Coastal Flood Resilience Project

WHITE PAPER

A Proposed National Strategy to Support Landward Migration of Coastal Wetlands
11.24.2023

The *Coastal Flood Resilience Project* is a coalition of organizations working for stronger programs to prepare the United States for the more severe coastal storms and rising sea level along the U.S. coast.

America's coastal wetlands are on a course toward dramatic decline as a result of steadily accelerating sea-level rise, more severe storms, and relentless coastal development. As these wetlands disappear, they will take with them habitat, storm buffering, water quality and carbon sequestration benefits of tremendous value.

Fortunately, there is still time to change course. A determined, cooperative effort by local, state, and federal governments — led by the Biden Administration — could dramatically increase the number of coastal wetlands that survive rising sea levels and help sustain their ecological and societal benefits into the future. For most coastal wetlands, survival will come as a result of landward migration. This is possible where geography does not present obstacles, such as steep slopes, and where human development has not already staked a claim.

This *White Paper* recommends that the country respond to the threat that rising seas and coastal development pose to the nation's coastal wetlands by developing a national strategy to support their landward migration to higher ground.
This *White Paper* is divided into three sections:

- Section I provides background information on the threats that rising seas, more severe storms, and coastal development pose for coastal wetlands;
- Section II outlines existing federal programs related to coastal wetlands; and
- Section III recommends that federal agencies work with state, tribal, and local governments and the Congress to develop a national strategy for sustaining coastal wetlands**.**

Section III proposes that a national coastal wetlands strategy be guided by a goal of no net loss of coastal wetlands (i.e., the loss of existing coastal wetlands to rising seas is at least offset by successful landward migration). Some key objectives for a national strategy include:

1. Focus on Landward Migration
2. Take Affirmative Actions to Facilitate Landward Migration
3. Seek Net Gain in Wetlands from Migration
4. Protect Existing Wetlands Where Appropriate
5. Provide Federal Leadership
6. Coordinate Work of Federal, State, and Local Governments
7. Coordinate Coastal Wetlands Strategy with Resilience Planning for Communities and Infrastructure
8. Educate and Engage the Public

A national coastal wetlands strategy should also include specific implementation actions. Section III recommends twelve specific actions:

1. Map and Assess Coastal Wetlands and Migration Pathways
2. Expand Support State and Tribal Coastal Wetland Programs
3. Provide Major Federal Grant Support to Sustain Tidal Wetlands
4. Implement Recommendations of the Federal Interagency Coastal Wetlands Workgroup
5. Amend Executive Order 11990 to Support Tidal Wetland Migration
6. Revise Compensatory Mitigation Guidance to Support Migration Corridors
7. Revise Flood Insurance Program to Discourage New Development in Migration Corridors
8. Demonstrate Tidal Wetland Corridor Protection on Federal Lands
9. Expand Tools for Acquisition of Tidal Wetland Migration Corridors
10. Revise Permit Processes to Discourage Barriers to Landward Migration
11. Promote Beneficial Use of Dredged Material to Support Wetland Accretion
12. Amend Statutory Definition of Waters of the United States

The Biden Administration should update existing Executive Order 11990 to formally authorize the existing Interagency Coastal Wetlands Workgroup and charge it with managing the development of a strategy, overseeing its implementation, and reporting on progress.

The Administration can implement some needed actions using existing authority and resources. For example, the Administration could initiate a national assessment of coastal wetland extent and potential for landward migration, could develop guidance for statewide plans to sustain wetlands as the climate changes, and could promote coordination of wetlands plans with related plans for beaches, coastal communities, and major, critical infrastructure. Full implementation of the actions described in this *White Paper*, however, will require new authority and funding from Congress. For example, Congress needs to appropriate funding for state coastal wetlands plans and to expand the wetlands protected by the Clean Water Act.

I) Problem Statement

Coastal and Tidal Wetlands: Current Extent and Rate of Loss

The U.S. Fish and Wildlife Service (USFWS) reported in 2009 that there are some 41.1 million acres of wetlands in coastal watersheds. This includes some 8.5 million acres (20.7 percent) in watersheds of the Great Lakes. Freshwater wetlands make up the largest part of all coastal wetlands (34.6 million acres or 84.3 percent). Tidal wetlands that experience tidal influences and varying degrees of salt water were estimated to be 6.4 million acres.

Over the period from 2004 to 2009, coastal wetlands declined by some 360,000 acres (almost 1 percent). But tidal wetland area declined by an estimated 1.5 percent. This represented a 35 percent increase over the rate of tidal wetland loss reported for the period between 1998 and 2004. Much of this loss was in the Gulf of Mexico, where the estimated rate of tidal wetland loss more than doubled, from 44,800 acres between 1998 and 2004 to 95,300 acres between 2004 and 2009.

Defining Terms

Tidal Wetlands: Wetlands subject to tidal influence.

Coastal Wetlands: Freshwater (nontidal) wetlands located in coastal watersheds and tidal wetlands taken together.

Although freshwater wetlands located in coastal watersheds are not at immediate risk from rising seas, many freshwater wetlands may become tidal wetlands as sea levels rise and existing tidal wetlands migrate landward, in some cases replacing existing freshwater wetlands. So the fates of tidal and freshwater wetlands are linked, and a strategy to sustain tidal wetlands requires consideration of nearby freshwater wetlands.

Finally, it is important to note that the USFWS is in the process of updating its reporting on the status and trends for wetlands and new information is expected to be published soon and is likely to underscore the need for a new national strategy.

Benefits and Value of Tidal Wetlands

The tidal wetlands that remain still provide an impressive array of ecological services and benefits to society. Often termed "the most productive ecosystems on Earth," they are nursery grounds for fisheries and provide habitat for birds, mammals and other wildlife. They also provide a buffer that protects other wetlands and communities from storm surges and flooding, reducing damages and loss of life. Along the Atlantic and Gulf coasts the protective value of wetlands is estimated to be about $1.8 million per square kilometer annually.

On top of all that, tidal wetlands help fight global warming by storing carbon at a rate that is about ten times greater than that observed in mature tropical forests. Although their carbon sequestration efficiency is great, NOAA estimates that coastal habitats sequester only about 4.8 million metric tons of carbon annually, which is less than one percent of U.S. annual carbon dioxide emissions. The likely inundation or landward migration of tidal wetlands in the face of

rising sea levels is expected to result in a gradual decline in carbon sequestered in tidal wetlands. But a recent study projected that these sequestration losses may be largely offset by reduced methane emissions due to salinization of freshwater wetlands by rising seas.

Threats to Tidal Wetlands

Rising sea level, more extreme coastal storms, and steady coastal urbanization pose an existential threat to tidal wetlands.

Steadily Rising Sea Level: The National Oceanic and Atmospheric Administration (NOAA) recently issued new estimates of future sea level rise, concluding that sea level along the U.S. coasts is likely to rise as much over the next 30 years (i.e., about 1.3 feet by 2050 in the "Intermediate" scenario) as it has over the last 100 years. Sea level rise averaging as high as 1.7 feet around the coastline is possible over this period and could reach as high as 2.2 feet in some places (e.g., in the Western Gulf of Mexico).

By the year 2100, NOAA projects that sea level rise along the U.S. coasts will average about 4 feet (in the "Intermediate" scenario) while an average increase of over 7.2 feet is possible. Sea level rise in some regions could be higher. By 2150, NOAA forecasts average sea level rise of over 7 feet in the "Intermediate" scenario with the possibility of average increases as high as 12.8 feet, with increases in the Western Gulf of Mexico of 14.7 feet.

These projected increases in future sea level pose a critical threat to tidal wetlands but they are not the full story. Some other aspects of sea level rise that are bad news for tidal wetlands are:

- **Accelerating Sea Level Rise:** The rate of global sea level rise is accelerating: it has more than doubled from 0.06 inches (1.4 millimeters) per year throughout most of the twentieth century to 0.14 inches (3.6 millimeters) per year from 2006–2015. Some wetlands can survive slow sea level rise but are overwhelmed as the rate increases.

- **Rapid Deterioration of Antarctic Ice Sheets:** NOAA's sea level rise report explains that there is a small chance that sea level rise will be significantly more than projected due to rapid deterioration of ice sheets in Antarctica and Greenland. These changes in ice sheets are difficult to model, but are thought to pose the greatest risk in the decades after 2050.

- **Sustained Sea Level Rise:** Sea levels will continue to rise for many centuries beyond the 2150 projections in the NOAA sea level rise report as a result of the warming that has already occurred and is continuing to occur, even if global temperatures are limited to not more than 2 degrees C as called for in the Paris Climate Agreement.

More Severe Coastal Storms: Coastal storms can be very damaging to tidal wetlands. Major storms can deliver storms surges of over fifteen feet. A warming climate is causing an increase

in the number of the strongest storms. These storms bring more extensive coastal flooding, higher storm surges, and increased rainfall. Research indicates that intense storms are slowing down and thus raining on a given place for longer, generating more flooding. Even as storms move more slowly, they intensify more rapidly, making their landfall harder to predict and more likely to result in major damages to ecosystems and communities and loss of life.

Coastal Population Growth and Development: The Atlantic, Gulf of Mexico, and Pacific coasts are home to over 100 million Americans. The population living right along the coast (i.e., at elevations of 33 feet and lower) is expected to double by 2060 to about 44 million. The development of homes and infrastructure to serve this increased population will result in some development directly in existing coastal wetlands but will also result in development of land that is not now a wetland but will become a wetland as sea level rises. These lands adjacent to and upland of existing wetlands do not now have the federal permitting protections that existing wetlands have (e.g., a permit required under section 404 of the Clean Water Act).

Coastal development often prompts efforts to hold a shoreline at or near a wetland in place with engineered structures such as seawalls and bulkheads. These structures can harm wetlands by restricting tidal flow that wetland vegetation requires. Some 14% of the coast is already armored by this infrastructure, and if the current rate of armoring continues, that percentage is expected to double by 2100. A related concern is that construction of hard protection structures can provide property owners located behind the structures confidence to build. This can result in localized population increases that increase density in risky areas and pose management challenges in the future when rising seas overcome protection structures.

Projected Loss of Tidal Wetlands

Rising seas will eventually drown virtually all the current tidal wetlands, converting them to open water. Some wetlands will survive in place for a time if seas rise slowly enough for sediment and plants to build up naturally, effectively raising the wetland. But the rate of sea level rise is accelerating and other factors, such as land subsidence, will shift the balance in favor of rising seas in the years ahead. For most tidal wetlands, survival will require landward migration. This is possible where geography does not present a natural obstacle, where human development is not a barrier, or where it is possible to modify geography or remove barriers.

The Latest Science on Tidal Wetland Response to Rising Seas: Scientists have debated whether natural processes of accretion of sediment and organic material might be sufficient to allow some or most tidal wetlands to slowly gain elevation, keeping pace with rising sea levels. This scenario could delay conversion of some wetlands to open water and perhaps preserve others indefinitely.

The most recent research, however, indicates that coastal wetland accretion is unlikely to preserve existing wetlands as rates of sea level rise accelerate. This 2021 study indicates that

accretion would benefit some wetlands for several decades, after which sea level rise would result in inundation:

> The question of how coastal wetlands will cope with future sea-level rise is a subject of much debate, with recent research providing contradictory answers. Our analysis suggests that much of this can be attributed to the time window under consideration. Even coastal wetlands that are able to persist during the next few decades are likely to be much less resilient through the remainder of this century and beyond.

This 2021 study reported:

> In our analysis, we see that threshold beyond which marshes fail to accrete relative to RSLR [relative sea level rise] is regionally variable, depending on GT [greater diurnal tidal range], and in many cases is already crossed, or will likely be crossed by 2100.

This 2022 research concluded:

> Marshes accrete more sediment, keeping up with sea-level rise up to a point, but sediment subsidence increases nonlinearly with accretion such that at higher rates of sea-level rise, marshes begin to sink. Marshes are unlikely to keep up with rising seas under current climate change projections.

A 2023 study found that more than 90 percent of salt marshes are likely to convert to open water by the year 2100:

> Model results anticipate that—in spite of potential accretion enhanced by vegetation and ecosystem engineer effects—there will be loss of high marsh, transient increases of low marsh, followed by loss of low marsh, and eventual conversion to shallow open water by the end of the century.

Potential for Landward Migration of Tidal Wetlands: Understanding that most tidal wetlands will not survive rising sea levels, critical question arise: How many tidal wetlands will be able to migrate landward thanks to helpful geography and lack of man-made obstacles? Could human intervention to modify geography or remove obstacles facilitate wetland migration that would not otherwise occur?

Several studies have looked at the potential for lateral, landward migration of tidal wetlands. This study evaluated migration potential based on the existing land cover and land use in migration areas and found substantial variation on a regional basis:

> Regions varied generally from north to south in the proportion of land that was available to accommodate lateral wetland migration. The northwest (Oregon and Washington) had the least, 21% under RCP 4.5. This was followed by the Southwest (CA)

> with 21% and Northeast (from Maine in the North to New Jersey in the South) with 23%. The South Central (Louisiana, Texas, and the rest of the Gulf Coast), Southeast (Atlantic Florida south-north to North Carolina), and the mid-Atlantic all had much higher proportions of land available for wetland migration. The mid-Atlantic zone had 43%, the Southeast had 44%, and the South Central zone had the most with 50%, under RCP 4.5

Acknowledging the challenges to landward migration, this study reinforced the importance of protecting existing migration corridors: "We find that protecting current refugia is a critical factor for retaining wetlands under accelerating SLR."

Ghost Forests

A 2022 study found that 40,000 acres of coastal forests and farmland along the mid-Atlantic coast had died off and converted to ghost forests over the past thirty years.

This 2022 study, involving scientists from the U.S. Geological Survey and other organizations, evaluated 166 US estuaries using data from NOAA's Coastal Change Analysis Program (C-CAP). They found that "landward migration of coastal wetlands will transform coastlines but not counter seaward losses." In addition, the analysis pointed to the likelihood that some wetlands migration would occur at the expense of other land uses, and suggested a more active role in managing this transition:

> Understanding and directing the ecological regime shifts and transformative impacts of tidal saline wetland migration into adjacent ecosystems, including highly valued coastal freshwater wetlands and coastal uplands, can help sustain and preserve landscape-scale biodiversity and the ecological and societal benefits provided by coastal ecosystems in the face of rising sea levels.

Unfortunately, there are currently no estimates of the potential for human intervention to create tidal wetland migration corridors through affirmative modification of existing geography or removal of man-made obstacles.

Loss of Wetland Function: A final concern is that wetlands that are able to migrate landward will need years to provide the same degree of ecosystem services they did originally. A study of over 600 restored wetlands worldwide found that biological structure and biogeochemical functioning "remained on average 26% and 23% lower, respectively, than in reference sites" even a century after restoration, which means that even the wetlands that do survive won't provide the same benefits. A study published in 2022 estimated the value of ecosystem services lost due to rising sea levels to be in the range of $2.5 billion and $6.1 billion, depending on the climate change scenario assumption (i.e., rate of sea level rise).

As noted above, declines of carbon sequestration as tidal wetlands are inundated are expected to be mostly offset by reduced emissions of methane from salinization of freshwater wetlands. Another study found that carbon sequestration declined by up to 40 percent in coastal forests where trees die due to salt water rising (i.e., ghost forests) although there is also research indicating that warmer and wetter conditions increase biomass in surrounding areas. Although

more research may clarify possible carbon sequestration losses, the current evidence is that sustaining current levels of sequestration will be difficult.

II) Current Federal Government Efforts to Sustain Coastal Wetlands

The good news for coastal wetlands is that there are now substantial policies and programs at the federal, state, and local levels to protect wetlands generally and, in fewer cases, coastal wetlands more specifically.

The bad news for coastal wetlands is that the existing policies and programs are mostly focused on protection of wetlands where they now are, rather than defining, protecting, and expanding the landward migration corridors that are essential to sustaining these ecosystems in the long term.

Federal Wetlands Protection Programs

Clean Water Act Wetland Permitting and Program Development: A key federal authority for protection of wetlands is Section 404 of the Clean Water Act (CWA). The CWA requires that development in wetlands under the jurisdiction of the Act (i.e., wetlands that are "waters of the United States), be avoided. Where development can't be avoided, Section 404 requires that a permit imposing conditions to limit impacts and might provide that any wetlands lost to development be replaced by construction of new wetlands nearby (i.e., compensatory mitigation or "trading"). Section 404, however, does not include unique protections for tidal wetlands or for freshwater wetlands in coastal watersheds.

Determining which wetlands are covered by the CWA (i.e., which are jurisdictional) has been debated over many years and the subject of several Supreme Court decisions. In May of 2023, the current Court majority narrowed the range of waters covered by the CWA, finding that there must be "a continuous surface connection" between a "relatively permanent" jurisdictional waterbody and a wetland for the wetland to also be jurisdictional. In the case of tidal wetlands, there should be a sufficiently continuous surface connection to ocean or estuary waters, which are indisputably waters of the United States, clearly establishing these wetlands as covered by the Act.

However, some freshwater wetlands in coastal watersheds that have for decades been considered jurisdictional may lack the newly required "continuous surface connection" to a jurisdictional waterbody. This means that the federal CWA will no longer be available to protect these wetlands that are often the most likely landward migration corridors for tidal wetlands. Unfortunately, there is now no national estimate of the number of coastal freshwater wetlands newly denied CWA protection.
It is also important to note that, for some 59 common activities in covered waters and wetlands, an applicant may seek to be covered by a standard, "nationwide permit" offering a

streamlined process and a standard set of conditions. The common activities eligible for these permits include several that often occur in coastal waters, including living shorelines and bank stabilization (e.g., bulkheads or seawalls).

The CWA also provides a general authorization for grants to states, tribes and local governments for wetlands program development. Grants total only about $15 million per year and are available for a range of monitoring and protection activities. There is, however, no priority established for coastal or tidal wetlands. Some examples of states that have developed effective wetlands programs with a strong coastal focus include Maryland, Delaware, and North Carolina.

State water quality standards, authorized under the CWA, apply to wetlands and some states have adopted numeric wetland water quality criteria. Wetland water quality standards support development of pollution controls including discharge permits. EPA encourages states to adopt water quality standards for wetlands but has not made standards for coastal or tidal wetlands a priority. Finally, some states also use authority under Section 401 of the CWA to assure that federal projects do not pose a threat to the quality of waters in the state.

Coastal Zone Management Act: The Coastal Zone Management Act (CZMA) provides grants to states to develop Coastal Zone Management Plans. Some states address wetlands in their general CZMA plans but others do not. Although states have wide discretion in the topics addressed in their general plans under CZMA Section 306 plans, grants under Section 309 are intended to "enhance" program impacts and focus attention on nine priority topics. Although wetlands are one of these nine priorities, the Section 309 wetlands objective is focused on protection of existing wetlands rather than migration corridors.

CZMA also provides authority for the National Estuarine Research Reserve program. The 30 reserves around the country work on a range of issues depending on conditions in each estuary. Recently, six of the estuaries began work to evaluate wetland migration options and issues, including Narragansett Bay and New Hampshire's Great Bay.

Funding for Wetlands Restoration and Acquisition: There are several federal programs providing funding for restoration and protection of wetlands, including several focused directly on coastal wetlands.

- **NOAA Transformational Habitat Restoration and Coastal Resilience Grants:** For FY 2023, NOAA is making $240 million in funding available for transformational habitat restoration and coastal resilience projects under the Bipartisan Infrastructure Law and Inflation Reduction Act. Grants are to "restore coastal habitat and strengthen community resilience," including coastal wetlands, but the amount of funding directed to wetlands will depend on which project applications are approved.

- **National Coastal Resilience Fund**: The National Coastal Resilience Fund invests in conservation projects that restore or expand natural features such as coastal marshes

and wetlands, dune and beach systems, oyster and coral reefs, forests, coastal rivers and floodplains, and barrier islands that minimize the impacts of storms and other naturally occurring events on nearby communities. The National Fish and Wildlife Foundation manages these grants and expects to award about $140 million in 2023. Although a significant portion of these grants provide benefits for coastal wetlands, projects generally restore or protect existing wetlands rather than landward migration corridors.

- **Fish and Wildlife Service Coastal Wetlands Conservation Grants:** In 2023, the USFWS awarded nearly $19 million to support 21 projects in eight coastal states to protect, restore or enhance nearly 14,000 acres of coastal wetlands and adjacent upland habitats. These grants could support migration corridors but the current funding level is too low to have much impact nationally.

- **USDA Wetland Grants:** Although not focused specifically on coastal wetlands, the Agricultural Conservation Easement Program provides funds to secure permanent or long-term easements to restore, protect, or enhance wetlands on private or tribal land.

Other Authorities: Several other federal government authorities address coastal wetlands.

- **Essential Fish Habitat:** Under the Magnuson Fisheries Management Act, NOAA identifies "essential fish habitat" and consults with federal agencies on development projects in these area and can discourage development in these areas. NOAA works to minimize or avoid environmental impacts during construction and other development that may impact marine fisheries and vital habitats, including wetlands.

- **Flood Mitigation Assistance Program:** FEMA's Flood Mitigation Assistance Program is intended to reduce flooding and is not directly focused on wetlands. But the program can be used for wetlands restoration and other natural infrastructure.

- **Coastal Barrier Resources Act (CBRA):** CBRA is designed to identify lightly developed coastal barriers and reduce development pressure on these places by restricting the use of federal funds for their development. Although most areas included in the program are beaches and dunes, some coastal wetlands are also protected.

Regional Initiatives

There are several regional collaborations focused on tidal and coastal wetlands:

- **South Atlantic Salt Marsh Initiative:** The South Atlantic Salt Marsh Initiative (SASMI) is a regional effort and voluntary, non-regulatory partnership that brings together leaders from the Southeast Regional Partnership for Planning and Sustainability (SERPPAS) and other local, state and federal partners, communities and nongovernmental

organizations to determine the greatest threats to the salt marsh ecosystem and opportunities to ensure its survival in the four-state region from North Carolina through Brevard County in east-central Florida. SAMSI recently released a plan that includes specific strategies for defining and protecting coastal wetland migration corridors.

- **Southern California Wetlands Recovery Project:** The Southern California Wetlands Recovery Project (WRP) consists of 18 public agencies coordinating with each other regarding the protection, restoration, and enhancement of California's coastal wetlands and watersheds between Point Conception and the Mexican border. This work includes an assessment of sea level rise impacts on marshes.

- **Southeast Aquatic Resources Partnership:** The Southeast Aquatic Resources Partnership (SARP) is a regional collaboration of natural resource and science agencies, conservation organizations and private interests developed to strengthen the management and conservation of aquatic resources in the southeastern United States. This work includes an Aquatic Connectivity Program that inventories aquatic connection barriers, evaluates benefits of barrier removal to prioritize barrier removal projects, and creates local teams to implement projects.

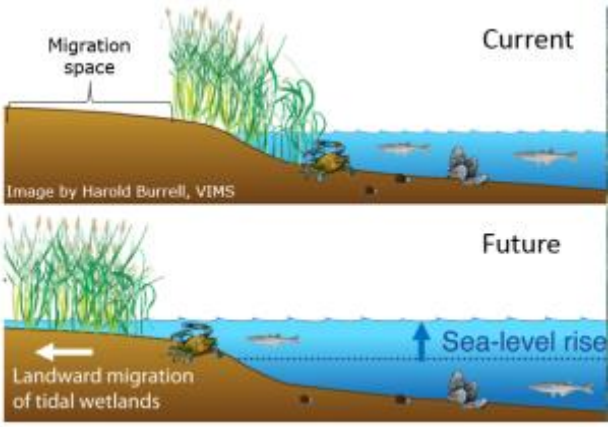
Selected Tools and Resources

There are a range of tools and resources that support coastal wetlands migration assessment and management.

- **Georgetown Climate Center Managed Retreat Toolkit:** The Managed Retreat Toolkit, managed by the Georgetown University Climate Center, is an online resource providing background and guidance on a range of topics related to climate adaptation, including wetland migration in the face of more severe storms and rising seas.

- **SLAMM Model:** The Sea Level Affecting Marshes Model (SLAMM) simulates the dominant processes involved in wetland conversions and shoreline modifications during long-term sea level rise. Map distributions of wetlands are predicted under conditions of accelerated sea level rise, and results are summarized in tabular and graphical form.

- **Resilient Land Mapping Tool:** The Nature Conservancy has developed a Resilient Land Mapping Tool that identifies and assesses "Resilient Coastal Sites" including "Marsh Migration Space" (i.e., the area of adjacent low-lying land that is potentially suitable for supporting tidal habitats in the future as sea levels rise, and into which the current habitats could migrate). The image below illustrates how current tidal marsh is expected to move into its migration space, while the existing marsh is lost to inundation.



Federal Planning to Protect Wetlands

Within recent memory, the federal government had national goals for protecting and restoring wetlands. For example, in 2005, the White House Council on Environmental Quality and six federal agencies released a plan with a goal of increasing the quantity and quality of wetlands, including an increase of three million acres over five years. As far back as 1977, Executive Order 11990 addressed wetlands protection and ordered federal agencies "to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative."

The network of federal, state and local programs, enhanced by recent investments in building climate resilience, clearly benefit the nation's wetlands. Still, there is today no national plan to improve the quality of the nation's freshwater and tidal wetlands, no measurable goal for sustaining these wetlands, and no process for tracking and reporting actions and progress toward goals. In addition, recent efforts to protect wetlands by improving regulations defining the wetlands considered to be "waters of the United States" and protected by the CWA were dealt a major setback by the Supreme Court decision in May of this year greatly narrowing the range of wetlands covered by the CWA.

EPA Report on Tidal Restrictions

In 2020, EPA published a report describing how coastal structures posed obstacles to coastal wetland migration in response to rising sea levels. EPA identified some 1,764 transportation related restriction structures in ten New England and mid-Atlantic states affecting 70,450 acres of salt marsh.

Recommendations for Reducing Wetlands Loss in Coastal Watersheds: Fortunately, in the case of coastal and tidal wetlands, there is a federal Interagency Coastal Wetlands Workgroup. Importantly, in 2022, this Workgroup published *Recommendations for Reducing Wetland Loss in Coastal Watersheds of the United States*, outlining the importance of coastal wetlands and making five recommendations:

1. Increase the Acreage of Wetlands Restored in Coastal Watersheds
2. Reduce Loss of Coastal Wetlands to Development

3. Reduce Coastal Wetland Loss Associated with Silviculture in the Southeast
4. Support the Collection, Enhancement, and Dissemination of Landscape-Scale Monitoring Data
5. Conduct Targeted Outreach and Stakeholder Engagement

Each of these five major recommendations is supported by more detailed actions, all of which are constructive and helpful (see Appendix I). For example, a key action supporting the recommendation to reduce loss of coastal wetlands to development is:

> Promote or fund the establishment of corridors preserved for coastal wetland migration inland in response to sea level rise and subsidence.

Still, there are some issues with the report:

- The report does not set goals for sustaining the extent or quality of coastal wetlands.
- The action in support of wetland migration corridors is simply one sentence, and the importance of defining and protecting these corridors is not highlighted among several dozen other recommended actions and supporting actions are not described.
- The supporting actions do not include information about which federal agency will lead implementation or indicate timelines for major milestones;
- There is no mechanism for tracking and reporting progress in implementing recommended actions.

Ocean Climate Action Plan: In March 2023, the Biden Administration released an *Ocean Climate Action Plan* outlining actions needed to protect the oceans in the face of a changing climate. The *Plan* includes chapters on "blue carbon," including carbon sequestration in coastal wetlands and on coastal resilience, including support for programs that protect coastal wetlands.

Recommended actions related to blue carbon are focused on research and mapping as well as developing standards for monitoring and managing carbon sequestered in tidal wetlands.

The coastal resilience chapter is focused on supporting communities threatened by more severe storms and rising seas, but also includes several actions focused on maintaining existing programs for wetland protection. Importantly, the *Plan* calls for

A Blue Carbon Action Agenda

The nonprofit organization Restore America's Estuaries released in 2022 a report offering recommendations for protecting the carbon sequestration value of coastal wetlands, including:

- Advance an "all of government" approach to Blue Carbon through dedicated resources and coordination of federal activities including a research agenda.
- Strengthen protections for Blue Carbon ecosystems.
- Remove barriers to Blue Carbon restoration projects.
- Advance policies and funding that support climate-related financing, public-private partnerships and market-based mechanisms.

federal agencies to "identify coastal ecosystem migration pathways to ensure persistence of critical habitats that support coastal fisheries and wildlife."

Assessment of Existing Coastal Wetlands Programs

Taken together, programs and policies for protection of coastal wetlands are an impressive package. This set of policies and programs will generate benefits for coastal wetlands but is unlikely to meet the challenges that a changing climate and coastal development will pose in the decades ahead. Some key shortfalls of current coastal wetlands programs include:

- **Lack of Focus on Landward Migration:** To a large extent, existing coastal wetland programs were developed prior to wide recognition of the impacts that rising seas will bring to coastal ecosystems, and do not make landward migration their major focus.

- **Lack of Recognition of Scale of Future Losses:** Existing programs are not scaled to manage the huge losses that rising seas will bring to tidal and coastal wetlands.

- **Lack of Clear Goal, Coordination, and Accountability:** The range of existing programs are not guided by a clear goal for a future state of coastal wetlands, and are not implemented under a coordination mechanism designed to address priorities, minimize overlap, or to measure progress and provide accountability for results.

- **Predates Narrowed Definition of Waters of the United States:** Existing programs were designed with an assumption that Section 404 of the CWA would continue to offer protection to many freshwater wetlands in coastal watersheds that are likely to become migration corridors. The recent Supreme Court decision narrowing the scope of waters and wetlands protected by the CWA now undermines protection of these areas.

III) A National Strategy for Saving Coastal Wetlands

Does more need to be done to sustain coastal wetland ecosystems in the face of rising seas, more severe storms, and coastal development? To summarize the key points:

- **Are coastal wetlands facing significant risks in the decades ahead?** Yes; recent studies indicate that rising sea level, more severe coastal storms, and coastal development will result in significant decline in coastal wetland extent and function.

- **Are coastal wetlands worth saving**? Yes; significant research documents the significant and diverse benefits of coastal wetlands in ecological and economic terms.

- **Are existing programs and policies likely sufficient to save coastal wetlands**? No; the scale of projected losses of coastal wetlands in the decades ahead, driven by rising sea levels, is unlikely to be meaningfully slowed by existing programs and efforts.

- **Are reasonably achievable programs and policies available that are likely to better sustain coastal wetlands?** Yes; existing programs can and must be expanded and new initiatives developed, as described in this *White Paper*.

- **Is a national strategy focused on saving coastal wetlands needed?** Yes; a national strategy is more likely to sustain coastal wetlands than is proceeding with ad hoc and uncoordinated program and policy actions, and such a strategy should be developed.

This Section III of the *White Paper* describes:

- a goal and objectives for a national coastal wetland strategy;
- key actions that should be included in a new strategy; and
- a process for developing and managing a strategy.

National Coastal Wetland Strategy: Goals and Objectives

What should be the goals and objectives of a national strategy to sustain coastal wetlands?

Goal: The goal of a national strategy should be to achieve no net loss of coastal wetlands.

Objectives: Some key objectives of a national coastal wetlands strategy should be to:

1. **Focus on Landward Migration:** The heart of a strategy should be to identify and protect corridors to allow for landward migration of tidal wetlands.

2. **Take Affirmative Actions to Facilitate Landward Migration**: In addition to protecting corridors to allow for natural migration of wetlands, a federal strategy should include affirmative actions that alter landforms and remove man-made obstacles to migration.

3. **Seek Net Gain in Wetlands from Migration**: In addition to supporting landward migration as needed to avoid a net loss of coastal wetlands, a strategy should seek to compensate for unavoidable losses by achieving in some cases a net gain as a result of landward migration where possible.

4. **Protect Existing Wetlands Where Appropriate**: A strategy should identify circumstances where geography and natural wetland accretion can be successful in protecting existing wetlands on an interim basis and support investments (e.g., living

> "Future-focused landscape conservation plans that incorporate the protection of wetland migration corridors can increase the adaptive capacity of these valuable ecosystems and simultaneously decrease the vulnerability of coastal human communities to the harmful effects of rising seas."
>
> *Coastal wetland adaptation to sea level rise: Quantifying potential for landward migration and coastal squeeze; 2018*

shorelines) that buy time for development of migration corridors using regulatory or financial tools.

5. **Provide Federal Leadership:** A strategy should coordinate programs, tools, and investments across federal agencies.

6. **Coordinate Work of Federal, State, and Local Governments**: A strategy should provide a national-scale framework but rely on state, tribal, and local government actions as well as efforts of non-profit organizations and collaborations on a regional basis.

7. **Coordinate Coastal Wetlands Strategies with Resilience Planning for Communities and Infrastructure:** Coastal communities and major infrastructure will need to adapt to more severe storms and rising seas, and development of migration corridors for coastal wetlands should be coordinated with coastal flood resilience planning for communities and infrastructure assets.

8. **Educate and Engage the Public**: A strategy should build a foundation of support for sustaining coastal wetlands by educating the public and decision-makers about the importance of wetlands and the need to build migration corridors to sustain them in the decades ahead.

National Coastal Wetland Strategy: Key Actions

Federal agencies, under the leadership of the Interagency Coastal Wetlands Workgroup, should approach development of a national coastal wetland strategy with a free hand and open mind, recognizing that the daunting scale of the challenge will require bold and creative actions. Some actions that should be considered for inclusion in a national strategy to sustain coastal wetlands are described below.

1. **Map and Assess Coastal Wetlands and Migration Pathways:** A key first step for a national coastal wetland strategy is to assess and map tidal wetlands and the migration corridors that they will need to migrate landward, including freshwater wetlands in coastal watersheds. This work should include:

Lead Agency: USFWS

- update of the 2009 USFWS report on the status and trends of coastal wetlands to create a contemporary baseline accounting for tidal wetlands;

- identification of wetlands expected to be inundated by rising seas by 2050 and 2100 under the "Intermediate High" scenario of the NOAA sea level rise scenario report, including a description of specific tidal wetlands at most imminent risk;

- use of a nationally consistent methodology to assess the potential for natural landward migration, the geographic and man-made obstacles that limit migration, and the potential for affirmative actions to remove or minimize obstacles, including summaries for each state and tribal jurisdiction;

- description of the ecosystem benefits of specific tidal wetlands, including any features of national significance (e.g., presence of threatened or endangered species, essential fish habitat, etc.);
- estimates of the existing carbon sequestration value of tidal wetlands and opportunities to sustain carbon sequestration during landward migration;

- identification of the owner of tidal wetlands and the identified migration corridor for the wetland (e.g., federal, state, tribal or local government, a nonprofit organization, or a private party) and an estimate of acquisition cost if readily available; and

- identification of wetlands associated with disadvantaged communities, as defined by Interim Guidance for the Justice40 Initiative described in Executive Order 14008.

This work should be undertaken by the USFWS, U.S. Geological Survey, National Oceanic and Atmospheric Administration (NOAA), the Environmental Protection Agency, and the Army Corps of Engineers, and coordinated by the existing Interagency Coastal Wetland Work Group. Agencies should consult with states, tribal governments, and local governments in this process. Prompt action to develop this information will support state and tribal coastal wetland program development.

2. **Expand Support for State and Tribal Coastal Wetland Programs:** The existing wetland program development grant program for state and tribal governments under the CWA, funded at only $15 million per year, is not adequate to support states and tribes in their efforts to contribute to wetlands protection, especially now that the Supreme Court has limited the wetlands subject to federal CWA permit requirements. A critical first step is for EPA and Congress to dramatically increase funding for the grant program nationwide, including funding for implementation.

Lead Agencies: EPA and NOAA

In addition, the program is a good foundation on which to build state and tribal coastal wetlands programs, and should be expanded to provide funding to support development of a coastal wetland plan and program by each coastal state and tribe with tidal wetlands. Note that some state or tribal governments may prefer to include coastal wetlands plans within the scope of existing Coastal Zone Management Programs funded by NOAA, and NOAA should cooperate with EPA to accommodate this interest.

EPA and NOAA, in cooperation with the Interagency Workgroup, should provide states and tribes with guidance for the development of statewide plans to sustain coastal wetlands as sea level rises. Key topics to address in guidance include how to:

- describe the extent of coastal wetlands in the state and the risk to these ecosystems posed by rising sea level, more severe storms, and coastal development, including a description of tidal wetlands at imminent risk of inundation;

- draw on federal mapping and assessment of wetlands to identify coastal wetlands within the state and identify, with more precision than federal mapping, tidal wetland migration corridors, including natural and man-made obstacles to migration (e.g., tidal flow restrictions);

- describe policies and programs to provide a pathway for the landward migration of tidal wetlands, including acquisition of wetlands and associated property located in migration corridors, removal of man-made obstacles to landward migration, and adjustments to slope and elevation of adjacent uplands;

- outline policies and programs for interim stabilization of tidal wetlands, such as use of vegetation and related living shoreline techniques, and identify specific tidal wetlands where such interim measures are appropriate;

- describe measures to engage disadvantaged communities, as defined by Justice40 Interim Guidance, and to assure that the interests of these communities are considered in implementation of the plan;

- describe measures to coordinate the plan with related plans (e.g., a plan approved under the Coastal Zone Management Act, the National Estuary Program, and related state or local plans) and with work underway to protect or relocate coastal communities and infrastructure; and

- describe measures to coordinate the plan with permit decisions under state or federal law, including issuance of permits for coastal protection structures under Section 404 of the CWA and review of federal projects for consistency with state water quality standards under Section 401 of the Act.

Guidance should address the hard choices that arise in drafting statewide plans. For example, the time horizon for statewide plans is a key consideration as a short time

horizon is likely to focus the plan on past risk, such as storm flooding, rather than permanent inundation coming later from rising seas.

In addition, states will rely on federal funding to implement plans but will need good information about the amount of funds likely to be available to make decisions about implementation of response actions. This information about likely resource constraints can inform judgements about whether to invest in multiple, short-term measures (e.g., living shorelines) or more permanent, one-time measures (e.g., land acquisition to facilitate migration).

Another difficult decision is setting priorities for investments in projects to support landward migration. A key criterion for setting priorities should be the potential for successful landward migration. Other factors might include the potential to sustain ecosystem services, including carbon sequestration.

States should submit statewide coastal wetland plans to EPA or NOAA for review and approval. EPA and NOAA should approve plans that are consistent with guidance. In any state with an approved plan, no federal agency should implement a major project, or make a grant for a major project, occurring within or directly affecting wetlands within the state unless the state certifies that the grant or project is consistent with the plan.

States and tribes should be encouraged to support substate regional collaborations to sustain coastal wetlands and to consider joining with neighboring states or tribes in multistate initiatives.

EPA and NOAA should seek additional funding to support state and tribal grants for coastal wetland program development in the FY 2025 budget, and develop guidance in cooperation with state and tribal governments during FY 2024. State and tribal coastal wetland plans should be developed in FY 2025 and approved by FY 2026.

3. **Provide Major Federal Grant Support to Sustain Tidal Wetlands:** As states and tribes expand their wetland programs to include coastal wetlands, they will need a source of funding to support program implementation. For example, states and tribes need financial assistance to implement projects to protect existing coastal wetlands (e.g., living shoreline projects where appropriate) and to support protection of migration corridors. Investments in migration corridors might include acquisition of the corridors and projects to alter natural geography or remove structures that pose an obstacle to wetland migration, such as tidal flow restriction structures associated with roads and small dams.

Lead Agency: Army Corps of Engineers

Congress should authorize the Army Corps of Engineers to implement a new coastal wetland program implementation grant to support states and tribes coastal wetland programs. Funding for this program should be provided starting in FY 2026.

4. **Implement Recommendations of the Federal Interagency Coastal Wetlands Workgroup:** The Interagency Coastal Wetlands Workgroup's report making extensive recommendations for federal agency actions to protect coastal wetlands includes many important specific proposed actions, including support for protection of wetland migration corridors. These recommendations are listed in Appendix II of this *White Paper.*

   Lead Agency: Interagency Coastal Wetlands Workgroup

   The federal agencies making up the Workgroup should continue to implement the recommendations in the 2022 report, and the Workgroup should publish an annual update on the status of implementation efforts. The progress of this work should be reported to states and tribes to inform their wetland program development work.

5. **Amend Executive Order 11990 to Support Tidal Wetland Migration:** Executive Order 11990 was issued in 1977 and addresses wetlands generally and calls on federal agencies to avoid the "long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative…". The administration should revise and update the Order to better address the risks posed by rising sea level and support protection of tidal wetland migration corridors.

   Lead Agency: Council on Environmental Quality

   Some key changes include:

   - Expand the Order's direction to avoid new construction in tidal wetlands to include areas that are not now wetlands, but are identified as a migration corridor that a tidal wetland will need as sea level rises;

   - add a definition of "migration corridor" as the area identified by the federal agency mapping and assessment process described in recommended action #1 above;

   - include migration corridors along with wetlands for application of the Order's requirements for notification of the Office of Management and Budget of wetland impacts and conveyance of development restrictions for wetlands at time of disposal of federal property; and

- require that any federal project in a tidal wetland or migration corridor be consistent with a state or tribal coastal wetland plan developed and approved under guidance described in recommended action #2 above.

Revision of the Order should be managed by the Council on Environmental Quality and be completed in FY 2024.

6. **Revise Compensatory Mitigation Guidance to Support Migration Corridors:** Federal regulations for implementation of the wetland permit program under section 404 of the CWA provide that, when development in a wetland cannot be avoided, a permit applicant may be required to compensate for the approved loss of wetland by developing new wetlands at an alternative site. Army Corps of Engineers guidance on the size of a new, compensatory wetland relative to the wetland area lost is a variable ratio based on the category (i.e., relative value) of the original wetland.

   Lead Agency: Army Corps of Engineers

   The Corps of Engineers, in cooperation with the EPA, should develop guidance on compensatory mitigation for tidal wetlands, including:

   - Defining a tidal wetland as a "Category 1" wetland (i.e., the highest quality wetland requiring the highest ratio of new wetland to lost wetland);

   - requiring that, in the case of a tidal wetland, a compensatory wetland must be in the area of the migration corridor for that wetland, as defined by the mapping and assessment process described in recommended action #1 above; and

   - allowing that compensation may include both wetland creation and activities to enhance the migration corridor, including removal of natural and man-made obstacles.

7. **Revise National Flood Insurance Program to Discourage New Development in Migration Corridors:** The Federal Emergency Management Agency (FEMA) manages the National Flood Insurance Program (NFIP), including issuing regulations describing the minimum elements of local ordinances for flood management that local governments must adopt to participate in the program. FEMA is currently in the process of revising local ordinance regulations, and should include in final regulations new requirements for mapping and protecting tidal wetlands and migration corridors.

   Lead Agency: FEMA

The Coastal Flood Resilience Project commented on proposed changes to FEMA regulations, recommending that local ordinances include greater protection for both natural areas and wetland migration pathways (see page 6 of comment). FEMA should revise requirements for local ordinances to recognize tidal wetland migration corridors and to discourage new development in these areas. When new development in a migration pathway cannot be avoided, FEMA should require that local ordinances provide for conditions including:

- posting a bond to pay for removal of permitted structures should apply to all permitted projects, not just major projects;

- prohibiting siting of development in a Migration Pathway in any case where the site includes areas outside of the pathway where the development could be located; and

- V zone design and construction standards (e.g., prohibition on use of fill for structural support of buildings; see 44 CFR 60.3 (6).

The NFIP also includes the Community Rating System (CRS) that offers reduced premiums to homeowners in communities that adopt flood management measures beyond those required to be included in the NFIP local ordinances. Section 430 of the CRS Coordinator's Manual describes credits given for community actions to adopt higher regulatory standards for new development. FEMA should revise the CRS manual to recognize tidal wetland migration corridors and to give credit to communities that adopt regulatory standards for these areas that are above protections required in a NFIP local ordinance.

8. **Demonstrate Tidal Wetland Corridor Protection on Federal Lands:** Large areas of coastal wetlands are owned and managed by federal agencies (e.g., Department of Defense, Department of the Interior, Department of Commerce). Federal agencies should participate in the mapping and assessment of assessment of these lands and migration corridors and, in cooperation with states and tribes, take the initiative to protect migration corridors. For example, the National Estuarine Research Reserve (NERR) system has initiated a project to demonstrate the use of wetland migration corridors at six of its 30 sites, including Narragansett Bay and New Hampshire's Great Bay.

Lead Agencies: Federal Land Management Agencies

Federal agencies should also take the initiative to demonstrate specific practices for facilitating landward migration of tidal wetlands, including mapping of migration

corridors, removal of man-made obstacles in migration corridors, and implementation of large landscape modifications (e.g., grading of a too-steep natural slope).

9. **Expand Tools for Acquisition of Tidal Wetland Migration Corridors:** Acquisition of wetland migration corridors is the surest way to steer development away from corridors and create opportunities to change the landscape as needed to facilitate migration or to remove man-made obstacles.

Lead Agencies: EPA and USFWS

Today, however, most investments in tidal wetlands are to purchase existing wetlands rather than migration corridors. Some states, however, have land acquisition programs that consider sea level rise. For example, the State of Maryland identifies "coastal lands with the highest potential to aid in adaptation if sea level rises a meter per century," and uses the assessment in making conservation investments. People in the San Francisco Bay area voted for Measure AA to provide local funds for wetlands protection in the face of sea-level rise. These programs and some others are a foothold, but more states need to follow this example.

New funding to implement coastal elements of state and tribal wetland plans (see recommendation #3 in this *White Paper*) should be available for purchase of both existing wetlands and wetland migration corridors. In addition, federal agencies administering existing grants to support wetland acquisition should add new eligibility for purchase of migration corridors where statutory authority allows.

10. **Revise Wetland Permit Processes to Discourage Barriers to Landward Migration:** Projects to use bulkheads, riprap, and seawalls to hold the coastline in place as sea level rises now cover an estimated 14 percent of the coast, and this percentage is projected to double by 2100. When applied to coastline that is a wetland, these armoring structures can reduce water available to the wetland and limit landward migration. Eight states have implemented total or partial bans on coastal armoring, but efficacy and enforcement vary. Some states encourage the use of "living shorelines" that replace traditional structures with designs using biological and natural materials and lesser tidal restriction.

Lead Agencies: EPA and Army Corps of Engineers

Coastal armoring projects also require permits under section 404 of the CWA from the Army Corps of Engineers. Under the current system, large projects require an individual permit, while smaller projects (e.g., projects under 500 feet in length) can proceed using a streamlined "general permit" (i.e., General Permit 13; Bank Stabilization). The use of this general permit limits analysis of the impact of the structure on the existing wetland and on the potential for successful landward migration. In addition, because the permit is easy to apply for, and the standard permit conditions are minimal, general permits result in more projects, and projects less tailored to specific circumstances, than would

individual project permits. A general permit is also available for projects involving living shorelines (see General Permit #54)

The Army Corps of Engineers, in cooperation with EPA, should withdraw the option to use General Permit 13 for a project involving tidal wetlands, requiring a more tailored individual permit instead. This change would generally reduce the number of permits for armoring of wetland coastline and improve the quality of permits that are issued. In addition, by leaving the general permit for living shorelines in place, some permit applications might shift from a hard armor design requiring an individual permit to a living shoreline design available through a general permit. Although a living shoreline can still limit landward migration, this approach is generally preferable to armoring.

11. **Promote Beneficial Use of Dredged Material to Support Wetland Accretion:** As discussed in Section I of this *White Paper*, in some tidal wetlands, the growth of plant biomass and the delivery of sediment from rivers results in accretion of wetlands at a rate that exceeds the rate of sea level rise, in effect preserving the wetland in place. These wetlands have the advantage of a grace period until accelerating sea level rise overtakes accretion, forcing the wetland to migrate inland. As the rate of sea level rise increases in the decades ahead, however, the number of tidal wetlands that can stay ahead of rising waters will decline.

Lead Agencies: EPA and Army Corps of Engineers

In addition to natural accretion, it is possible to raise tidal wetlands by placing thin layers of dredged material on top of wetland plants, enhancing the rate of accretion. The Army Corps of Engineers is developing methods for thin layer placement of dredge material at tidal wetland project sites where suitable dredged material is available. Successful thin layer placement of dredged material can be a good alternative to building a bulkhead or related armoring.

Funding for beneficial reuse, including thin layer placement, is available under several iterations of the Water Resources Development Act. Local sponsors of a project need to provide 35 percent of costs and pay long term maintenance costs, which can be significant as layers of material need to be applied periodically. Contaminants in dredged material can also be a concern. The Corps of Engineers has used up to 35 percent of dredged material for beneficial uses, but has set a goal of using 70 percent of material for beneficial purposes, including thin layer placement, by 2030.

State and tribal coastal wetland programs should address the potential use of thin layer placement and federal funding for implementation of these programs (see recommendation #3 in this *White Paper*) should be available for these projects. In

addition, the Corps should seek authority from Congress to reduce local sponsor match for these projects and allow for the Corps to pay some maintenance costs.

12. Amend Statutory Definition of Waters of the United States:

Lead Agency: EPA

The CWA definition of "waters of the United States (WOTUS)," which describes the waters needing permits under the Act, is much debated and litigated over the past fifty years. Any chance that Congress will be able to agree on constructive amendments to this definition is very remote. Still, the significant harm that rising sea level will cause to tidal wetlands has not been considered in these debates and, as these impacts are better understood in coming years, Congress might be willing to consider amendments that would narrowly expand CWA jurisdiction, and federal agencies should seek this amendment as part of a national coastal wetlands strategy.

For example, sea level rise causes surface inundation of tidal wetlands but also can raise local groundwater levels, resulting in a hydrologic connection between a tidal wetlands and a nearby freshwater wetland. Under the current definition of WOTUS, a freshwater wetland might be within CWA jurisdiction if it had a "continuous surface water connection" with the tidal wetland. But the freshwater wetland would not be covered by the CWA if it lacked a surface level connection, even if rising groundwater was altering the wetland hydrology and changing salinity of the water and plant structures. Prior WOTUS definitions provided that a subsurface hydrologic connection between a recognized water of the United States (e.g., the ocean) and an otherwise isolated wetland would make the waterbody with the connection a water of the United States.

Amending the definition of WOTUS to cover the freshwater wetlands with a subsurface hydrologic connection to a tidal wetland would apply CWA permit tools, such as a permit under Section 404 for development in a wetland, to the freshwater wetland. This would minimize development in the freshwater wetland and facilitate the migration of the tidal wetland.

Finally, a related amendment needed to the definition of WOTUS is to include land areas that are not now wetlands but will become wetlands as sea level rises and tidal wetlands migrate landward. By applying the precautionary principle and defining areas recognized as both wetlands and future wetlands, the CWA permit authorities can be applied in a timely way to steer development away from areas that will become wetlands during the design life of a structure, but do not yet meet the current WOTUS definition. Recognizing that the location of tidal wetlands is shifting within the design life of many types of projects supports a permit requirement and process to minimize project impacts and facilitate the eventual transition of an upland site to a tidal wetland.

Process for Developing and Managing a National Coastal Wetlands Strategy

Developing and implementing a national coastal wetlands strategy will be a complex process. Some key elements of this process are described below.

1. **Update Executive Order 11990:** The existing Executive Order addressing wetlands should be promptly updated to address coastal wetlands specifically. A revised order should formally authorize the existing Interagency Coastal Wetlands Workgroup and charge it with managing the development of a strategy, overseeing its implementation, and reporting on progress on a periodic basis.

2. **Initiate Mapping and Assessment of Coastal Wetlands**: A key first step is to promptly initiate mapping and assessment of coastal wetlands in order to inform strategy development. This work should be completed within two years.

3. **Publish Initial Coastal Wetland Strategy**: The Interagency Coastal Wetlands Workgroup should publish a final coastal wetland strategy within two years after providing for public review and comment.

4. **Engage State, Tribal, and Local Governments**: Throughout the development of a strategy the Workgroup and individual federal agencies should closely engage state, tribal, and local governments.

5. **Engage Congressional Committees:** Senior officials should consult with members of Congress on committees with jurisdiction over coastal wetlands during the development of a national strategy and throughout its implementation, including providing periodic progress reports.

6. **Revise and Update Strategy**: Within five years of publication of an initial strategy, the Workgroup should revise and update the strategy to include the most current scientific information on the rate of sea level rise, risks of more severe storms, and rate of population growth and development in coastal areas. A revised strategy should also reflect lessons learned from implementation of the strategy and new ideas for the best ways to sustain coastal wetlands.

The *Coastal Flood Resilience Project* is a coalition of organizations and individuals working for stronger programs to prepare for coastal storm flooding and rising sea level in the United States. The views expressed in this *White Paper* are those of the supporters listed below and do not represent the views or endorsement of their organizations.

Supporters of this *White Paper* include:

- Jay Austin; Environmental Law Institute
- Susan Crawford; Harvard Law School
- Stephen Eisenman; Anthropocene Alliance
- John Englander; Rising Seas Institute
- Harriet Festing; Anthropocene Alliance
- Rebecca Kihslinger; Environmental Law Institute
- Bethany Kraft; Audubon Society
- Charles Lester; Director of the Ocean and Coastal Policy Center at UC Santa Barbara and former executive director of the California Coastal Commission
- Jeffrey Peterson; author of *A New Coast: Strategies for Responding to Devastating Storms and Rising Seas* and former Deputy Associate Director for Water Policy, White House Council on Environmental Quality
- Susan Ruffo; United Nations Foundation and former Associate Director for Climate Preparedness and Resilience, White House Council on Environmental Quality
- Jason Scorse; Middlebury Center for the Blue Economy
- Stefanie Sekich; Surfrider Foundation
- Mary Carson Stiff; Wetlands Watch
- Shana Udvardy; Union of Concerned Scientists
- Robert Young; Director, Program for the Study of Developed Shorelines; Western Carolina University

Appendix I

Interagency Coastal Wetlands Workgroup
Recommendations for Reducing Wetland Loss in Coastal Watersheds of the United States

1. Increase the Acreage of Wetlands Restored in Coastal Watersheds

1.1 Increase the amount of restoration in coastal watersheds

1.2 Enhance the ability to track restored wetland acres and function

1.3 Enhance reclamation and restoration of former sand and gravel mines

2. Reduce Loss of Coastal Wetlands to Development

2.1 Improve and increase the use of voluntary programs to protect wetlands from development

2.2 Improve interagency coordination to protect wetlands from development and its indirect effects

2.3 Increase use of a broader array of federal authorities to protect wetlands from impacts of development

2.4 Support local planning to increase the acreage of protected coastal wetlands

2.5 Enhance state and tribal protections for wetlands, including those wetlands that are not otherwise regulated

3. Reduce Coastal Wetland Loss Associated with Silviculture in the Southeast

3.1 Increase the understanding of forested wetland loss mechanisms in areas managed for timber production

3.2 Improve interagency coordination and stakeholder engagement in forested wetland conservation

3.3 Develop or improve tools to enhance protection of forested wetlands in timber production

4. Support the Collection, Enhancement, and Dissemination of Landscape-Scale Monitoring Data

4.1 Continue to support and improve the USFWS NWI Coastal Watersheds Wetlands Status and Trends reports

4.2 Produce new USFWS NWI Comprehensive Change Analyses in areas identified as experiencing high levels of wetland loss

4.3 Update the NWI geospatial dataset within coastal watersheds

4.4 Continue support for and improve the resolution of C-CAP products

4.5 Strengthen coordination between NOAA C-CAP and USFWS NWI

4.6 Support the development of techniques to improve the mapping of forested wetlands

5. Conduct Targeted Outreach and Stakeholder Engagement

5.1 Identify and address gaps in public understanding regarding coastal wetland loss

5.2 Identify recommendations that require outreach and stakeholder engagement in order to be effective and implement appropriate outreach plans