Surfrider Foundation's Approach to Addressing Coastal Climate Change Impacts

Part 1. Introduction

In 2013, the Intergovernmental Panel on Climate Change (IPCC) released an updated report on global climate change. The report plainly states:

Warming of the climate systems is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased.

It was concluded that even if greenhouse gas (GHG) emissions were reduced to zero today, we would continue to feel the effects of climate change for centuries. These effects range from increased frequency and severity of weather events, to changes in sea level, increased rates of erosion, and acidification of the ocean. Additionally, the continued release of GHG emissions overtime is expected to exacerbate and amplify these already detrimental effects.

The Surfrider Foundation (hereinafter referred to as "Surfrider") is a non-profit, environmental organization dedicated to the protection and enjoyment of the world's oceans, waves and beaches through a powerful activist network. Considering that the mission of Surfrider is grounded in the promise to protect the world's ocean, waves, and beaches, it is imperative that Surfrider develop an effective strategy to respond to the coastal effects of climate change.

Surfrider's approach is built around the idea of adaptation, defined by the IPCC as "an adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities". Climate change adaptation is based on the premise that since we can no longer stop climate change from happening, we have to respond in a way that lessens the damage experienced. In consideration of the predictions that continued GHG emissions could exacerbate the already severe effects of climate change, Surfrider will also begin to address methods to reduce GHG emissions.

In this report, Surfrider will articulate its approach to empower its large grassroots network of over 250,000 supporters, members, and activists worldwide, to promote adaptation to the coastal effects of climate change including sea level rise, increased intensity of weather events, and ocean acidification. Surfrider will also identify its approach to mitigate the coastal effects of climate change by encouraging the prevention, reduction, and sequestration of GHG emissions through collaboration with partner organizations. In the next section of the report (Part 2), the scientific basis for each of these three coastal effects of climate change will be examined, as well as what impacts they have on the coast. In the third section (Part 3), Surfrider's current environmental policies will be used to more precisely illustrate Surfrider's stance on coastal climate change adaptation. In the final section (Part 4), specific strategies for addressing these coastal effects of climate change will be explored through the lenses of education, advocacy, public planning, and mitigation.

Part 2. Scientific Basis for Coastal Effects of Climate Change and Potential Impacts

I) Sea Level Rise

i) Scientific Basis for Sea Level Rise

The IPCC reports with high confidence, "the rate of sea level rise since the mid-19th century has been larger than the mean rate during the previous two millennia," and that from 1901 to 2010, global mean sea level increased by roughly 0.19 meters, at an average rate of 1.7 mm per year. The IPCC projects that the sea level will continue to rise at increasing rate throughout the 21st century. This projection is supported by recent findings obtained from National Aeronautics and Space Administration (NASA) satellite observations that measured sea level rise from 1993 to 2016, where the rate of change has increased to 3.5 mm per year (over double the average rate of change between 1901 and 2010).

Figure 1. Sea Level Height Measurements 1993 to 2016

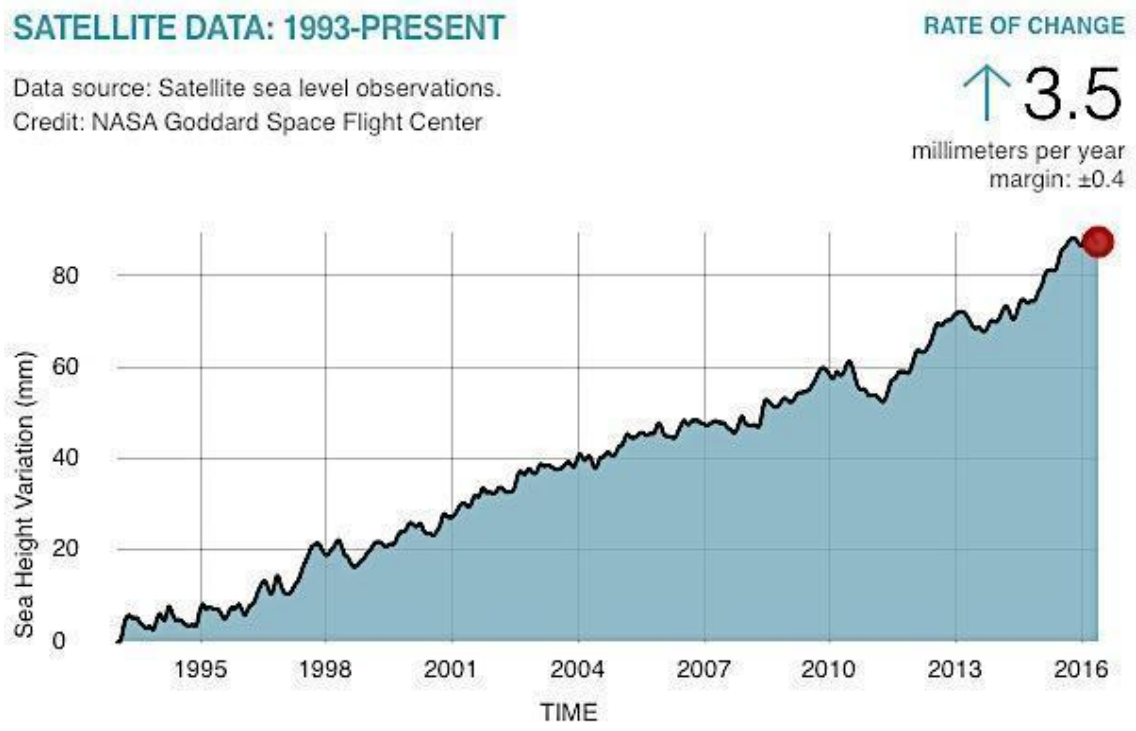

Figure 1. Sea level height measurements (in mm per year) tracked from NASA satellite observations. The base year of 1993 is established at 0 mm, with each subsequent year measured against the 1993 height up until 2016.

The two main causes of sea level rise are (1) the melting of continental ice sheets, and (2) ocean thermal expansion, in which the warming of ocean water causes water molecules to expand. The IPCC reports that since the early 1970s, these two events have led to 75% of the observed global mean sea level rise.

The IPCC reports with high confidence "over the last two decades, the Greenland and Antarctic ice sheets have been losing mass, glaciers have continued to shrink almost worldwide, and Arctic sea ice and Northern Hemisphere spring snow cover have continued to decrease in extent". It is also considered "very likely" that Arctic sea ice cover, Northern Hemisphere spring snow cover, and global glacier volume will all continue to decrease throughout the 21st century.

Ocean thermal expansion, also known as ocean warming, is caused from the increased solar radiation absorbed by the Earth's oceans. The oceans store the bulk of the climate system's increase in energy, thus causing ocean water to warm, molecules to expand and sea levels to rise. The IPCC reports that ocean warming accounts for more than 90% of the energy accumulated between 1971 and 2010. This warming mainly occurs near the ocean's surface, in an area called the upper mixed layer. It is here that the ocean has increased in temperature by 0.11 °C [0.09 to 0.13] per decade since 1971.

ii) Effects of Sea Level Rise on the Coastal Environment

In the report, "Coastal Impacts, Adaptation and Vulnerabilities: A Technical Input to the 2013 National Climate Assessment," a group of experts focused attention on current sea-level rise and projected increases for two main reasons: (1) "population densities have increased greatly and coasts have undergone intense development during a period of relatively stable sea level over the past century" and (2) "coastal landforms such as barrier islands, wetlands, and deltas are already dynamic and therefore highly vulnerable to sea level rise".

Between the large increase in coastal development and the dynamic nature of coastal environments, it is possible to conclude that there will be a significant impact from sea level rise on coastal communities. In this section, sea level rise will be discussed in relation to coastal erosion and its resulting damage to development, beaches, and surf spots.

(1) Coastal Erosion

Coastal erosion refers to the redistribution of sand from the beach face to offshore. A 2004 Florida International University study of coastal erosion found that "there is a highly multiplicative association between long-term sandy beach erosion and sea level rise". This means that with each increase in the rate of sea level rise, there is an even greater increase in the rate of coastal erosion. The results of this study are important because they support that "the already-severe coastal erosion problems witnessed in the 20th century will be exacerbated in the 21st century under plausible global warming scenarios."

Although the effects of coastal erosion will be diverse, this report will solely address how erosion leads to damage to coastal infrastructure and development, and the loss of beaches and surf spots.

(a) Damage to Development

Coastal counties in the United States cover just 13 percent of the nation's continental land area, yet comprise 51 percent of the nation's population. A 2012 technical report to the National Climate Assessment determined that almost half of the new residential building permits issued in the United States since 1980, were issued in coastal counties. In addition to significant residential growth, the coast is also home to numerous urban centers and "important infrastructure such as seaports, airports, transportation routes, oil import and refining facilities, power plants, and military bases".

Coastal erosion not only puts waterfront developments in direct danger of inundation, but also threatens structures located on top of coastal bluffs. As beach sand is transported off the beach, coastal bluffs are directly exposed to seawater and shore break. Seawater is then able to undercut the base of the bluff, weaken the structural stability of the bluff face, and cause increased erosion and landslide risk. As sea levels continue to rise, coastal ecosystems will become increasingly subject to erosion, leaving much of this development highly vulnerable.

(b) Loss of Beach and Surf Spots

The natural process of beach building is dynamic, which causes beaches to naturally fluctuate in width and sand mass, as sand cyclically gets redistributed on and offshore. Sand is brought to the shoreline by three main methods: (1) the transportation of inland sediments by freshwater rivers and streams; (2) the steady natural erosion of coastal bluffs and dunes; and (3) the cyclical movement of offshore sediment from the continental shelf towards the beach, in addition to lateral sediment movement from neighboring beaches. Sand also leaves the shore due to long-shore sediment movement, caused by strong waves, tides, and currents along the shoreline, transporting sediment laterally from one beach to another, and to offshore sinks.

The main source of sand varies at different geographic locations. For example, the transportation of inland sediments by coastal streams and rivers historically accounts for up to 90% of beach sand on the California Coast. On the East Coast of the United States, however, a combination of landward movement of sediment from the continental shelf and erosion of coastal dunes generally provide most of the refurbishment of sand for beaches. To be noted, the initial source of sand along much of the east coast is from historic glacial deposits, yet this continued transport of sediment is necessary to replenish beach size.

Anthropogenic alterations of these natural sand formation systems have resulted in loss of beach long before the recent impacts of sea level rise**,** especially in California where coastal development and the damming of streams and rivers have prevented sediment from reaching the beach. The rise in sea level, however, has and will continue to exacerbate the reduction in beach size by increasing the rate at which beach sand moves offshore.

Additionally, in response to the loss of beaches as natural buffers for coastal developments, cities will issue permits for shoreline armoring projects such as seawalls, riprap, or beach fill. These unnatural modifications to the shoreline provide only short term protection for developments, and have lead to increased erosion downshore, further narrowing beaches, reducing coastal access, and altering surf spots.

II) Increased Intensity of Weather Events

i) Scientific Basis for Increased Intensity of Weather Events

The National Climate Assessment reports that over the last 50 years, the strength and frequency of extreme weather events has increased. These changes have included "prolonged periods of excessively high temperatures, heavy downpours, and in some regions, severe floods and droughts". Although there have always been extreme events due to natural causes, "scientific evidence indicates that the probability and severity of some types of events has increased due to climate change". This evidence includes recent research demonstrating that climate change can alter atmospheric circulation and weather patterns such as the jet stream. There is also scientific evidence that climate change may be altering the ocean's thermohaline circulation system, which could further alter regional climates.

ii) Effects of Increased Intensity of Storms on the Coastal Environment

The coastal effects of increased intensity of weather events are vast and not entirely predictable. In this section, coastal flooding as a product of higher storm surges, and its resulting damage to development and water quality will be explored.

(1) Coastal Flooding

The National Climate Assessment defines coastal flooding as an event "predominantly caused by storm surges that accompany hurricanes and other storms that push large seawater domes toward the shore". The National Oceanic and Atmospheric Administration (NOAA) reports "inundation events are among the more frequent, costly, and deadly coastal hazards that can affect coastal communities in the United States."

(a) Damage to Coastal Development

Without even taking climate change into account, storm surges are already flooding low-lying areas, damaging property, disrupting transportation systems, destroying habitat, and threatening human health and safety". More severe and frequent storms, coupled with sea level rise, will increase the magnitude of coastal flooding, and therefore its respective damage to development from saltwater exposure, structural weakening, and exacerbated rates of erosion. For example, NOAA reports "much of the United States' densely populated Atlantic and Gulf Coast coastlines lie less than 10 feet above mean sea level. A storm surge of 23 feet has the ability to inundate 67% of interstates, 57% of arterials, almost half of rail miles, 29 airports, and virtually all ports in the Gulf Coast area".

(b) Damage to Water Quality

In addition to significant damage to development, increased levels of coastal flooding will affect water quality. This is primarily due to the fact that wastewater and stormwater conveyance and treatment systems as well as groundwater aquifers will face "saltwater intrusion, corrosion, flooding, and inundation" ultimately resulting in the release of and public exposure to untreated waste. Saltwater intrusion into coastal aquifers and rivers will additionally lead to reduced drinking water quality and availability, which can have dire consequences for areas already suffering from drought and low water supply.

III) Ocean Acidification

i) Scientific Basis for Ocean Acidification

Ocean acidification is the result of the ocean absorbing carbon dioxide, which decreases the ocean's pH, making it more acidic. Currently, oceans are absorbing about a quarter of the human produced carbon dioxide each year. This process has numerous negative implications for ocean life because more acidic oceans can change the amount and type of nutrients available for marine life, increase the toxicity of trace metals that would otherwise be harmless in neutral environments, and make it difficult for shellfish, corals, and other organisms to grow their shells or skeletons, among others.

ii) Effects of Ocean Acidification on the Coastal Environment

The environmental and economic implications of a more acidic ocean are vast and still not completely understood. The fundamental chemistry of the ocean is changing, meaning impacts could affect the entire marine environment, from sediment composition to coral reef structures, and microscopic photosynthetic organisms to thousand pound marine mammals. Though there is some uncertainty regarding the specific impacts, recent studies have identified the following five marine ecosystems likely to be most vulnerable to changes from ocean acidification: (1) tropical coral reef, (2) open ocean plankton, (3) coastal, (4) deep sea, and (5) high latitude ecosystems. Changes to these ecosystems have and are expected to continue to cause detrimental reductions to marine biodiversity, shifts in community structure and species composition, and alterations to food webs, in addition to the impacts on various economic industries that rely on those resources. For example, shellfish and the communities that rely on natural shellfish populations and mariculture economically are starting to experience the negative side effects of ocean acidification.

(1) Economic Impact

Washington State has a $270 million dollar shellfish industry that supports 3,200 jobs annually. In Puget Sound, an estuarine off the northwest coast of Washington State, scientists are finding that ocean acidification has caused waters to become so corrosive, "they are eating away at oyster shells before they can form". Even at small family owned farms, like Chelsea Oyster Farm near Olympia Washington, effects of ocean acidification are already being felt, where oyster seed production (the initial stage in oyster farming) has recently decreased by as much as 80 percent. Other

commercially important shellfish experiencing negative effects from ocean acidification include European lobster, Pacific shrimp, and sea urchin.

In addition to reduced revenues for the mariculture industry, a reduction in the amount of shellfish and coral reefs can hinder the natural ability of reefs to buffer against storm surge, prevent beach erosion, provide important fisheries habitat, and protect water quality. The loss in these benefits could cause significant economic impacts to coastal communities that are dependent upon beach tourism, marine recreation, as well as subsistence and commercial fishing.

Part 3. Surfrider Policies on Climate Change

Surfrider has adopted four separate policies which collectively frame Surfrider's approach to addressing the effects of climate change on coastal resources. These four policies include the Policy on Global Warming, the Beach Preservation Policy, the Position Statement on Marine Protected Areas, and the Beach Manifesto.

I) Policy on Global Warming

The Surfrider Policy on Global Warming states that due to the irrefutable existence of climate change, Surfrider will take its effects into account when considering coastal and ocean issues, and advocate for public and private entities to the do the same. Surfrider will continue to advocate for appropriate setbacks for coastal development based on the best available science concerning erosion, sea level rise, and other coastal effects of climate change. Surfrider asserts that climate change and sea level rise will only further reduce the efficacy of shoreline armoring and beach fill. In areas where sea level is rising rapidly, Surfrider advocates for coastal realignment where structures are relocated away from dynamic shorelines.
http://www.surfrider.org/pages/policy-on-global-warming

II) Beach Preservation Policy

The Surfrider Beach Preservation Policy is based on the premise that each specific case of beach preservation is unique, and thus should be evaluated in the context of its local setting. In general, Surfrider supports responsible coastal management that avoids the creation of coastal hazards and erosion problems. In undeveloped areas, Surfrider asserts that beach preservation should include the placement of beaches and beachfront lands in public trust, the establishment of appropriate beach setbacks based on predicted, current and historic erosion trends, and the restoration of natural sediment transport processes in coastal watersheds. In developed areas where erosion is increasing, Surfrider advocates for coastal realignment from dynamic shorelines. In areas where that is not possible, beach nourishment projects may be considered on a case to case basis. Generally, Surfrider advocates for long-term solutions to beach preservation issues that maximize public benefit.

There are no circumstances where Surfrider would support the installation of stabilization or sand retention structures along the coastline for the purpose of

beach preservation. It is only within the context of protecting existing coastal development that Surfrider would even consider supporting the construction of such structures.
http://www.surfrider.org/pages/beach-preservation-policy

III)__Position Statement on Marine Protected Areas
A Marine Protected Area (MPA) is generally defined as any area of the coast and ocean together with associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment. Surfridersupports the establishment of MPAs to protect and restore estuarine and marine areas to naturally functioning ecosystems which facilitate higher levels of resilience against multiple stressors including climate change impacts. Additionally, MPAs help reduce the need for coastal armoring such as bulkheads and seawalls because the rehabilitated coastal ecosystems can serve as effective buffers areas against rising seas and storm surges.
http://www.surfrider.org/pages/surfrider-foundation-position-statement-on-marine-protected-areas-mpas

IV)__Beach Manifesto
The Surfrider Beach Manifesto provides a vision for how beaches and coastlines should be protected from human development to ensure their lasting natural form and functions. The following statements are included within this vision:

1. Beach access would be free and uninterrupted because shorelines would be allowed to move uninterrupted.
2. Sand would flow freely, and not be blocked by groins, or walled up behind seawalls and riprap. Shoreline setbacks would be enforced so erosion would not be a threat to coastal development.
3. There would be no net loss of surfing areas, and all coastal recreation opportunities would be protected.
4. The latest scientific information regarding climate change impacts would be easy to access, and simple to communicate to the public so they could effectively participate in the decision-making process regarding coastal resources.

http://www.beachapedia.org/Beach_Manifesto

Note: In the future, Surfrider will issue direct position statements on shoreline realignment, dredge and fill, coastal armoring, The National Flood Insurance Program, and Citizens Property Insurance Program.

Part 4. Surfrider Goals and Strategies for Addressing Coastal Effects of Climate Change

Based upon the policies above, Surfrider is pursuing the following goals and strategies to address the effects of climate change on the coasts and ocean.

I) Goals

1. Promote broad adoption and implementation of coastal climate adaptation strategies that protect wildlife habitat, natural shorelines, and existing developments (*high priority*)
2. Prevent, reduce and sequester GHG emissions through collaboration with partner organizations *(lower priority)*

II) Strategies

Surfrider strategies for advancing coastal climate adaptation and GHG reduction fall under four main categories: education, advocacy, public planning, and mitigation.

i) Education

Surfrider will continue to educate coastal communities and Surfrider supporters about growing climate change-related challenges and opportunities to be a part of the solution. Education efforts will be more strategically focused on the coastal impacts of climate change, adaptation strategies to promote resilient communities, public awareness on the voting records of elected officials, and methods to reduce and minimize GHG emissions.

(1) Education to Advance Goal 1: Coastal Climate Adaptation Strategies

To advance coastal climate adaptation strategies that protect wildlife habitat, natural shorelines, and existing developments, Surfrider will educate coastal members, communities, stakeholders, planners, and the general public about the various types, effectiveness, and impacts of coastal climate adaptation mechanisms. By providing information on the opportunities for coastal resilience and the detrimental impacts caused by certain armoring techniques, communities will become aware of the current state of their coastlines, and the serious potential to lose all access to natural coastlines if protective structures continue to be permitted. To promote better accountability and transparency, Surfrider will also educate the public about voting records of elected and appointed public officials on conservation issues. These "report cards" will help drive greater awareness and support for decisions that protect our coasts and oceans. Surfrider believes education is the foundation for developing a passionate, motivated network of coastal community members that will actively promote coastal resilience through the implementation of low-impact but highly effective coastal climate adaptation strategies.

(2) Education to Advance Goal 2: Prevent, Reduce, and Sequester GHG Emissions

Surfrider will help prevent, reduce, and sequester GHG emissions by educating coastal members, communities, stakeholders, planners, and the general public about the current and future impacts of climate change, the various actions and processes that contribute to climate change, and opportunities to reduce and prevent GHG emissions. Surfrider will partner with organizations that provide information on ways to reduce and prevent GHGs through energy efficiency improvements, renewable energy projects and the switch to sustainable products, among others. Surfrider will also educate members, volunteers, and the general public about methods to sequester GHG emissions through the Ocean Friendly Gardens

Program. Educating the public about the needs, options, and easily implementable tools available to live a low carbon lifestyle will help motivate and mobilize coastal community members to reduce their GHG emissions, support carefully designed renewable energy projects, and when applicable, utilize landscaping techniques to sequester GHG emissions.

(3) Specific Strategies for Educating Target Audiences

The strategies Surfrider will utilize to educate about climate change, building resilience, and reducing GHG emissions, can be categorized by three main target audiences: national level supporters (Surfrider members and partner organizations), regional supporters (Surfrider chapters and volunteers), and the general public (coastal communities across the nation).

(a) *Strategies for National Supporter Education*

- Communicate through Surfrider website and communication networks (campaign pages, blog posts, Beachapedia), social media (e.g. Facebook, Twitter, and Instagram), national activations, and publications (Making Waves and The Drop)
    - "How To's" for the development of ocean friendly gardens
    - Information on coastal impacts from climate change
    - Adaptation methods compared to protective devices
    - Options for sustainable recreation products (eg. eco-surfboards)
    - Everyday methods to reduce GHG emissions
    - Information on the successful adaptation and emissions reduction strategies being implemented by other regions and nations
- Partner with Smart Fin to spread public awareness, understanding, connection and interest in ocean acidification
    - Help with product development, outreach, advertising, and the public accessibility of regional results and changes overtime

(b) *Strategies for Regional Supporter Education*

- Communicate through chapter websites, blog posts, social media, emails, flyers, videos, and posters
- Host workshops and trainings with various NGOs, science and community partners
    - Ocean Friendly Garden Workshops for community members to provide knowledge and tools necessary for individuals to transform their yards. Provide information about the benefits of Ocean Friendly Gardens (composting diverts food waste from landfills, thus preventing methane emissions and necessary transportation emissions; certain gardening techniques can actually sequester carbon, retain and purify water, provide habitat for local wildlife)
    - Causes, impacts and measurement methods of ocean acidification. Introduction to Smart Fin technologies.

    - Increasing energy efficiency and reducing GHG emissions at home and during everyday activities (hosted with partner organizations), including the use of renewable energy
- Social media communications tools will include "infographics" to visually tell the story of coastal effects of climate change
- Develop and distribute climate adaptation literature and other informational materials via tabling at local events
    - brochures illustrating the coastal effects of climate change, including sea level rise and increased erosion, and information on ways to increase coastal resiliency
- Present at regional chapter conferences and local chapter meetings
    - Information on the coastal effects of climate change
    - Information on ways to increase coastal resiliency and implement adaptation strategies
    - Information on the destructive side effects of bluff and sand retention devices and other forms of shoreline armoring and refurbishment
- Lead "field trips" to demonstrate the effects of sea level rise and coastal erosion on beaches, bluffs, and coastal development
- Lead "field trips" to demonstrate the negative side effects of hard protective devices at various shorelines
- Coordinate with local chapters to equip Surfrider members with the information and tools to speak about coastal effects of climate change at meetings of local government
- Develop Surfrider Youth Leadership Program:
    - Presentations to students outside of the clubs
    - Video Contest
    - Online Science Fair
    - Climate adaptation-related school curriculum such as an Ocean Friendly Gardens video which demonstrates how kids can start their own Ocean Friendly Garden at their school or home
- Develop a Climate Change Adaptation Toolkit for use by Surfrider activists and chapter networks
    - Toolkit will include background information on the causes and effects of climate change, problems associated with climate change adaptation work, and examples of local activities that can influence adaptation planning
- Develop a How to Advocate for LCP Update Chapter Toolkit for use by Surfrider activists and chapter networks in California
    - Toolkit will equip staff and volunteers to assist their jurisdiction with establishing, updating, or strengthening their Local Coastal Program (LCP) Land Use Plan.
    - Toolkit will include a background on Local Coastal Programs (LCPs), current status of LCP's across the state, a list of priority topics LCPs should cover, example language to be included in the development or updating of LCPs, a list of relevant policies and supporting legislation, and

comment letter templates to assist with communication efforts between chapters and government/agency staff

- Create report cards on conservation votes of regional elected officials and representatives
    - Track all votes in support or against coastal and ocean conservation policies or actions
    - Continue to conduct the Act Coastal program, tracking and reporting the voting record of California Coastal Commissioners
    - Expand similar programs to other regions

(c) *Strategies for General Public Education*

- Generate "earned media" through press releases, guest editorials and PSAs
    - Partner with athletes such as surfers and recreation industry leaders for their participation and involvement
- Table at public events
    - Surfrider members and volunteers will distribute brochures illustrating climate change, sea level rise, adaptation, and GHG reduction information
- Collaborate with partners to generate TV coverage of climate change issues, adaptation methods, and ocean acidification
- Increase Surfrider participation in rallies and protests
    - Emphasize the climate advocacy implications of Hands Across The Sand
    - Partner with organizations to strengthen coastal adaptation and GHG reduction goals (eg. 350.org during NY Climate March)
- Surfrider will continue to build relationships with coastal tribes to assist and encourage the consideration of sea level rise, and other effects of climate change, in developments and targeted preservation
- Host awareness campaigns and events to highlight potential coastal impacts of climate change
    - For example, a sea level rise marking day could be utilized to demonstrate how the change in tideline during a King Tide could become the norm with sea level rise

ii) Advocacy

Surfrider will take active measures to shape and promote support for carefully designed coastal adaptation and GHG emission reduction actions, policies, and legislation at the local, state, and national levels. Surfrider will target specific education efforts to build awareness around current and upcoming climate change adaptation and mitigation policies, provide training and information for supporters and volunteers to mobilize advocacy efforts, and work directly with agencies and jurisdictions to develop, modify and review current and proposed policies.

(1) Advocacy to Advance Goal 1: Coastal Climate Adaptation Strategies

Surfrider will continue to utilize regional staff, chapters, members and supporters to promote the implementation of coastal climate adaptation strategies by advocating for various shoreline protection policies, insurance reform, and coastal realignment policies that protect wildlife habitat, natural shorelines, and existing developments.

(a) *Shoreline Protection Policies*

Surfrider will advocate for changes in shoreline protection policies at the federal, state and local level to advance coastal climate adaptation strategies. Surfrider will support and work to implement policies that require setbacks for development, promote landward retreat of developments currently located in expected inundation areas, provide protection and restoration of coastal vegetation and wetlands, and establish zoning that prevents construction in high risk erosion and inundation areas.

Surfrider will continue to actively fight against policies that promote the use of permanent protective structures either onshore (e.g. jetties and seawalls) or offshore (e.g. breakwaters). Surfrider discourages the use of dredge and fill, and supports policies that will only consider dredge and fill as a last resort for temporary protection of critical infrastructure, while a long-term retreat strategy gets developed. Surfrider has already helped stop numerous proposals for destructive developments including groin, seawall, dredge and fill, and breakwaters. Additionally, Surfrider advocates to strengthen regulations regarding different types of shoreline protection policies that prohibit the use of shoreline armoring for all new or significantly modified developments, prevent extensions of current shoreline armoring for existing structures, and require mitigation for and removal of current armoring structures once their approved use time expires.

(b) *Insurance Reform*

Surfrider will continue to advocate for broad 'insurance reform', improvements of FEMA policies, and the closure of multiple loopholes at the state and federal level that subsidize redevelopment of areas damaged by or at high risk for inundation or erosion from sea level rise and increased storm activity. Insurance reform supports the goal of implementing climate adaptation strategies by preventing development in high-risk areas, thereby creating a natural buffer between sea level rise and developments. One prime example of Surfrider successfully advocating for insurance reform is in Florida, where Surfrider's Florida Regional Coordinator, Holly Parker, helped pass SB 1770 which ended state subsidized insurance for new construction and substantial improvements seaward of the Coastal Construction Control Line, or within the Coastal Barrier Resource System.

(c) *Coastal Realignment Policies & Funding*

Surfrider will continue to advocate for coastal realignment as a primary solution for protecting developments threatened by sea level rise. Additionally, Surfrider is researching and advocating for methods to incentivize funding for buyout programs, and provide the legal framework for rolling easements to support realignment projects, protect property values, and maintain property acreage. One coastal realignment project Surfrider has already been actively involved in is the Surfers' Point Managed Shoreline Retreat Project in Ventura, California. Due to this project, the beach will be widened by 60-feet, and the coastline will be further protected

from erosion. Surfrider will continue to advocate for, and support, projects similar to Surfers' Point.

(2) Advocacy to Advance Goal 2: Prevent, Reduce, and Sequester GHG Emissions

Surfrider will advocate for policies that reduce and prevent GHG emissions to help stabilize the current rate of climate change. For instance, Surfrider will support and promote policies that are carefully crafted to reduce the nation's reliance on fossil fuels, prohibit offshore oil and liquid natural gas (LNG) development, and develop clear plans for phasing out the use of fossil fuels.

(a) *Emissions Prevention and Reduction Policies*

Surfrider will work in conjunction with other groups to advocate for legislation and policies that prevent, reduce, and sequester GHG emissions. These policies could include national, state, regional, and local GHG emission limits, percent renewable requirements, public transit and safe active transportation options and energy efficiency standards. Surfrider will advance renewable energy projects carefully designed to avoid impacts to recreation, wildlife, and natural resources by generating support through members and partner organizations. Surfrider will also support GHG reduction policies by attending rallies, commenting on local Climate Action Plans, and encouraging members to drive less by using mass transit and active transportation.

(b) *Policies that Prevent Offshore Oil and LNG Development*

Surfrider will continue to advocate for policies that prevent and prohibit offshore oil and natural gas drilling, therefore helping to prevent GHG emissions and oil spills. Surfrider was heavily involved in the efforts to prevent the leasing of offshore oil leases in the Mid Atlantic, which successfully resulted in no offshore oil leases granted by the OCS Oil and Gas Leasing Program from 2017 to 2022 for the region. Advocacy and outreach include the collaborative and nationwide Hands Across the Sand, Not the Answer, and Protect the Atlantic campaigns, among others.

iii) Public Planning

Surfrider will increase its involvement in public planning processes at the regional, state, and local level, to ensure that the latest science on coastal effects of climate change is more proactively addressed. Active involvement in planning processes provides key opportunities to stay up to date on proposed policies and strengthen shoreline development policies to advance the goal of promoting coastal adaptation strategies that protect wildlife habitats, natural shorelines, and provide a buffer against the impacts of climate change.

(1) Public Planning to Advance Goal 1: Coastal Climate Adaptation Strategies

Surfrider will follow the development of and when possible, attend or join government committees, working groups, and departments that work on coastal resiliency and climate change issues. Surfrider will attend municipality and planning

workshops, comment on shoreline regulations and coastal Land Use Plans, and support land acquisitions for public use. Surfrider will also work to engage local jurisdiction representatives, county commissioners, and a growing constituency of recreational users in public planning processes. For instance, at the regional level, Surfrider has provided comments on the California Coastal Commission's Sea Level Rise Policy Guidance document, provided presentations on building coastal resilience for regional planners, community members, scientific advisors, and commissioners at Coastal Resiliency Workshops, and engaged local communities in the development of regional data portals that identify and inform decision makers about important cultural and recreational uses along the Northeast and Mid Atlantic coasts.

At the local level, Surfrider will encourage and provide assistance for local planning agencies to incorporate 'best management practices' (BMPs) and best available science when implementing coastal development and preservation policies. This includes the use of sea level rise projection models, coastal and bluff erosion projection models, and protection of critical habitats that help buffer and mitigate the impacts of climate change and ocean acidification. The continued attendance and involvement in local planning meetings will give Surfrider credibility when advocating at the local level, and the ability to formulate a more distilled approach when educating legislators and decision makers about climate change impacts and adaptation work.

One prime example of Surfrider's involvement in local planning is with the Local Coastal Program (LCP) Assistance Grant Program in California, which provides funding for local governments to incorporate sea level rise and other effects of climate change into their coastal Land Use Plans. During this process, Surfrider staff have and will continue to choose two or three LCP grants recently awarded and work directly with municipalities, local planners, and community members to incorporate strong adaptation strategies. To expand these efforts to the state level, staff will provide the tools necessary for chapters across the California coastline to assist local governments with updating, reviewing, and strengthening LCPs.

iv) Mitigation

The implementation of coastal adaptation strategies that increase the resiliency of coastlines to the impacts of climate change, are by definition, helping to mitigate (or lessen) the coastal impacts of climate change. This strategy will instead address the term mitigation specifically defined by the National Center for Atmospheric Research as "attempts to slow the process of global climate change, usually by lowering the level of greenhouse gases in the atmosphere."

(1) Mitigation to Advance Goal 2: Prevent, Reduce, and Sequester GHG Emissions

Surfrider's approach to mitigate the coastal effects of climate change is to protect and create ecosystems that provide carbon sequestration services, reduce GHG emissions, and limit ocean acidification. These mitigation approaches

include Surfrider's Ocean Friendly Gardens program and the protection of blue carbon ecosystems.

The Ocean Friendly Gardens program is part of Surfrider's Clean Water Initiative, and mitigates of the coastal effects of climate change in three main ways: (1) it creates "living soil" which locks up five times as much carbon at plants, (2) it diverts methane forming food waste from landfills by encouraging the use of compost, and (3) it greatly reduces nutrient loading which is one of the main causes of ocean acidification.

Surfrider will also promote the use of blue carbon as an approach to mitigate the coastal effects of climate change and ocean acidification. Blue carbon is the carbon captured by living coastal and marine organisms and is stored in coastal ecosystems. Current studies have suggested "mangroves and coastal wetlands annually sequester carbon at a rate ten times greater than mature tropical forests. They also store three to five times more carbon per equivalent area than tropical forests". Coastal wetlands and mangrove ecosystems also help purify and reduce nonpoint source pollution, such as "urban runoff", from entering the marine environment, and therefore from contributing to ocean acidification and hypoxia (depletion of dissolved oxygen that results in "dead zones"). Surfrider will work to increase the preservation of mangroves and coastal wetlands, and partner with organizations working to restore proper ecosystem functioning of these environments.

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