtable, resiliency workgroup meetings. etc)
Update or redesign climate adaptation outreach materials (Weathering Change)	2 (Water Resiliency Tool to protect coastal properties, stormwater feasibility assessment to educate public)
Track number and results of technical assistance projects on community access and resilience	1 (story map to address current and future climate vulnerabilities)

C1.3: Protect and enhance natural areas and public access

Performance Measures & Key Deliverables	CCMP Entries Received
Improved protection and access in at least 2-3 locations	3 (Shoreline stabilization and protection projects)
Increased protection and access in at least 2-3 locations	9 (Protection projects through acquisitions)
Access points inventory development	
Track number and results of land protection and improvement projects on natural areas and access	12 (projects above)

C1.4: Connect people to natural areas and waterfronts in the Delaware Estuary

Performance Measures & Key Deliverables	CCMP Entries Received
Complete new/updated ecotourism website and increase visitor counts	
Inventory/assess existing exhibits and signage and add new exhibits, displays, or materials on living shorelines and freshwater mussels	2 (PDE living shoreline table display, living shoreline display in DuPont Nature Center)

Track number and results of outreach programs and projects on ecotourism and recreation, including engagement of youth in green jobs programs	5 (promoting outdoor recreation activities, recreation guide, Green Jobs/youth programs)
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Strong Communities Goal 2: Improve Public Awareness and Stakeholder Engagement

C2.1: Through marketing and communications, build awareness and brand for the Delaware River and Bay

Performance Measures & Key Deliverables	CCMP Entries Received
Continuous increase in distribution/exposure and examples of success in each state, with at least one major regional marketing campaign	2019 PDE web presence analytics – Posts – 777, Visits – 43,409, Downloads – 3,372 2020 PDE web presence analytics – Posts - 280, Downloads – 15,323, Visits – 57,529 Estuary News subscribers – 12,000, E-newsletter recipients – 6,930 PDE contact database of ~25,000 contacts
Track number and results of outreach programs and projects (marketing and communications), including increased distribution of Estuary News (2-4 issues annually) and use of DelawareEstuary.org (refreshed weekly) and social media	12 (PDE contact database, PDE social media, quarterly Estuary News, Schuylkill Clean Sweep app.)

C2.2: Utilize events to increase stewardship and engage new people

Performance Measures & Key Deliverables	CCMP Entries Received
Continuous improvement in event attendance (# of people/events annually)	Total attendees/participants at events to increase stewardship and engagement – 17,070 in 2019, 26,791 in 2020
Examples of reaching key audiences in each state successfully, including hosting/supporting at least one major event annually	13 (RASCL Summit in DE, Delaware River Festival in PA and NJ, Experience the Estuary Celebration in PA, Earth & Arbor Day in DE, Clean Water Rally in DE, webinar series & virtual events)
Track number and results of outreach programs and projects related to events	35 (all activities reported in this strategy, including tabling events, outreach campaigns, special events, presentations, etc.)

C2.3: Develop and promote programs that engage teachers and schools in stewardship of the Delaware Estuary

Performance Measures & Key Deliverables	CCMP Entries Received
At least one effective program for teachers/schools in each state and a growing community of teachers, schools, and students they reach	6 (FWW programming in Philadelphia, Teacher’s Workshop in DE, NJ, and PA, Stormwater project in Montgo. County, Rain Gardens in DE, SAN in-school programming)
Track number and results of outreach programs and projects related to teachers and schools, including production and distribution of classroom materials and guides, and creation/use of internships and outdoor/floating classrooms	1 (Wilmington Outdoor Classroom planning)

C2.4: Develop and promote programs with local communities and partners that foster volunteer stewardship and experiential learning

Performance Measures & Key Deliverables	CCMP Entries Received
Assess and increase corps of volunteers and citizen scientists with new data/outcomes shared/used annually, including shell bags produced, storm drains marked, debris removed	24 (river cleanups, oyster shell recycling program, freshwater mussel volunteer surveys, master watershed steward program), total volunteers - 6,210, bags of shell - 5,159
Track number and results of outreach programs and projects related to volunteers and citizen scientists	24 (all entries for this strategy track outreach programs results, including cluster initiatives, FMRP and PENNVEST activities, river cleanups, stewardship programs, shell bagging, rain gardens, green jobs programs, citizen monitoring, etc.)

C2.5: Publish and share outreach materials and scientific results

Performance Measures & Key Deliverables	CCMP Entries Received
Continue hosting the Delaware Estuary Science & Environmental Summit biennially, and involve more stakeholders at each event	1 (316 participants, 145 talks and poster presentations at 2019 Delaware Estuary Science & Environmental Summit)

(300 people or more, 100 presentations or more)	
Distribute and share reports, publications, and other literature online at DelawareEstuary.org (4,500 annually)	12 (100,000 literature hard copy, 15 PDE science reports/publications, 5 PDE outreach reports, Schuylkill Street Art Contest Brochure – 500, Philadelphia Art Contest Brochure – 1,840, Wilmington Art Contest Brochure – 196, SAN progress report – 150, 2020 Estuary News – 22,490, share CCMP tracking results on PDE website)
Produce and distribute reports on accomplishments annually and reports assessing the state of the Estuary's conditions and trends of 3-5 years	0 (<i>next TREB and proceeding SOE will be in 2022</i>)
Track outreach programs and projects through products published by scientists, managers, and practitioners	1 (DVRPC white paper on climate adaptation tools available online that could be used by municipalities planning for climate change impacts)

C2.6: Engage key stakeholders to coordinate science and management of the Delaware Estuary

Performance Measures & Key Deliverables	CCMP Entries Received
Sustain and improve leveraging (through involvement/coordination)	<i>(all entries for this strategy help to 'sustain and improve leveraging' for science and management)</i>
Continue to convene EIC, STAC and PDE Board of Directors' meetings (at least quarterly) and SC (biannually) to coordinate the management conference	~30 PDE Board of Directors-related meetings, ~40 DELEP-related meetings (EIC, SC, STAC)
Track and expand additional meetings and other activities to engage new stakeholders and promote collaboration to address key issues in sub-watersheds	37 (USACE & DRBC coordination, USFWS - Coordinate Delaware River Fish and Wildlife Management Cooperative through mtg. participation, Delaware Estuary Science & Environmental Summit, NJ Coastal Resiliency Collaborative, NJ Climate Change Alliance, DE Bayshore Council, RASCL planning meetings, SAN meetings, Christina Cleanup Committee meetings, Urban Waters meetings, DRWI meetings)

C2.7: Monitor, develop, and promote opportunities to assess impacts of outreach

Performance Measures & Key Deliverables	CCMP Entries Received
Conduct focus groups and surveys	
Identify and implement new performance measures for outreach	
Track numbers and results of research projects on outreach	1 (adopt a creek program – sends pre and post surveys to participants)

HEALTHY HABITATS

Healthy Habitats Goal 1: Prevent Wetland Loss

H1.1: Establish clear baselines for tidal wetland conditions and track changes over time

Performance Measures & Key Deliverables	CCMP Entries Received
Complete baseline rapid condition assessments (e.g., Mid-Atlantic Tidal Wetland Rapid Assessment Method) for all watersheds adjoining the Delaware Estuary by 2025	19 (DNREC state-wide wetland mapping project (10-year update), wetlands transgression and MACWA work, tree core collections, data loggers, ground water monitoring wells, Site Specific Intensive Monitoring (SSIM) of wetlands along Christina River, Dennis Creek, Maurice River, Dividing Creek, Crosswicks Creek, wetlands assessments in New Castle County)
Maintain landscape-level inventory maps (e.g., National Wetland Inventory) no more than 10 years old for all watersheds adjoining the Delaware Estuary	2 (Wetland condition data into Watershed Resource Registry, DNREC state-wide wetland mapping project (10-year update))
Produce one research report or product annually and an integrated report every five years to identify wetland stressors, translate outcomes, and guide tidal wetland management and restoration, respectively	1 (Research report on multi-year review of long-term monitoring efforts in Mid-Atlantic)
Track monitoring and research on tidal wetlands within the Delaware Estuary focus area and vicinity	<i>All activities listed above relate to monitoring and research on Del Est tidal wetlands</i>

H1.2: Restore, enhance, and manage tidal wetlands for maximum health and resilience

Performance Measures & Key Deliverables	CCMP Entries Received
Use MACWA data and mapping tools to identify and implement five pilot projects by 2022 to restore or avert the loss of 100 acres in different tributary watersheds along the Estuary’s salinity gradient	7 (pilot projects for restoration, creation, enhancement of tidal wetlands, wildlife areas located in swamps – 287.89 acres, wetland condition data into Watershed Resource Registry, tidal wetland local reference site data for reference wetland tool)
Produce one research or monitoring report annually to guide successful implementation of nature-based tactics	<i>In process of being updated and tracked – to be posted on PDE’s website Data and Reports section (PDE Science Reports, Reports by Others)</i>
Use research and monitoring to identify ways to increase wetland health and resiliency via practices such as Phragmites, mosquito, hydrology, and buffer management	2 (Riparian buffer restoration and buffer plantings)
Track restoration, management, research project numbers, and results on tidal wetlands	20 (MACWA meetings, wetlands restoration projects – total of 1,418.14 acres restored)

H1.3: Develop and implement natural and nature-based techniques to stabilize and restore eroding shorelines, and to build and protect wetlands, infrastructure, and other key resources

Performance Measures & Key Deliverables	CCMP Entries Received
Produce at least one new report, guidance product, or training annually to share research and development of new and innovative nature-based tactics and decision support tools to sustain, enhance, or restore tidal wetlands.	6 (Delaware Living Shoreline Committee meetings and living shoreline coordination, living shoreline feasibility model development)
Implement 5 new living shoreline projects spanning the salinity gradient over 10 years, including at least one large-scale project	3 (Sedge Island living shoreline installation – NJ, Maurice River install – NJ, constructed wetland installed at Cornwells Elementary School - PA)
Produce one monitoring report annually to assess and translate outcomes from at least one living shoreline project	<i>In process of being updated and tracked – to be posted on PDE’s website Data and Reports section (PDE Science Reports, Reports by Others)</i>

Track the number and results of restoration projects that use nature-based methods such as, but not limited to, living shorelines	28 (Camden, NJ living shoreline planning & investigation, habitat restoration and protection projects, living shoreline augmentation, living shoreline long-term monitoring and maintenance, living shoreline shellfish counts, RTK & veg surveys at living shoreline sites)
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H1.4: Protect, enhance, and improve non-tidal wetlands

Performance Measures & Key Deliverables	CCMP Entries Received
Identify, plan, and prioritize high-value nontidal wetlands to protect in each state by 2025	2 (identified potential areas for coastal forest research – NJ, freshwater wetland rapid assessments - DE)
Increase protection and restoration of nontidal wetlands with at least one successful example in each state annually	2 (nontidal wetland protection project – PA, nontidal land acquisition – DE, wetlands restoration project - PA)
Produce at least one outreach product annually to promote non-tidal wetlands' stewardship, protection, and restoration	<i>In process of being updated and tracked – to be posted on PDE's website Data and Reports section (PDE Science Reports, Reports by Others)</i>
Track number and results of projects for nontidal wetlands' restoration and protection	<i>All activities listed above relate to projects for nontidal wetlands' restoration and protection</i>

Healthy Habitats Goal 2: Stem Forest Loss

H2.1: Inventory, map, and increase connectivity and resilience of forests for water quality

Performance Measures & Key Deliverables	CCMP Entries Received
Inventory baseline forest acreage and conditions for water quality	2 (1 trail inventory and 1 registry with forest aspects)
Identify strategies and begin measuring connectivity between forest patches compared to baselines	
Assess likely changes from baseline in forest acreage and conditions attributable to climate change and other factors, and furnish recommendations to increase resilience	

H2.2: Promote stewardship practices by local partners for the health and sustainability of forests for water quality

Performance Measures & Key Deliverables	CCMP Entries Received
Increase the number of forest landowners and acres in stewardship management plans and restoration activities	2 (stewardship and management plans)
Maintain/increase funding for forest cost-share and incentive programs	
Track number and results of forest restoration, management and research projects	17 projects, 124.5 acres, 2,998 trees & shrubs (restoration projects, including native plantings)

H2.3: Protect and manage high-value and threatened forests for water quality

Performance Measures & Key Deliverables	CCMP Entries Received
Place an additional 50,000 acres of forests under permanent protection by 2025 with examples that preserve or enhance forest connectivity in each state	29 projects, 3,602.1 acres (land acquisition projects for protection, establishment, and enhancement)
Develop new partnerships to encourage economic incentives and opportunities for forest stewardship for landowners	
Track number and results of landowner outreach forest protection projects	

Healthy Habitats Goal 3: Increase and Improve Fish & Shellfish Habitat

H3.1: Inventory, map, protect, and enhance habitat critical for fish and crabs

Performance Measures & Key Deliverables	CCMP Entries Received
Complete a baseline benthic map of vegetated and hard-bottom reef habitats throughout the tidal Estuary and develop a strategy to update benthic maps periodically	2 (Baseline hydroacoustic monitoring of SAV – EPAR3, Lower Christina River Benthic Mapping)
Make progress in restoring fish passage by alleviating at least one obstruction per state	2 (Brandywine Shad 2020 feasibility study on 10 dams to restore fish passage, funding for Columbia Lake dam removal)

Develop a sustained propagation and restocking program for shad	
Track the number and results of restoration, enhancement, and mapping projects for fish/crab habitat	

H3.2: Restore oyster beds and productivity in and around the Delaware Bay

Performance Measures & Key Deliverables	CCMP Entries Received
Sustain effective research, monitoring, and management of oyster reefs, including studies of the ecosystem services oysters provide	3 (oyster physiology, oyster reef construction, impacts of extreme events on oysters)
Secure at least \$1 million annually by 2022 to support shell planting that boosts oyster recruitment and productivity	Funds for oyster research and oyster shell recycling activities reported - ~\$14,000
Produce and distribute materials promoting oyster restoration and shell recycling (restaurants, volunteers)	11 (13 participating oyster shell recycling restaurants, 8 publications on results of surveys, research, or restoration projects related to oysters, Delaware Bay Oyster Stock Assessment, shell bagging events & volunteers, shell recycling meetings, PDE shell collection ~555 tons)
Track the number and results of restoration, enhancement, and outreach projects to measure the number of oysters in the Estuary annually	1 (Delaware Bay Oyster Stock Assessment)

H3.3: Inventory, restore, and manage mussel populations

Performance Measures & Key Deliverables	CCMP Entries Received
Increase survey coverage, both scientific and volunteer, annually to assess native freshwater mussels' status	26 (Freshwater mussel surveys on status, survival, growth, habitat surveys, mussel monitoring activities)
Conduct research and produce one report annually to demonstrate tactics to enhance freshwater and ribbed mussel populations and associated ecosystem services	1 (ribbed mussel physiological experiment)
Increase populations of native freshwater mussels annually by enhancing their habitat and expanding propagation and reseeded programs	12 (Freshwater Mussel Recovery Program & Mussels for Clean Water activities, FWW exhibit hatchery activities, propagation experiments to produce juveniles, releasing

	mussels, broodstock collection for propagation)
Perform at least one project annually to sustain or enhance ribbed mussel populations, such as via hatchery propagation or use in living shorelines	1 (ribbed mussel physiological experiment)
Track the number and results of surveys, research, and restoration projects related to both freshwater and saltwater mussels	27 (Freshwater mussel surveys on status, survival, growth, habitat surveys, mussel monitoring activities. Ribbed mussel experiment)

H3.4: Protect and restore horseshoe crabs and their habitat

Performance Measures & Key Deliverables	CCMP Entries Received
Sustain annual spawning and trawl surveys of horseshoe crabs and annual shorebird surveys with volunteers	1 (shorebird and HSC monitoring)
Sustain or increase participation in sanctuaries, volunteer flipping activities, and distribution of educational materials (including plush horseshoe crab)	2 (distribution of HSC plush, voluntary HSC sanctuary signage)
Increase the number of beach restoration projects to provide high-quality horseshoe crab spawning and shorebird foraging and nesting habitat	
Conduct research and expand monitoring to understand the habitat needs of juvenile horseshoe crabs	
Track the number and results of surveys, research, and restoration projects related to horseshoe crabs to increase protection and monitoring/research	1 (coordination and technical expertise on shorebirds and horseshoe crabs)

H3.5: Manage and improve populations of rare, endangered, or otherwise important native species in the Delaware Estuary

Performance Measures & Key Deliverables	CCMP Entries Received
Use SMPs to assess the cumulative effects of impingement/entrainment on ecologically important native species	7 (native plantings, pollinator habitat projects, threatened species protection)
Develop contingency plan for zebra mussels	

Work with partners to identify and reduce habitat acres affected by invasive species annually in each state	2 (Invasive species eradication project (Tree-of-Heaven, bamboo))
Perform annual outreach to increase stewardship and landowners' use of native species	1 (Wilmington Earth Day native plant give-away)
Track the number and results of species-related projects	2 (Tree-of-Heaven, Swamp Pink)