

SOUTH KOHALA COASTAL ACTION PLAN 2030

A CLIMATE-SMART CONSERVATION STRATEGY



Developed by the South Kohala Coastal Partnership

with funding and other support from



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ACRONYMS

CAP; CAP/OS	Conservation Action Planning; Conservation Action Planning Open Standards
ENSO	El Niño Southern Oscillation
MMA	Marine Managed Area
SKCAP	South Kohala Conservation Action Plan
SKCAP 2030	South Kohala Coastal Action Plan 2030
SKCP	South Kohala Coastal Partnership
SMART	Specific, Measurable, Achievable, Relevant, Timebound

GLOSSARY

Adaptive capacity	the capacity of a system to adapt if the environment where the system exists is changing (e.g., ecological systems and human social systems)
Effective management	management actions that maintain and improve natural populations at healthy levels. This typically includes understanding the species/habitat of concern; appropriate actions to address threats, including regulations and enforcement; and monitoring to measure results
Health	see Viability
Impact	a significant or major effect
Maladaptation	an adaptation that does not succeed in reducing vulnerability but increases it instead
Resilience	the ability of a system to maintain key functions and processes in the face of stresses or pressures by resisting to and then recovering or adapting to change. It can be applied to both ecological systems and social systems (e.g., human communities). Coral reef resilience refers to a reef ecosystem's ability to recover from a disturbance and recover towards a coral-rich state, and/or to maintain morphological diversity as opposed to shifting to being dominated by algae or a single coral
Shoreline hardening	installation of engineered-shore structures to prevent coastal erosion, provide flood protection and/or stabilize sediment
Target	a resource that you want to conserve, which can be a species, habitat, ecological system, cultural practice, social value or economic resource that a strategy has chosen to focus on. All targets at a site should collectively represent the biodiversity of concern at the site. Synonymous with biodiversity target
Threat	in CAP/OS, a human activity that directly or indirectly degrades one or more targets (e.g., unsustainable fishing, nutrient pollution). Typically tied to one or more stakeholders. They can also be natural phenomena altered by human activities (e.g., increase in extreme storm events due to climate change). Threat rank definitions are in Appendix D
Viability	in CAP/OS, a measure of target health based on established definitions and the most critical factors likely to affect the long-term persistence and adaptation of that target in the project area. Viability rank definitions are in Appendix C



EXECUTIVE SUMMARY

This South Kohala Coastal Action Plan 2030 (SKCAP 2030) is a climate-smart conservation strategy that represents a major new commitment by the South Kohala Coastal Partnership (SKCP) to our shared vision of:

*a restored, healthy, abundant, resilient
South Kohala coastal system,
cared for and cherished by an island community,
guided by the values and traditions of South Kohala.*

Co-sponsored by the National Oceanic and Atmospheric Administration (NOAA) National Centers for Coastal Ocean Science's Ecological Effects of Sea Level Rise Program, Hawai'i Department of Land and Natural Resources' Division of Aquatic Resources (DLNR DAR), and The Nature Conservancy (TNC), this plan builds on our first six years of effective action, successful network-building and lessons learned. For the first time, our plan includes the best current understanding of the growing local impacts from global climate change and identifies actions to strengthen natural resilience to these impacts through sound, proactive local resource management and planning.

Since our start, our Partnership clearly demonstrated our strong commitment to collaborative action by making significant progress on almost all the priorities set forth in our first shared strategy.¹ In 2018, more than 60% of our active partner organizations are SKCP founders (Table 1), providing a very strong foundation for this long-term collaborative work. We remain committed to our

community-based approach to achieve both ecological and socio-cultural goals for the entire South Kohala coastline.

Our Partnership continues to focus on managing six priority resources or conservation targets identified in 2012 – anchialine pools and wetlands, coral reef ecosystems, important food resources, native reef herbivores, native reef predators, and community connectivity and stewardship. Together, these targets capture most of the coastal ecosystems, natural communities, focal species, and cultural resources valued by the people of South Kohala and Hawai'i. If we effectively manage these six targets, South Kohala's coastal and marine life will be healthier, more abundant, and more resilient to global climate change impacts.

All of our conservation targets are at risk of being degraded and destroyed by multiple threats over time. We identified the top ten threats that have direct and destructive impacts on the coastal and marine ecosystems, human communities, and food resources of South Kohala. Most of these are driven or exacerbated by human activities and can be directly managed – unsustainable fishing, destructive (new) coastal development, nutrient pollution, sedimentation at stream discharges, groundwater disruption, invasive species affecting anchialine pools and wetlands, shoreline alteration, and impacts from various recreational activities.

¹ South Kohala Conservation Action Plan 2012

Climate change is projected to directly impact coastal and marine life through sea level rise, ocean warming and coral bleaching, and ocean acidification. These climate impacts also exacerbate many of the top ten threats to South Kohala ecosystems. However, we can take action locally to increase resilience to these climate impacts. Recent studies indicate that ***the best conservation action to help reefs and marine life persist or recover from climate change impacts is to reduce all other major threats.***

We developed six overarching climate-smart action strategies for conservation in South Kohala.

1. **Resilient Ocean Policy** – to support effective fishery management and marine managed areas
2. **Soil & Watershed Management** – to reduce sedimentation on reefs and coastal waters
3. **Clean Water Management** – to ensure safe and abundant groundwater entering coastal waters
4. **County & Community Conservation Planning** – to create a sound government framework to advance and sustain this work
5. **Community Connectivity & Stewardship** – to ensure active community input and support

6. **Climate-Smart Threat Assessment** – to learn how to address poorly understood threats

For each strategy, we used the new “climate-smart design process” to understand the complex, inter-related threats and to identify high impact, feasible strategies to reduce their impacts.

Most importantly, our SKCAP 2030 provides an agreed-upon roadmap for partner leadership and action to care for South Kohala’s coastal resources over the next decade and to build the critical capacity and knowledge needed to do even more in the future. This is a dynamic or “living” plan, and we will use it to guide our collaborative decisions and priorities based on our results, lessons learned, innovations and new partnerships each year.

SKCAP 2030 implementation is already underway by groups of committed partners ready to lead marine conservation at scale in South Kohala. We will also share our work with others across the Hawaiian archipelago, so together we can learn to care for our islands, oceans, and people as our world continues to warm.

CLIMATE-SMART DESIGN GUIDING QUESTIONS

Three climate-smart questions guided our resource management strategies and actions:

➤ *How will climate change affect the threats to your targets?*

For example, sea level rise and more powerful, frequent storm events will increase flooding, which will increase nutrient pollution from coastal cesspools (Strategy #3) and sediment loads from upland slopes (Strategy #2), both of which are already high threats to South Kohala’s reef ecosystems.

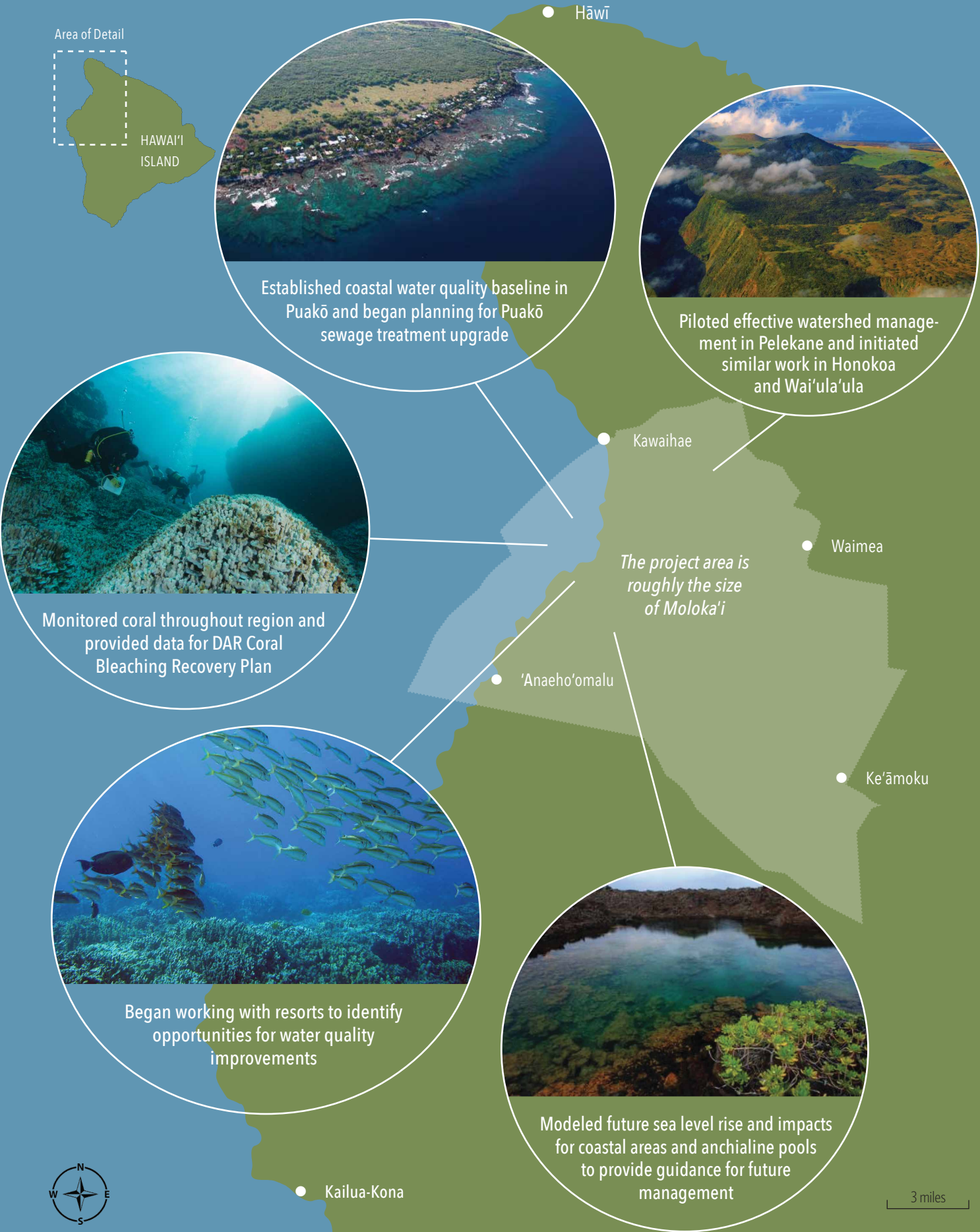
➤ *How can management actions be adapted to remain effective given those changes?*

For example, resilient new wastewater systems should be located above the highest projections for sea level rise, including consideration for storm surge, high tides, and flood events. Riparian stream corridors will need to be widened to reduce eroding soil from entering streams, and revegetation efforts will need to consider both increased drought and flood conditions.

➤ *What other strategies or management actions may be needed to address vulnerability gaps?*

For example, county, state, and community planning (Strategy #4) processes can protect anchialine pools and wetlands by ensuring that there is land available for them to “migrate” inland as sea level and water tables rise.

FIGURE 1: SOUTH KOHALA COASTAL PARTNERSHIP PROJECT AREA & KEY ACCOMPLISHMENTS



INTRODUCTION TO SOUTH KOHALA

Spanning portions of Mauna Loa, Mauna Kea, and the Kohala Mountains, South Kohala is one of five traditional districts stretching from the mountains to the sea on the west coast of Hawai‘i Island. The lava flows that created the lands and shorelines of South Kohala are 3,500-230,000 years old.

This diverse geologic foundation shaped the region’s watersheds and coastal and marine habitats. Deep, steep-sided gulches formed where montane forests sent water coursing across dry leeward lands through erosive soils for hundreds of millennia. Ancient Hawaiians captured water and retained fertile soils in parts of South Kohala through complex agricultural field systems to meet the needs of a pre-contact population that may have rivaled today’s population of nearly 20,000. These dry lands supported a diversity of plant species found nowhere else on earth. These plants, in turn, supported traditional medicine, construction, and early commerce for the young Hawaiian Kingdom.

South Kohala’s coastline supports a diversity of nearshore habitats – from sheltered wetlands and estuarine nurseries to dynamic tidal complexes, expansive shallow coral reef flats, and steep submarine cliff faces and lava tubes. Twenty percent of Hawai‘i’s coral reef species are found nowhere else on Earth, and West Hawai‘i coral reefs are among the healthiest and most productive in the state.



Healthy and productive reef

KEY STATISTICS

3 mountains	<i>Sea Area:</i> 24,797 acres
13 ahupua'a	<i>Land Area:</i> 138,105 acres
4 watersheds	<i>Reef Area:</i> 41.43 acres
	<i>Kohala Summit:</i> 5,480 ft.
	<i>Population (2017):</i> 19,657

South Kohala’s fringing coral reef is known for its habitat diversity and historic abundance. Growing in clear ocean waters upon a solid foundation of stone, South Kohala’s coral reefs provide for subsistence, economy, culture, coastal protection, carbon cycling, education, inspiration, and more. Stretching from Kapalaoa to Kawaihae Harbor, South Kohala’s coral reef ecosystem is part of one of the longest uninterrupted reefs in the state.

Globally significant wetland habitats called anchialine pools, or loko wai ‘ōpae, sparkle along South Kohala’s coastline and provide windows into the water flowing beneath the ground from summit to sea. These habitats host rare and endemic species of shrimp, snails, insects, and birds. Some were used by the first settlers of these lands to support traditional fisheries, irrigate plants, and meet household needs. Hawaiians modified some pools into fishponds, or loko i‘a, an innovative system of sustainable fish production that supported year-round reliable harvest.

For many hundreds of years, the people of South Kohala lived in balance with these important natural resources to sustain an island lifestyle. Similarly, the modern culture of South Kohala relies upon healthy watersheds and coastal and marine life. Agriculture is still a major enterprise in Kohala, with fertile farms in small towns that still receive reliable rain and water from historic agricultural diversions. It is still easy to get to know farmers, to find locally-grown produce, and for residents to plant seeds that yield fresh fruits

and vegetables in their own backyards. Ranching in Hawai‘i began in this region and its legacy is apparent throughout the district.

South Kohala’s iconic coastline is a tourism hotspot for the island. People travel here from all over the world to experience Hawai‘i’s natural beauty. The coastal resorts that support these visitors constitute five of the top ten employers on Hawai‘i Island – representing a powerful driver for our local economy and partners in the well-being of our island communities.

South Kohala is home to four coastal communities, and many local place names reflect the area’s abundance. Our resident communities enjoy and appreciate our beautiful coastline and still gather there to recreate, to celebrate, to subsist, to practice culture, and to enjoy nature. Local livelihoods are built on sharing our coastline’s natural wonders with visitors and on continuing long traditions of fishing for food, trade, or more recently, for sale. Voyagers, navigators, fishermen, sailors, paddlers, and merchants still ply these sheltered coastal waters. As the primary shipping port for West Hawai‘i, South Kohala is a rare example where recreational, commercial, shipping, and military uses co-exist. The dock where the military transport ships land is in the bay where fleets of canoes once departed, until Kamehameha I brought an end to interisland conflict.

Though a tremendous amount has changed, the character of South Kohala is still built around a love for this place and a tradition of collective stewardship. The communities of South Kohala are committed to action to ensure that this lifestyle can continue and to ensure the region’s rich natural



South Kohala’s iconic shoreline

resources are able to adapt and be resilient to global climate change impacts. South Kohala is a region defined by the convergence of old and new, from its geology to its economy. It has been and remains ready to meet this challenge by communities working together. If we are collectively successful, these ancient coastal and marine habitats should outlive all the planners, practitioners, educators, managers, researchers, designers, and facilitators involved in this planning process and continue to fulfill their function for communities and nature.

SOUTH KOHALA COASTAL PARTNERSHIP

Our South Kohala Coastal Partnership (SKCP) launched in 2013 to protect and steward the South Kohala region's vital resources. Our collective vision of success is:

A restored, healthy, abundant, resilient South Kohala coastal system,
cared for and cherished by an island community,
guided by the values and traditions of South Kohala

This vision resulted from community input in 2010 to the Hawai'i Department of Land and Natural Resources' (DLNR) Division of Aquatic Resources (DAR), as they sought community guidance on actions to better manage coastal and marine life. South Kohala's coral reef ecosystem had just been designated a priority area by the Hawai'i Coral Reef Strategy working group – a statewide group of marine managers and scientists committed to understanding and improving the health of Hawai'i's marine resources.

Through a two-year process facilitated by The Nature Conservancy (TNC), over 70 agency, community, non-profit, and individual partners came together and developed the 2012 South Kohala Conservation Action Plan (SKCAP) to focus actions around highly effective strategies to manage and sustain South Kohala's valuable coastal resources. These actions addressed the most serious threats to these resources based on the best available data and local experience. At that time, information about climate change was not sufficient to fully consider how it interacts with threats in South Kohala. Through the SKCAP planning process, a strong, committed partnership emerged. Recognizing that ongoing collaboration was vital to implementing their plan, the SKCP officially formed in 2013. More information about our Partnership, including our 2012 plan and planning process, can be found at our website (<http://www.southkohalacoastalpartnership.com>).

Our Partnership has clearly demonstrated its strong commitment and ability to take action on a shared strategy for the improved health of South Kohala's coastal and marine life. Thirty-five SKCP founding organizations are still active in 2018 (Table 1). These have been joined by new organizations with complementary skills and resources, providing a very strong foundation for this long-term collaborative work. Today our Partnership works with more than 50 organizations representing federal, state, and county government; natural resource agencies; non-governmental organizations; local and global businesses; scientists and universities; community groups; and more. Table 1 lists our active partner organizations in 2018, including many acronyms used in this plan.

In 2018, we developed our new *South Kohala Coastal Action Plan 2030: A Climate-Smart Conservation Strategy* (SKCAP 2030) to bring our Partnership together around a current, clear, shared understanding of the health and threats to our resources, including the complex impacts from global climate change that are already becoming evident. Co-sponsored by National Oceanic and Atmospheric Administration National Centers for Coastal Ocean Science's Ecological Effects of Sea Level Rise Program (NOAA-NCCOS-EESLR), DLNR DAR, and TNC, we assessed and updated our collaborative 2012 plan. As in 2012, we used the proven

conservation action planning/open standards (CAP/OS) process, but this time with a special focus on integrating the increasing body of

knowledge on the local impacts from global climate change. Our Conservation Action Planning Process is described in a later section.

Table 1. South Kohala Coastal Partnership – 2018*

**35 founding organizations are still active partners in 2018; 19 new organizations were active in 2018*

Acronym	Agency
ALKA*	Ala Kahakai National Historic Trail, National Park Service*
ATA	Ala Kahakai Trail Association
CORAL*	Coral Reef Alliance*
DAR*	Division of Aquatic Resources*
DLNR*	Department of Land and Natural Resources*
DOFAW*	Division of Forestry & Wildlife*
EMAU	E Mau Na Ala Hele
EOR*	Eyes of the Reef*
Fisheries LAS*	Fisheries Local Action Strategy*
No acronym	Forest Solutions
HCFRU*	Hawai'i Cooperative Fisheries Research Unit*
HI County*	Hawai'i County* Planning Department
HIHWNMS*	NOAA Hawaiian Islands Humpback Whale National Marine Sanctuary *
HI State Parks	Hawai'i State Parks
HWMO	Hawai'i Wildfire Management Organization
HWF*	Hawai'i Wildlife Fund*
No acronym	Hui Mālama Loko I'a
KKN	Kai Kuleana Network
KCA*	Kailapa Community Association*
KCRA*	Kohala Coast Resort Association*
KPB	Keep Puakō Beautiful
KWP*	Kohala Watershed Partnership*
LYNKER	Lynker Technologies
MKF	Malama Kai Foundation
No acronym	Mauna Kea Resort
MKSWCD	Mauna Kea Soil & Water Conservation District
MLSA*	Mauna Lani Sea Adventures*
No acronym*	Nā Maka 'o Papahānaumokuākea

Acronym	Agency
NFWF*	National Fish & Wildlife Foundation*
NARS*	Natural Area Reserves System*
NOAA*	National Oceanic & Atmospheric Administration
NOAA ESD*	NOAA Ecosystem Sciences Division*
NOAA Kona IEA*	NOAA Kona Integrated Ecosystem Assessment*
NOAA NMFS*	NOAA National Marine Fisheries Service*
NOAA OCRM*	NOAA Office of Coastal Resource Management*
NOAA OHC	NOAA Office of Habitat Conservation
NOAA PIFSC*	NOAA Pacific Island Fisheries Science Center
NPS*	National Park Service
NRCS	Natural Resources Conservation Service
PCA*	Puakō Community Association*
PIRPB	Pacific Islands Regional Planning Body
SKCDP AC*	South Kohala Community Development Plan Action Committee*
No acronym	Swell Minded
TKC*	The Kohala Center*
TNC*	The Nature Conservancy*
TNC HIMP*	TNC Hawai'i Island Marine Program*
TNC HMP*	TNC Hawai'i Marine Program*
UCB*	University of California Berkeley*
UH*	University of Hawai'i
UHH*	University of Hawai'i at Hilo*
UH PICASC	UH Pacific Islands Climate Adaptation Science Center
UH Sea Grant	University of Hawai'i Sea Grant
USGS*	United States Geological Survey*
WDFI	Waikoloa Dry Forest Initiative
WHFC*	West Hawai'i Fisheries Council*

SOUTH KOHALA & CLIMATE CHANGE²

Coral reefs are at risk globally, and global climate change is expected to exacerbate current threats. There is abundant and compelling evidence for climate change impacts on coral reefs as well as many other ecosystems, and wide recognition that natural resource managers must integrate climate change impacts into planning to be effective. Doing this requires examining both the complex interactions between climate change and other system stressors across multiple spatial and time scales, as well as understanding the many desired uses and services these coastal and marine ecosystems provide today and into the future.

Climate change is projected to seriously impact coastal and marine life through sea level rise; changes in water temperature and chemistry; increased nutrient pollution and sedimentation from flooding; potentially dramatic changes in storms and associated swell events; and increased droughts and fire. The magnitude and uncertainty of these climate change threats is daunting, as are the potential interactions between these impacts. Further, “maladaptation” from new coastal development and shoreline hardening³ (e.g., seawalls, breakwaters, revetments) intended to provide short-term relief can worsen shoreline erosion, beach loss, structural damage, and other impacts over time. On Hawai‘i’s coral reefs, climate change impacts may exceed the reef’s natural resilience to resist chronic stressors.

For example, coral bleaching events occurred statewide and globally in both 2014 and 2015, resulting from high sea surface temperatures. Coral cover in West Hawai‘i was reduced by almost half

CLIMATE-SMART DESIGN GUIDING QUESTIONS

- How will climate change affect the threats to your targets?
- How can your management action(s) be adapted to remain effective given those changes?
- What other strategies or management actions may be needed to address vulnerability gaps?

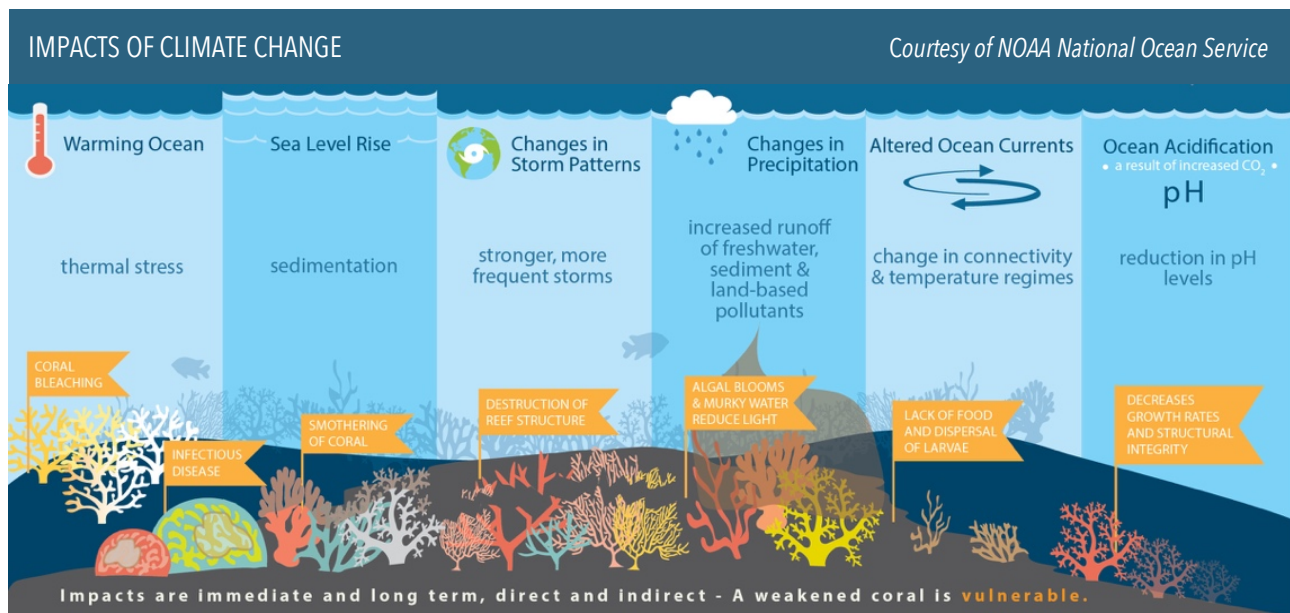
after the 2015 coral bleaching event, and these warming conditions are expected to occur more frequently in the future. Coral bleaching and other climate change impacts such as ocean acidification reduces a reefs’ ability to recover from heavy sedimentation, nutrient pollution, and other degradation.



Bleached coral, 2015

² This section was adapted from Dr. C.A. Courtney’s 2018 summary of *Climate-Smart Design for Conservation for Coastal Ecosystems in South Kohala* prepared for this plan. Full list of her citations is available. The References section provides a list of references and links considered most useful to this planning process.

³ *Shoreline hardening* is the installation of engineered-shore structures to prevent coastal erosion, provide flood protection, and/or stabilize sediment.



In 2017, extremely high tides inundated the South Kohala coast. While these high tide events were natural, they came on top of rising seas and created impacts that coastal communities in the area are not accustomed to or prepared for. Higher sea level affects important wetland habitats by periodically drowning these inland habitats until they are lost to the ocean and by spreading destructive invasive species into new, currently pristine habitats. These 2017 high sea level events increased the urgency for habitat protection, management, and restoration of these vital ecosystems.

All these events emphasize the results of recent scientific studies projecting major changes in the magnitude and frequency of climate change driven impacts. They demonstrate the potential for climate change to compound existing threats such as invasive species and nutrient pollution. Given the significance of these threats in South Kohala, it became critical for us to revisit and update our CAP.

For our SKCAP 2030, we set out to understand the best available science on projected climate change impacts on our coastal and marine resources. We learned that climate change will create significant new threats to South Kohala's coral reefs and

anchialine pools – two of our key targets – from increasing water temperature, ocean acidification, and sea level rise. Climate change will also exacerbate existing system-wide stressors, including increased sedimentation and nutrient pollution caused by droughts and/or fires followed by heavy rains and sea level rise. Our January 2018 workshop included guidance from technical experts on the projected magnitude and severity of climate change threats to coastal and marine life in Hawai'i and South Kohala (Appendix A).

The key findings from the 2012 Pacific Islands Regional Climate Assessment (PIRCA) related to conservation of coastal ecosystems are all likely to affect South Kohala:

- **Low islands, coral reefs, nearshore and coastal areas on high islands, and high elevation ecosystems are most vulnerable to climatic changes.**
- **Freshwater supplies will be more limited,** especially as the quantity and quality of water in aquifers and surface catchments change in response to warmer, drier conditions coupled with increased occurrences of saltwater intrusion.

- **Rising sea levels will increase the likelihood of coastal flooding and erosion**, damaging coastal infrastructure and agriculture, negatively impacting tourism, reducing habitat for endangered species, and threatening shallow reef systems.
- **Extreme water levels will occur** when sea-level rise related to longer term climate change combines with seasonal high tides, interannual and interdecadal sea-level variations (e.g., ENSO, Pacific Decadal Oscillation, mesoscale eddy events), and surge and/or high run-up associated with storms.
- **Higher sea surface temperatures will increase coral bleaching**, leading to a change in coral species composition, coral disease, coral death, and habitat loss.
- **Rising ocean acidification and changing carbonate chemistry will have negative consequences** for both island and pelagic marine ecosystems; although potentially dramatic, the exact nature of the consequences is not yet clear.
- **Distribution patterns of coastal and open-ocean fisheries will be altered**, with potential for increased catches in some areas and decreased catches in other areas, but open-ocean fisheries will be affected negatively overall in the long term.
- **Increasing temperatures, and in some areas reduced rainfall, will stress native plant and animal populations and species**, especially in high-elevation ecosystems, with increased exposure to non-native biological invasions and fire, and with extinctions a likely result.
- **Threats to food and water security, infrastructure, and public health and safety will increase.**

CONSERVATION PLANNING PRINCIPLES

- Integrate adaptation into existing work
- Plan large-scale & long-term
- Safeguard people & wildlife
- Reconsider goals, not just strategies
- Avoid maladaptation – unintended negative effects
- Manage for change, not just for persistence

More information at <http://reefresilience.org>

- **Many of these projected impacts are now unavoidable**, making some degree of adaptation essential.

Our SKCAP 2030 strategies were developed by applying the *key questions and planning principles for climate-smart conservation actions* (see Text Boxes & Table 2). At the July workshop, Dr. Kitty Courtney provided expert guidance on projected climate change effects on each of the major threats to our South Kohala targets and outlined potential management actions to strengthen the area's resilience (Appendix A). In general, studies indicate that the *primary conservation action* to help reefs and marine life persist or recover from climate change impacts is to *reduce all other major threats* (e.g., direct destruction, overharvesting, sediment, nutrient pollution, invasive species). Our 2030 strategies focus on reducing these direct threats to maximize ecosystem resilience to climate change. In addition, we will continue to proactively learn more about potential climate changes impacts and climate-smart responses.

Table 2. Climate-Smart Adaptation Strategies⁵

General Adaptation Strategy	Description
A. Reduce non-climate stresses	<i>Minimize localized human stressors (e.g., pollution, unsustainable fishing pressure, coastal development) that hinder the ability of species or ecosystems to withstand or adjust to climatic events</i>
B. Protect key ecosystem features	<i>Focus management on structural characteristics (e.g., geophysical stage), organisms, or areas (e.g., spawning sites) that represent important "underpinnings" or "keystones" of the current or future system of interest</i>
C. Ensure connectivity	<i>Protect habitats that facilitate movement of organisms (and gene flow) among resource areas</i>
D. Restore structure and function	<i>Rebuild, modify or transform ecosystems that have been lost or compromised, in order to restore desired structures (e.g., habitat complexity) and functions (e.g., nutrient cycling)</i>
E. Protect refugia	<i>Protect areas less affected by climate change (i.e., currently protective habitats or future protective habitats) as sources of "seed" for recovery or as destinations for climate-sensitive migrants</i>
F. Relocate organisms	<i>Engage in human-facilitated transplanting of organisms from one location to another in order to bypass a barrier (e.g., conflicting current)</i>
G. Support evolutionary potential	<i>Protect a variety of species, populations and ecosystems in multiple places to bet-hedge against losses from climate disturbances, and where possible manage these systems to assist positive evolutionary change</i>
H. Other — Prevent Human Maladaptation ⁴	<i>Maladaptation is "an adaptation that does not succeed in reducing vulnerability but increases it instead"</i>

⁴Additional adaptation strategy from Conservation Coaches Network Rally 2018

⁵ West, Jordan M., Catherine A. Courtney, Anna T. Hamilton, Britt A. Parker, Susan H. Julius, Jennie Hoffman, Karen H. Koltes, and Petra MacGowan. 2017. "Climate-Smart Design for Ecosystem Management: A Test Application for Coral Reefs." *Environmental Management* 59 (1):102-117. doi: 10.1007/s00267-016-0774-3.

CONSERVATION ACTION PLANNING PROCESS

Our South Kohala Coastal Action Plan 2030 was developed by a dedicated, multidisciplinary team of SKCP partners, who met at three workshops in 2018 (Appendix B). This new plan will guide our collaborative action over the next critical decade with a clear set of long-term and large-scale strategies.

TNC hosted and facilitated the workshops using the proven CAP/OS process and tools (Figure 2 & Appendix B). CAP/OS guides project teams to identify effective conservation strategies and to track progress over time based on objective assessments of the health of their target resources and the impact of the most serious threats. Like all Conservation Action Plans (CAPs), the SKCAP 2030 is designed for iterative, adaptive management. We will revisit and update these strategies and actions regularly, so we can continually improve our conservation impact.

PLANNING TEAM

Our **SKCAP 2030 Planning Team** comprised of more than 40 SKCP members who attended three planning workshops in 2018: 1) the Climate Change workshop in January; 2) a Strategy workshop in August; and 3) a Lead Agency workshop in November (Table 3). Planning Team members represented more than 30 partner organizations – over half of the groups active in our SKCP – including government agencies, businesses, community groups, major landowners, conservation organizations, natural resource managers, cultural practitioners, planners, scientists, universities, recreational interests, and philanthropists.

Julia Rose, SKCP Coordinator, and Chad Wiggins, Director of TNC's Hawai'i Island Marine Program, formed and co-led a small **Core Team** to guide and support the planning process. The Core Team included representatives from TNC and the National



Park Service's Ala Kahakai National Historic Trail, working closely with Strategy Leads (Planning Team members who volunteered to serve as the lead or point person for each strategy). The Core Team and Strategy Leads ensured timely and representative feedback as the plan was developed.

TNC contracted two consultants to provide essential support to the Planning Team. Audrey Newman served as lead facilitator for the Core Team and CAP/OS process, including the August and November planning workshops, and for producing the final plan. Dr. Kitty Courtney participated in the Strategy Workshop and shared her extensive expertise with the *Adaptation Design Tool*⁶ and climate change impacts on Hawai'i's marine ecosystems and climate-smart resource management options.

⁶ West et. al. & Reef Resilience Network on-line training (<http://reefresilience.org>)

SKCAP 2030 PROCESS

Each of our three planning workshops was designed to gather broad partner input on critical components of the plan:

1. **SKCAP 2030 Climate Change Workshop #1** (23-25 January 2018): This three-day workshop reviewed the 2012 SKCAP through the lens of projected climate change impacts. Experts reported on likely impacts in South Kohala from increased ocean temperatures, sea level rise, ocean acidification, and extreme weather events (storms, drought, fire). The complex interactions between climate impacts and other threats were identified, and initial threat rankings were discussed along with possible strategies.
2. **SKCAP 2030 Strategy Workshop #2** (31 July-2 August 2018): This second three-day workshop summarized the climate change findings and updated threat analysis. Partners reached consensus on three core elements of the plan: 1) critical threats to the conservation targets that must be addressed; 2) a set of climate-smart strategies to significantly reduce these threats over the next decade; and 3) draft SMART objectives and key actions for highest priority strategies.
3. **SKCAP 2030 Lead Agency Workshop #3** (14-15 November 2018): The last two-day workshop specifically reached out to key agency representatives who could lead and partner with others to implement each of the strategies and key actions in the SKCAP 2030. Together they:
 - Reviewed and refined all six priority strategies and identified lead agencies for each strategy and most key actions.
 - Confirmed and added to the list of achievements and lessons learned since 2012.
 - Discussed and agreed on five critical Partnership capacity needs for successful growth and implementation (guiding values; clear partner roles & responsibilities; financial

structure & sustainability; strategic Partnership events & meetings; and SKCAP 2030 outreach). They formed ad hoc teams to address each.

Each participant also identified at least one action they would initiate by January 2019 to begin implementing the SKCAP 2030.

In addition to participating in workshops, the Core Team met separately in May, June, and August and held weekly or semiweekly calls to ensure that the process was progressing and that each workshop was productive. The Core Team's work included reviewing and updating all essential information from the 2012 plan; planning and logistics for the workshops; filling information gaps following the workshops; and serving as the first critical reviewers for all workshop and plan documents. Major decisions and outputs by the Core Team included:

- **Confirmed six South Kohala conservation targets** agreed in 2012 and updated the viability (health) rank for each target in consultation with local experts (Appendix C). Updated "Community Kinship & Stewardship" target name to "Community Connectivity & Stewardship" based on Planning Team input.
- **Completed 2018 Threat Analysis**, adding climate change threats and updated rankings for all threats. (Appendix D includes the full Threat Ranking Matrix and rank definitions.)
- **Updated CAP Miradi Software** with latest target and threat definitions, ranks, notes, and analyses.
- **Refined strategies** drafted by Planning Team between meetings.
- **Revisited measures** from 2012 SKCAP and identified short list of practical indicators to track target viability, threats, and strategy effectiveness (Appendix H).

Table 3. South Kohala Coastal Action Plan Planning Team - 2018

Name	Organization	Name	Organization
Alan Brown	Ala Kahakai Trail Association	Keola Childs	Hawai'i County Planning Dept
Aric Arakaki**^	Ala Kahakai National Historic Trail, NPS	Kevin Sullivan**	Hawai'i County Planning Dept
Audrey Newman^	Conservation & Sustainability Advisor	Kitty Courtney	TetraTech
Brad Stubbs	NOAA Habitat Blueprint Program	Kristina Kekuwa	NOAA Office of Coastal Management
Carolyn Stewart	Malama Kai Foundation	Leila Morrison	TNC HI Island Marine Program
Cecile Walsh^	TNC HI Island Marine Program	Liana Murillo	Surfrider Foundation
Chad Wiggins**^	TNC HI Island Marine Program	Lindsey Kramer**	Division of Aquatic Resources
Chris Hawkins	Malama Kai Foundation	Megan Lamson Leatherman	Hawai'i Wildlife Fund, Division of Aquatic Resources
Cody Dwight	Kohala Watershed Partnership	Nahaku Kalei	Ala Kahakai National Historical Trail, NPS
David Delaney**	Division of Aquatic Resources	Nick Agorastos	Division of Forestry & Wildlife
David Kidwell	NOAA National Centers for Coastal Ocean Science (NCCOS)	Nikki Sanderlin	Division of Aquatic Resources
Dena Sedar	Hawai'i State Parks	Pablo Beimler**	Hawai'i Wildfire Management Organization
Diane (Maka'ala) Kanealii**	Kailapa Community Association	Rick Gmirkin**^	Ala Kahakai National Historic Trail, NPS
Dustyn Hirota	Forest Solutions	Roxie Sylva	TNC, Maui Marine Program
Eric Conklin**	TNC HI Marine Program	Sam Bennett**	Swell Minded
Erica Perez**	CORAL	Sarah Hawkins	Pacific Islands Regional Planning Body/Lynker
Francis Ruddle	Maunalani Sea Adventures	Shalan Crysdale	TNC, HI Island Program
Jean Tanimoto	NOAA Office of Coastal Management	Stephanie Donoho	Kohala Coast Resort Association
Jen Lawson	Waikoloa Dry Forest Initiative	Steven Colberts	UH Hilo Marine Science
Jordan Hollister	Kailapa Community Association	Steve Hess	USGS Pacific Islands Ecosystem Research Center
Julia Meurice	Lynker Technologies	Tamara Hynd	Hawai'i Wildfire Management Organization
Julia Rose**^	South Kohala Coastal Partnership/TNC	Tracy Wiegner	UH Hilo Marine Science
Kamuela Plunkett**	Hawai'i County Planning Department		
Katy Hintzen**	UH Sea Grant		

****Strategy Leads** ^Core Team Members

CONSERVATION TARGETS: WHAT WE ARE PROTECTING

The South Kohala coastline includes diverse and valuable natural and cultural resources that require active management and protection to recover and thrive into the future. We recognize that ecological and social systems share deep roots, and one cannot succeed without the other. Our Partnership continues to pursue collaborative actions to manage and recover the top six priority resources or **conservation targets** identified in 2012 – anchialine pools and wetlands, coral reef ecosystems, important food resources, native reef herbivores, native reef predators, and community connectivity and stewardship (Table 4). Native

reef herbivores and predators receive special attention due to their importance within coral reef ecosystems and sensitivity to fishing and recreational pressures.

Together, these targets capture the majority of coastal ecosystems, natural communities, focal species and cultural resources valued by the people of South Kohala and Hawai'i. If we effectively manage these six targets, South Kohala's coastal and marine life will be healthier, more abundant and more resilient to global climate change impacts.

Table 4. Condition of South Kohala Conservation Targets - 2018

Target	CAP/OS Viability Rank	Definition
Coastal Wetlands	FAIR	All brackish water systems and associated native flora and fauna, especially anchialine pools and fish ponds.
Coral Reef Ecosystems	FAIR	Fringing, patch and reef flat habitats with associated organisms, including many species of corals, invertebrates, fish, and turtles.
Coastal and Marine Food Resources	POOR	Abundant food resources found from the high-water mark to three nautical miles from shore, including but not limited to <i>limu</i> , salt, 'opihi, he'e, ha'u'uke'u'uke, wana, lobster, <i>leho</i> , nearshore and coastal pelagic food fish ('ōpelu, akule), and reef ko'a.
Native Reef Herbivores	FAIR	Important grazers and reef species that consume <i>limu</i> (algae, marine plants), such as urchins, parrotfish, surgeonfish, and turtles.
Native Reef Predators	POOR	Predatory fishes and reef organisms that consume fish, such as jacks, sharks, and uku.
Community Connectivity & Stewardship	GOOD	Familial, personal or spiritual connection to natural and cultural resources that leads to active community-based management of coastal and marine resources.

VERY GOOD - Ecologically desirable status; requires little intervention for maintenance.

GOOD - Within acceptable range of variation; some intervention required for maintenance.

FAIR - Outside acceptable range of variation; requires human intervention.

POOR - Restoration increasingly difficult; may result in extirpation of target.

Nearly all of South Kohala’s conservation targets are at risk of continued degradation over time. The current health or *viability* of each target was updated in 2018 using the best available information from DAR and TNC coral reef surveys, fisher observations of resource abundance, wetland habitat surveys, and participation in cultural and community programs. Viability is a measure of target health based on established definitions and the most critical factors likely to affect each ecological or cultural resource. Five of the targets remain in poor or fair condition, meaning these resources require active management to survive and regain healthy status. The wide range of species and natural communities that will be conserved by managing these conservation targets (a.k.a. nested species) along with more details on the viability ranks can be found in Appendix C.

In many ways, the viability of the coral reef ecosystem is a function of the health of every other target. Similarly, in the social and cultural context of South Kohala, community connectivity and stewardship are directly linked to each target. Community connectivity and stewardship recognizes the relationship between people and nature and the importance of a healthy connection with nature for people’s well-being. This is the only target that improved in the past six years – its viability rank changed from poor in 2012 to good in 2018. This reflects increased participation in cultural and community programs and stewardship activities hosted by partners to care for coastal and marine life and the traditions of South Kohala.



What we will mālama

CRITICAL THREATS TO OUR TARGETS

Kūpuna Francis Ruddle tells us, “For every fish you see today, I’ve seen seven.” His observation is confirmed by many others in South Kohala – from ancestral Hawaiian families to fishermen, dive masters, and biologists – South Kohala’s marine life continues to decline.

In South Kohala, all six of our conservation targets are affected by multiple threats, which act together to degrade and/or destroy these resources over time. Thirteen direct threats were evaluated and ranked using standard criteria to assess their impact on each target. A threat with severe and widespread impacts on a target is

ranked “high” or “very high” for that target. Appendix D includes the full threat ranking analysis with definitions, and potential climate-smart responses for each threat to strengthen the system’s **resilience** to climate change and other stressors.

Ten priority threats have direct and destructive impacts on coastal and marine ecosystems, human communities, and food resources of South Kohala (Table 5). The top six threats seriously impact many targets and are primary drivers of degradation in South Kohala.

Table 5. High Priority Threats in South Kohala

Threat	Overall Threat Rank	Definition
Unsustainable Fishing Practices	HIGH	Harvest that exceeds the natural replenishment rate, leading to decline or degradation over time, including both insufficient fishing regulations and non-compliance.
Destructive (New) Coastal Development	HIGH	Physical destruction and degradation of current and potential future habitat from paving or impervious surfaces (especially in anchialine pool areas). Presence of new structures in coastal areas and associated direct impacts.
Increased Ocean Temperature	HIGH	Increase of ocean temperature that exceeds the threshold where coral bleaching is likely to occur.
Sea Level Rise	HIGH	Seawater intrusion into coastal areas resulting from rising sea level associated with global warming.
Nutrient Pollution	HIGH	Nutrients and associated contaminants delivered to coastal areas from land (e.g., wastewater, fertilizers) in excess of natural flux.
Sedimentation at Stream Discharges	MEDIUM	Sediment deposited in the ocean from coastal and upland erosion often increased by goats and destructive land-use practices; threat is high in the stream discharge areas where it occurs.
Wetland Groundwater Disruption	MEDIUM	Changes in volume of freshwater delivered to coastal areas due to water diversions or withdrawal.
Invasive Species in Wetlands	MEDIUM	Invasive fishes, plants and algae can dominate and overtake native wetland ecosystems.
Shoreline Alteration for Community Connectivity	MEDIUM	Modifications of coastline from natural condition (e.g., seawalls, structures, sand mining).
Recreational Impacts for Community Connectivity	MEDIUM	Human interaction with coastal systems without taking resources (e.g., trampling, littering, sunscreen, human waste).

Unsustainable fishing impacts coral reef fish populations by, among other things, selectively removing larger fish that are often most important for reproduction. It also has cascading effects by dramatically reducing some fish species, which alters the marine food web and can change the ecosystem to favor species that are not valued for food or other uses. Climate change may impact recruitment, distribution patterns and habitat for target species. **New coastal construction** can directly and indirectly destroy anchialine pools, reefs, and nearshore habitats. If the shoreline is hardened to provide short-term protection from sea level rise, extreme coastal erosion and other long-term problems often result. Impacts from **increased ocean temperature** leading to coral bleaching and **sea level rise** were described earlier in the South Kohala & Climate Change section. **Nutrient pollution** has been studied extensively in Puakō and is believed to affect all six South Kohala targets along most of the coastline, due to wastewater and fertilizers seeping from cesspools, septic tanks, landscaping, and other sources to pollute nearshore waters and the reef. Sea level rise will exacerbate all these problems.

Sediment (and associated pollutants) from degraded watersheds smothers and kills coral in at least two important locations where rivers and streams reach the sea in South Kohala. Sediment has very high impacts in stream discharge areas where it occurs and is ranked “medium” only because its scope is localized. Sedimentation is also significantly increased by fire through erosion from burned slopes. Fire history in South Kohala includes the majority of the largest fires in the State, and some slopes burn every year due to the recurring fire cycle caused by rapid growth (and re-growth) of unmanaged vegetative fuels, predominantly invasive and fire-prone grasses. Experts agree that increased wildfire threats are imminent largely due to climate change, increasing population, and continued introduction and expansion of invasive, fire-prone plant species.

Anchialine pools and fishponds in South Kohala are gravely threatened by **invasive species** (introduced fish that prey on native shrimp populations and invasive vegetation that accelerate infilling from sediments). Sea level rise will

accelerate the transmission of these invasive species between ponds. On O‘ahu, invasive species are currently disrupting and changing the ecological balance of native coral reef ecosystems. Some of these species have been confirmed in Kawaihae Harbor and preventing their establishment and spread – in South Kohala and beyond – is a high priority. The unique and rare species living in South Kohala’s low-salinity wetland ecosystems are highly sensitive to **disruptions in groundwater flows**, especially reduction or impairment of freshwater quantity and quality from upslope development, droughts, and aquifer pollution or overdraft. Alternatively, flooding from storms or sea level rise will change the size and location of current pools and fishponds and possibly transform them to intertidal habitats. Again, both drought and flooding are projected to increase with climate change.

Though one individual’s **recreational activities** may have minimal impacts, the growing number and cumulative effect of visitors, residents and businesses using South Kohala’s beaches and nearshore waters is significant and already diminishing the experience. In addition, coral bleaching and ocean acidification increase the sensitivity of reefs to human activities. Business as usual will exacerbate the degradation of reefs, fisheries and other resources over time. **Shoreline alteration** affecting access also seriously reduces community connectivity with their resources, and shoreline hardening to protect structures from sea level rise impacts are likely to worsen coastal erosion over time.

Most of these priority threats are driven by human activities and can be directly managed in many ways, including improvements in land use, harvesting, building, planning, and social practices. However, two high-ranking threats are direct impacts of climate change – **increased ocean temperature and sea level rise** – and can only be addressed by ensuring the robust health and vigor, and therefore adaptive capacity, of the affected targets. All these impacts are likely to intensify as our population grows and global climate change advances in the coming years.

All ten priority threats are addressed directly or indirectly in the climate-smart strategies outlined in our plan.

CLIMATE-SMART STRATEGIES

Together, we will implement **six priority strategies** that collectively address South Kohala’s top ranked threats and help catalyze recovery of our conservation targets:

1. **Resilient Ocean Policy** – including fishery management and marine managed areas
2. **Soil & Watershed Management** – to reduce sedimentation on reefs and coastal waters
3. **Clean Water Management** – to ensure safe and abundant groundwater entering coastal waters
4. **County & Community Conservation Planning** – to create a sound government framework to advance and sustain this work
5. **Community Connectivity & Stewardship** – to ensure active community input and support
6. **Climate-Smart Threat Assessment** – to learn how to address poorly understood threats

These strategies were identified by the full Planning Team. Actions to implement each strategy were developed by small groups of knowledgeable partners over a series of meetings and virtual discussions. They were then rigorously peer reviewed, and agreed to, and adopted by the full Partnership.

The collective impact of these six climate-smart strategies will significantly improve the health, abundance, and resilience of our South Kohala coastal resources. These strategies build on our early successes and lessons, and they represent our best current knowledge. They are also designed to help us prepare for unprecedented changes due to a shifting climate. Importantly, our Partnership recognizes the need to continually learn and adapt, so each strategy includes active monitoring of progress and impact. Each strategy is presented in four parts:

- 1) **Background** briefly describes the Planning Team’s rationale for each strategy.
- 2) **Climate-smart design considerations** summarizes the Planning Team’s response to the three climate-smart design questions for each strategy to support adaptive management and increased resilience.
 - How will climate change affect the threats to your targets?
 - How can management actions be adapted to remain effective given those changes?
 - What other strategies or management actions may be needed to address vulnerability gaps?
- 3) **SMART Objective** (Specific, Measurable, Achievable, Relevant, Timebound) describes the outcome we aim to achieve by 2030 or “*what success will look like*,” including increased resilience to climate change.
- 4) **Key Actions** are essential and sufficient to achieve the outcome, assuming all actions are successfully implemented.

In addition, we identified numerous **Activities** for each Key Action to be implemented by partners over time. These are listed in the Working Action Plan for SKCAP 2030 in Appendix F. As part of our “living plan,” we anticipate this workplan will change over time as we practice adaptive management based on our success, lessons learned, and new opportunities.

Every strategy requires collaboration by many partners; none of this work can be accomplished by a single agency or organization. Committed leadership is the key to successful collaborations. For each strategy, one or two partner organizations volunteered to lead implementation and others agreed to collaborate on key actions. The founding members of these partner-led Strategy Teams are listed with each Strategy below.

STRATEGY 1: RESILIENT OCEAN POLICY

Objective 1: With support from the South Kohala community, secure place-based management for **30% of South Kohala’s nearshore marine ecosystems in a resilient marine managed area (MMA) network** and implement **marine policies to maintain or improve fish and target invertebrate populations for 70% of nearshore marine habitat.**

Our Resilient Ocean Policy strategy calls for “effective management” of all South Kohala nearshore marine resources (species and habitats) to maintain and improve natural populations at healthy levels. It uses a two-pronged approach:

- Active and long-term fisheries management to ensure that the level of take does not degrade marine life or habitat, so that depleted fisheries can recover. This requires updated laws, rules, regulations, and practices; community-supported compliance; and periodic monitoring to adjust or adapt management over time.
- A well-designed and effectively managed network of marine managed areas (MMA) to support the sustainable use of marine resources at multiple scales.⁷ This MMA network should include the full diversity of South Kohala’s native species, habitat types (e.g., fringing reefs, sandy shorelines), and ecological conditions (e.g. wave exposure) and should consider the full range of possible management designations.

To ensure natural connectivity, we will need to collaborate with adjacent communities outside South Kohala to ensure healthy fisheries and marine resources along our coast. Co-management of marine resources by communities and agencies at a local scale is proven effective for long-term sustainability of coastal and marine life as well as social benefits. This approach is also consistent with traditional Hawaiian management systems.

Climate-smart Design Considerations: The severity and intensity of coral bleaching events in South Kohala is expected to continue due to increasing sea surface temperature resulting from increasing global greenhouse gas emissions. Recent studies indicate that reef herbivores

⁷ McLeod, E., R. Salm, A. Green, and J. Almany. 2009. Designing Marine Protected Area Networks to Address the Impacts of Climate Change. *Frontiers in Ecology and the Environment* 7: 362-370. ([pdf](#), 651k) & <http://reefresilience.org/coral-reefs/resilient-mpa-design/>

STRATEGY TEAM & LEAD PARTNERS*

Division of Aquatic Resources*
The Nature Conservancy*

Lynker Technologies | Mālama Kai Foundation
NOAA Coral Reef Conservation Program
The Kohala Center | West Hawai’i Fisheries Council

enable marine communities to be more resilient to bleaching, highlighting the importance of maintaining and restoring healthy herbivore populations. Reduction of all reef stressors (including water quality impacts) also enhances bleaching resiliency; these are addressed in Strategies 2 and 3 to reduce sedimentation and nutrients in our coastal waters. The MMA network design also will incorporate the latest reef resilience principles, such as connectivity to source reefs that support healthy populations by producing and transporting abundant larvae via currents.

KEY ACTIONS

1. **Integrate traditional ecological knowledge, global science, and community information** to identify and support improved rules, regulations, and “pono practices” needed for effective fisheries management and to ensure healthy coastal resources in a changing climate.
2. **Build strong community and agency support for adaptive fisheries management**, including increased capacity and funding for education and outreach to improve compliance.
3. **Support improved statewide fishing rules and enforcement** to promote sustainable fishing in South Kohala.
4. **Enhance the network of marine managed areas** in South Kohala based on reef-resilience principles⁸, including an understanding of recruitment patterns and connectivity, and a robust and engaged community process.
5. **Implement research and monitoring** to quantify effects of fisheries management and marine managed areas on South Kohala’s reef ecosystems and coastal/marine food resources, including biological, climate, socio-economic, and other indicators.

⁸ Reef-resilience principles call for understanding sources and sinks of recruitment to South Kohala from other parts of the island or at depth. This may require research on likely climate impacts on the currents and eddies of West Hawai’i island.

STRATEGY 2: SOIL & WATERSHED MANAGEMENT

Objective 2: *Reduce sedimentation of stream channels and nearshore waters*, by increasing soil retention in 80% of highly erosive areas in two of South Kohala's major watersheds (Pelekane and Honokoa), increasing drought-tolerant vegetative cover of riparian areas and effectively managing ungulates.

Sediment and associated pollutants from the erosion of South Kohala's watersheds seriously degrade our coral reefs. Where major streams enter the ocean, unnaturally high sediment loads smother coral and block sunlight needed for coral growth and survival, causing mortality and loss of habitat for coastal and marine life. The USGS has found that most of this erosion comes from relatively small high-erosion areas that can be identified, mapped, and managed. Major sources of erosion are wildfires, uncontrolled grazing by ungulates (e.g., goats and cattle), and unmanaged dry grasses that fuel the fire cycle. Further, experts agree that wildfire threats will increase largely due to climate change. This strategy outlines an integrated approach to revegetation, goat removal, fire prevention, and improved land use to reduce this threat to marine (and stream) resources, as well as increase the safety of local communities.

Climate-smart Design Considerations: The South Kohala area is expected to experience more extended periods of drought interspersed with extreme rainfall events due to climate change. Drought conditions will increase the likelihood of wildfire, reduce vegetative cover, and increase exposure of soil to erosion. Extreme rainfall events will cause massive soil erosion and transport to nearshore waters and coral reefs. Long-term strategies should include a focus on reducing fire ignition risk and increasing infiltration rates of the landscape through reforestation to reduce the likelihood and magnitude of erosive runoff.

STRATEGY TEAM & LEAD PARTNERS*

Kohala Watershed Partnership*

The Nature Conservancy*

Hawai'i Wildfire Management Organization

Kailapa Community Association

Mauna Kea Soil and Water Conservation District

Natural Resource Conservation Service

The Kohala Center | US Geological Survey

KEY ACTIONS

1. ***Identify highly erosive areas*** in Pelekane and Honokoa watersheds to prioritize restoration efforts.
2. ***Remove all feral goats from Pelekane and Honokoa Watersheds below the Kohala Mountain Road*** and maintain both watersheds as goat-free areas into the future.
3. Work with land managers to ***improve infrastructure and grazing management practices for cattle*** to promote soil retention and mitigate fire risk.
4. After ungulate management is in place, ***revegetate highly erosive areas*** currently contributing to excessive sediment loads in stream channels.
5. ***Restore riparian corridors*** to decrease erosion; increase sediment management, groundwater infiltration, nutrient/pollutant uptake, soil moisture retention, storm-water abatement, and cultural/community connections; integrate climate change impacts into restoration design.
6. Work with key stakeholders to ***strengthen State and Hawai'i County policies and regulations*** for erosion reduction, sediment control, fire management, storm water management, and natural riparian buffers along perennial and intermittent streams (links to Strategy 4).
7. ***Develop and begin implementation of a comprehensive fire management plan*** that outlines pre-, during, and post-fire actions.
8. ***Identify and track practical indicators*** for reduced sedimentation rates and soil retention.

STRATEGY 3: CLEAN WATER MANAGEMENT

Objective 3: *Ensure clean and abundant groundwater for South Kohala’s coastal systems* by transitioning at least one current wastewater system for development makai of (below) Queen Ka’ahumanu Highway to highest quality (R1) clean, re-usable water and working with coastal developments to increase irrigation, landscaping, and wastewater efficiency through climate-smart design.

Healthy reefs and communities require clean coastal waters. Puakō in South Kohala is one of the most studied nearshore areas on Hawai’i Island, providing valuable information for coastal and marine management since the 1970s. Currently, cesspools and other onsite disposal systems are a major cause of poor coastal water quality. These studies suggest that poor water quality is likely one of the key stressors to coral reefs.

In general, increasing nutrients and associated contaminants impact corals, especially where herbivore populations are reduced. The best international science indicates that some reefs can recover – even from catastrophic bleaching events – but a major factor in recovery is the reduction or elimination of other existing local stressors, including wastewater contaminants. Building on strong community support and recent work by CORAL and partners, this strategy will implement long-needed wastewater upgrades at Puakō. We will also survey and engage South Kohala’s resort communities to determine if they need to improve their wastewater systems and landscape management practices to reduce contaminants. Improved wastewater practices will be monitored and shared with other coastal communities in Hawai’i.

Climate-smart Design Considerations: Chronic coastal flooding is increasing with sea level rise. Cesspools and other on-site disposal systems along the coast are susceptible to saltwater intrusion from rising seas. These systems will cease to function properly with saltwater intrusion and release nutrients and other contaminants to the nearshore waters that will impact coral reefs. In Puakō, many cesspools are already inundated and leaching into the coastal waters. New or

STRATEGY TEAM & LEAD PARTNER*

The Coral Reef Alliance*

Kohala Coast Resort Association
The Nature Conservancy | UH Hilo

retrofitted systems should be designed for periodic or chronic inundation, depending on their flood risk.

KEY ACTIONS

1. ***Implement R1 wastewater treatment at Puakō*** designed for sea level rise, storm, and other climate change considerations to significantly reduce wastewater contaminants to coastal waters and catalyze reef recovery.
2. ***Initiate work for resilient wastewater treatment upgrade*** designed for sea level rise and other climate change impacts at an additional coastal development.
3. Work with scientists, civil engineers, and development representatives to ***implement environmentally beneficial upgrades for wastewater, irrigation, and/or landscaping***, including sea level rise, storm, and other climate change considerations.
4. ***Monitor the effectiveness of water improvements in adjacent coastal waters.***



Studies confirmed pollutants reach ocean in up to three days

STRATEGY 4: COUNTY & COMMUNITY PLANNING

Objective 4: *Integrate the SKCAP 2030 priorities and promote the adoption of climate-smart development and conservation actions throughout the Hawai'i county planning and implementation framework*, with active support from communities, government agencies and local leadership.

The Hawai'i County Charter, County General Plan, and many other county planning processes are critical to the success of the SKCAP 2030. County and community planning is a new strategy for our Partnership and was deemed essential due to the large scale and long-term nature of our high-ranking threats. For example, reducing sedimentation, protecting anchialine pool systems, improving nearshore water quality, and preparing for climate change require new policies, long-range planning, and large-scale implementation at the County and community levels. Our Partnership has been invited to provide valuable input and strategic guidance to the Hawai'i County planning and decision-making framework, which in turn will help advance our SKCAP 2030 objectives. It will also help us identify and address shared priorities with a wider range of stakeholders and decision makers, including communities beyond South Kohala. Hopefully, this new strategy will improve the long-term sustainability and impact of the SKCAP 2030 and the South Kohala Coastal Partnership.

Recommendations under this strategy could address the following issues:

- native forest habitats & restoration
- sediment & erosion control
- invasive species management
- coastal wetland management
- coastal zone management
- special management areas
- water withdrawal regulations
- water reclamation & reuse
- stormwater management
- cesspool transition
- land use zoning
- riparian buffers
- coastal setbacks
- conservation districts

Climate-smart Design Considerations: Chronic coastal flooding and erosion is increasing with sea level rise, affecting ecosystems, communities and

STRATEGY TEAM & LEAD PARTNERS*

Hawai'i County Planning Department*

Kailapa Community Association*

Subcommittee of key partners for all key actions

businesses in South Kohala and all of Hawai'i island. If unimpeded by structures, natural ecosystems – such as anchialine pools and wetlands – will migrate inland as sea level rises. Shoreline hardening in response to sea level rise will have negative impacts on coastal resources including beaches, anchialine pools, and public access. On-site disposal systems such as cesspools, inundated with saltwater from rising seas will cease to function and will cause nearshore pollution. This new strategy calls for a close partnership with the County to help create a planning and regulatory framework to help South Kohala and other regions prepare for these emerging challenges.

KEY ACTIONS

1. ***Identify specific recommendations for the County and communities*** to integrate the SKCAP 2030 priorities into the planning and implementation framework (e.g., Hawai'i County General Plan, South Kohala Community Development Plan, and Hawai'i County codes, rules, regulations), including identifying where state or federal support is needed.
2. ***Ensure SKCAP 2030 recommendations are included in the Hawai'i County General Plan, South Kohala Community Development Plan, and other relevant planning processes.***
3. ***Protect existing and future anchialine pools and other priority habitats***, including migration inland over time due to sea level rise, groundwater changes, invasive species, and other climate change impacts.
4. ***Ensure implementation of SKCAP 2030 priority recommendations*** are included in the county planning and implementation framework.

STRATEGY 5: COMMUNITY ACTION & CONNECTIVITY

Objective 5: *Increase community connectivity, commitment and action to improve the health of coastal and marine life*, through effective communications, community stewardship, cultural and place-based activities, and strong partnerships in South Kohala.

Agencies cannot manage without community support and communities need agency capacity. Since 2012, we have built a strong, diverse, and growing collaboration across agencies and community partners with a very small SKCP coordination team. This plan identifies new partners essential to our success – especially landowners, resorts, elected leaders, and respected community champions – and calls for a new structure to continue growing our Partnership’s impact. We also need to invest in strategic communications to mobilize key stakeholders and secure broad support for effective policies, plans, programs, and projects along the entire South Kohala coastline.

Climate-smart Design Considerations: Sea level rise will be a major factor affecting all coastal activities, including access and infrastructure currently used for ocean recreation. Fish pond restoration will also need to be designed to adapt to rising seas. Increased ocean temperature, ocean acidification, and other stressors increase the sensitivity of coral reefs to human activities, calling for more education, outreach, and management to minimize people’s impacts. Vulnerability to all these climate change impacts needs political support to address them in state and county programs, plans, regulations, and capital improvement projects.

STRATEGY TEAM & LEAD PARTNERS*

Ala Kahakai Trail Association*
NPS Ala Kahakai National Historic Trail*
 E Mau Nā Ala Hele
 Hawai’i Wildfire Management Organization
 Mālama Kai Foundation | SwellMinded
 Waikoloa Dry Forest Initiative

KEY ACTIONS

1. ***Increase SKCP coordination, leadership, effective action, connectivity, and impact.***
2. ***Identify and add new community partners*** to actively co-implement the SKCAP 2030 priorities (land owners, tourism industry representatives, schools/teachers, business associations, agencies, non-government and community organizations, and other influential groups and individuals).
3. ***Develop and co-implement a communications strategy*** for the SKCP to promote conservation success, increase connectivity, and build broad community support for the SKCAP 2030 priorities and our Partnership’s shared vision and values.
4. ***Engage the full diversity of South Kohala’s communities*** through stewardship projects, cultural and/or place-based experiences, and other activities that increase connection to place and ensure effective management of coastal and marine life.
5. ***Describe and share broad ecosystem benefits of soil and erosion management*** with the community and key stakeholders to build support for effective management, including actions to mitigate climate change impacts (e.g., increased drought and fire, groundwater disruption).

STRATEGY 6: CLIMATE-SMART THREAT ASSESSMENT & RESPONSE

Objective 6: *Understand the effects of specific threats on priority resources* and how those threats intersect with, and are magnified by, climate change to inform the five-year revision of the SKCAP 2030 and communicate this information to key audiences.

Good planning is an iterative process, and managers understand that new threats emerge constantly. If emerging threats are identified and assessed early, managers can prepare appropriate and cost-effective responses or test various options where management is uncertain. For example, in 2012, the impact of roi and other invasive fish on coral reef ecosystems was uncertain. Based on an intensive removal effort in Puakō, it appears that their impact is not as serious as assumed and active management is probably not needed. Today, there is little known about contaminants and water quality requirements for healthy reef ecosystems. Invasive species are a significant problem in anchialine pools, but effective management tools are still being tested (in other locations). To keep this plan current, a small, active committee of partners will determine how to better understand these and other emerging threats and will engage partners to take management action as needed. Our partners are committed to real-time adaptive management. We also agreed to review this plan by 2025 to adjust our strategies, if needed, based on all we learn.

Climate-smart Design Considerations: We are just beginning to observe the early impacts of climate change on South Kohala's reefs and other conservation targets. We will continue to actively observe and document the effects of coral bleaching, sea level rise, fire regimes, and other climate-related impacts in our region. We will also continue to use local and international research on climate change and resilience factors in coastal and marine ecosystems to improve our management actions over time.

KEY ACTIONS

1. **Establish a committee of the SKCP to track emerging information** on the effects of climate change on South Kohala resources, such as inundation and migration of anchialine pools and infrastructure, coral bleaching, rainfall, ocean

acidification, invasive species, drought, and fire effects on erosion.

2. Utilizing information developed in Action 1, **develop a short annual climate science communication brief** to inform the community and improve adaptation management and planning (e.g., next iteration of SKCAP 2030; County General Plan; South Kohala Community Development Plan).
3. Promote and facilitate projects by SKCP member organizations and others to **understand the sources and relative impacts of chemicals and other contaminants** (e.g., pharmaceuticals, personal care products) on coral reef ecosystems from households, wastewater systems, injection wells, golf courses, landscaping, and agricultural lands.
4. Promote and facilitate projects by SKCP member organizations and others that seek to **improve invasive species detection, response, and removal from marine and estuarine systems**, especially to increase resilience to climate change impacts.
5. Promote and facilitate projects by SKCP member organizations and others that seek to **understand optimal water quality parameters for coastal wetlands and nearshore reefs** to maximize climate-resilience.
6. **Designate one or more representatives from the SKCP to participate in state, county, and local climate change related meetings and partnerships** (e.g., Hawai'i Ocean Resources Management Plan, State Climate Commission, South Kohala County Planning Process, Hawai'i-based conferences and symposia) to facilitate two-way learning and engagement.
7. **Explore climate-related partnerships to benefit SKCP** (e.g., UH Sea Grant King Tides Citizen Science project).

STRATEGY TEAM & LEAD PARTNER*

*Lynker Technologies**

University of Hawai'i Sea Grant
The Nature Conservancy

TAKING ACTION & MEASURING SUCCESS

Our South Kohala Coastal Action Plan 2030 represents a major new commitment by the South Kohala Coastal Partnership to our shared vision of ***“a restored, healthy, abundant, resilient South Kohala coastal system, cared for and cherished by an island community and guided by the values and traditions of South Kohala.”***

It builds on our first six years of effective action, successful network-building, and lessons learned. For the first time, our plan includes the best current understanding of the growing local impacts from global climate change and ways to build resilience to these impacts through sound, proactive local resource management and planning.

SKCAP 2030 presents a clear roadmap for collaborative action at scale in the next decade. With this plan, our Partnership will begin to manage the major climate-related threats to coastal and marine life throughout the South Kohala coastal region. We remain committed to our community-based approach to achieve both ecological and socio-cultural goals for South Kohala. Our successes, challenges, and lessons will be used to continually adapt our efforts and improve our impact. We will also share our work with others across the Hawaiian archipelago, so together we can learn to care for our islands, oceans, and people as our world continues to warm.

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Collecting data for sea level rise models

PARTNERSHIP IN ACTION

Implementation of our SKCAP 2030 is already underway. At the Lead Agency Workshop, nine partner organizations stepped up to lead or co-lead our six strategies. The Planning Team also identified partners well-positioned to work on each of the key actions and activities (Appendix F). Our Partnership is also actively growing through strategic recruitment of key stakeholders and essential skills, as well as natural attraction of professionals working in the region on natural, cultural, or community resource issues.

As SKCP grows, our structure and processes will continue to evolve. This planning process helped flag critical capacity and organization needs for our Partnership now. In response, we formed six partner-led Strategy Teams at our first Partnership meeting in 2019. Each team will implement and adapt the workplan for their strategy. Each team member will engage their organization in direct action, and the teams will recruit new partners as needed. Our Partnership also agreed to an updated leadership, decision-making, and meeting structure that focuses on SKCAP 2030 implementation (Appendix G).

ADAPTIVE MANAGEMENT & MEASURING SUCCESS

Like all CAPs, the SKCAP 2030 is designed for adaptive management. Our SKCAP 2030 monitoring plan will answer two interrelated questions that are common to most conservation projects:

- **Strategy Effectiveness:** Are the conservation actions we are taking achieving their desired results?
- **Status Assessments:** How are our key targets, threats, and other factors changing over time?

In addition, we are committed to answering a new critical question:

- **Climate-smart Design:** What have we observed or learned that confirms or changes our understanding of the three climate-smart design questions?



Monitoring changes along the coast

“...I have been struck again and again by how important measurement is to improving the human condition. You can achieve amazing progress if you set a clear goal and find a measure that will drive progress toward that goal – in a feedback loop ... This may seem pretty basic, but it is amazing to me how often it is not done and how hard it is to get right.”

Bill Gates

To answer these questions, we will continue making observations and collecting data on indicators that reflect the health of each target and changes in the scope and severity of each threat (Appendix H).

Each Strategy Team will also identify and track practical measures to assess the effectiveness of their actions and progress towards their objective. Whenever possible, we will use monitoring data and protocols already in place, such as the Puakō Monitoring Plan, rather than initiate new data gathering that can be difficult and costly to maintain. We will also identify signals or triggers to alert us when adaptive management or course correction is needed or to avoid maladaptation.

Finally, to create a culture that learns from challenges and celebrates success, our Partnership will convene annually to take stock of our strategies, identify major milestones and critical gaps, and agree on priorities for the coming year. We also will hold a full strategy review after five years to update the SKCAP 2030 strategies and actions based on all we have learned.

ACKNOWLEDGEMENTS

This updated and climate-smart South Kohala Coastal Action Plan 2030 reflects the deep commitment, expertise and engagement of many South Kohala Coastal Partnership members. Mahalo a nui loa to each of the organizations and individuals who actively participated in this planning process (Table 3). We cannot name each of your contributions, but together you made this plan and our future work possible.

We are deeply grateful to the three partner agencies who recognized the importance of integrating climate change into our conservation action plan for South Kohala and co-sponsored this planning process – NOAA’s Center for Coastal Ocean Science, DLNR’s Division of Aquatic Resources, and TNC’s Hawai‘i Program. The lessons we learned while conducting this project are already helping guide our colleagues and partners in similar efforts.

We are forever indebted to Dr. Kitty Courtney, Marine Environmental Science Expert at TetraTech, for sharing her deep knowledge of climate change effects on coral reef and coastal ecosystems with our team. She guided us through these complex interactions, introduced us to the latest climate change planning tools, and helped us translate it all into practical management options and the three climate-smart questions that we must all integrate into our work going forward. Her input to this plan at every stage was invaluable.

Special appreciation to our advisors for their valuable guidance and insights throughout this planning process. Aric Arakaki, NPS Ala Kahakai National Historic Trail Superintendent and Rick Gmirkin, NPS Archeologist expanded our understanding and integration of community and cultural issues. Emily Fielding, TNC Maui Marine Program Manager, shared her extensive experience and examples for using CAP/OS to plan for special Hawai‘i marine environments and sent Roxie Sylva from the Maui team to join our planning workshops.

For each of our six strategies, knowledgeable partners volunteered to serve as strategy leads or advisors. They reviewed early drafts, provided critical input, led group discussions, and significantly improved the final plan. Our sincere thanks to Lindsey Kramer & David

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