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Dear Dr. Filer,

I hereby express my support for NatureServe's application for membership in the Chesapeake Watershed Cooperative Ecosystem Studies Unit (CESU). NatureServe is the leading authority on threatened and endangered plants, animals, and ecosystems in the Americas. We provide the scientific knowledge that supports informed decisions to conserve, manage and protect biodiversity. Together, with our Network of over 90 programs, we collect decision-quality data about imperiled species and entire ecosystems, and transform that data into knowledge products and visualizations. We provide comprehensive expert analyses and support to guide decision-making, implement action, and enhance conservation outcomes, including in the Chesapeake Bay watershed. For that reason, we are pleased to have the opportunity to join with other dedicated partners in caring for the watershed.

NatureServe is committed to the goals of the CESU, as evidenced by our past engagement with Chesapeake Watershed partners. Joining the CESU can only make our partnerships stronger. It will enable the partners to access and engage with our team of conservation scientists and database staff, as well as facilitate engagement with our state Network programs. Our membership in the CESU will provide our staff and Network members with opportunities to continue our current projects and to identify new opportunities to study, protect, conserve, and improve the watershed.

We look forward to working with you in the future.

Sincerely,

Sean T. O'Brien, Ph.D.
President & CEO

NatureServe

Application to join Chesapeake Watershed Cooperative Ecosystem Studies Unit

A. Expression of desire to enroll in the CESU as a new partner institution/organization.

NatureServe is submitting this application to join the Chesapeake Watershed Cooperative Ecosystem Studies Unit (CHWA CESU) as a new nonfederal organization. The NatureServe Network in the Americas is comprised of Natural Heritage Programs and Conservation Data Centers and together we empower people to sustain biodiversity by making sure everyone has access to the knowledge they need to be better stewards of our shared lands and waters. We serve as an authoritative source of comprehensive, decision-quality biodiversity data. We also develop software applications and decision support tools and provide analyses that support resource management and conservation activities. We work closely with local, regional and national partners in support of the goals and objectives of the CHWA CESU and its partners, including active, ongoing engagement with many of these organizations. This application demonstrates our commitment to the mission of CHWA CESU.

B. Confirmation that the institution/organization has read the CESU agreement and agrees to support the CESU mission and goals and fulfill the roles and responsibilities of a nonfederal partner, as described in the CESU agreement.

Our President and CEO, Sean O'Brien, supports this application, as described in the attached letter. His letter of endorsement firmly commits us to the responsibilities and roles that we as a nonfederal partner bring to the CESU's goals. Dr. O'Brien will ensure that we meet the expectations of the CESU partnership and that we seek creative ways to advance the mission.

C. Description of the institution/organization, its mission, and the primary focus of collaborative activities to be supported through the CESU in the context of the CESU mission.

NatureServe provides the scientific knowledge that supports informed decisions to conserve, manage and protect biodiversity. We support a Network of 97 programs across the Americas and together we collect decision-quality data about imperiled species and entire ecosystems, transform that data into knowledge products and visualizations, develop innovative software solutions to manage and analyze the data and provide meaning through expert analyses and support to guide decision-making, implement action, and enhance conservation outcomes.

Our work is guided by several key questions. What species and ecosystems exist? Where are they found? How are they doing? What actions will help? Are the actions working? Answers to these questions support the mission of the CESU in many ways. Example outcomes from the use of our data, tools and analyses include: a) a local land trust with limited resources protects land with the highest conservation value, b). A transportation agency builds in a different location to avoid at-risk species, protecting nature while also saving time and money, c) A city develops a plan to maintain healthy ecosystems in their watershed because it helps provide clean water for their residents, d)

Scientists learn which factors most strongly influence species and ecosystem vulnerability to climate change in a watershed.

As rapid changes threaten our planet and all life that depends on it, NatureServe and the Natural Heritage Network keep a finger on the pulse of the planet and its plants and animals whose future depends on conservation action and sustainable resource management. We are on the front lines of halting the decline of biodiversity, with our focus on the prevention of species and ecosystem declines and the conservation of vulnerable species and the places most at risk. For more about our work see: https://www.natureserve.org/about-us

Below we list a suite of projects that represent our ongoing engagement with partners to better understand, conserve, manage, and maintain biodiversity in the Chesapeake Watershed. By working together, we can help meet the mission of the Chesapeake Watershed partnership.

Regional Projects

Explore Natural Communities – National Capital Region

Visitors to national parks are often provided trail maps, but no information on the natural habitats and species that they observe as they walk the trail. NatureServe has worked closely with the National Park Service in the National Capital Region to create web tools that make natural communities and notable species of each park readily accessible to the public. Now visitors can get to know a park through the eyes of a naturalist. The innovative website design contains field guides and interactive maps about nature—especially natural communities—in national parks and other places. The natural communities are described using the U.S. National Vegetation Classification, which is used to map all national parks (see "National Park Service Vegetation Inventory Program"). Thus, although this tool currently focuses on National Capital Region parks, it can potentially be expanded to many other park regions. For more information, see: https://www.explorenaturalcommunities.org/.

LandScope Chesapeake

NatureServe works closely with the Chesapeake Conservation Partnership, which has identified long-term landscape conservation goals for achieving a vision of a vibrant, healthy and sustainable Chesapeake region. Through a multi-year cooperative agreement with the NPS Chesapeake Bay Program, we have developed LandScope Chesapeake as the shared conservation GIS portal (within LandScope) for the Chesapeake Conservation Partnership – see: http://www.landscope.org/chesapeake.

Climate Change Vulnerability Assessments of Terrestrial Ecosystems – National Capital Region

To understand how climate change will impact terrestrial natural resources in the National Capital Region, the National Park Service partnered with experts at NatureServe to conduct climate change vulnerability assessments. These assessments provide park managers and visitors an understanding of how the climate is changing in the National Capital Region and which areas and ecosystems are most and least vulnerable. This information supports the development of meaningful natural resource management strategies and facilitate better communication of climate change vulnerability

to park visitors. For more information visit the website for an overview of the project and for climate change analyses for each NCR park.

https://www.natureserve.org/biodiversity-science/publications/climate-change-vulnerability-terrestrial-areas-national-capital

Species

Prioritization and Conservation Status of Rare Plants in the North Atlantic Region

Tracking species at-risk requires ongoing evaluations to ensure that the information is current. NatureServe conducted a conservation assessment for vascular plants that occur in the North Atlantic Landscape Conservation Cooperative. This project relied heavily on the knowledge and expertise of the Natural Heritage botanists in the region, including their documentation of the precise locations of extant populations, and the conservation status assessment methodology (state ranks, global ranks) of NatureServe and the Natural Heritage Network. The primary outcome is a prioritized list of at-risk plant species with a comprehensive analysis of rarity, threats, trends, legal protection, inclusion in State Wildlife Action Plan revisions, conservation status, habitat, and climate change. This information supports the development of priority conservation actions in the region.

https://lccnetwork.org/project/prioritization-and-conservation-status-rare-plants-north-atlantic-region

iMapInvasives

Invasive species have a strong, negative impact on biodiversity. iMapInvasives is an on-line, GIS-based data management system used to assist citizen scientists and natural resource professionals working to protect our natural resources from the threat of invasive species. It is designed to share and manage invasive species information for stakeholders within states and provinces. This information includes species maps, treatment efforts and effectiveness, and areas where invasive species were searched for but were not found. Since many regulatory and budgetary decisions about invasive species are made at the state level, each jurisdiction can customize their iMapInvasives platform by selecting their tracked species list, setting user roles and permissions, and many other details. On a broader scale, iMapInvasives is a growing, collaborative partnership of participating states and provinces, with a collaborative network of professionals and shared resources to help combat the threat of invasive species. The NatureServe Network has built iMapInvasives, which is now available throughout the US and is heavily and actively used by PA and NY, with substantial additional data from VA and WV (and more states in the northeast). More information on this application is found at https://www.natureserve.org/conservation-tools/imapinvasives.

Ecosystems and Landscapes

Ecosystem Classification and Mapping

Addressing concerns over ecosystem collapse and the loss of ecosystem services that they provide within the Chesapeake watershed and beyond requires a systematic classification and mapping process for all ecosystems. NatureServe ecologists have partnered with experts in state and federal agencies and the Ecological Society of America to lead efforts to develop state, national and internationally standardized classifications for terrestrial ecosystems and vegetation. We are a lead

partner in the development of the U.S. National Vegetation Classification (USNVC), recognized by the Federal Geographic Data Committee as the federal vegetation classification standard, and we have developed the Terrestrial Ecological Systems classification, a parallel ecosystem standard that is compatible with the USNVC and advances our understanding of the ecological setting and mosaics of vegetation patterns. Both classifications provide ecological units useful for standardized mapping and conservation assessments of habitat diversity and landscape conditions. For information on the USNVC see http://usnvc.org and for information on Terrestrial Ecological Systems classification, see http://natureserve.org/conservation-tools/terrestrial-ecological-systems-united-states.

National Park Service Vegetation Inventory Program

National Parks need a comprehensive catalogue of the ecosystems in their parks because species and ecosystems vary from park to park, and park managers, researchers, and ecologists all need and use this information to maintain plant biodiversity, better understand wildlife habitat, and manage challenges such as exotic species, insect outbreaks and diseases, and wildland fires. For that reason, NPS initiated the Vegetation Mapping Inventory, a program that classifies, describes, and maps vegetation types in more than 270 national park units across the country. NatureServe has been a partner with NPS in this inventory program since its outset in 1994 and throughout the history of the program. The NPS Vegetation Mapping Inventory follows well-established procedures that are compatible with other agencies and organizations. The inventory uses the USNVC, a system that is integrated with the major scientific efforts in the systematic classification of all U.S. vegetation, and it meets Federal Geographic Data Committee standards. Our work with NPS included support for mapping all national parks in the Chesapeake watershed and across the nation. For more information on the program, see https://www.nps.gov/im/vegetation-inventory.htm and https://www.nps.gov/im/vmi-products.htm.

National LANDFIRE Program

Maps of ecosystems within agency lands are insufficient for understanding the larger regional context of their ecosystems, as well as for understanding a wide range landscape processes such as fire. For that reason, the interagency LANDFIRE program initiated a nation-wide map of ecosystems. LANDFIRE is a cornerstone of a fully integrated national data information framework developing and improving vegetation and fuels data products. These products are based on the best available authoritative data and science in an "all lands" approach to inter-agency/inter-organizational collaboration and cooperation. NatureServe staff have worked closely with the LANDFIRE program throughout its history, providing the standard vegetation and ecological systems classifications that are a cornerstone of the mapping process. Through this national program, the entire Chesapeake watershed has been mapped using both ecological systems and the USNVC, and NatureServe staff are available to guide applications of these maps for natural resource management. One version of the national map that also covers the watershed can be found here: https://gis1.usgs.gov/csas/gap/viewer/land_cover/Map.aspx.

Ecological Assessments

Northeast Regional Floristic Quality Assessment

Ecologists require accurate, reliable metrics to document the condition of ecosystems and their response to stressors. Floristic Quality Assessment (FQA) is a robust, botanically-based method for assessing the quality of ecological communities and natural areas. Integral to the method is that each native plant species in a state or region is assigned a value that that indicates how it responds to stressors. In the Northeast Region (including six New England states and New York), NatureServe was contracted by, and worked closely with, the Environmental Protection Agency and New England Interstate Water Pollution Control Commission to improve the FQA approach using an ecoregional, rather than state, framework. The improved FQA approach now provides ecologists with a consistent tool across all states in the northeast. For more information see: https://neiwpcc.org/our-programs/wetlands-aquatic-species/nebawwg/nqa/

Ecological Integrity Assessments

Ecological Integrity Assessments provide a standard "biophysical exam" that assesses how well an ecosystem is doing, including its component vegetation, soil and hydrology, as well as its size and interactions with the surrounding landscape. They provide land managers, conservationists, and agencies with critical information on factors that may be degrading, maintaining or helping to restore an ecosystem. NatureServe has implemented a three-level approach to assess ecological integrity, from remote sensing imagery, to rapid field assessments and detailed quantitative assessments. We work closely with state and federal partners to conduct our assessments, which provide critical information on the status of all wetlands within watersheds, as well as where high-quality wetland remain. For example, in in New Jersey, we worked with the state program to complete a wetland evaluation across all NJ watersheds
http://state.nj.us/dep/wms/WALZ_NJ_Wetlands_NJWMC_May2016_updated.pdf

Coastal Resilience Assessments

NatureServe worked with the National Fish and Wildlife Foundation (NFWF) and the National Oceanic and Atmospheric Administration (NOAA) to develop the information needed to help communities become more resilient to coastal flooding while improving conservation and condition of fish and wildlife. NatureServe led the development of seven Targeted Watershed Assessments, working closely with NFWF, NOAA, and USACE, our Network member programs, local partners, and stakeholders. Included in the seven is the Delaware Bay and Coastal Watersheds (DE and NJ) .https://www.nfwf.org/coastalresilience/Documents/delaware-bay-and-coastal-watersheds-coastal-resilience-assessment.pdf

D. **Description or list of the primary programs, departments, or other institutional divisions of relevance to federal land management, environmental, and research agencies that will likely be engaged in CESU activities. Include website addresses for further information, as appropriate.**

NatureServe expertise in biodiversity is concentrated in three of our divisions.

Data and Methods. This division, led by Kathy Goodin, ensures that high quality data and methods are used to collect information on all at-risk species and ecosystems across the Americas. The division activities include Data Management and Exchange, Database Analyses, and Data Development.

Applications and Analyses. This division, led by Dr. Healy Hamilton, develops critical assessment tools and models and conduct analyses to determine the at-risk status of species and ecosystems. Division activities include Ecological Assessment, Spatial Analyses, and Biodiversity Indicators.

Products. This division, led by Lori Scott, develops key software used by NatureServe and the Network. Key activities include Software Development, Product Management, and Product Support.

E. **A list of and brief description of the staff or faculty with expertise in disciplines and subject areas of relevance to federal land management, environmental, and research agencies (do not submit CVs).**

Data & Methods Division

Kathy Goodin, Vice President for Data & Methods received her M.Sc. in biology from University of Miami, Miami, Florida and a B.A. in biology and environmental studies from Macalester College in St. Paul, MN. Goodin oversees the Data and Method division. Past activities include *Director of the Marine program for NatureServe* and lead marine scientist responsible for the development of the Coastal and Marine Ecological Classification Standard (the US federal standard) and implementation of NatureServe's marine strategy.

Don Faber-Langendoen, Senior Ecologist & Conservation Methods Coordinator received his Ph.D. from St. Louis University and his M.Sc. in Botany from the University of Toronto. His key duties include the classification and conservation status of ecosystems (including both NatureServe and IUCN Ecosystem Red lists,) ecological integrity assessment, and monitoring methods. He currently serves as Editor-in-Chief for the USNVC Review Board.

Bruce Young, Chief Zoologist and Senior Conservation Scientist received his Ph.D. in Zoology from the University of Washington. He coordinates the zoology programs, oversees conservation database of animal taxa, leads on animal conservation assessments, and analyzes and reports on conservation data including native pollinators and vulnerability to climate change. He is an expert in conservation status assessments of species using NatureServe and IUCN Red List criteria and serves on IUCN Species Survival Commission Red List Committee that governs the Red List.

Anne Frances, Lead Botanist, received her Ph.D. in Environmental Horticulture and Botany from the University of Florida and her M.S. in Biology from Florida International University. She provides leadership and oversight of the NatureServe Botany Department including two professional botanists. She oversees the creation and review of Global Ranks for the botany department, including plants and selected lichens, fungi, and algae, serves as Principal Investigator on projects involving global conservation status assessments and climate change

vulnerability index assessments of plants, and serves as the North American Plant Red List Authority for the IUCN.

Michael Lee, Data Analyst, has a B.Sc. degree in Biology from the University of North Carolina at Chapel Hill. He is an expert in database design, interface design and implementation, data transformation and transfer, SQL, Visual Basic, JSON, XML, Access, PostgreSQL, MySQL. He also works on web design and web tool development: SVG, CSS, JavaScript, HTML. He is highly skilled in document parsing and transformation of documents into databases. Mr. Lee is also experienced in mapmaking (in ArcGIS and automated maps in R) and statistical analyses.

Margaret Ormes, Director of Science Information Resources holds a B.A. in Biology from Colorado College, Colorado Springs, CO. She supervises staff engaged in the management of botanical, zoological, and ecological data as it relates to taxonomy and classification, distribution, natural history, and conservation status assessments of species and ecological communities. She has expertise in taxonomic nomenclature; and manages several projects in collaboration with the Integrated Taxonomic Information System, housed at the Smithsonian Institution. She oversaw the development and publication of watershed distribution maps of North American (north of Mexico) freshwater mussels and the IUCN Red List program for North American freshwater fishes.

Applications and Analysis Division
Healy Hamilton, Chief Scientist has a Ph.D. in Integrative Biology from the University of California and an M.A. in Environmental Studies from Yale. Dr. Hamilton leads a staff of over 10 scientists with expertise in the applications and analysis of biodiversity data. She is also a world expert on the taxonomy, evolution and conservation of seahorses and their relatives. Dr. Hamilton is past President of the Society for Conservation GIS, a Fellow of the World Conservation Monitoring Centre, and serves on the Science Committee of the National Park Service Advisory Board. She is a Switzer Foundation Environmental Leadership grantee and a former U.S. Fulbright Scholar.

Pat Comer, Chief Terrestrial Ecologist has a M. Sc. Degree in Natural Resources (Forest and Landscape Ecology) and a B.S. in Biology at the University of Michigan, Ann Arbor. Pat has worked extensively across the Americas, initially for The Nature Conservancy, and since 2002, for NatureServe. His applied research has focused on ecosystem classification and description, mapping vegetation at multiple spatial and thematic resolutions, assessing status and trend in ecological integrity or condition, climate change vulnerability assessment, and documenting at-risk status. Pat has extensive experience with multi-objective ecoregion-scale assessment, planning, and monitoring and its applications with government agencies and the NGO sector.

Regan Smyth, Spatial Analysis Program Manager Regan Smyth Regan earned both a M. Sc. in Ecosystem Science and Management and a B.S. in Environmental Science and Biology from Duke University, with a certificate in Geospatial Analysis. She is the Director of NatureServe's Spatial Analysis program, where she leads a team of scientists and GIS analysts working to provide the scientific information that supports biodiversity conservation across the Americas. Regan's expertise lies in adapting spatial analysis tools to address diverse resource management needs, including modeling and mapping of ecosystems and species habitat, development of biodiversity

indicators, and spatial threats assessment, including climate change vulnerability analyses. She currently is coordinator of NatureServe's network-wide species distribution modeling initiative and Map of Biodiversity Importance project.

Mike Gill, Biodiversity Indicators Program Manager (BSc Ecology, University of British Columbia) is the Director of NatureServe's Biodiversity Indicators Program, where he leads a team of scientists and policy and geo-spatial analysts working to increase the impact and utility of biodiversity data through the development and visualization of biodiversity indicators. Concurrently, Mike holds an elected position as Co-Chair of the Group on Earth Observations Biodiversity Observation Network and has been appointed as an Honorary Fellow of UN Environment's World Conservation Monitoring Centre. The Biodiversity Indicators Program is currently collaborating with governments and institutions globally and specifically in the Tropical-Andes, Southeast Asia, the Arctic, and sub-Saharan Africa.

Pete Cutter, Senior Conservation Scientist earned a Ph.D. in Conservation Biology from the University of Minnesota, a B.A in Environmental, Population, and Organismic Biology from the University of Colorado, and a B.A. in Philosophy from St. Lawrence University. Dr Cutter is a conservation biologist and landscape ecologist who has worked in the US, Southeast Asia, and East Africa. He has worked with a broad range of partners and technologies to build regional capacity for protected area management, biodiversity monitoring, systematic conservation planning, and ecosystem services assessment. He has facilitated the stakeholder-driven design and deployment of spatial tools for collaborative data collection and review, including the Collect Earth Online platform and NatureServe's Species Distribution Model review tool.

Products Division

Lori Scott, Chief Information Officer and Vice President for Products, holds a B.S. in Mathematics from Bucknell University. Ms. Scott directs the operations of NatureServe's Products Division. In this role, she sets information technology strategy and oversees software development and support functions, which includes delivering and maintaining information systems to support the field data collection and management activities of NatureServe's network of independent heritage programs across the Americas.

David Hauver, Principal Software Engineer, graduated from the University of Virginia with a BS in Computer Science. He has served as the technical lead on many key NatureServe projects, including the development of a web-based version of Biotics, NatureServe's flagship biodiversity data management software; LandScope America, an online encyclopedia of open spaces; Explore Natural Communities, an interactive nature guide for the parks of the Natural Capital Region. He is also leading the development of the new NatureServe Explorer online searchable database for the 100,000 species and ecosystems tracked by NatureServe and its Natural Heritage Network.

Erik Gelhausen, Software Project Manager, holds a B.S. in Biology from The College of William and Mary and a Project Management Professional Certification from the Project Management Institute. Erik is coordinating software project activities for several major initiatives including the

NatureServe Explorer redesign project and the development of a suite of online web applications that streamline the environmental review process for state agencies including Virginia and Pennsylvania within the Chesapeake Bay Watershed.

F. **For academic institutions, include a description of student demographics and the institution's status as a minority-serving institution (e.g., as defined by the U.S. Department of Education).**

Not applicable

G. **Description or list of facilities, equipment, centers, or institutes that would provide support to the research, technical assistance, or educational activities of relevance to federal land management, environmental, and research agencies that will be engaged in CESU activities.**

Description of facilities

NatureServe main office (2550 South Clark Street, Suite 930, Arlington, VA 22202) includes the necessary software and hardware capabilities to support the research, technical assistance, assessments, and training of relevance to federal land management, environmental, and research agencies that will be engaged in CESU activities. NatureServe maintains a secure server hosting environment at a colocation facility with fully redundant power, data and physical network infrastructures. This colocation facility hosts the biodiversity information databases for NatureServe and its Network partners throughout the US and Canada. NatureServe also maintains a robust cloud hosting environment for a growing suite of web applications using both Amazon Web Services and Microsoft Azure. We have over 40 years of experience with federal and foundation funding, and the necessary skills needed to administer grants and contracts.

H. **Description or list of past research, technical assistance, and educational services supported through federal financial assistance awards that are of relevance to federal land management, environmental, and research agencies that will be engaged in CESU activities.**

Federal Financial Assistance Awards

The table below (Table 1) provides a list and brief description of research and technical assistance that are supported through federal financial assistance awards and relevant to federal agencies engaged in CESU activities. The list includes past awards that continue to this day and beyond.

Table 1. List and brief description of research and technical assistance that are supported through federal financial assistance awards.

Partner / Project	Project Title	Project Description	Begin Date	End Date	NatureServe Project Code
Bureau of Land Management (BLM)	BLM Multi-Jurisdictional Database (MJD) License WEST 2019	Provide MJD dataset to BLM under a new Data License Agreement for 14 states in the Western U.S. The MJD	10/1/2018	9/30/2020	BLM0F073

		contains locations of at-risk species on western BLM lands.			
	BLM Multi-Jurisdictional Database (MJD) License EAST 2019	Provide MJD dataset to BLM under a new Data License Agreement for selected states in the southeastern U.S. The MJD contains locations of at-risk species on eastern BLM lands.	10/1/2018	9/30/2020	BLM0F074
	BLM Maps and Analysis 2019	Develop maps and conducting analysis of conservation target species for the U.S. Bureau of Land Management.	10/1/2018	9/30/2020	BLM0F075
	BLM Botany Data	Provide updated information to the BLM on rare plants occurring on their lands.	10/1/2018	9/30/2020	BLM0F076
	BLM U.S. National Vegetation Classification (NVC) Key App	Provide smart-phone app for field keys to NVC types	10/1/2018	9/30/2020	BLM0F077
	BLM U.S. National Vegetation Classification (NVC) training	Produce training webinar recording for NVC Guidebook and other NVC-related products.	10/1/2018	9/30/2020	BLM0F078
	BLM Botany Data	Update Global Ranks of rare plants on BLM land; provide support to the Red List Authority of North American plants.	9/30/2019	9/30/2020	BLM0F080
	BLM Species Distribution Models New Mexico	Model distributions of 6 plant species with Natural Heritage New Mexico and assess accuracy in the field to refine modeling efforts.	9/30/2019	9/29/2020	BLM0F081
	BLM Data Life Cycle & Observation Standard	Coordinate with BLM to develop an observation data standard that is compatible with the Network Standard.	9/30/2019	9/29/2020	BLM0F082
	BLM BLD (Biological Locations Database) West 2020	Deliver state-wide Element Occurrence /Observation data for the BLM western region.	9/23/2019	9/29/2020	BLM0F083
	BLM Southeast (SE) Analyses 2019-2020	Based on a refined list of special status species for the SE US, analyze occurrence and habitat suitability model availability.	9/30/2019	9/29/2020	BLM0F084

	BLM Assessment Inventory and Monitoring (AIM) 2020 field sampling Eagle Lake	BLM AIM 2020 field sampling Eagle Lake.	10/1/ 2019	12/31/ 2021	OSU0F005
	BLM_NSX2_0	Add fields for EIA and HCCVI, maps, and .pdf download capabilities.	6/27/ 2019	6/26/ 2022	BLM0R079
Department of Defense (DoD)	DoD Handbook & Training	DoD Legacy funded project to review and update the online DoD Handbook and develop concept for an online training for DoD natural resources managers.	9/21/ 2018	3/20/ 2020	DOD0F003
	Noblis Peer Review	Provide scientific peer review of reports and proposal in support of DODs environmental research program.	1/16/ 2019	1/15/ 2020	TBP0M001
LandScope	Colorado Plateau Plant Partnership (CPNPP) LandScope Portal	Configure and maintain a custom LandScope portal for Colorado Plateau Plant Partnership.	5/8/ 2017	5/30/ 2022	BLM0R065
	LandScope Chesapeake	Expand LandScope for use by the Chesapeake Conservation Partnership.	9/22/ 2016	9/22/ 2021	NPS0R192
National Park Service - Explore Natural Communities (ENC)	ENC Mobile Map Viewer	Develop Mobile map viewer for ENC in one NCR park.	4/27/ 2015	3/15/ 2020	NPS0R179
	NCR ENC Continued	Continue development of Mobile map viewer for ENC in one NCR park.	9/16/ 2015	9/30/ 2023	NPS0R184
	ENC Mobile Year 2	Continue development of Mobile map viewer for ENC for one NCR park.	5/26/ 2016	3/15/ 2021	NPS0R189
	Expanding ENC (MANA, PRWI)	Expand development of Mobile map viewer for ENC to two other NCR parks.	8/17/ 2016	9/30/ 2023	NPS0R193
	ENC Mobile Year 3	Create Mobile Accessibility of Explore Natural Communities.org to Enhance Visitor Experience of Natural Communities in NCR parks.	11/1/ 2016	3/15/ 2021	NPS0R196
	NCR ENC map viewers	Complete first iteration Explore Natural Community map	9/20/ 2017	9/30/ 2023	NPS0R202

		viewers for the following parks: ANTI, CATO, MANA, MONO, NACE, and PRWI.			
	NCR ENC expansion	Continue ENC expansion for NCR parks.	7/24/ 2017	9/30/ 2023	NPS0R203
	ENC Continued 2019	Continue development of ENC with a focus on adding content for GWMP, MANA, MONO, PRWI, ANTI, and WOTR.	9/12/ 2018	9/30/ 2023	NPS0R208
National Park Service – Climate Change	NCR Climate Change Adaptation Strategies	Initiate Climate Change assessments for NCR parks.	8/13/ 2015	9/30/ 2020	NPS0R182
	NCR- Climate Change Year 2	Conduct Habitat Climate Change Vulnerability Index (HCCVI), Connectivity Analysis, Adaptation Strategies for Ecological System Targets.	8/4/ 2016	9/30/ 2023	NPS0R190
	NCR Climate Change Phase III	Develop climate change adaptation strategies for NCR parks via ecological integrity analysis of existing plot data and adaptation workshop with park staff. This builds off our previous climate change vulnerability assessments.	9/15/ 2017	9/30/ 2023	NPS0R204
	NCR Climate Change Phase III Ecological Integrity Assessment (EIA)	Compile ground-based inventory and monitoring data to assess the level of ecological integrity and range of ground-based stressors for all forest stands in NCR parks. Information will be used to rate their sensitivity and adaptive capacity to climate change.	9/19/ 2018	9/30/ 2023	NPS0R209
	NCR Climate Change Phase IIIb Ecological Integrity Assessment (EIA)	Complete the tasks as specified in NPS0R209, integrating the EIA work from that project into this comparison of EIA with Bird Community Index, and integrate EIA scores into HCCVI model, and provide adaptive management scenarios.	8/9/ 2019	9/30/ 2023	NPS0R211
National Park Service - other	Vegetation Remap at Great Smoky Mountain National Park (GRSM)	Support NatureServe's role in all aspects of GRSM mapping over the next 4 years.	4/1/ 2016	6/30/ 2021	NPS0R188

	Great Smoky Mountain National Park (GRSM) Remap Phase II	Support NatureServe's role in finalizing products for GRSM mapping.	4/1/ 2017	6/30/ 2021	NPS0R197
	NPS Bioblitz analysis	Analyze 10 years of data from bioblitzes that took place on US National Parks	7/18/ 2018	6/2/ 2021	NPS0R206
	NPS Technical publications	Support publication of NPS report.	7/18/ 2018	6/2/ 2021	NPS0R207
U.S. Forest Service (USFS)	Sustainable Forests Report	Support the National Report on Sustainable Forests by providing specific data on forest-associated species derived from the NatureServe Network data and other sources.	7/2/ 2019	6/30/ 2020	USF0F073
	Rare Plant Ranking (17-CS-11132422-134)	Rank 120 rare plants occurring on USFS lands, refining the list of endemic plants occurring on USFS lands using GIS.	3/30/ 2017	12/22/ 2022	USF0R059
	Bombus Rank Reviews (17-CS-11132422-134)	Review and update conservation status assessment ranks for 35 Bombus species.	3/30/ 2017	12/22/ 2022	USF0R060
	Species of Conservation Concern (17-CS-11132422-134 MOD1)	Conduct global ranking and species endemism research with emphasis on species occurring on US National Forests.	3/26/ 2018	12/22/ 2022	USF0R062
	USFS Digger Bee Ranks (17-CS-11132422-134 MOD1)	Use the Rank Calculator to establish Global Ranks for at least 20 species of digger bees.	3/26/ 2018	12/22/ 2022	USF0R063
	USFS Animal Rank Review (2018 17CS11132422129 MOD1)	Review conservation status ranks for 140 animal species.	4/17/ 2018	9/30/ 2022	USF0R064
	USFS - National Aquatic Biodiversity Assessment (NABA) Support	Provide up to date distribution and status information for US aquatic animals.	8/23/ 2018	7/31/ 2023	USF0R066
	Species of Conservation Concern Phase 2	Conduct global ranking and species endemism research with emphasis on species occurring on US National Forests.	3/6/ 2019	12/22/ 2022	USF0R067
	USFS Animal Rank Review 2019	Review conservation status ranks for 140 animal species.	5/20/ 2019	9/30/ 2022	USF0R068

	(17CS11132422129 MOD2)				
	USFS National Aquatic Biodiversity Assessment (NABA) Hydrologic Unit Code Maps	Update watershed distributions of aquatic animals in support of the USFS National Aquatic Biodiversity Assessment.	9/5/ 2019	7/31/ 2023	USF0R072
	U.S National Vegetation Classification & LANDFIRE	Support the development of software tools for the USNVC and support LANDFIRE applications.	7/19/ 2019	12/8/ 2021	USF0R074
U.S. Fish and Wildlife Service	FWS R4 Species Distribution Models pilot	Create a library of distribution models for a suite of prioritized target species to empower the FWS to more efficiently guide field inventory efforts and contribute to the development of best management practices to proactively sustain our nation's natural heritage.	9/24/ 2019	6/30/ 2022	USW0R035

Educational Activities

Biodiversity without Boundaries, NatureServe's annual conference, puts some of the most important scientific breakthroughs on display to an audience that includes scientists from the NatureServe Network plus scores of government agencies, leading academic institutions, and fellow conservation organizations. This diverse mix fills the niche between academic meetings and policy-centric conferences. Dozens of interactive workshops, symposiums, and panels comprise the heart of the agenda, sessions that tackle the most pressing topics facing conservation science today—as well as those approaching fast over the horizon. Government attendees have included representatives from the EPA, Environment Canada, Department of Defense, the USDA Forest Service, National Park Service, Parks Canada Agency, US Fish and Wildlife Service, the Bureau of Land Management, Army Corps of Engineers, NOAA, and the US Geological Survey, as well as state and provincial agencies. For more information on our 2020 conference, see https://www.natureserve.org/news-events/events/biodiversity-without-boundaries/biodiversity-without-boundaries

I. **Description or list of current formal agreements and informal relationships with federal agencies that are of relevance to federal land management, environmental, and research agencies that will be engaged in CESU activities.**

U.S. Forest Service – MOU (19-SU-11132422-135). NatureServe and the U.S. Forest Service have an MOU that provides the framework for cooperation and coordination on multiple activities, including, but not limited to: conducting assessments, inventory, monitoring, data acquisition,

and other scientific and management activities necessary to conserve fish, wildlife, plants, vegetation, watersheds, and ecological systems critical to sustaining biological diversity.

Federal Geographic Data Committee (FGDC), Vegetation Subcommittee -MOU (14-MU-11132660-039). NatureServe is a cosignatory, along with the U.S. Forest Service, the U.S. Geological Survey, and the Ecological Society of America, to support the implementation and maintenance of the U.S. National Vegetation Classification Standard (FGDC 2008). This system is critical to the efficient stewardship of the Nation's biological resources, including throughout the Chesapeake Watershed. NatureServe activities are supported by a contract with the U.S. Forest Service.

Chesapeake Conservation Partnership. NatureServe is a participating member of the partnership, which fosters collaboration to conserve culturally and ecologically important landscapes that benefit both the human and natural communities that are in the watershed.

https://www.chesapeakeconservation.org/
https://www.chesapeakeconservation.org/wp-content/uploads/2015/05/Partner-List-May-2015.pdf

Landscope Chesapeake. In 2012, the National Park Service, U.S. Geological Survey and NatureServe jointly executed a memorandum of understanding to collaborate on development of Landscope Chesapeake. This web-based mapping platform was initially designed to advance land conservation goals set out in the *Strategy for Protecting and Restoring the Chesapeake Bay Watershed* developed in response to Executive Order 13508. Through a multi-year cooperative agreement with the NPS Chesapeake Bay Program, NatureServe has developed LandScope Chesapeake as the shared conservation GIS portal (within LandScope) for the Chesapeake Conservation Partnership.

Ecological Society of America's Vegetation Classification Panel (https://esa.org/vegpanel/). NatureServe collaborates with federal agencies through participation on the Panel, which comprises staff from federal, state, academic and non-governmental organizations. The Panel develops the scientific standards for the U.S. National Vegetation Classification (http://usnvc.org/), oversee the USNVC Review Board, and facilitates plot-based vegetation analyses to VegBank, a web-based plot archive (http://vegbank.org). NatureServe also participates on the Review Board and regularly contributes plot data to VegBank. All vegetation plot data from national parks in the Chesapeake watershed have been uploaded to VegBank, as have plot data gathered by the Virginia and West Virginia Natural Heritage Programs. NatureServe activities are supported, in part, by a contract with the U.S. Forest Service.

J. **Confirmation of the institution's/organization's willingness to accept a limited overhead rate of 17.5% and cost items to which the rate is applicable for activities conducted through the CESU, including research, technical assistance, and educational services (this overhead rate applies to the entire institution/organization for CESU activities).**

Chief Operations Officer Steve Sellers supports this application and acknowledges that the maximum overhead rate for all work will be 17.5% and that there can be limitations on the cost items where the overhead rate can be applied. As part of NatureServe's commitment to this partnership we consider the difference between this rate and our federally negotiated overhead cost rate (29.3%) to be, **in part,** an in-kind contribution and supportive of the collaborative work that would be completed by NatureServe staff.

K. Designation of a technical representative (with full contact information – name, title, full address, phone, fax, email) to serve on the CESU steering committee.

Don Faber-Langendoen will serve as the technical representative for NatureServe and serve on the Chesapeake Watershed Steering Committee. His contact information is as follows:

Don Faber-Langendoen
Senior Ecologist and Conservation Methods Coordinator, NatureServe
2550 South Clark Street, Suite 930, Arlington, VA 22202
Adjunct Associate Professor, SUNY College of Environmental Science and Forestry
Illick Hall, Rm 303, 1 Forestry Drive, Syracuse, NY 13210
don_faber-langendoen@natureserve.org
703-908-1816

Steve Sellers, our Chief Operations Officer, will be the administrative representative for NatureServe. His contact information is:

Steve Sellers
Chief Operating Officer, NatureServe
2550 South Clark Street, Suite 930, Arlington, VA 22202
steve.sellers@natureserve.org
703-908-1851

L. Participation in CESU annual/semi-annual partner meetings, and facilitation of internal and external communication, promotion, and response to CESU correspondence and administrative actions (e.g., announcements, new member applications, processing agreements/amendments, five-year reviews).

NatureServe will attend and actively participate in partner meetings, will facilitate internal and external communications, and promote and respond to correspondence and administrative actions from the CESU in a timely manner. The primary responsibility for these tasks will be assumed by Don Faber-Langendoen. Don will work closely with Samantha Belilty, Marketing and Communications Manager on communication and promotion efforts as needed.

M. Agreement to relay agency-specific research, technical assistance, and educational needs and associated funding opportunities to other institutional/organizational members (e.g., faculty, students).
Don Faber-Langendoen will relay agency-specific research, technical assistance, and educational needs and associated funding opportunities to the appropriate NatureServe Division. These include

the Data and Methods Division (which Kathy Goodin directs), the Applications and Analysis Division (which Healy Hamilton directs) and the Products Division (which Lori Scott directs).   The Vice Presidents and their staff will develop grant proposals as appropriate in response to announcements of funding opportunities.

N. Signature (or endorsement) from an appropriate official, with authority to commit institutional resources in a binding multi-year federal cooperative and joint venture agreement (e.g., president, executive director, chief financial officer, vice president for research, director of sponsored programs).

Dr. Sean O'Brien, our president and CEO, has provided a letter of support and endorsement as part of this application. In the letter, he expresses much enthusiasm for NatureServe's membership as a means of contributing to the good work of the CHWA CESU and partner agencies.

O. Letters of support from one or more CESU federal agency partners sponsoring the new partner's application, including a description of successful past collaborative work supported through federal financial assistance awards.

Letters of support are attached from J. Patrick Campbell of the National Park Service and Catherine O'Riordan of the Ecological Society of America.

United States Department of the Interior

13 January 2020

Eric Davidson, Director
Chesapeake Watershed CESU
University of Maryland Center for Environmental Science
Appalachian Laboratory
301 Braddock Road
Frostburg, MD 21532

Dear Dr. Davidson,

We support Natureserve joining the Chesapeake Watershed CESU.

Natureserve has worked cooperatively and extensively with the national parks in Interior Region 1--National Capital Area for more than 15 years. Federal financial assistance to Natureserve has been over $1 million through the years for numerous projects.

The Natureserve staff has provided expert technical assistance and research to national park managers for project management and planning, rigorous data collection and analyses, plant community classifications, natural community mapping, biological inventories for the management and protection of rare, threatened and endangered species. Additionally, they developed extensive educational outreach with the national parks about their natural community information and publicly shared it through an engaging, plain language website called Explore Natural Communities that has interactive park vegetation maps. This website serves the parks and the visitors.

Thank you for your consideration of the Natureserve application package.

Sincerely,

J. Patrick Campbell, Chief

Ecological Society of America

1990 M St, NW, Suite 700
Washington, DC 20036

January 15, 2020

Daniel M. Filer, M.B.A., Ed.D.
Chesapeake Watershed CESU Research Coordinator
Region 1 - National Capital Area - Resource Stewardship & Science
National Park Service
University of Maryland Center for Environmental Science - Appalachian Laboratory
301 Braddock Road - Room 304
Frostburg, MD 21532

Dear Mr. Filer:

I am writing in support of the application by NatureServe to participate in the Chesapeake Watershed Cooperative Ecosystem Studies Unit (CWCESU) network. For more than 15 years, NatureServe has played a critical role in developing the U.S. National Vegetation Classification (USNVC), supported by federal financial assistance awards from the U.S. Forest Service and in partnership with the Ecological Society of America (ESA). The USNVC is a central organizing framework for documentation, inventory, monitoring, and study of vegetation in the United States from broad scale formations like forests to fine-scale plant communities. The Classification allows users to produce uniform statistics about vegetation resources across the nation at local, regional, or national levels.

NatureServe has assisted federal government agencies, including the U.S. Geological Survey, U.S. Forest Service, and other agencies, in developing the standards for the USNVC, including standards for plot-based survey methods and databases, and developing and maintaining a dynamic approach to revising the classification based on peer-review.

Based on the long and successful efforts of NatureServe in supporting the USNVC and their collaborative efforts with ESA, I am recommending NatureServe as a member of the CWCESU. If you have any questions, please do not hesitate to contact me at the phone number or email address below.

Sincerely,

Catherine O'Riordan

Executive Director, Ecological Society of America