Adaptation Strategies Recommended for Sanctuary Implementation by the Advisory Council

Color key:	Eliminated entirely from strategy list	Retained in strategy list for other agencies, but will not be incorporated into the Sanctuary's Climate Action Plan	Incorporated into Climate Action Plan	New strategy added by Sanctuary staff

Ref #	Approach	Strategic Management Action	Sanctuary Notes
1	Dynamic Management	Add or relocate sediment to areas that are sediment-starved in estuaries and wetlands to help keep pace with sea level rise.	This strategy will not be included in the Sanctuary's Climate Action Plan, as there are currently no sediment-starved estuaries within Sanctuary boundaries.
2	Dynamic Management	In areas dominated by grey infrastructure, identify potential demonstration sites for green infrastructure projects and/or other "active management" projects; implement and evaluate effectiveness to inform future efforts across the region. Potential project options include: - Use wastewater treatment plants to supply fully treated and advanced wastewater for estuaries where benefit can be demonstrated. - Build a horizontal levee in threatened part of sanctuary (e.g., estuary that is flood-prone or needs additional habitat) - Install bioswales near areas dominated by infrastructure/roads - Install rain gardens with soil layers engineered to help storm water infiltrate underlying layers of soil -Find ways to allow larger passage for high flow events	

3	Dynamic Management	To the extent practicable, reduce or modify armoring that exacerbates erosion; replace or enhance with natural material to create sloped, transitional habitat (e.g., native oyster reef or dune). If armoring can't be removed and replaced, implement living shoreline techniques in conjunction with new construction/repairs. Related to strategy #2.	
4	Dynamic Management	Let go of pocket beaches that can’t retreat, and do not intervene with management actions.	
5	Dynamic Management	For sediment-heavy estuaries, conduct instream and upstream restoration work to reduce sediment delivery and flash floods. Activities could include: - restore impaired and incised creeks - add large woody debris - reconnect creeks to floodplain - restore incised creeks by raising elevation to allow overflows/sediment deposition - dechannelize upstream segments - restore stream complexity - remove old road crossings and legacy roads, parking lots and other sediment sources - plant vegetation (e.g., drought/heat tolerant native species) - incentivize best land management practices that enhance soil health and decrease runoff and erosion (e.g., rotate land uses on agricultural upland properties, plant drought-tolerant natives, forest management) - build retention ponds/catchments that can be used for upland water management opportunities **For all activities listed, note that environmental conditions (e.g. storms, flooding, erosion, drought, SLR) can shift areas within estuaries between sediment-starved and sediment-heavy, so this action will need to be dynamic and respond to changing estuary conditions in the future.	

6	Dynamic Management	~~Encourage a climate-smart response to erosion events that smother the rocky intertidal by developing a diagnostic decision support tool so management agencies know how to respond to either 1) recover the habitat by removing material, 2) leave material and encourage surfgrass growth or 3) leave material and take the opportunity for creation of a new beach. Have the knowledge to take advantage of the new situation due to erosion events. Ideally would have some options with the ultimate goal of leveraging resources to provide the best response.~~ Develop a decision diagnostic support tool to encourage a climate-smart response by managment agencies to erosion events that smother the rocky intertidal. The tool should help managers decide whether to recover the habitat by removing the material, or leaving the material to enable the habitat to recover on its own or shift to a different habitat type. Managers need to have the knowledge to take advantage of new situations due to erosion events. Ideally, this tool would have options with the ultimate goal of leveraging resources to provide the best response.	Same content, but wording was changed to be more clear.
7	Dynamic Management	Maintain streamflow to mitigate estuarine temperature increases and salinity changes. Activities to help maintain streamflow could include: - upland water management (e.g., implement best management practices) - dam releases - upland restoration - building and using water retention ponds (land owners draw water from ponds rather than stream)	

8	Education	~~Develop a comprehensive education/outreach plan to address all of the 10 categories of strategy approaches in this report, including: partnerships with environmental education organizations, schools and other public entities, social media and other communication strategies, interpretive signage and collaboration with other agencies and public entities to create a goal for climate literacy.~~ Develop a Climate Education Plan to detail and document the incorporation of climate change messaging, stories, and solutions into existing education programs.	This strategy was revised significantly with input from the Superintendent and the Education Program Coordinator.

9	Education	~~Enhance education programs (including marsh and tidepool education and interpretation programs) through training and guidance to communicate the implications of climate change and the exacerbating stressor of trampling and recreation on coastal habitats. Target existing programs (e.g. Duxbury and Fitzgerald Marine Reserves) and identify other highly-visited areas that need attention from volunteer docents (e.g. Pillar Point, Bean Hollow, Pigeon Point). Docents should all have a common training core that includes climate change impacts and the exacerbating stressor of trampling and recreation on intertidal habitats, as well as tidepool etiquette and safety and the impact that impaired safety will have on natural resources. (i.e. boat groundings and the impact of emergency response). Strategies could include SLR visualizations and clean-ups.~~ Enhance tidepool education and interpretation programs through training and guidance to communicate the implications of climate change and the exacerbating stressor of tidepool visitation and recreational extraction on coastal habitats. Develop a common training core for docents that includes climate change impacts and the exacerbating stressor of tidepool visitation and recreational extraction on intertidal habitats, as well as tidepool etiquette and safety and the impact that impaired safety will have on natural resources. (e.g. boat groundings and the impact of emergency response).	This strategy was revised significantly with input from the Superintendent and the Education Program Coordinator.

10	Habitat Protection and Restoration	Remove or modify structures that disrupt the delivery of sediment via long-shore sediment transport (jetties, breakwaters, storm and wastewater discharge pipes), and coastal and near-shore structures that contribute to erosion. Prioritize areas that are already impacted by these structures, and remove where possible. If the structure cannot be removed, then enable for managed retreat (for bluffs to feed the beach as sea level rises) and support beach nourishment to allow for beach expansion.	
11	Habitat Protection and Restoration	Create local and regional sediment management plans for full range of the sanctuary that are climate informed.	
12	Habitat Protection and Restoration	Restrict and direct human access on cliff base, face and top; including motorized transport.	
13	Habitat Protection and Restoration	Monitor dredge materials to be used for beach restoration or expansion for contaminants, make sure existing regulatory mechanisms control for contaminant exposure and take into account interaction with additional stresses form climate change (e.g. temperature, dilution concentrations, pH)	

14	Habitat Protection and Restoration	In the aftermath of a spill of oil or other contaminant, ensure that restoration of affected areas takes into account climate considerations (type of restoration, location of restoration, what should actually be restored based on climate envelope modeling to predict what species will likely become dominant). Oil spill restoration plans need to explicitly account for climate impacts on restoration of affected sites.	
15	Habitat Protection and Restoration	Identify and purchase 1) cliff lands that are less likely to erode to provide enduring cliff habitat and public access, and 2) lands behind cliffs to allow for landward migration of cliff habitat.	
16	Habitat Protection and Restoration	Stabilize cliffs through revegetation (with native, climate appropriate species) and natural netting (e.g. jute, not chain-link fence). Design any hardening methods to take into account ecosystem needs (e.g. seabird nesting).	
17	Habitat Protection and Restoration	In restoration projects, use native, drought tolerant and heat resistant species or strains that fulfill ecological function of beach and dune processes.	
18	Habitat Protection and Restoration	Restore and/or create high marsh/upland transitional vegetation, wetland habitat, and deltas in areas that are flood-prone for multiple purposes: to accommodate landward marsh migration, to provide refuge habitat for marsh and upland species during high tide events, and to provide flood protection	
19	Habitat Protection and Restoration	Construct/augment coastal dunes. Remove/relocate shoreward constraints to dune movement and evolutions.	

20	Habitat Protection and Restoration	~~Protect beaches in order to protect cliffs (see beach strategies: 4, 8-11, 13, 14, 17, 19, 22, 23, 25-27, 29, 32-39, 42, 44, 45, 49, 50, 54, 59, 60, 62, 66-71, 75, 76, 78).~~ Protect and enhance beaches in order to provide a buffer to SLR and storms to protect vulnerable cliffs	Wording of this strategy was revised.
21	Human Disturbance	~~Manage human access to critical rocky intertidal areas. The type of access to rocky intertidal ecosystems that seemed appropriate in the 1960s may not be as appropriate now based on current knowledge of the increasing impact of people on these changing and likely more fragile ecosystems.~~ Manage access to rocky intertidal habitat that serve as climate change refugia. Identify locations in the study region with functional rocky intertidal habitat that is less vulnerable to the impacts of climate change, including sea level rise, increased air temperatures, wave action, pH, and erosion, and may serve as climate refugia for rocky intertidal organisms. Identify site-specific methods to manage access to these areas to limit human disturbance.	"Restrict" was changed to "Manage", as the Sanctuary will review impacts and then consider appropriate management actions to address those impacts. Strategy was then re-written to reflect priorities.
22	Human Disturbance	With the expectation that climate change impacts (such as those from storm activity and sea level rise) will reduce or change ~~cause~~ major marine mammal haul-outs and seabird nesting sites, provide protections for new sites, including climate change refugia. ~~to change~~, ~~monitor and identify new locations of major marine mammal haul-outs and seabird nesting sites (see strategy 43) and provide protections for those locations.~~ Reduce human disturbance, especially during times of heavy surf and inundation that will reduce availability of these habitats. Protect from major sources of disturbance from land, air and sea when appropriate, either as Special Closures, low overflight regulation zones or land-based closures. ~~For example, NPS creates seasonal closure depending on the location of new elephant seal colonies and exposure to storm surf.~~	Minor wording changes.

	Human Disturbance	Reduce acoustic impacts and ship strikes on large whales in the Sanctuary by supporting the implementation of the Vessel Strikes and Acoustic Impacts (2012) Report.	Vulnerability Assessment identified ship strikes and acoustic impacts as the primary threat to blue whales; as climate impacts are less significant and difficult to manage, this is the ideal pursuit for decreasing vulnerability of large whales in the Sanctuary.
23	Human Disturbance	Minimize access through dunes to protect dune stability.	
24	Invasive Species Management	Prevent non-native invasive species establishment (aquatic and terrestrial) in estuaries, rocky intertidal, and pelagic environments. Potential activities to prevent establishment include: - plant natives (e.g., in disturbed areas) - remove invasive species that are near/adjacent to estuaries that have the potential to invade (e.g., invasive tunicate, green crabs). - enhance education to recreational users and communities to prevent boaters, etc. from aiding in introductions.	Last bullet point added; additional habitats added

25	Invasive Species Management	~~Review and possibly change the definition of introduced/invasive/non-native aquatic and terrestrial species for management.~~Clarify the definition of introduced/invasive/non-native aquatic and terrestrial species to take climate-induced changes into account.~~-~~An example for aquatic species may be that if it is a California Current species, it should be managed as a native, and expansions into the study area should be considered a migration or expansion.	Re-worded to be more clear. The Sanctuary will review our regulations to ensure they are taking climate considerations into account and will consider revising appropriately. Currently, the definition of introduced species is very broad, and may need to be revised.
26	Invasive Species Management	Enhance/establish the detection and monitoring of species changes (southern species moving north, northern species moving out and invasive species moving in) via a novel rapid assessment program. Organize a workshop with regional monitoring programs (PISCO, MARINe, LiMPETS, PRNS, CDFW) to develop a rapid assessment program and/or determine if an existing program may adequately serve this role. Determine how to leverage existing efforts. Focus on existing sampling sites (e.g. MARINe), and include both less disturbed sites, and urban/highly visited sites like Fitzgerald and Duxbury where volunteers and visitors can be engaged. Leverage citizen science networks and programs.~~Something similar to Reef Check, partner with PISCO and MARINe (currently monitoring sites two times per year, needs to be more frequent and in more locations). Engage land managers (such as PRNS, CDFW, Sanctuary via LiMPETS) to leverage pre-existing efforts to detect and monitor. Create a uniformity of practice across the region.~~	More detail added
27	Invasive Species Management	~~Rapid response of non-native invasive species removal following detection to protect natural systems (e.g., control invasives via: manual removal, flooding, fire in transition zones; reestablish natives).~~ Following detection of invasive species, conduct rapid response of non-native invasive species removal to protect natural systems.	

28	Invasive Species Management	Remove non-native invasive plants (e.g. jubata grass) that undermine cliff integrity, and where appropriate, replant with natives or drought-/heat- tolerant species that support cliff structure.	
29	Landward Migration	To the extent practicable, remove/redesign roads in locations that act as barriers to natural expansion of habitats. Prioritize roads that are already impacted by high tides and start with those immediately. Always remove roads where possible; if not possible, redesign the road. Steps to accomplish this action in a changing climate include: 1) Identify areas that: A) are critical for estuary expansion and that have roads that impede estuary migration, and B) have roads vulnerable to sea level rise, flooding, other climate impacts 2) Develop Rapid Climate-Ready Response plans: develop plans that will allow for road removal/redesign in case of a disaster (e.g., road is wiped out in a flood) 3a) Post-disaster (flooding/road failure): implement the Rapid Climate-Ready Response plan to move/redesign road to a enhance future resilience 3b) If road is not impacted by climate change/extreme events, remove/redesign the road as available during standard maintenance schedule timeframes (i.e., when the opportunity arises to replace/redesign the road, take it)	

30	Landward Migration	For roads that can't be raised/moved, or in conjunction with raising/moving roads, look for opportunities to create functional habitat (e.g., replace hard/grey infrastructure such as rip-rap with living shorelines and migration space)	Combined with strategy 29
31	Landward Migration	~~For locations identified as having coastal area available for developing new intertidal habitat (see strategy 43), allow cliffs to erode to create new habitat. Discourage the creation of seawalls that would inhibit cliff erosion.~~ For locations identified as having appropriate substrate available under eroding coastlines for potential colonization and creation of new intertidal habitat (see strategy 42), allow those areas to erode to create new habitat. Discourage the creation of structures that would inhibit erosion. For locations identified as not having available substrate under eroding coastlines, protect and stabilize those areas from erosion in order to protect intertidal habitat from smothering (refer to the following cliff protection strategies: 12,16, 53).	Removed "rocky" from strategy description of the intertidal to make this more broad and applicable to other habitats (e.g. beach, dune). Added more detail for clarity
32	Landward Migration	Explore legal and economic mechanisms to encourage coastal habitat protection in exchange for something analogous to an agricultural tax credit (e.g. coastal protection tax credit or transfer of development rights).	

33	Landward Migration	Exclude development in critical habitat areas and areas of potential habitat expansion through various policy changes. Exclusion language should be integrated into policies for retrofitting existing buildings, new construction, and rebuilding post-disaster. Add sea level rise conditions to general plans and local coastal plan updates.	
34	Landward Migration	Prioritize locations, purchase or redesignate available land for inland movement of beach and dune habitat, using Open Space/Conservation Easements	
35	Landward Migration	Move or remove infrastructure that blocks or impedes habitat migration, or presents a potential risk of contamination to critical habitats, including utilities (e.g. power lines, sewer pipes), buildings, roads, or agriculture endeavors.	
36	Landward Migration	Work with counties to zone for protection of dunes and cliffs (setbacks, buffers, moratoria, elevate structures, designate areas of special biological interest for protection) to reflect changing coastal conditions	
37	Landward Migration	Consider the removal of seawalls (including rip rap) and make associated modifications to support retreat.	
38	Landward Migration	Assess the need to move or modify visitor facilities, pavement, and parking lots.	
39	Science Needs	Develop a systematic research and science agenda to inform climate-smart adaptation.	Redundant with ongoing efforts.

40	Science Needs	Conduct regional inventory and modeling to identify how existing estuaries may change and identify potential areas for estuary expansion; use this information to set regional adaptation priorities. This effort includes: - completing current estuary inventory - identifying values of different estuaries (e.g., estuary harbors endangered species [or those that may become so], has valuable wilderness character, soundscapes, landscapes, lightscapes, pinniped breeding sites and haulouts, salmon habitat, etc.] - identifying where future estuary habitat may move - better understanding how habitat types may change, and - better understanding and modeling system dynamics, and how they may change (e.g., how tidal prism may change) If possible: - Model entire region, utilizing current information/regional efforts and modeled future changes to identify net changes to estuaries - If not, model specific sites of management interest - If really limited, look only at the information we currently have (e.g., OCOF model) rather than conducting new modeling	Lead agency changed because this is beyond the scope of the sanctuary.
41	Science Needs	~~Capitalize on natural extreme events to increase monitoring and knowledge of estuary processes and climate change impacts~~ Conduct monitoring before and following natural extreme events to build on knowledge of climate change impacts to estuarine processes and to inform adaptive management ~~(e.g., monitor impacts of projected El Nino, study closed/open estuaries) and to inform the general public.~~	Re-wording

42	Science Needs	Determine the source of sediment for vulnerable beaches in order to improve sediment supply processes.	
43	Science Needs	Identify future viable locations for rocky intertidal habitat migration inland either through modeling or known information (how do rocky intertidal areas form, and would there be available rock inland for habitat migration? Is there rock under the cliff bluffs or under the sand?). Identify future viable locations for seabird and marine mammal breeding sites and haul-outs.	
44	Species Protection	Designate, expand, and increase enforcement of resource management areas to enhance and support special protections for target species in the context of climate change.	
45	Water Quality Management	Improve storm water management by reducing combined sewer overflow events.	
46	Water Quality Management	Capture and redirect storm water away from cliff face into better infiltration systems to reduce erosion and avoid landslides.	

47	Water Quality Management	Consider stricter prohibitions for effluent flows of excessive fertilizer and excessive sediment via TMDLs to address stressors of excessive nutrients at low flow times and resulting algal blooms and excessive sediment on rocky intertidal habitat, both of which are likely to increase in severity due to climate change impacts. 1) Watershed managers and regional water quality control boards should enforce TMDLs with forestry operations, municipalities, agriculture, etc. to limit exposure of coastal and ocean habitats to excessive sediment and nutrients. 2) Incorporate climate considerations into formulation of TMDLs in specific locations (see site specific category) to respond to predicted climate change impacts on outflows of sediment, toxins and nutrients. See publication: http://pubs.acs.org/doi/pdf/10.1021/acs.est.5b00909. ~~To prevent algal blooms, Regional Water Quality Control Boards that manage TMDLs for nutrients should consider stricter prohibitions for effluent flows of excessive fertilizer to address stressors of excessive nutrients at low flow times into the ocean, a situation likely to get worse with climate change.~~	Combined with strategy below, some re-wording.

48	Water Quality Management	Take a watershed approach for rocky intertidal areas near estuary mouths, streams, etc. to limit sediment and improve water quality entering from the watershed: 1) Watershed managers and regional water quality control boards should enforce TMDLs with forestry operations, municipalities, agriculture, etc. to limit sediment coming down into the intertidal area. 2) Incorporate climate considerations into formulation of TMDLs in specific locations (see site specific category) to respond to predicted climate change impacts on outflows of sediment, toxins and nutrients.	Combined with strategy 47.
49	Water Quality Management	Improve storm water management by creating bioswales and other urban run-off reduction tools (e.g. permeable pavement, street trees/catchment/storage).	
50	Water Quality Management	Improve storm water management by reducing agricultural (croplands and livestock) run-off (buffer strips).	
51	Alleviate Climate Impacts	Restore lower intertidal mussel beds and algae, including sea palms (a species identified as vulnerable), to reduce impact of wave energy on intertidal zones by enhancing physical/structural resistance. ~~to lessen impacts of storms on intertidal zones by enhancing structural roughness (physical/structural resistance).~~	Timeframe was changed to long-term, and the word "enhanced" was removed from the strategy description. Re-wording

52	Alleviate Climate Impacts	Restore subtidal kelp forests to attenuate waves and buffer from enhanced storm activity.	
53	Alleviate Climate Impacts	Restore surfgrass *(Phyllospadix)* and algal species to act as aqueous canopies and provide shading to reduce temperatures and reduce evaporation in tide pools.	Removed "enhanced" from strategy description.
54	Alleviate Climate Impacts	Diminish heat stress by testing the efficacy of shade delivery systems (including nest umbrellas/boxes/tents and revegetation) or encouraging animals to nest in more protected areas.	This strategy was eliminated because the sanctuary does not support active manipulate to maintain a steady state for any ecosystem on an on-going basis.
55	Dynamic Management	Manage the bar: - create a breach if estuary closes and conditions are detrimental to estuarine species or resources of interest - actively close the bar if estuary is open and conditions are detrimental to estuarine species or resources of interest	This strategy was eliminated because the sanctuary does not support active manipulate to maintain a steady state for any ecosystem on an on-going basis.
56	Dynamic Management	Reconsider sediment requirements and stream management mandates to ensure sustainable sediment delivery to estuaries. Activities could include: - conduct sediment study for each estuary site to determine if estuary is sediment-starved or keeping pace with sea level rise - recommend that sediment management plans be climate-informed	
57	Habitat Protection and Restoration	Protect and restore eelgrass in areas that have been adversely affected by human activities, and where restoration will have co-benefits (reducing wave energy and erosion). ~~such as aquaculture operations, moorings or other infrastructure.~~	Replaced "promote" with "restore" because language was unclear. 2nd clause was added, activity examples removed.

58	Habitat Protection and Restoration	Remove overgrowth of macroalgae (ulva blooms) from rocky intertidal habitat as they occur.	This strategy has been eliminated because it is not clear when ulva blooms are natural or due to pollution - this impact should instead be addressed at the source through water quality management. Risks to intertidal communities may outweight benefits.
59	Habitat Protection and Restoration	Beach nourishment	This strategy has been eliminated because it is redundant with strategy 10 - locations specifics have been merged.
60	Habitat Protection and Restoration	Install beach sediment traps (add good jetties, giant fine mesh nets, sand flume cells) to accumulate sediment where needed.	This strategy was eliminated because the sanctuary does not support active manipulate to maintain a steady state for any ecosystem on an on-going basis.
61	Habitat Protection and Restoration	Restrict livestock access to cliff top, including rotational grazing plans.	
62	Habitat Protection and Restoration	Evaluate and remove or modify barriers to riverine flow and sediment supply (dams, bridges, culverts, and flood-control gates) to allow for greater sediment transport to beaches and estuaries.	
63	Habitat Protection and Restoration	Restore marshlands to enhance water flow and balance sediment transport. Activities could include sinuous channelization.	

64	Habitat Protection and Restoration	If a barrier is required to protect human infrastructure, determine the most beneficial material to use and the best design to encourage rocky intertidal species to colonize and/or migrate landward. This is not a recommendation to create new barriers, and should only be implemented where totally necessary, or the barrier is already in place and opportunities exist to refashion the barrier / infrastructure in a way that promotes a simultaneous habitat use with the barrier.	Sanctuary regulations do not allow armoring below mean high tide.
65	Habitat Protection and Restoration	Protect cliffs from erosion to protect rocky intertidal habitat from smothering (see cliff protection strategies: 8, 9, 11, 12, 14-16, 20, 22, 25-29, 33, 35, 39, 46, 54, 61,69).	Combined with strategy 31
66	Human Disturbance	Prepare for increased beach use in the event that climate change results in dryer, sunnier weather, including managing traffic, litter, visitor services, ~~etc~~. , and visitor activities. Manage the density and distribution of beach users if beaches become to impacted by high visitation, while protecting the public's right to access the coast.	2nd part of statement added
67	Human Disturbance	Manage pet beach experience/access (leashes, locations)	Considered a part of managing visitor activities (in above strategy)
68	Human Disturbance	Manage or control density and distribution of beach users if beaches become too impacted by high visitation, while respecting the public's right to access the coast.	Combined with strategy 66.

69	Landward Migration	Provide incentives for people to voluntarily relocate in areas that were, or could be, sensitive habitat, or where development reduces habitat resilience: - Incentivize managed retreat if space is available - Initiate and practice land trading (e.g., trade less valuable park land for private land that is vulnerable to flooding and that currently blocks habitat migration) - Purchase land, when possible, to facilitate habitat migration	
70	Landward Migration	~~Create~~ Explore a Transfer of Development Rights program in areas needing protection to reflect changing coastal conditions. In hazard areas or sensitive habitat areas that will be threatened by SLR over time, transfer development rights from vacant lots not suitable for development to other locations in the jurisdiction	
71	Landward Migration	Work with County general plans and coastal zone LCPs to consider development in anticipation of sea level rise.	
72	Science Needs	Promote estuarine research to enhance eelgrasss restoration efforts. Identify most critical research questions based on management needs for eelgrass restoration. Develop an Eelgrass Research Plan to inform management and restoration activities, start with Tomales Bay and Bolinas Lagoon. ~~Major research questions may include:~~ ~~- Eelgrass distribution: why is there no eelgrass in Bolinas and Pescadero?~~ ~~- Do salinity and turbidity affect eelgrass establishment and persistence?~~	Questions moved to activity within strategy.

73	Science Needs	Pursue and encourage research in OA-mitigation methods that remove CO2 from seawater, following the recommendations of the West Coast Ocean Acidification and Hypoxia Panel (Chan et al. 2016). ~~including the restoration of photosynthesizers (kelp, surfgrass) to locally mitigate the impacts of OA and sequester carbon. Sanctuary should seek partnerships with technical experts who wish to establish experimental treatment plots to test these mitigation techniques.~~	Removed expansion term; 2nd clause added. Content removed is instead in specific activities.
74	Science Needs	Better understand climate impacts on larval dispersal to ensure that larval source locations are effectively protected within the MPA system and are able to reach various intertidal areas (inside and outside MPAs). Investigate larval dispersal of key species and how this relates to distances among MPAs. Also consider important areas that are not currently designated MPAs.	
	Science Needs	To provide greater protection of critical biogenic habitats and key species, map the full extent of blue carbon habitat (seagrass beds, tidal marshes) and biogenic habitat (bull kelp beds, deep sea corals) in the Sanctuary.	Research by Climate Program Coordinator indicated a critical need to understand the full distribution of these habitat types in order to inform future implementation of strategies and to inform future blue carbon habitat restoration.
	Science Needs	To track the impact of ocean acidification and inform the development of new protections, increase monitoring of pH, CaCO3, and water column indicator species.	A need indicated by our Science Coordinator
75	Species Protection	Augment haul-out and nesting sites: floating haul outs, larger buoys, artificial offshore floating structures	This strategy was eliminated; Sanctuary will not recommend to other agencies that modifications of this nature be made.

76	Species Protection	Support animal rescue and rehabilitation services.	Intent and responsibility not clear, no direct tie to climate change, and a very general statement.
77	Species Protection	Incorporate climate change into fisheries management to address the impact of ocean acidification and climate stressors. Exact strategy would depend on how specific species are being impacted. Monitoring to track impacts and effectiveness of regulations will be needed.	
78	Water Quality Management	Manage for flash flood and high flow events that might adversely affect existing and new vegetation by increasing absorption and decreasing runoff. Strategies may include: improve culverts, pumps, tide gates, bridges, stream management, increased use of permeable pavement and increased absorption opportunity, all communities require rain barrels.	

Climate Action Plan
Eliminated
Other agencies
Added