B.E.A.C.O.N.
Beach Erosion Authority for Clean Oceans and Nourishment

A California Joint Powers Agency

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NOTICE MEETING

BEACH EROSION AUTHORITY FOR CLEAN OCEANS AND NOURISHMENT (BEACON)
SCIENCE ADVISORY COMMITTEE (SAC)
MEETING

Tuesday,
September 14, 2021
Time: 1:00-3:00 pm

NOTICE IS HEREBY GIVEN of a **MEETING** of the Beach Erosion Authority for Clean Oceans and Nourishment (BEACON) Science Advisory Committee. The date, time, and place of the meeting shall be as follows:

DATE: **TUESDAY, SEPTEMBER 14, 2021**
TIME: **1:00 pm-3:00 pm**
PLACE: **TELECONFERENCE (see details below)**

The agenda of business to be conducted is below.

MARC BEYELER, BEACON SCIENCE DIRECTOR
DATE: **TUESDAY, SEPTEMBER 14, 2021**

On June 11, 2021 and effective immediately, Governor Newsom issued Executive Orders N-07-21 and N-08-21, which rescinds some prior Executive Orders related to COVID-19, but Executive Order N-08-21 states that some other prior Executive Orders related to COVID-19 still remain necessary to help California respond to, recover from, and mitigate the impacts of the COVID-19 pandemic. Consistent with Executive Order N-08-21, the BEACON SAC Advisory Board will meet via teleconferencing, and members of the public may observe and address the meeting as shown below, but may not participate in-person.

The following alternative methods of participation are available to the public:

1. **You may observe the live meeting of the SCIENCE ADVISORY COMMITTEE via Zoom Meeting:**

September 14, 2021 Time: 1:00 pm-3:00 pm

Join Zoom Meeting

https://us02web.zoom.us/j/88664403071?pwd=VmdyTlE4VUU0M0FEL0FFbFJHbFJvZz09

Meeting ID:-886 6440 3071

Passcode: 117209

2. **You may call in to listen live to the Science Advisory Committee Meeting by dialing:**

   +1 669 900 6833 US (San Jose); 88664403071#,,,,*117209

3. **If you wish to make a general public comment or to comment on a specific agenda item, the following methods are available:**

a. **Distribution to the Science Advisory Committee. Submit comments via email to Staff@Beacon.ca.gov prior to 5:00 p.m. on September 13, or through mail to BEACON Attn: Science Advisory Committee at 501 Poli Street, Ventura, Ca 93001 to be received no later than 5:00 p.m. on September 13th. Your comment will be placed into the record and distributed appropriately.**

b. **Read into the record at the meeting. Submit comments of 250 words, or less, via email to Staff@Beacon.ca.gov prior to 5:00 p.m. on September 13, 2021, 2021 prior to the SAC meeting. Please indicate if you would like to make a general public comment, a comment on a specific agenda item, or both. Please state in your email, or mail, if you would like the comment "read into the record." Every effort will be made to read your comment into the record, but some comments may not be read due to time limitations. Comments timely received on an agenda item will be placed into the record and distributed accordingly.**

c. **By Zoom. Log onto Zoom as described above. The meeting will be controlled by the BEACON Executive Director. If you wish to make a comment during the agenda item for public comment, please raise your hand using the Zoom instructions on your computer. By using the typed messaging capability of Zoom you should also indicate to the Executive Director which Agenda Item you wish to speak on or if you wish to make a general comment that is not specific to an Agenda Item. BEACON Staff will make every effort to call you during the indicated item so that you may comment.**

In compliance with the Americans with Disabilities Act, individuals needing special accommodations to participate in the meeting should contact BEACON at least three working days prior to the meeting.

BEACON Science Advisory Committee (SAC) MEETING AGENDA

September 14, 2021
1:00 pm-3:00 pm

1. **Administrative Items**
   A. **Call to Order and Roll Call – Dr. Patsch, SAC Co-Chair; Marc Beyeler**
   B. **Consideration and Approval of the Minutes of the BEACON SAC Meeting of January 29, 2021. Co-Chair Patsch; ED Marc Beyeler**
2. **Presentation and Discussion of Draft Final Research Agenda. Co-Chairs**
3. **Presentation and Discussion of Draft Final Research Agenda Implementation Schedule. Co-Chairs and Executive Director**
4. **Consider Adopting the draft Final Research Agenda. Co-Chairs and SAC**
5. **Session Wrap-Up Summary-Next Steps**
6. **Adjournment. Co-Chairs**

Late Distribution of Materials

Any disclosable public records related to an open session item on a regular meeting agenda and distributed by the City Clerk to all or a majority of the members of the BEACON Board less than 72 hours prior to that meeting are available for inspection in the City Clerk Office, at 5775 Carpinteria Ave, Carpinteria, CA. 93013 and on the Internet at: BEACON.CA.GOV.

Any written ex-parte communication subject to disclosure by members of the BEACON Board may be published online as an attachment to the corresponding item.

BEACON SCIENCE ADVISORY COMMITTE MEETING MINUTES

DATE: Friday, April 23, 2021
TIME: 11:00 AM
PLACE: TELECONFERENCE

Item	1A	Call to Order and Roll Call– Co-Chair, Dr. Patsch
Minutes/ Actions:	**Members Present:** **RECORD** • **Dr. Kiki Patsch** • **Dr. Doug George (joined late)** • **Mr. Robert Battalio PE** • **Dr. Jenifer Dugan** • **Dr. Lesley Ewing PE** • **Dr. Philip King** • **Dr. Charles Lester** • **Dr. Dan Reineman** • **Dr. David Revell** • **Dr. Dan Hoover- absent** • **Dr. Sean Vitousek** • **Dr. Kristen Goodrich** **Also in attendance BEACON Executive Director Marc Beyeler and CA Sea Grant Program Coordinator Nick Sadrpour.** **?? introduced herself as a member of the public.**	

Item	1B	Consideration and Approval of Minutes of the BEACON SAC Meeting held on January 29, 2021- Dr. Patsch
Minutes/ Actions:	Motion by Dr. Patsch Second by Dr. Ewing PE Yes- Dr. Vitousek, Dr. Revell, Dr. Reineman, Dr. Lester, Dr. King, Dr. Goodrich, Dr. Ewing PE, Dr. Dugan, Mr. Battalio PE, Dr. Patsch No- none Abstain- none	

Item	2	Presentation and Discussion of Draft Science Research Agenda -Dr. Patsch, Marc Beyeler
Minutes/ Actions:	Co-Chair Dr. Patsch introduced the background of presenting action plan to SAC, getting feedback through both SAC meetings in January and the process of how the content now in Draft Science Research Agenda reflects the information collected through the meetings and spreadsheet exercise. Mr. Sadrpour provided further details on how the document was developed. Mr Battalio PE commented that multiple scenarios must be considered when developing alternatives. Dr. Patsch referenced Dr. Ewing PE's comments on timeline, scenarios, and the importance of considering that in this planning process. Executive Director Beyeler highlighted the considerations of climate projects and timeline. Dr. Reineman inquired if BEACON has specific scenarios for modeling/planning or if the CA Coastal Commission time horizon/sea level rise scenarios were used? Executive Director Beyeler clarified that BEACON does not have its own but utilizes state guidance including the new state Sea Level Rise Principles, and now as a function of planning has accepted the scenarios 3.5 ft by 2050 and generally accepted state scenarios and objectives. Dr. Revell agreed on the importance of trying to follow state guidance. There have been decisions made on past guidance to influence based efforts and modeling. May want to keep caveat on not just the newest guidance, but the best available science. What's observed and verified. For BEACON, we need to think about other aspects besides SLR: precipitation, sediment yield, wave conditions, etc. Sort of a second tier of scenarios: droughts, wave climate.	

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	Dr. Ewing PE highlight the need to consider groundwater as well. From the commission perspective, discuss SLR scenarios first in planning, then second in design. That is important for triggers. BEACON can help encourage going forward, to have members identify in LCPs opportunity for triggers to change approach so that it can be regionally consistent. Executive Director Beyeler commented that the hope is to address that by bringing the managers together at a workshop. It's a bit of a call and response between the SAC and managers. What do the manager's need from science to do affective regional adaptation planning? For example, coordinated and aligned regional monitoring. The local municipalities are presenting SLR planning and adaptation actions to the BEACON Board to help coordinate activities and identify how BEACON can support the regional effort towards coastal resilience goals. We are hoping to increase combined watershed/precipitation to coastal hazards understanding, but we've struggled to get traction with that. We've synthesized a narrative description of the topic with implementation of the actions related to them including collaborations and partnerships. We are looking to improve that with you all and other partners. Mr. Battalio PE mentioned our language could be specific, when we talk about scenarios, combined flooding, we can extend the concept towards guidance on parameters used in scenarios, how do you characterize future precipitation/storm intensity? There are multiple ways to do it but some coordination would be helpful. If a city is going to look at river and creek flow, it'd be good to address climate scenario models. Dr. Revell agreed with Mr. Battalio PE and felt the SAC is appropriate for standardizing these concepts, scenarios, and parameters. Dr. Patch agreed. Dr. King agreed with the comments and added a hypothetical that in the future: Some larger beaches may get more attendance as the smaller beaches disappear. Looking at how we think attendance and social science might respond to sea level rise has been a challenge to deal with but will be increasingly important. Dr. Lester commented that the discussion sounded like somewhat of a sensitivity analysis of vulnerability assessments, the connection seems to be to the governance and management, what scenarios we choose is a function of what people want to understand about resources are. Part about tying back to goals and objectives. Why are we advising about science? Monitoring for why? Understand change to beaches why? This relates to Dr. King's comments because we want to determine how these parameters are linked with coastal use and management. Seems like it's a good next step to interact with managers Dr. Patsch tied this train of through to the managers' workshop and thinking about coproduction of science Dr. Goodrich pointed out that Figure 1 seemed pretty linear and asked if there is a way to illustrate it that it's more iterative? Mr. Sadrpour commented that the goal of Figure 1 is for the SAC to see themselves in the process, certainly the SAC is involved in some capacity in many of these activities and trying to include specifically 'where does the SAC fit" since it has a really a big lift. Dr. Goodrich acknowledged this and pointed to how TRNERR utilized scenarios in climate change planning efforts. Mr. Battalio PE commented that we also need to think about where other participants, member agencies, and stakeholders fit in. Dr. Ewing PE appreciated that this group is great because she always learns something new about Santa Barbara, and it'd be great to build an inventory of what's been done and ways to consolidate it so that we don't repeat efforts but leverage and the SAC can strategically identify where to better encourage, prioritize, and support needed research. Executive Director Beyeler highlighted Dr. Ewing PE's comment because it overlaps heavily with the goal of these BEACON efforts. No action was required to be taken.

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Item	**3**	**Presentation and Discussion of Draft Research Agenda Implementation Schedule**
Minutes/ Actions:	Mr. Sadrpour provided an introduction to the Implementation Schedule. Developed with a timeline over next 2 years and nested under the focus areas. Executive Director Beyeler clarified that the schedule is ambitious and part of it is being opportunistic applying for grants or other outside funding opportunities. Hoping to identify these areas of opportunity but also acknowledge what is currently in the que. In the time since the BEACON SAC has been established there have been at least three grants awarded that are very relevant to the Draft Science Research Agenda: 1. Permit streamlining for beneficial use of sediment under OPC's Prop 68 2. Dr. Lester's analysis of adaptation planning and 3. Dr. Patch, Dr. Reineman, Dr. King, and Dr. Lester's Beach Sustainability Assessment funded through CSU Coast and California Sea Grant. We also want to highlight the Science Initiatives that are active in the region so that we can work to align, coordinate, and leverage these efforts. Additionally try to support where the gaps are and where BEACON can make the most impact. We've begun to summarize the municipal entity efforts and beginning to fill these buckets that have Dr. Revell pointed out the science initiatives seem regional in scope, but for site specific efforts; for himself and Mr. Battalio PE there are other activities that could be listed. How do we take the site-specific efforts and incorporate them? Executive Director Beyeler asked the SAC to help with this. Maybe there isn't a good repository for project level results and data. Maybe BEACON can serve as a data repository for the project specific information. Perhaps new implementation task could be to identify where site specific information, or regional information could be useful for. Dr. Lester commented that is a perfect example, what you want to achieve will help determine what scale your study needs to be. Dr. Patsch mentioned if we had a regional scale to identify the most important beach, then there might be a project ongoing at that beach we are unaware of. Dr. Dugan said that Dr. Revell's comment reminded her that as an ecologist, understanding all the BEACON/non-BEACON projects, in particular flood control, projects done at a site are critical and currently many are unknown to her and others. Having information where project monitoring or other smaller dredge disposal projects have happened where some information exists and it can be pooled together. Sort of a history of efforts for beaches of importance in the BEACON landscape. There are a lot of missing pieces and where we can thread them together, emergency, project, ongoing, that could really help dialing in what we can expect from a beach, from an ecological perspective particularly. Dr. Ewing PE followed up mentioning one of the other parts of this, is the identification of the full range of regional partners including State Parks, CalTrans, and many others. Dr. Reineman commented that assessing the full range of projects happening and entities involved would help progress BEACON efforts. A similar effort in Monterey tried to coordinate the research and management entities in the area. What we're discussing is how BEACON can be a hub. A goal unto itself could be a repository and connector hub. Maybe it's a new Implementation Task: Coordination and serving as connector. Seems it could be as a value, and we are uniquely positioned. Dr. Vitousek agreed saying it could sort of function as a repository and a rolodex of what's going on and who are the people doing it. Dr. King commented that we need a graduate student who can help with this effort. Co-Chair Dr. George joined meeting at 12:04 Dr. Dugan agreed mentioning that a grad student or CA Sea Grant Fellow working on the historical efforts, projects, and people could make a lot of progress. What has happened at each of the beaches, where are the studies, etc. Executive Director Beyeler really appreciated the discussion and valued the input. The data collection sometimes isn't the challenge, but the management, update, upkeep of it is often more challenging from a financial standpoint. We identify needs that are currently not being meet, and we go to entities	

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	that are supposed to fill that gap. Sea Grant, OPC, etc. Often it's project level and there are short timeframes and often getting support for these efforts are challenging. One important thing to point out is that BEACON is hoping to add ex-officio members like the agencies mentioned. Dr. King seconded Executive Director Beyeler. Often this pitch isn't made to the entities that should care about. If we did a benefit cost analysis, the benefits would far out weigh the costs. We should do it. No action was required to be taken.

Item	**4**	**Discussion of Draft Managers' Workshop Agenda**
Minutes/ Actions:	Dr. George reviewed the planning schedule for the Manager's Workshop. Highlighting that the co-production aspect is trying to bring the managers and scientists together from the beginning. What the needs are, what science is going on, and how can the science satisfy the needs. We've focused on the scientists with SAC, we've had discussion with managers and hope to prioritize the mangers at the June 2021 workshop, then next year we're hoping to have a summit that incorporates both the scientists and the managers. Executive Director Beyeler provided an overview of the Manager's Workshop to be held in June 2021, including that the goal is to help connect the pieces of all that has been discussed to better integrate management needs into science endeavors and inform managers of ongoing scientific activities. It's not just the managers by themselves, we invite the SAC to participate. We hope to highlight managers to kick off the workshop about what they want/need in terms of science support. As mentioned, we have a survey out now to the managers to help gain input before the workshop. Trying to prioritize the managers as the perspective of the discussion. Dr. George agreed and wanted to add that we want to get away from siloing SAC and mangers and this is a first effort to bridge that gap. Dr. Lester asked if we start that with a regional set of goals for the workshop? Executive Director Beyeler replied that he has prompted the managers to be focused around what are the regional needs that BEACON can support them locally. This information exchange can help with the linkage from the municipal level to the regional level. Our manager's assemblage in June is a bit of not only the municipal staff/managers but also other agency and stakeholder staff. We don't need just what one agency needs, but what they need in a regional context? State Parks own as much of the beaches in Santa Barbara Littoral Cell as any other. Dr. King agreed with Dr. Lester commented, we need to change the conversation so that it's not just all about hyper local issues. Executive Director Beyeler welcomed any and all feedback to help change that through agenda setting. Dr. George walked through draft workshop agenda. Dr. King asked if some breakout group could focus on social science needs? Maybe ask people to "talk about something in the BEACON region that is needed other than from your specific jurisdiction". Dr. Revell asked if there are specific staff from specific municipalities targeted. It'd be great to see the list and see if there are gaps. Executive Director Beyeler mentioned we can share the invite list with the SAC. Dr. Dugan commented that as a part of the CEVA project, we had an interesting experience. What happened is we had so much turnover in the managers through the course of the project. Just want us to think about turnover and prepare for that. Every meeting we felt like we were almost starting over. Given the timescale of the effort, when we talk about choosing the managers, we should come fully aware. More time to bring new people up to speed from the managers' site. Dr. George mentioned that hopefully the roundtable can be a part of the beginning of the workshop where we can shift focus from just local jurisdictions. For the small groups we certainly invite and encourage SAC participation and we can disperse you throughout the breakout groups. Then we will	

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	present Draft Research Agenda and other efforts of the SAC to the managers. We tried to identify big themes to prompt the science relevant discussions. Dr. Revell highlight that one important question to ask is what experience have they endured where they wish they had better scientific information or access to it? Those shared experience can help them come with examples without us pre-judging what they need or think. Executive Director Beyeler agreed, as much as we know, we don't know. We will share the invite list and feel free to provide more names. Additionally, if there are leaders or key people that you think we should coordinate with more please let us know. We welcome that and it can only improve our effort. Dr. Lester mentioned that spending time looking at overlap or potential overlap of these managers to present the commonalities or shared goals that these entities might have. Seeing what the shared managers interest are. Assuming most of the managers have something to do with the shoreline, but do they know shared understanding. Maybe it's a matrix of the different entities? Dr. Dugan agreed that a larger regional context, interconnectedness is needed. Downstream and upstream factors that affects what happens and especially the performance of a particular project. Dr. George closed out the meeting highlight that materials will be distributed to the SAC before the Managers' Workshop in June. No action was required to be taken.

Item	**5**	**Session Wrap-Up Summary**
Minutes/ Actions:	The SAC Co-Chairs explained that follow up from the Manager's Workshop, reviewing the Draft Research Agenda and corresponding Implementation Schedule, and adopting a meeting schedule would be continued at the following SAC meeting session to be scheduled in September 2021. **Public comment was solicited after each agenda item. No public comment was received except where noted.**	

Adjourn to next regular meeting to be scheduled in September 2021 by Teleconference or Video

Conference. Meeting Minutes by Nick Sadrpour, Program Coordinator, California Sea Grant.

REVIEW DRAFT
BEACON RESEARCH AGENDA

A Research Agenda for the BEACON Coast and the Santa Barbara Littoral Cell

Prepared by the BEACON Science Advisory Committee (SAC)
Review Draft September 2021

REVIEW DRAFT

A Research Agenda for the BEACON Coast and the Santa Barbara Littoral Cell 2021-2026

BEACON Science Advisory Committee

September 2021

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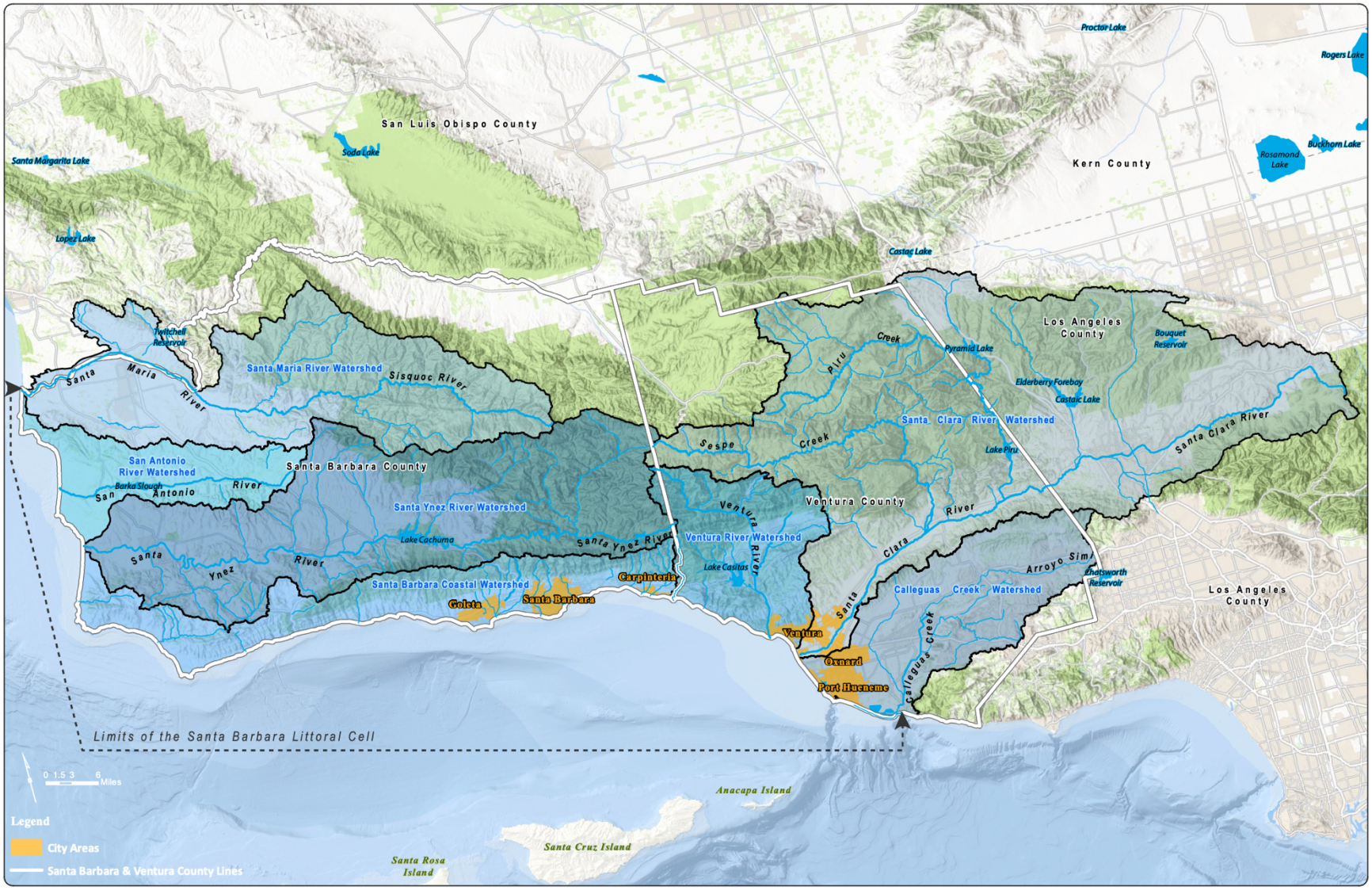


Figure 1. BEACON “Coast” and the Santa Barbara Littoral Cell

Overview: Linking Science Research and Regional Management

For the past year and one-half, BEACON executive staff and Board have been developing and implementing policies and plans for expanded science support for BEACON's programs and projects. In November 2020, the BEACON Board approved Bylaws for a BEACON Science Advisory Committee (SAC) and confirmed the initial leadership and membership of the SAC (BEACON, 2020; 2021). Starting in January 2021, the BEACON SAC has been meeting and reviewing how science research and data collection can be enhanced and expanded to better inform decision-making, and address the related topics of regional sediment management (RSM), coastal resource and ecosystem management, and regional climate change and sea level rise (SLR) adaptation planning.[1]

The BEACON "Coast" (Figure 1) is the largest littoral cell along the California Coast, stretching more than 140 miles from the Santa Maria River in the north to the Mugu Submarine Canyon to the east. The Santa Barbara Littoral Cell (SBLC) drains several large coastal watersheds providing sediment and sand to the coast. This important coastal region faces many threats and many challenges, including many management and governance demands, requiring BEACON to seek out the best available science and support any new initiatives, or activities that would assist with improved decision-making and improved outcomes.

BEACON's Coastal Regional Sediment Management Plan (CRSMP) (BEACON 2009) outlines key understandings and management strategies. Particularly, beach nourishment (including beneficial reuse of sediment) has been a long-term strategy used in conjunction with coastal engineering and shoreline stabilization techniques. Going forward there is critical need to better understand policy, regulatory, and funding aspects of coastal regional sediment management (BEACON 2021c, Ulibarri et al., 2020). Additionally, there are gaps of understanding from the physical and engineering perspective of sediment grain size, placement technique, source, and stockpiling where additional research can help inform specific management actions (Ludka et al. 2018, Ludka et al., 2016, Pendleton et al., 2012).

This document outlines an initial draft Research Agenda supporting management and decision-making for regional sediment management, coastal resource management and regional climate change and sea-level rise adaptation planning. BEACON is in a unique position to better connect science and policy as it acts in many important ways as a boundary organization[2] translating science and technical information for decision-makers and the public.

The key objective going forward is to bridge identified gaps between science and decision-making, better integrating science into BEACON's program and project initiatives. BEACON can serve as a facilitator, connecting regional to local coastal resilience, science, and decision-making. While the pace of science research in the BEACON coast is accelerating, the pathways between these science efforts and BEACON's programs and policies remain weak.

[1] SAC Agenda and Meeting Minutes, January 19, 2021 and SAC Agenda and Meeting Minutes, January 29, 2021.

[2] Boundary organizations often perform important translation functions in making complex scientific and technical information 'understandable' to more generalist decision-makers, stakeholders and members of the public.

Figure 2 highlights the process and framework for coordinating and integrating science and insight from the SAC into BEACON activities. As illustrated, the development of this Science Research Agenda is an iterative process that requires regular evaluation and feedback from both the SAC and relevant managers and stakeholders. There are several discrete steps that have been followed by BEACON in the process of developing the Research Agenda, including:

- Preparing a Science Strategy, identifying the need for the SAC and the need for a Science Action Plan;
- Identifying the elements of a Science Action Plan; Establishing the SAC;
- Preparing a set of Science Goals and Objectives; Completing an initial Science and Data Gap Analysis;
- Developing priorities for an initial BEACON Research Agenda; Convening a Managers-Scientists Workshop;
- Preparing the BEACON Research Agenda, and developing a short-term Research Agenda Implementation Plan.

Importantly, the initial Science Goals and Objectives and recommended action items have been included in BEACON's first Strategic Planning Goals and Objectives document, adopted in March 2021. (BEACON, 2021).

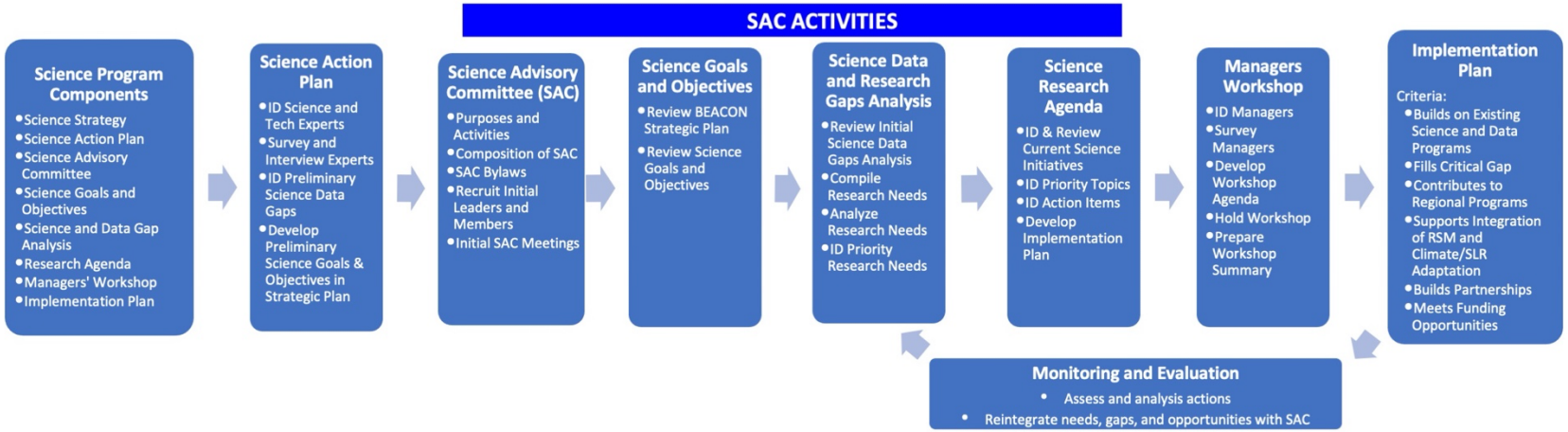


Figure 2. Process flow chart of developing and gathering feedback on BEACON's Science Research Agenda with ongoing feedback with the SAC and managers.

Gaps in Science, Data, Knowledge, and Policy

Currently, several different data collection and research efforts focused on coastal sediment processes, coastal and ocean physical systems, and a range of climate adaptation needs are being undertaken by partner organizations which could help inform BEACON's regional sediment management actions going forward (BEACON 2009) Appendix B.

BEACON staff and board members, as well as BEACON's member agency managers, need to better understand current data collection and research efforts, gaps in the collection of data, and identify future data collection and research needs. Additionally, BEACON can support increased integration of these science initiatives to support decision-making, and link pathways from science to decision-making, including climate adaptation and coastal resilience.

This proposed research agenda addresses gaps in science and data to support policy, programs, and projects addressing regional management, including related gaps covering a range of topics: Management and Decision Science, Physical Conditions and Shoreline Changes, Social and Economic Conditions and Trends, Coastal Ecology, Ecosystem Services, and restoration science and practice (see Figure 3).

Draft Research Agenda Focus Topics and Suggested Implementation Actions

The Draft BEACON Science Action Plan (2020) identified several areas of research focus which the SAC reviewed at its sessions in January 2021. SAC members added and further elaborated on these topics, identifying early implementation priorities, continuing data needs, and frameworks and mechanisms for organizing research priorities and activities at its meeting in April 2021.

Below are the research focus areas identified by the BEACON SAC:

- *Management and Decision Science*
- *Integrating Climate Science into BEACON Policies, Programs and Projects*
- *Regional Monitoring Programs*
    - *Physical Shoreline Data Collection and Monitoring*
    - *Coastal Ecology and Ecological Regional Monitoring*
    - *Human Use and Economics Data Collection and Monitoring*
- *Interdisciplinary Research*
- *Modeling*
- *Prototyping and Demonstration Projects*

Management and Decision Science

BEACON should expand its focus on governance and management science in order to broaden and improve its effectiveness as a regional leader through multi-agency and interdisciplinary coordination, capacity building, and program implementation (Goodrich et al., 2020). Examining the connections between science and policy in an effort to improve them, will require BEACON to bring to bear an analysis and evaluation of governance and management science techniques and methods. Identifying and assessing adaptation pathways will also require a focus on governance and management typologies and evaluation methods (Norgaard et al., 2021). This includes the use of a range of analytical tools and activities including

focused surveys and workshops of member agencies and relevant researchers, a range of different normative and formative evaluation techniques, and various planning tools, such as scenario planning.

Additionally, of key importance, is BEACON's role as a convener within the region helping share lessons learned from demonstration projects and best practices within the region. The distilling and translating of research, monitoring, and modeling information can support advancements in local efforts to help achieve regional goals (Goodrich and Warrick, 2015).

Regional goals are necessary to drive the form, function, and evaluation of activities pursued by BEACON. Along with climate change impacts, management and governance touches every other aspect of this Science Research Agenda. Through any number of governance and adaptive planning and iterative frameworks, BEACON can champion advancements in regional coastal management through science supported decision making.

These holistic approaches require establishment of regional goals that drive a monitoring and inventory of coastal resources, assessment of changes to those resources, an understanding of feasible actions to implement, and ongoing monitoring to ensure actions meet the designated goals of managing those coastal resources. Figure A-1 (Appendix A) illustrates a framework of an iterative process that can integrate management and governance science with the other major themes identified by the SAC: interdisciplinary, climate science, modeling and prototyping, and monitoring, focused on regional goals.

Early Implementation Actions:

- Expand coordination role and activities analyzing and implementing best options to increase coordination and connections, including acting as hub, serving as connector, and/or functioning as a repository
- Continue and expand upon focused efforts to link scientists through the BEACON SAC, and develop expanded partnerships with local and regional managers such as ongoing Managers Workshops and targeted integration of science (including social science) efforts to better understand how science activities can contribute to achieving management goals. Consider appointing a Manager Liaison to the SAC to facilitate direct communication between groups.

Integrating Climate Science into BEACON Policies, Programs and Projects

Climate change and sea level rise represent the most serious threat to successful sediment management and coastal adaptation within the BEACON coast. BEACON must integrate up-to-date climate science into its policies, programs, and projects (BEACON, 2016, King et al., 2015). Recent science and technical reports and studies detail projected changes from climate and SLR, including extreme events and impacts on regional shoreline. For example, Vitousek et al. (2017) found that 31-67% of beaches in Southern California could be lost due to shoreline change under SLR projections of 0.93-2.0m in the absence of any adaptation interventions. Study of the 2015-16 El Niño winter demonstrated the need for higher spatial and

temporal resolution of shoreline monitoring through LiDAR or satellite imagery to better understand how the shifts of mean wave direction and energy correspond with shoreline changes (Smith and Barnard, 2020, Barnard et al., 2017).

These resources and other assessments should be expanded and further downscaled to the BEACON coast and these new science and research efforts should guide BEACON's incorporation of climate change and SLR considerations into a Climate and SLR Update to the CRSMP (BEACON 2009).

Early Implementation Actions*:*

- Develop work plans to integrate climate and SLR impacts into regional sediment management plans focused on downscaled regional shoreline models and watershed coastal flooding models.
- Identify, catalogue, and continue to keep up to date local jurisdiction assessment and planning documents that incorporate sea level rise and climate science into coastal resource management
- Develop Regional Adaptation Strategy Report to support a SLR Update to the Coastal Regional Sediment Management Plan (CRSMP).

Regional Monitoring Programs

Implementing BEACON's programs and projects need to be supported by continuing regional monitoring, including US Geological Survey's (USGS) shoreline profiling, and expanded regional monitoring program incorporating ecological baseline data and information, and human use and user information.

Early Implementation Actions*:*

- Further work towards coordination of regional monitoring (of all types) including data standardization, shared data repository for local projects to feed into, and some initial analysis and metrics to help local managers easily use and implement monitoring information, including importantly, bluff-based beaches, and align the various monitoring programs to better leverage one another.

Physical Shoreline Data Collection and Monitoring: Monitoring physical changes to the coastline has been a long priority of BEACON, its member agencies, and partners. Fortunately, there exists a robust surveying program through the USGS for much of the Santa Barbara and Ventura coastline. Additionally, there are other various physical monitoring efforts including those that utilize student groups at CSU Channel Islands led by SAC co-chair Dr. Kiki Patsch, and the Community Alliance for Surveying the Topography of Sandy Beaches (CoAST SB) program sponsored by California Sea Grant. Additionally, various ad hoc monitoring occurs to a limited extent around coastal development projects. While these activities provide ample information about the physical status of the beaches, BEACON should take a leadership role to better align the monitoring programs to fill spatial and temporal gaps, as well as to focus efforts around management needs.

Early Implementation Actions*:*

- Extend shoreline physical profiling to all regional beaches and align the various monitoring programs to better leverage one another.

Coastal Ecology and Ecological Regional Monitoring: Less ecological research has been conducted in the past twenty years within the BEACON coast than physical science. However, BEACON's sediment management efforts have relied on available physical and ecological science initiatives addressing regional sediment management program and project impacts. Going forward, BEACON's sediment management and climate change adaptation programs and activities should expand support for up-to-date ecological research focused on coastal and marine ecosystems, habitats, and species, particularly shoreline and marine environments including sensitive beach and intertidal areas (Barnard et al., 2021, Myers, et al. 2019).

There are opportunities to attenuate climate change related impacts to different coastal habitats, including beaches and wetlands. Local governments can manage these ecosystems and the surrounding area so they more effectively sustain ecosystem services and the beneficial services they provide into the future (e.g. stopping beach grooming and restoring wide beaches so dunes can form; allowing both wetlands and beaches to transgress inland; removal of shoreline armoring and effective sediment management), contributing to an ecosystem-based adaptation (Schooler et al., 2019, Myers, et.al., 2019). At the same time, there is a need to better understand the potential for ecological impacts of specific coastal management features and strategies (e.g. groins, revetments, nourishment activities, etc.) as well as a better understanding of the immediate, cumulative, and long term ecological impacts of these (Griggs et al., 2020, Dugan and Hubbard, 2011).

Regional Ecosystem Goals- The SAC discussed two models of regional ecosystem goal setting for habitat and resource restoration in CA that may offer some lessons learned, including the San Francisco Bay Habitat Goals program (SCC, 2010-18) and the Southern California Wetlands Recovery Program (SCC, 2018).

Early Implementation Actions*:*

- Develop a Sandy Beach Habitat and Species Framework Analysis and expand baseline data collection of habitat and species conditions within the region.
- Develop draft scope of work for an Ecosystem Goals Program

Human Use and Economics Data Collection and Monitoring: Over the past twenty years, BEACON has incorporated available coastal user and economic data into its program and project development, supporting the collection and assessment of baseline human use and economic information. These data remain incomplete, however, and BEACON needs to support expanded social science data collection and analysis to support its sediment management, climate adaptation, and ongoing coastal resilience efforts (King et al. 2018, King and McGregor, 2012).

Currently, many social science topics addressing governance, institutional competencies, and law and policy remain un- and under-studied. Socio-economic data, including beach use data, "is stale or inaccurate" (King, 2021). The BEACON study area needs more human use research with regard to the following: (1) Who visits, why, and where are they from? (2) What mechanisms can improve underserved communities access and use of BEACON's beaches? (3) What is the economic impact of BEACON's beach visitation? (4) How will sea level rise and other anthropogenic changes impact BEACON's beaches and beach visitation?.

Early Implementation Actions*:*

- Update human beach use and beach user information, including socio-economics, and investigate development of a data portal housed at BEACON or a local university.

Interdisciplinary Research

BEACON's programs and projects have to address combined social and ecological systems (SES) if they are to be successful. Regional sediment management approaches emphasize the development of multiple benefit projects that address both environmental and social benefits. Increasing efforts within the BEACON coast are being directed to interdisciplinary analysis but gaps and voids remain (Myers et al., 2019). Through the SAC activities and objectives identified in the Science Action Plan, BEACON will have the requisite information to intentionally encourage interdisciplinary science for improved decision-making. The Santa Barbara Area Coastal Ecosystem Vulnerability Assessment (CEVA) analyzed future changes to southern Santa Barbara County climate, beaches, watersheds, wetland habitats and beach ecosystems. This framework can be implemented in Ventura County providing for a consistent analysis of ecosystem vulnerability for the BEACON region.

Early Implementation Actions:

- Extend the CEVA framework analysis from Santa Barbara County to the Santa Barbara Littoral Cell encompassing Ventura County.

Modeling

BEACON needs to continue to support and expand modeling efforts of partners that can help provide insight to innovative regional sediment management and SLR adaptation solutions. BEACON has supported efforts to model regional climate and SLR impacts on coastal resources and supported modeling efforts aimed at better understanding sediment transport and fate dynamics on a littoral cell basis. BEACON should further this work and include watershed scale approaches that link upper reaches of fluvial systems with coastal environments. This information can directly lead to advancements in the development of and understanding of various prototypes of coastal adaptation strategies and shoreline stabilization techniques.

BEACON should support updating and refining regional down-scaling of climate, and weather models, with a particular focus on extreme events, that address coastal watershed and coastal ocean conditions affecting both sediment management and coastal adaptation.

Early Implementation Actions:

- Seek funding to support further modeling efforts focused on watershed to littoral cell processes and regional downscaling of climate linked impacts (e.g. sea level rise, temperature, fire, precipitation, and flooding) including a focus on extreme events.
- Continue to support data collection and modeling of sediment source, transport, and fate of a variety of grain sizes to help inform coastal adaptation activities (e.g. beach nourishment/beneficial use, prototyping shoreline stabilization projects, dredge material placement, identifying priority monitoring areas, etc.)

Prototyping

BEACON has been a long-time supporter of proof-of-concept demonstration projects, involving living shoreline treatment projects, and innovative coastal resource restoration projects, including integrated beach and dune restoration and 'managed retreat' projects.

BEACON should continue to support innovative prototyping efforts, including sand stabilization and retention structures, such as 'green' groins that prioritize mimicking natural cobble berm features. These efforts can better establish the type and extent of impacts (positive and negative) coastal resilience strategies have on natural environments (Ventura County, 2019). In particular this includes building experimental design components into projects with alternative features to support designing strategies that produce the best results to achieve local and regional goals (i.e., ecological, recreational, protective, etc.).

Early Implementation Actions:

- Develop one or more new research project(s) focused on innovative sediment retention structures that are environmentally sound and provide resilient features.

Research Agenda Early Implementation Actions Summary

- Expand coordination role and activities analyzing and implementing best options to increase coordination and connections, including acting as hub, serving as connector, and/or functioning as a repository
- Continue and expand upon focused efforts to link scientists through the BEACON SAC, and develop expanded partnerships with local and regional managers such as ongoing Managers Workshops and targeted integration of science (including social science) efforts to better understand how science activities can contribute to achieving management goals. Consider appointing a Manager Liaison to the SAC to facilitate direct communication between groups.
- Develop work plans to integrate climate and SLR impacts into regional sediment management plans focused on downscaled regional shoreline models and watershed coastal flooding models.
- Identify, catalogue, and continue to keep up to date local jurisdiction assessment and planning documents that incorporate sea level rise and climate science into coastal resource management
- Develop Regional Adaptation Strategy Report to support a SLR Update to the Coastal Regional Sediment Management Plan (CRSMP).
- Further work towards coordination of regional monitoring (of all types) including data standardization, shared data repository for local projects to feed into, and some initial analysis and metrics to help local managers easily use and implement monitoring information, including importantly, bluff-based beaches, and align the various monitoring programs to better leverage one another.
- Extend shoreline physical profiling to all regional beaches and align the various monitoring programs to better leverage one another.
- Develop a Sandy Beach Habitat and Species Framework Analysis and expand baseline data collection of habitat and species conditions within the region.
- Develop draft scope of work for an Ecosystem Goals Program
- Update human beach use and beach user information, including socio-economics, and investigate development of a data portal housed at BEACON or a local university.
- Extend the CEVA framework analysis from Santa Barbara County to the Santa Barbara Littoral Cell encompassing Ventura County.
- Seek funding to support further modeling efforts focused on watershed to littoral cell processes and regional downscaling of climate linked impacts (e.g. Sea level rise, temperature, fire, precipitation, and flooding) including a focus on extreme events.

- Continue to support data collection and modeling of sediment source, transport, and fate of a variety of grain sizes to help inform coastal adaptation activities (e.g. beach nourishment/beneficial use, prototyping shoreline stabilization projects, dredge material placement, identifying priority monitoring areas, etc.)
- Develop one or more research project(s) focused on innovative sediment retention structures that are environmentally sound and provide resilient features.

Research Agenda Implementation Schedule 2021-2022

The implementation schedule below highlights key activities to be initiated, or expanded and enlarged, in the next two years in support of ongoing and proposed BEACON activities. Leveraging external sources, BEACON has secured funding for some of the early implementation activities recommended and will be working with project partners to implement portions of the recommended actions and activities, including considering developing coordinated regional monitoring programs, and supporting demonstration projects to evaluate project effectiveness and feasibility and potential applicability to other coastal sites and locations.

Reseach Agenda Implementation Schedule 2021-2022

Topic	Implementation Task	2021 Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2022 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Reseach Agenda																							
	Implementation Schedule	Draft	SAC	Revised		Mgr Review				Revised		Final											
Mgmt and Decision																							
	Science-Policy Pathways							Draft WP		Final WP		Regulatory Agency Workshops											
Sed Mgm and SLR																							
	SLR Update-CRSMP							Draft WP		Revised WP													
	Sed Fines-T&F Model	Draft WP	Final WP	Coop Agmt		Modeling						Draft Results			Final Results								
	Model Regional Permit							Draft WP		Final WP		Regulatory Agency Workshops						Develop Performance Criteria					
Regional Monitoring																							
	Reg. Monitoring Program Review								Gap Analysis			ID prioity Monitoring Topics											
	Physical																						
	Aligning Regional Monitoring			Initial Discussion		Cont. Discussion																	
	Extend Shoreline Profiling											Develop Target Locations			Cooperative Agreement; Work Plan			Year One Expanded Shoreline Profiling					
	Ecological																						
	Extend CEVA to Ventura County								Draft WP														
	Sandy Beach Habitat and Species Ecology	Draft WP	Final WP	Coop Agmt										Framework Analysis				Select Regional Beaches Assessments					
	Develop Regional Ecological Goals																						
	Socio-Economic																						
	Updating User Data	ID Target Beaches-Cooperative Agmt; Funding				Data Acquisition			Data Analysis														
	Socio-Economic Data Portal	SG Prop						Full Prop				Agmt	WP	Feas & Options Analysis				Develop Prototype Data Portal					
	Develop Regional Recretionlal Goals																						
Interdisciplinary																							
	Extend CEVA to Ventura County								Draft WP														
Modeling	**Integrated Regional Modeling**																						
	Regional SLR-Climate Downscaling																						
	Regional Beaches Vulnerabilty Model	Draft WP	Final WP	Coop Agmt																			
	Watershed Extreme Event Flood Model																						
Prototyping	**Shoreline Retention and Stabilization**																						
	Beach-Dune LS		Surfers Point Final Permits									Final Bid Drawings						Monitoring Pgm		Installation			
	Green Groins																						
	Reefs-Oil Piers Demo Pjt																						
	Funded pojects																						
	Unfunded																						

Figure 3. Research Agenda Implementation Schedule 2021-2022

Sources and References

P.L. Barnard, et.al. (2009). Coastal Processes Study of Santa Barbara and Ventura Counties, California. United States Geological Survey (USGS). Report 2009-1029.

Barnard, P. L., Dugan, J. E., Page, H. M., Wood, N. J., Hart, J. A. F., Cayan, D. R., Erikson, L. H., Hubbard, D. M., Myers, M. R., Melack, J. M., & Iacobellis, S. F. (2021). Multiple climate change-driven tipping points for coastal systems. *Scientific Reports 2021 11:1*, *11*(1), 1–13. https://doi.org/10.1038/s41598-021-94942-7

BEACON. (2009). Coastal Regional Sediment Management Plan- Central Coast from Pt. Conception to Pt. Mugu. https://beacon.ca.gov/wp-content/uploads/2021/03/CRSMP.pdf

BEACON. (2010). Sensitive Shoreline and Nearshore Resources and Shoreline Types Within the BEACON Jurisdictional Region. Beach Erosion Authority for Clean Oceans and Nourishment, August, 2010.

BEACON. (2011). COASTAL REGIONAL SEDIMENT MANAGEMENT PLAN FINAL Focused Programmatic Environmental Impact Report (Revised) Beach Erosion Authority for Clean Oceans and Nourishment (BEACON) March 2011.

BEACON. (2016). BEACON Survey. BEACON Board Meeting, March 2016, Ventura, CA.

BEACON. (2020a). BEACON Science Advisory Committee (SAC) Bylaws, adopted November 20, 2020.

BEACON. (2020b). BEACON Science Advisory Committee (SAC) Membership, approved November 20, 2020.

BEACON. (2021a). Draft BEACON Science Action Plan, January 2021.

BEACON. (2021b). BEACON SAC Agenda and Meeting Minutes, January 19, 2021 and January 29, 2021.

BEACON. (2021c). BEACON SAC Managers Workshop, June 17, 2021 Workshop Summary

California Coastal Conservancy. (1999; 2014). San Francisco Baylands Ecosystem Habitat Goals Report; Baylands Ecosystem Habitat Goals Technical Update. California State Coastal Conservancy, Oakland, CA.

California Coastal Conservancy. (2010). San Francisco Subtidal Habitat Goals 50 Year Conservation Plan. California State Coastal Conservancy, Oakland, CA.

California Coastal Conservancy. (2018). Regional Strategy, 2018. California State Coastal Conservancy, Oakland, CA.

California Coastal Commission. (2015). Improved Valuation of Impacts to Recreation, Public Access and Beach Ecology from Shoreline Armoring, Administrative Draft, September 28, 2015, San Francisco, Ca.

Chambers Group, Inc. (2001). BIOLOGICAL REPORT: Appendix B., Moffatt & Nichol Engineers. 2001. Technical Report, South Central Coast Beach Enhancement Program Criteria and Concept Design. February 2001. Prepared for

Coastal Frontiers. (2000). Fall 2000 BEACON Beach Profile Survey Letter Report. January 2, 2001. Prepared for BEACON.

Dean, RG. (1988). Sediment Budget BEACON Project - Santa Barbara to Point Mugu. Report prepared for Noble Consultants. 18 pp.

Department of Boating and Waterways and State Coastal Conservancy. (2002.) California Beach Restoration Study. January 2002. Sacramento, California.

Dugan, J.E. and David M. Hubbard. (2011). Ecological Effects of Coastal Armoring: A Summary of Recent Results for Exposed Sandy Beaches in Southern California.

Finzi Hart J.A., P. M. Grifman, S. C. Moser, A. Abeles, M. R. Myers, S. C. Schlosser, J. A. Ekstrom (2012). *Rising to the Challenge: Results of the 2011 Coastal California Adaptation Needs Assessment.* USCSG-TR-01-2012.

Goodrich, K. A. and Jonathan A. Warrick. (2015). Fines: Rethinking our Relationship. The Proceedings of the Coastal Sediments. https://doi.org/10.1142/9789814689977_0148

Goodrich, Kristen A., George, D. A., Beyeler, M, Grifman, P, Sadrpour, N. (2020). Toward improved coastal sediment management through coordination in California, Shore & Beach, 88(3), 31-38. https://doi.org/10.34237/1008833

Griggs, G., Kiki Patsch (2018). Natural changes and human impacts on the sand budgets and beach widths of the Zuma and Santa Monica cells, Southern California. Shore & Beach 86, (1), Winter 2018.

Gary Griggs, Kiki Patsch, Charles , K., Lester, and Ryan C., & Anderson, R. (2020). Groins, sand retention, and the future of Southern California's beaches. *Shore & Beach*, Vol. 88, No. 2, Spring 2020. 14–36. https://doi.org/10.34237/1008822

Goals Project. (2015). The Baylands and Climate Change: What Can We Do. Baylands Ecosystem Habitat Goals Update 2015 prepared by the San Francisco Bay Area Wetlands Ecosystem Goals Project. California State Coastal Conservancy, Oakland, CA.

Judge, J., Newkirk, S., Leo, K., Heady, W., Hayden, M., Veloz, S., Cheng, T., Battalio, B., Ursell, T., and Small, M. (2017). Case Studies of Natural Shoreline Infrastructure in Coastal California: A Component of *Identification of Natural Infrastructure Options for Adapting to Sea Level Rise* (California's Fourth Climate Change Assessment). The Nature Conservancy, Arlington, VA. 38 pp.

King, Philip. (2006). The Economics of Regional Sediment Management in Ventura and Santa Barbara Counties, prepared for the California State Resources Agency, fall 2006, prepared for the Coastal Sediment Management Work group (CSMW): http://dbw.ca.gov/CSMW/PDF/Economics_of_RSM_0706.pdf. And Prepared under contract to BEACON.

King, P.G. (2021). Presentation to Implementing and Scaling Resilient Solutions in Coastal California, University of California, Irvine, March 3, 2021.

King and McGregor. (2013). Managing Sandy Beaches. Prepared for the Beach Erosion Authority for Clean Oceans and Nourishment (BEACON). Ventura, Ca.

King, P.G., McGregor, A. R., & Whittet, J. D. (2015). Can California coastal managers plan for sea-level rise in a cost-effective way? *Http://Dx.Doi.Org/10.1080/09640568.2014.985291*, *59*(1), 98–119. https://doi.org/10.1080/09640568.2014.985291

King, P.G, McGregor, A. (2012). Who's counting: An analysis of beach attendance estimates and methodologies in southern California. *Ocean and Coastal Management*, *58*, 17–25. https://doi.org/10.1016/j.ocecoaman.2011.12.005

King, P. G., Nelsen, C., Dugan, J.E., Hubbard, D.M., Martin, K.L., Battalio, R.T. (2018). Valuing beach ecosystems in an age of retreat. Shore and Beach, 86(4) 45-59.

Ludka, B.C., Gallien, T.W., Crosby, S.C., Guza, R.T., 2016. Mid-El Niño erosion at nourished and unnourished Southern California beaches. Geophys. Res. Lett. 43, 4510–4516. https://doi.org/10.1002/2016GL068612

Ludka, B.C., Guza, R.T., O'Reilly, W.C., 2018. Nourishment evolution and impacts at four southern California beaches: A sand volume analysis. Coast. Eng. 136, 96–105.https://doi.org/10.1016/j.coastaleng.2018.02.

Moffatt & Nichol Engineers. (2005). Implementation Guidelines and Compliance Protocol. February 2005. Prepared for BEACON.

Moser, S., J. Finzi Hart, A. Newton Mann, N. Sadrpour, and P. Grifman (2018). "Growing Effort, Growing Challenge: Findings from the 2016 CA Coastal Adaptation Needs Assessment Survey." *California's Fourth Climate Change Assessment.*

Myers, M.R., Barnard, P.L., Beighley, E., Cayan, D.R., Dugan, J.E., Feng, D., Hubbard, D.M., Iacobellis, S.F., Melack, J.M., Page, H.M. (2019). A multidisciplinary coastal vulnerability assessment for local government focused on ecosystems, Santa Barbara area, California. Ocean Coast. Manag. 104921. https://doi.org/10.1016/j.ocecoaman.2019.104921

Norgaard, R. B., Wiens, J. A., Brandt, S. B., Canuel, E. A., Collier, T. K., Dale, V. H., Fernando, H. J. S., Holzer, T. L., Luoma, S. N., & Resh, V. H. (2021). Preparing Scientists, Policymakers, and Managers for a Fast-Forward Future. *San Francisco Estuary and Watershed Science*, *19*(2). https://doi.org/10.15447/SFEWS.2021V19ISS2ART2

Patsch, KGriggs, G. (2008). A sand budget for the Santa Barbara littoral cell, California. Mar. Geol. 252 (1–2), 50–61. https://doi.org/10.1016/j.margeo.2008.01.013.

Pendleton, L., Mohn, C., Vaughn, R.K., King, P.G., Zoulas, J.G. (2012). Size matters: The economic value of beach Erosion and Nourishment in Southern California. Contemp. Econ. Policy 30, 223–237. https://doi.org/10.1111/j.1465-7287.2011.00257.

Rosov, Brad, Stephanie Bush, Tiffany Roberts Briggs, Nicoloe Elko. (2016). The State of understanding the impacts of beach nourishment activities on infaunal communities. Shore & Beach, Vol. 84., No. 3, Summer 2016.

Schooler, N.K., Dugan, J.E., Hubbard, D.M., Straughan, D. (2017). Local scale processes drive long-term change in biodiversity of sandy beach ecosystems. Ecol. Evol. 7 (13), 4822–4834. https://doi.org/10.1002/ece3.3064.

Schooler, N. K., Dugan, J. E., & Hubbard, D. M. (2019). No lines in the sand: Impacts of intense mechanized maintenance regimes on sandy beach ecosystems span the intertidal zone on urban coasts. *Ecological Indicators*, *106*. https://doi.org/10.1016/j.ecolind.2019.105457

Smith, S.A. and P.L. Barnard. 2020. The Impacts of the 2015/2016 El Niño on California's Sandy Beaches, Geomorphology (2020), https://doi.org/10.1016/j.geomorph.2020.107583.

Ulibarri, N., Goodrich, K. A., Wagle, P., Brand, M., Matthew, R., Stein, E. D., & Sanders, B. F. (2020). Barriers and opportunities for beneficial reuse of sediment to support coastal resilience. *Ocean and Coastal Management*, *195*. https://doi.org/10.1016/j.ocecoaman.2020.105287

U.S. Army Corps of Engineers. (1978). Survey of Beach Erosion Conditions, Ventura County. USACoE, Los Angeles District, Coastal Planning Division, Los Angeles, CA.

U.S. Army Corps of Engineers, (1997). Santa Barbara and Ventura Counties Shoreline, California Draft Reconnaissance Report. US Army Engineer District Los Angeles, Los Angeles, CA.

US Army Corps of Engineers. (2018). California Regional Assessment, National Shoreline Management Study, September 2018.

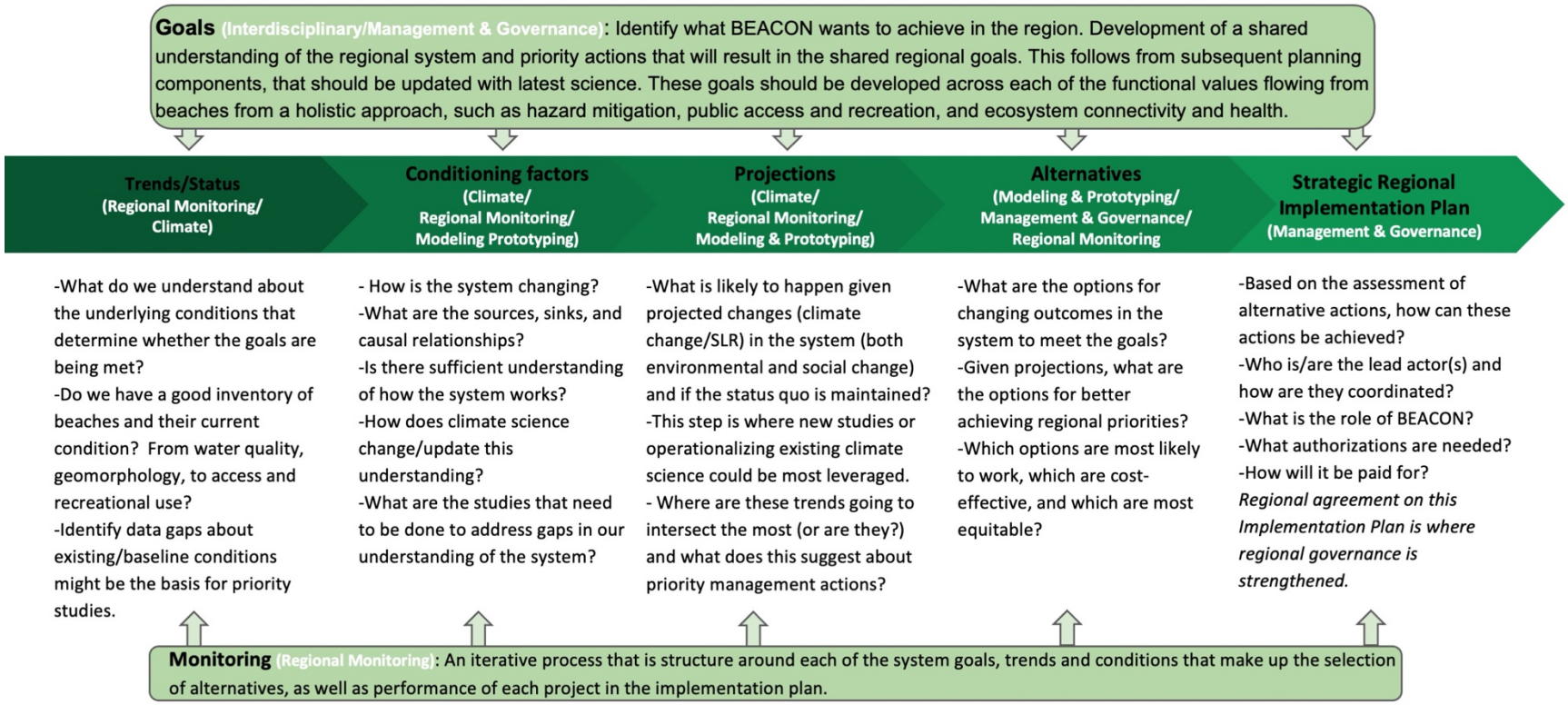
U.S. Army Corps of Engineers. (2006). Coastal Sediment Analysis Tool (CSBAT) Beta Version-Sediment Management Decision Support Tool for Santa Barbara and Ventura Counties, Draft Technical Report for U.S. Army Corps of Engineers, Los Angeles District, June 2006.

Ventura County. (2019). VC Resilient Coastal Adaptation Project- Sea Level Rise Adaptation Strategies Report. County of Ventura Resource Management Agency-Planning Division. https://docs.vcrma.org/images/pdf/planning/programs/vcrcap/adaptation_report_final.pdf

Vitousek, S., P. L. Barnard, P. Limber,L. Erikson, and B. Cole. (2017). A model integrating longshore and cross-shore processes for predicting long-term shoreline response to climate change, J. Geophys. Res. Earth Surf., 122, 782–806, doi:10.1002/2016JF004065.

Warrick, J.A., 2013. Dispersal of fine sediment in nearshore coastal waters. Journal of Coastal Research, 29(3), 579–596. Coconut Creek (Florida), ISSN 0749-0208.

Appendix A
Figure A-1.



Appendix B

Relevant Reseach and Science Initiatives in SBLC

Research Initiative	Sponsor Agency	Research Topic	Geographic Extent	Principal Investigator(s)	Time Period	Research Focus	Source of Funds	Cooperating Agencies	Link to Available Resources
Shoreline Monitoring	USGS	Physical Monitoring	SBLC-Elwood-Pt. Mugu	Dan Hoover	1995-present	Shoreline monitoring	USGS	BEACON	
SBC LTER	NSF	Ecological Monitoring	Santa Barbara Channel (local focus)	Bob Miller	2000-present	Kelp ecosystem monitoring		NSF, UCSB, MSI, LTER network	https://sbclter.msi.ucsb.edu/
SBC LTER Kelp Monitoring	UCSB	Ecological Monitoring	Coal Oil Point Reserve	Jessica Nielsen	2012 to present	Kelp monitoring			https://copr.nrs.ucsb.edu/about/programs/subtidal-monitoring
Multi-Agency Rocky Intertidal Network (MARINe)	BOEM, NPS, OPC, PISCO, US Navy	Ecological Monitoring	Alaska to Baja	Pete Raimondi	1997-present	Rocky intertidal habitats	Various	Several	https://marine.ucsc.edu/index.html
BOEM		OCS Oil and Gas Pgm				Environmental impacts			
CoSMoS	USGS	Flood Modeling	California	Patrick Barnard	2013-present	Coastal storms and sea level rise impacts modeling	USGS/OPC	Several	https://www.usgs.gov/centers/pcmsc/science/coastal-storm-modeling-system-cosmos?qt-
CoSMoS COAST	USGS	Shoreline Modeling	California	Sean Vitousek	2017-present	Shoreline evolution	USGS	Several	
Santa Barbara Channel MPA Collaborative	OPC, BEACON	Ecological Management	Santa Barbara MPAs	Julie Bursek, Kristen Hislop	2012-present	MPA management and enforcement	OPC, SB Museum of Natural History	OPC, CDFW, CINMS, EDC	https://www.mpacollaborative.org/santabarbara/
Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO)	UCSB, UCSC, OSU	Ecological Monitoring	Oregon and California	Jennifer Caselle, Carol Blanchette, Libe Washburn	1999-present	Long term ecosystem monitoring	Various	CDFW, OPC, CINMS, ReefCheck	http://www.piscoweb.org/
Beach Sustainability Assessment (BSA)	CSUCI	Interdisciplinary coastal assessment	Santa Barbara and Ventura	Kiki Patsch, Dan Reineman, Phil King, Nina Roberts, Charles Lester	2013-present	Ecology, Geomorphology, Social Utility	CSUCI/CSU COAST/CASG		https://www.bsa-camp.org/
COPE Ecological Monitoring Network	UCSB	Ecological Monitoring	Central Coast	Ali Burgos	2021-present	Subtidal ecological monitoring	NSF COPE		
Dune Science Collaborative	CASG	Dune/Living Shoreline strategies	California	Laura Engeman; Nick Sadrpour	2020-present	Community of practice around dune coastal resilience strategies	Honda Foundation/CASG	CASG, USC SG, Bay Foundation, CRC	coming soon
Permit Streamlining: Fine Sediment Transport/Fate, Ecological Impacts, Placement Protocols, etc.	OPC, BEACON	Interdisciplinary sediment permiting	Santa Barbara	Marc Beyeler, Jon Warrick, Jenny Dugan, Nick Sadrpour, Maureen Spencer	2021-2023	Permit Streamlining: Fine Sediment Transport/Fate, Ecological Impacts, Placement Protocols, etc.	OPC, BEACON, SB County Flood Control	Santa Barbara County Flood Contol District	
Marshes on the Margin	SCC/NCCOS	Ecological and physical changes of wetlands due to sea level rise	Southern California Bight	Evyan Sloane, John Largier, Karen Thorne, Jeremy Lowe, Jeff Crooks, Melodie Grubbs, Eric Stein	2018-present	wetland transitions and mouth opening/closing changes due to sea level rise	NCCOS EESLR	TRNERR, Santa Barbara Airport	https://trnerr.org/marshes-on-the-margin/

Community Science:

Research Initiative	Sponsor Agency	Research Topic	Geographic Extent	Principal Investigator(s)	Time Period	Research Focus	Source of Funds	Cooperating Agencies	Link to Available Resources
Grunion Greeters	Pepperdine	Ecological Monitoring	Southern California Bight	Karen Martin	2010?	Grunion spawning	NMFS-SWR	Several	http://grunion.pepperdine.edu/ggproject.htm
Communicty Alliance for Surveying the Topography of Sandy Beaches (CoAST SB)	CASG	Physical Monitoring	Santa Barbara (various beaches)	Aaron Howard	2018-present	Shoreline monitoring	Various	USGS, BEACON, CASG	https://caseagrant.ucsd.edu/project/coast-sb-community-alliance-for-surveying-the-topography-of-sandy-beaches
Beach Water Quality	SB ChannelKeeper	Water Quality Monitoring	Santa Barbara and Ventura	Ben Pitterle		Water quality	Island Brewing Company		https://www.sbck.org/our-work/field-work/beach-water-quality/
Surfrider BWTF-Ventura	Surfrider	Water Quality Monitoring	Ventura and Santa Barbara	April Bender	2018-present	Water quality	Chuck Vinson Memorial Fund		https://ventura.surfrider.org/programs-and-campaigns/bwtf/
King Tides	CSUCI/Surfrider	Coastal Storms and Flooding	Ventura	Dan Reineman		Coastal flooding		Coastal Commission	https://www.coastography.org/home/kingtides

Report Preparation

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Dr. Kristen Goodrich
Dr. Dan Hoover
Dr. Phil King
Dr. Charles Lester
Dr. Dan Reineman
Dr. David Revell
Dr. Sean Vitousek

September 2021