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

A California Joint Powers Agency

Member Agencies

Al Clark
City of Carpinteria

Kyle Richards
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Steven Gama
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Eric Friedman
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Gregg Hart, Chair
Das Williams
County of Santa Barbara

Carmen Ramirez, Vice Chair
Matt LaVere
County of Ventura

Executive Director
Marc Beyeler

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NOTICE MEETING

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

Tuesday, December 7, 2021
Time: 2:00 pm-2:45 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, DECEMBER 7, 2021**
TIME: **2:00 pm-2:45 pm**
PLACE: **TELECONFERENCE (see details below)**

The agenda of business to be conducted is below.

MARC BEYELER, BEACON SCIENCE DIRECTOR
DATE: **TUESDAY, SEPTEMBER 7, 2021**

The California State Legislature recently passed, and the Governor signed, Assembly Bill 361 (Rivas, 2021), which amends the Government Code to allow Brown Act bodies to continue to meet remotely if certain elements are met.
Members of the public may observe and address the Board as shown below:
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:

December 7, 2021, 2021 Time: 2:00-2:45 pm

Join Zoom Meeting

https://us02web.zoom.us/j/86849854060?pwd=dnJ2VWtiN0dkZkM4cWFqaFJhS0oxQT09

Meeting ID: 868 4985 4060

Passcode: 350192

2. **You may call in to listen live to the Science Advisory Committee Meeting by dialing: +16699006833**
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 December 6, 2021, 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 December 6th. 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 December 6, 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

December 7, 2021
2:00 pm-2:45 pm

1. **Administrative Items**
   - **A. Call to Order and Roll Call – Dr. George, SAC Co-Chair; Marc Beyeler**
   - **B. Report on Circumstances of the COVID-19 State of Emergency**
     - **i. Receive and file:**

a. **An update that the State and County remain under a proclaimed state of emergency related to COVID-19; and**
b. **The Santa Barbara County Public Health Department recommendation issued September 28, 2021, and the Ventura County Health Officer recommendation issued September 21, 2021 regarding social distancing.**

ii. **Provide direction to Staff about the location of the next meeting.**

C. **Consideration and Approval of the Minutes of the BEACON SAC Meeting of September 14, 2021. Co-Chair George; ED Marc Beyeler**

2. **Discussion and Adoption of Draft Final Science Research Agenda. Co-Chairs**

3. **Adopt January Meeting Date**

4. **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.

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STAFF REPORT

Meeting Date: December 7, 2021
Agenda Item: 1b

To: BEACON Science Advisory Committee (SAC)
From: Executive Director/Science Director

Date: December 7, 2021

Subject: Report on Circumstances of the COVID-19 State of Emergency

Recommended Actions:

i. Receive and file:
   a. An update that the Nation, State, and County remain under a proclaimed state of emergency related to COVID-19; and
   b. The Santa Barbara County Public Health Department recommendation issued September 28, 2021 and the Ventura County Health Officer recommendation issued September 21, 2021 regarding social distancing.

ii. Provide direction to staff about the location of the next meeting.

DISCUSSION:

The California State Legislature recently passed, and the Governor signed, Assembly Bill 361 (Rivas, 2021) (AB 361), which amends the Government Code to allow Brown Act bodies to continue to meet remotely if certain elements are met. AB 361 took effect immediately and applies to all Brown Act boards, committees, and commissions. Below summarizes the ongoing declared emergencies related to the COVID-19 pandemic and the current status of community transmission.

Federal and State

On January 31, 2020, the Secretary of Health and Human Services (HHS) declared a public health emergency under section 319 of the Public Health Service Act (42 USC § 247d) in response to COVID-19. On March 13, 2020, the US President declared a national emergency concerning the COVID-19 pandemic which has been extended until February 24, 2022. On March 4, 2020, Governor Newsom declared a state of emergency for conditions caused by COVID-19 which has been extended until March 31, 2022.

Santa Barbara County

On March 12, 2020, the Santa Barbara County Director of Emergency Services proclaimed a Local Emergency as a result of the COVID-19 and the Santa Barbara County Health Officer declared a Local Health Emergency, due to the imminent and proximate threat to public health from the introduction of COVID-19 in Santa Barbara County. Thereafter, on March 17, 2020, the Santa Barbara County Board of Supervisors ratified the Proclamation of a Local Emergency and the Declaration of a Local Health Emergency which remain in effect.

On September 28, 2021, the Santa Barbara County Public Health Officials recommended utilizing teleconferencing options for public meetings as an effective social distancing measure to facilitate participation in public affairs and encourage

participants to protect themselves and others from the COVID-19 disease (Attachment 1). As of December 1, 2021, Santa Barbara County is categorized as having a "substantial" level of community transmission by the US Centers for Disease Control and Prevention's four-tiered system. As of December 1, 2021, the Santa Barbara County Public Health Department reports a case rate of 7 per 100,000 and a 4.0% testing positivity rate.

Ventura County

On March 12, 2020, the Ventura County Public Health Department declared a local health emergency in response to 1) increased spread of novel coronavirus (COVID-19) across the country 2) in alignment with the Governor of California's Declared State of Emergency and mass gathering guidance 3) an increase of local cases. Thereafter, on March 17, 2020, the Ventura County Board of Supervisors proclaimed a Local Emergency and ratified and extended the Declaration of a Local Health Emergency which remain in effect.

On September 21, 2021, the Ventura County Public Health Officer recommended "that physical/social distancing measures continue to be practiced throughout our Ventura County communities to minimize the spread of COVID-19, including at meetings of the Board of Supervisors and meetings of other legislative bodies of the County of Ventura." (Attachment 2). As of December 1, 2021, Ventura County is categorized as having a "moderate" level of community transmission by the US Centers for Disease Control and Prevention's four-tiered system. As of December 1, 2021, the Ventura County Public reports a case rate of 6.4 per 100,000 and a 2.1% testing positivity rate.

Attachments:

1. Santa Barbara County Health Officials AB 361 Social Distance Recommendation.
2. Ventura County Health Officer recommendation regarding Social Distancing and Continued Remote Meetings of Legislative Bodies.

Santa Barbara County
PUBLIC Health
DEPARTMENT

Public Health Administration

300 North San Antonio Road ◆ Santa Barbara, CA 93110-1316
805/681-5100 ◆ FAX 805/681-5191

Van Do-Reynoso, MPH, PhD *Director*
Suzanne Jacobson, CPA *Chief Financial Officer*
Paige Batson, MA, PHN, RN *Deputy Director*
Darrin Eisenbarth *Deputy Director*
Dana Gamble, LCSW *Interim Deputy Director*
Polly Baldwin, MD, MPH *Medical Director*
Henning Ansorg, MD *Health Officer*

HEALTH OFFICIALS AB 361 SOCIAL DISTANCE RECOMMENDATION

Issued: September 28, 2021

COVID-19 disease prevention measures, endorsed by the Centers for Disease Control and Prevention, include vaccinations, facial coverings, increased indoor ventilation, handwashing, and physical distancing (particularly indoors).

Since March 2020, local legislative bodies-such as commissions, committees, boards, and councils- have successfully held public meetings with teleconferencing as authorized by Executive Orders issued by the Governor. Using technology to allow for virtual participation in public meetings is a social distancing measure that may help control transmission of the SARS-CoV-2 virus. Public meetings bring together many individuals (both vaccinated and potentially unvaccinated), from multiple households, in a single indoor space for an extended time. For those at increased risk for infection, or subject to an isolation or quarantine order, teleconferencing allows for full participation in public meetings, while protecting themselves and others from the COVID-19 virus.

Utilizing teleconferencing options for public meetings is an effective and recommended social distancing measure to facilitate participation in public affairs and encourage participants to protect themselves and others from the COVID-19 disease. This recommendation is further intended to satisfy the requirement of the Brown Act (specifically Gov't Code Section 54953(e)(1)(A)), which allows local legislative bodies in the County of Santa Barbara to use certain available teleconferencing options set forth in the Brown Act.

Henning Ansorg, MD
Public Health Officer
County of Santa Barbara

Van Do-Reynoso, MPH, PhD
Public Health Director
County of Santa Barbara

VENTURA COUNTY
PUBLIC HEALTH

A Department of Ventura County Health Care Agency

Rigoberto Vargas, MPH
Director

Robert Levin, MD
Health Officer/Medical Director

To: Board of Supervisors
County Executive Office
Clerk of the Board

From: Dr. Robert Levin, Ventura County Health Officer

Date: September 21, 2021

Re: Recommendation regarding Social Distancing and Continued Remote Meetings of Legislative Bodies

I strongly recommend that physical/social distancing measures continue to be practiced throughout our Ventura County communities to minimize the spread of COVID-19, including at meetings of the Board of Supervisors and meetings of other legislative bodies of the County of Ventura.

California Department of Public Health ("CDPH") and the federal Centers for Disease Control and Prevention ("CDC") caution that the Delta variant of COVID-19, currently the dominant strain of COVID-19 in the country, is more transmissible than prior variants of the virus, may cause more severe illness, and that even fully vaccinated individuals can spread the virus to others resulting in rapid and alarming rates of COVID-19 cases and hospitalizations (https://www.cdc.gov/coronavirus/2019-ncov/variants/delta-variant.html). Additionally, the CDC has established a "Community Transmission" metric with 4 tiers designed to reflect a community's COVID-19 case rate and percent positivity. Ventura County currently has a Community Transmission metric of "high" which is the most serious of the tiers.

Whether vaccinated or not, positive individuals are contracting the Delta variant and infecting others in our communities. Social distancing and masking are crucial mitigation measure to prevent the disease's spread. Remote meetings of legislative bodies of the County, including but not limited to the Board of Supervisors, are a recommended form of social distancing that allows for the participation of the community, staff, presenters, and legislative body members in a safe environment, with no risk of contagion. It is recommended that legislative bodies of the County continue to implement 100% remote meetings.

If you have any questions regarding this recommendation, please do not hesitate to contact me.

BEACON SCIENCE ADVISORY COMMITTE MEETING MINUTES

DATE: Tuesday, September 14, 2021
TIME: 1:00 PM
PLACE: TELECONFERENCE

Item	1A	Call to Order and Roll Call– Co-Chair, Dr. George
Minutes/ Actions:	**Members Present:** **RECORD** • **Dr. Kiki Patsch- absent** • **Dr. Doug George** • **Mr. Robert Battalio PE** • **Dr. Jenifer Dugan** • **Dr. Lesley Ewing PE** • **Dr. Philip King- absent** • **Dr. Charles Lester** • **Dr. Dan Reineman** • **Dr. David Revell** • **Dr. Dan Hoover** • **Dr. Sean Vitousek** • **Dr. Kristen Goodrich** **Also in attendance BEACON Executive Director Marc Beyeler and CA Sea Grant Program Coordinator Nick Sadrpour.** **Members of the public briefly introduced themselves:** Michaela Miller (CSUCI/BEACON), Chris Huitt (State Lands Commission), Meagan Flier (CA Coastal Commission), Corryn Knapp (SFSU/intern), Brian Adair (City of Santa Barbara), Jeremy Smith (CA Coastal Commission)	

Item	1B	Consideration and Approval of Minutes of the BEACON SAC Meeting held on April 23, 2021- Dr. George; ED Marc Beyeler
Minutes/ Actions:	Motion by Dr. Ewing Second by Dr. Revell Yes- Dr. Vitousek, Dr. Revell, Dr. Reineman, Dr. Lester, Dr. King, Dr. Goodrich, Dr. Ewing PE, Dr. Dugan, Mr. Battalio PE, Dr. Patsch, Dr. George No- none Abstain- none	

Item	2	Presentation and Discussion of Draft Final Research Agenda. Co-Chairs -Dr. George, Marc Beyeler ED
Minutes/ Actions:	Dr. George thanked the SAC for their time reviewing and providing comments and feedback to the Research Agenda and welcomed Mr. Beyeler to give a background of how we got here. Mr. Beyeler also thanked the SAC for their achievements of getting here. Appreciated the SAC advising BEACON integrating revisions into the Strategic Plan objectives based on feedback from managers and SAC. This helped feed into the Science Action Plan identifying where the gaps are for science initiatives to help BEACON's region and its member agencies. Since January we've been working on a series of priority topics and how to address things on a shorter term to help achieve longer term plan goals. The Research Agenda nests within the Strategic Plan and how does the SAC suggest items and what authority is there to take action on those. Our language may have changed on the specific title of documents: Science Goals, Science Strategy, Science Action Plan, and now a Research Agenda seems most appropriate for where it nests in the authority of BEACON.	

BEACON SCIENCE ADVISORY COMMITTE MEETING MINUTES

DATE: Tuesday, September 14, 2021
TIME: 1:00 PM
PLACE: TELECONFERENCE

	Dr. George mentioned the priority action items that we've invested time and discussion into have wanted to include the feedback, comments, and suggestions from you all as a SAC. We also had a Managers Workshop in June which gave us excellent insight into what BEACON can prioritize from the science side providing insight to. What we've added is input from April SAC Session discussion and action specifically the need to identify regional goals, the need to develop a range of scenarios to be modeled and evaluated, the need to emphasize use of best available science, the need to ID impacts from and connections between SLR and other factors: precipitation, sediment yields, ocean and wave conditions, etc., and BEACON should provide regional scenarios and evaluation parameters. From the June workshop feedback we wanted to highlight the regional topics of importance including regional coordination and info and data sharing, regional monitoring, and regional sediment permitting. Mr. Battalio PE appreciated the summary and review. Didn't track exactly where the updates were made to the document based on feedback. Figure 3 was referred to as a table and the first two columns of the table set the topics. Wasn't clear if the input from the managers workshop ended up in the table or if it ended up somewhere else. Did enjoy the Managers Workshop and felt that there was a lot of traction with regional efforts and the function of BEACON. Mr. Sadrpour explained a bit that feedback from the managers workshop could be called out and maybe synthesized and highlighted a bit more, but that it absolutely was incorporated throughout the document. The managers request for a repository of information has been included and was willing to work with Mr. Battalio to refine Figure 3 and crosswalk objectives of the Strategic Plan with the Research Agenda. Highlighted that we have the workshop summary show what was discussed at the workshop and what the key pieces were, such as alignment of regional monitoring which was a major priority at the managers workshop. That information was then plugged into the Research Agenda where our framework made sense. Mr. Beyeler thanked Mr. Battalio PE for the feedback and agreed we should explain how the implementation schedule better aligns with the research agenda better. Dr. Lester mentioned the document does a good job presenting all the pieces of a complex puzzle that we're all interested in. But the list of the action items/ priorities are a little uneven. Some are specific and tangible. Some next steps are clear and others are a little less targeted. Shows a little how the physical, biological, social science, governance are integrated. They seems to be a big need and that was highlighted in the workshop. What do we choose to do next? Is it based on the next grant that comes through, or is there some process that we should set up about how these things should happen together. Dr. Revell asked for a summary of managers workshop, perhaps include priorities of that in the appendix could help focus on strategy vs tactics. Mr. Sadrpour reshared the link to the workshop summary with the SAC. Dr. Dugan mentioned we could potentially marry the actions items with existing and potential funding sources. Dr. George appreciated those points and commented that integration is our challenge and task. Dr. Revell said there was a lot of good research activities identified in the agenda. And perhaps our science perspective could use the managers perspective. The needs of the managers should drive the research needs. Dr. George asked for examples of how others have done this in past with other groups.

BEACON SCIENCE ADVISORY COMMITTE MEETING MINUTES

DATE: Tuesday, September 14, 2021
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Mr. Batallio PE mentioned looking at past strategic plans could help us learn collectively over time better.

Dr. Ewing PE suggested at this point is we have a lot of research items and agenda items; now might be a good point to step back and say: what is the management benefit of having this done; what is the technical/scientific merit for having this done. That could help us see where they align. By doing that it could make it a lot easier to get grants because it is clearly linked. Specifically, figure 2 could be more iterative. For example, infrastructure at the coast should be included in the physical monitoring. Could help with the purpose of maintaining a beach somewhere because there is a critical infrastructure component there.

Dr. Lester agreed with Dr. Ewing PE saying the agenda needs to be integrated with the management objectives -- the why.

Dr. Goodrich emphasized that the frequency of interactions with the managers could be helpful to think about. It doesn't always have to be a workshop style setting. We should work to promote interactions beyond just regular workshops. Workshops are extremely valuable, but there are other interactions that happen in the background that could really help us put a finer point on what we're trying to do. Sometimes scientist-manager workshops can feel like "checking the box", what else can we do collectively to keep this feeling alive and genuine?

Dr. George agreed with Dr. Goodrich. We have brought up the idea of having a manager liaison to this group. Obviously that person will not be able to speak for all jurisdictions but could offer a healthy perspective to our conversations. Asked for input from other SAC members: are you looking at management needs when you're setting up a research project?

Dr. Hoover commented, we have such a straight forward monitoring plan and it's been in place for so long. So the conversations have been ongoing for a long time but three often aren't direct links for sharing data. Often it feels like we force data on them rather than them coming to us. Most municipalities work on the contractor model, which isn't necessarily bad.

Dr. Dugan mentioned that for the CEVA project we did that specifically for the Santa Barbara coastal cities. It's interesting to see it come back that it's still a difficult conversation about habitat/ecosystem loss vs impacts to infrastructure/transit.

Dr. Reineman added that current work that he and Dr. Patsch are working on, coastal access in CA, has involved ongoing and direct dialogue with folks in management community. Facilitation of communication between groups supports the idea of a liaison.

Dr. Vitousek added that what we've been focusing on recently is using satellite images and automating that so that we can provide that information to people can use it.

Dr. Hoover said the real time modeling and immediate information is a key research area our teams are working on with things like CoSMoS. Adding in info on groundwater and shoreline position work that Dr. Vitousek is working on are next steps. We are very interested in making these connections to Managers. We haven't necessarily had a great deal of success with it. Just the shoreline measurements we make and sometimes respond to a specific request. This is an opportunity to help formalize that.

Dr. Lester commented that as an advisor to BEACON, I'm compelled to look at the Strategic Plan and then organize that in a way that falls under the 8 goals under the Strategic Plan. That might helps us see how they fit together. There are more specific needs and targeted needs that came out of managers workshop and other stakeholder conversations. Trying to identify the shared goals, and the strategy needs to be informed about what are we trying to accomplish. Trends, conditioning factors, and where

BEACON SCIENCE ADVISORY COMMITTE MEETING MINUTES

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	we're going in the future. The new OCOF tool is a great asset. One representation of these shared goals Dr. George asked if the current version of the document not reflect that? Dr. Lester maybe it could be more cohesive and highlighting that this research agenda is trying to address Strategic Plan. Mr. Sadrpour said he would revise the document to better illustrate how the Research Agenda aligns with the BEACON Strategic Plan. Dr. Revell added that part of the challenge is that the management questions is that much of the past work has been consultant driven. Looking at the managers workshop is staff constraints, capacity, translating non-standardized data, Mr. Battalio PE and I have been involved in these projects in this area. Looking at the recovery of beaches is important too. How are we going to deal with responses to extremes? We can point to recent journal articles, but no manager is ever going to find or read that paper. So thinking about a resource repository and providing some translation of information to the managers is difficult and a task for BEACON. Some of our projects are now generating dashboards on shoreline profiles, dune crest elevation, survey transects and make it usable and easy to view for non-technical managers. We have a great braintrust on the research side, the managers assembled were appropriate and are the ones making decisions. This is a major opportunity to help develop something like that for BEACON. Dr. George commented this is a great discussion, and summarized it: -need better integration with BEACON Strategic Plan -need a bit of a roadmap of how things are laid out in the document -building on 'beyond integration', how do we want to get our information into the hands of the folks we want to be interacting with, and how they interact back with us Mr. Beyeler added that we interviewed a series of the managers asking about their priorities and tried to integrate those comments and contributions into the Research Agenda. It'd be great to understand how we can engage and blend scientific gap filling with management gap filling No action was required to be taken. Public comment was asked for.

Item	**3**	**Presentation and Discussion of Draft Final Research Agenda Implementation Schedule. Co-Chairs and Executive Director**
Minutes/ Actions:	Dr. George said the goal with the implementation schedule is to connect us to objectives and initiatives going on. There are things somewhat outside of the SAC that are in here. How do we draw the interests of the managers needs and what's in the agenda into specific steps? This can be from the perspective as a SAC member or a representative of an agency, group, or even a discipline. Mr. Beyeler commented this is a conversation about staffing, prioritization, and opportunity costs. This is a step to pick things we've been working on those that are funded in darker yellow and those we are not working on but would help get us to fulfilling our priorities (unfunded-lighter yellow). We'd welcome a high order discussion of the priorities of these activities. The discrete scheduling items are flexible, this is just helpful for us to plan and look at staff capacity and needs.	

BEACON SCIENCE ADVISORY COMMITTE MEETING MINUTES

DATE: Tuesday, September 14, 2021
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	Dr. George thanks Mr. Beyeler for his overview. Dr. Lester mentioned that it was helpful to take the perspective of "okay what do I do first". And what is the staffing level I have vs what is required for these. For BEACON, you have a unique and specific perspective as a regional entity. It's not local or state. Perhaps it's that watershed scale. Understanding what it is, characterizing infrastructure, the inputs/interferences, causal factors making system work or not. Those will be useful to managers when they ask 'what should we do" and they conflicting answers about it. In some ways that could be a priority way to maximize BEACON's unique organizational structure. Dr. Revell agreed with Dr. Lester. What can we accomplish regionally that will be beneficial. We've done it at the jurisdictional level. But we haven't had something that connects the boundaries of the jurisdictions like what BEACON could do. Updating the CRSMP could be that mechanism. Including SLR impacts and adaptation. Mr. Batallio PE commented that how we describe existing coastal conditions: physical, biological, socio-economic is critical. One of the cool things this group could do is help develop a rubric to how we'd describe the conditions. Look at what information is available to help inform that outline. Then ID what is really missing. Mr. Beyeler shared that the CEVA SB project seems to be a great model for the coastal conditions and the suggested changes. And we don't recognize the ecological boundaries/impacts for our area. We have the CEVA project for Santa Barbara County. BEACON has to partner with organizations and entities that implement these actions. There are systems approaches to prioritization of having projects. Dr. Ewing asked, Do you think the managers would have any interest in one or more permitting workshops to discuss permitting for beach nourishment and living shorelines, information needs, monitoring and ways to coordinate on both info gathering and monitoring to move projects forward? One other item for this is to discuss other stakeholders like Flood Control, and ways to involve them appropriately. Mr. Beyeler highlighted that the recently funded OPC Prop 68 grant to BEACON and partners looking at fine sediment transport and fate hopes to do just that. Dr. George proposed that the SAC digest this information while Mr. Sadrpour turns around new version that incorporates the input from today. We get that back out to the SAC to maintain momentum and convene. Asked the members to review the draft so that we have a short meeting and be prompt as we head towards the end of the year. Perhaps a 1-hour meeting to review final changes. No action was required to be taken. Public comment was asked for.

Item	**4**	**Consider Adopting the draft Final Research Agenda. Co-Chairs and SAC**
Minutes/ Actions:	Table Item 4 based upon feedback from SAC No action was required to be taken.	

Item	**5**	**Session Wrap-Up Summary**

BEACON SCIENCE ADVISORY COMMITTE MEETING MINUTES

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Minutes/ Actions:	Dr. George summarized the meeting and next steps. Staff will turn around new version that incorporates the input from today. Shooting for pre-holiday meeting in November/December. January/February for next big SAC meeting. We will consider in-person at that time. We'd also like to discuss an annual summit and events through 2022. **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 December 2021 by Teleconference or Video

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

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STAFF REPORT

Meeting Date: December 7. 2021
Agenda Item: 2

To: **Science Advisory Committee (SAC)**
From: **Executive Director/Science Director**
Date: **December 7, 2021**

Subject: BEACON Draft Final Research Agenda

Recommended Actions:

i. Discuss and Adopt the BEACON Draft Final Research Agenda-2021-2026, 2021 Version. (Exhibit I).

DISCUSSION:

Since April 2021 the BEACON SAC has been discussing and reviewing different elements of a BEACON Research Agenda. The Research Agenda is intended to help BEACON support and develop science support and research activities over the next five years, reviewed annually and updated and modified as necessary. The Research Agenda Early Implementation Actions reflect the prioritization made by the BEACON SAC to key areas where specific investment would benefit the coastal resources in the BEACON region. These Research Agenda Early Implementation Actions take into consideration ongoing science activities (Appendix A) and existing planning investments (Appendix C) all through the lens of BEACON's programmatic goals and objectives (Appendix B).

The BEACON SAC's over-arching goal is to provide recommendations and guidance to the BEACON Board and executive staff for understanding the existing coastal conditions and anticipated future shifts to coastal resources based on climate and adaptation scenarios. This document serves as a framework for BEACON to continue supporting research and projects that help implement BEACON's Strategic Plan.

This December 2021 version of the Research Agenda has benefited by input from managers active in developing RSM and SLR Adaptation projects and initiatives, and from the discussion between managers and scientists at the workshop in June 2021. This document is meant to be adaptable and updated over time as new opportunities, issues, and relevant coastal management needs arise. The information provided within was developed by the BEACON SAC for the purposes of identifying key research and scientific actions that would advance BEACON's primary objectives of coordinated regional coastal resource management, including those specifically designated in the updated BEACON Strategic Plan.

It is important to note that any future research and science endeavors also need to nest within planning and implementation efforts taken by individual municipalities and jurisdictions in the region. Appendix C of the Research Agenda catalogues the local agency coastal vulnerability and adaptation planning resources. BEACON intends to keep the activities listed in Appendices A and C up to date going forward.

BEACON science staff is recommending the SAC adopt the attached final draft plan as the initial BEACON Research agenda, understanding that it will be revised on a regular basis and updated to integrate new research and research result over time.

FINAL REVIEW DRAFT
BEACON RESEARCH AGENDA

A Research Agenda for the Beach Erosion Authority for Clean Oceans and Nourishment (BEACON) Coast and the Santa Barbara Littoral Cell

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

FINAL REVIEW DRAFT
A Research Agenda for the BEACON Coast and the Santa Barbara Littoral Cell
2021-2026
BEACON Science Advisory Committee
December 2021

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BEACON Background

BEACON's policies, projects, and programs seek to accomplish important complimentary goals and objectives. BEACON's Coastal Regional Sediment Management Plan (BEACON, 2009) is intended to outline the ways and means to conserve and restore the valuable sediment resources along the Santa Barbara and Ventura Counties coastline.

BEACON's programs and projects seek to reduce shoreline erosion and coastal storm damages, protect sensitive environmental resources, increase natural sediment supply to the coast, preserve and enhance beaches, improve waterquality along the shoreline, and optimize the beneficial use of material dredged from ports, harbors, and other opportunistic sediment sources.

BEACON's primary objectives[1] are to:
A. Identify solutions to coastal erosion and environmental problems;
B. Coordinate the use of local, state, federal and private resources;
C. Facilitate design, financing, construction and maintenance of beach restoration, shoreline protection, and environmental protection and enhancement projects;
D. Collect and analyze data needed to facilitate the design projects and to monitor their performance;
E. Coordinate local government involvement and keep elected officials and citizens informed;
F. Support the preparation of contingency plans by Member Agencies to be ready in emergencies to direct public and private efforts to combat erosion and to take steps necessary to coordinate the protection of public and private property;
G. Spearhead local government lobbying efforts at the State and Federal levels;
H. Collect and analyze data addressing regional-level climate and sea-level rise impacts to coastal beaches, coastal beach access, and coastal structures;
I. Identify regional-level solutions to impacts resulting from changes in climate, weather, and sea-level rise that may affect BEACON member agencies beaches through coordinated regional planning; and
J. Coordinate regional-level responses among BEACON member agencies to climate, weather, and sea-level rise changes impacting beaches, coastal beach access, and coastal structures.

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[1] BEACON Bylaws Article II Section 1

BEACON Mission, Vision, and Operating Principles

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BEACON Mission

Provide venue for regional coordination of beach nourishment, coastal resources restoration, and protection of coastal water quality within Ventura and Santa Barbara counties to ensure that beaches are sustainably maintained and preserved, coastal shoreline resources are enhanced, coastal water quality protected, and coastal beach access provided.

BEACON Vision

The BEACON coast, its beaches, and its natural coastal resources are preserved, enhanced and sustainably managed in perpetuity through close coordination and collaboration among its member agencies, the public, and its community and private partners.

BEACON Operating Principles

Collaborative: Partnering with Others
Inclusive: Informing and Including all interested Stakeholders
Science-based: Utilizing the Best Available Science to Support
DecisionsTransparent: Open Communication of Intentions and
Plans Accountable: Documenting and Measuring Outcomes
Equitable: Ensuring Access and Resilience for all BEACON Communities and all Residents

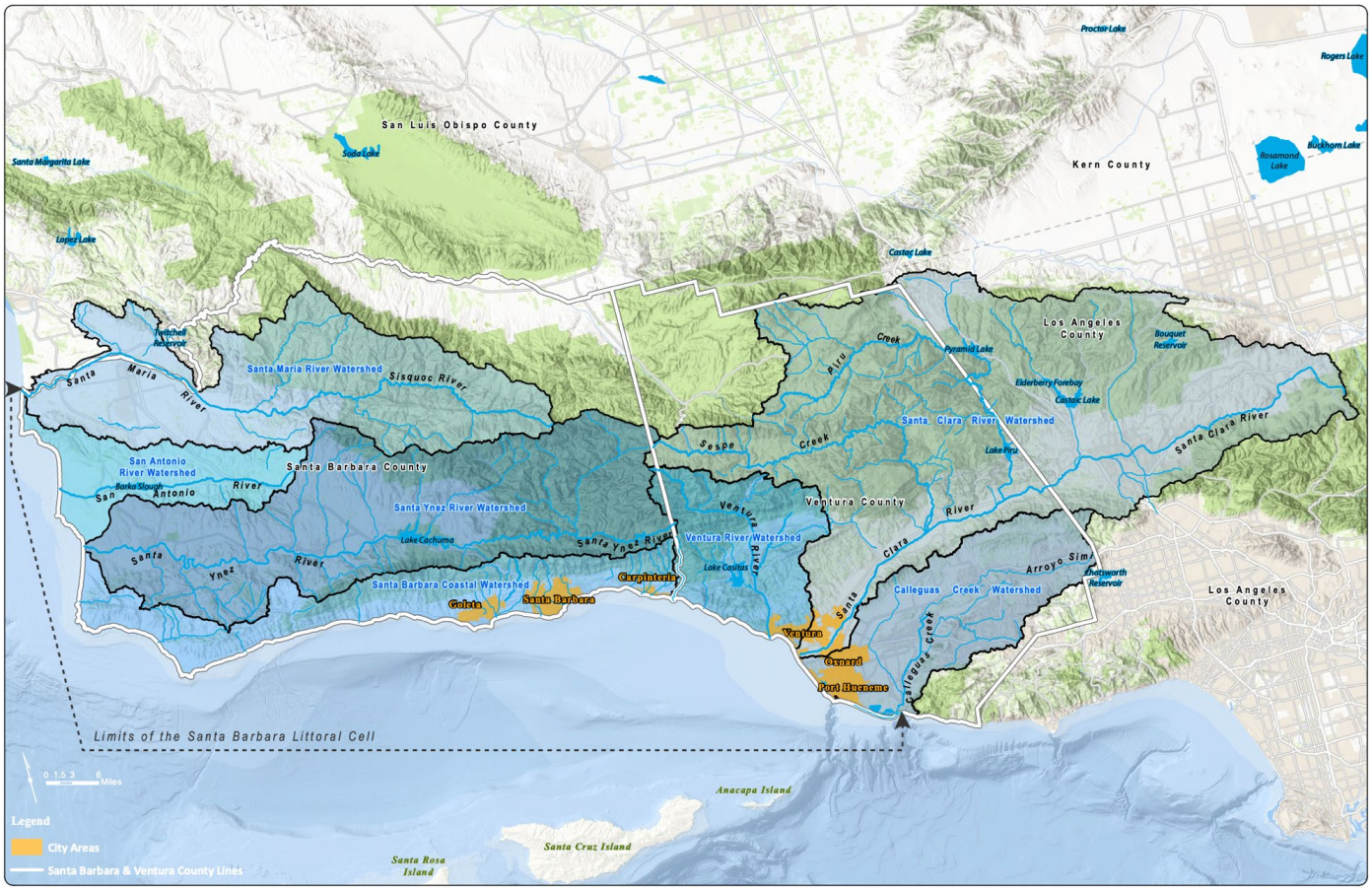

Figure 1. BEACON "Coast" and the Santa Barbara Littoral Cell

Summary: Linking Science Research and Regional Sediment Management and Climate Adaptation

This document outlines an initial Research Agenda for the Beach Erosion Authority for Clean Oceans and Nourishment (BEACON). This document is meant to be adaptable and updated over time as new opportunities, issues, and relevant coastal management needs arise. The information provided within was developed by the BEACON Science Advisory Committee (SAC) for the purposes of identifying key research and scientific actions that would advance BEACON's primary objectives of coordinated regional coastal resource management, including those specifically designated in the updated BEACON Strategic Plan (BEACON 2021c).

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 SAC and confirmed the initial leadership and membership of the SAC (BEACON, 2020a, 2020b, 2021a). 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.[2] The BEACON SAC's over-arching goal is to provide recommendations and guidance to the BEACON Board and executive staff for understanding the existing coastal conditions and anticipated future shifts to coastal resources based on climate and adaptation scenarios.

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 2021d, 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 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

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

a unique position to better connect science and policy as it acts in many important ways as a boundary organization[3] 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, there is an opportunity to solidify pathways between these science efforts and BEACON's programs and policies. The charge of the BEACON SAC members is to use their expertise and robust experience to inform the BEACON Board and staff on critical science activities to support the region as a whole.

Figure 2 highlights the overlap and illustrates the coordination and integration of science and perspectives from the SAC into BEACON activities. The development of this 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:

- Prepared a Science Strategy, identifying the need for the SAC and the need for a Science Action Plan;
- Identified the elements of a Science Action Plan; Established the SAC;
- Prepared a set of Science Goals and Objectives; Completed an initial Science and Data Gap Analysis;
- Developed priorities for an initial BEACON Research Agenda; Convened a Managers-Scientists Workshop;
- Prepared the BEACON Research Agenda, and developed 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, 2021c). This document serves as a framework for BEACON to continue supporting research and projects that help implement BEACON's Strategic Plan (BEACON 2021c).

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[3] 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.

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 A outlines several relevant science initiatives that can be leveraged to better inform BEACON member agencies.

Figure 2. Diagram of activities and overlap amongst BEACON Board and staff, Science Advisory Committee, and relevant coastal natural resource managers.

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 establish pathways for science to inform decision-making, including in the areas of climate adaptation and coastal resilience. Figure 2 illustrates that an interdisciplinary approach is essential to the coordination and integration of science. Information from the local resource managers as well as the SAC can assist the BEACON Board and staff in providing resources and support that is helpful at the regional level.

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, and Ecosystem Services, and restoration science and practice (see Figure 3). These items address ~~goals and objectives (Appendix B) identified in the~~ BEACON Strategic Plan (BEACON, 2021c). It is important to note the emphasis of interdisciplinary efforts throughout many of the identified focus areas,

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

implementation actions, and nested. Additionally, it is important to note that any future research and science endeavors also need to nest within planning and implementation efforts taken by individual municipalities and jurisdictions in the region. Appendix C catalogues the local agency coastal vulnerability and adaptation planning resources. BEACON intends to keep the activities listed in Appendices A and C up to date going forward. The Research Agenda Early Implementation Actions reflect the prioritization made by the BEACON SAC to key areas where specific investment would benefit the coastal resources in the BEACON region. These Research Agenda Actions take into consideration ongoing science activities (Appendix A) and existing planning investments (Appendix C) all through the lens of BEACON's programmatic goals and objectives (Appendix B).

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SAC Focus Area		Research Agenda Early Implementation Actions	Nested Tasks	BEACON Strategic Plan Goals and Objectives
Management and Decision Science		-	-	**Goal 2** Obj. 2.1
		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	Build BEACON stakeholder network	Obj. 8.1
		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.	Science-Policy Pathways (regulatory agency workshops)	**Goal 8** Obj. 8.2 Obj. 8.3
			Model Regional Permit	Obj. 1.1 Obj. 1.2 Obj. 1.2.1 Obj. 1.2.2 Obj. 1.3
Integrating Climate Science into BEACON Policies, Programs and Projects		-	-	**Goal 1**
		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.	-	Obj. 2.2
		Develop an update to the BEACON Coastal Regional Sediment Management Plan (CRSMP) that includes current climate and sea level rise information, in additional to adaptation strategies that can be taken at a regional level.	SLR Update-CRSMP	Obj. 2.2.1 Obj. 3.1
		Continue to identify and keep up to datea a catalogue of local jurisdiction assessment and planning documents that incorporate sea level rise and climate science into coastal resource management.	-	Obj. 2.2
Regional Monitoring Programs	-	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 bluff-backed beaches, and align the various monitoring programs to better leverage one another.	Regional Monitoring Program Review	Obj. 2.3
	Physical Shoreline Data Collection and Monitoring	Extend shoreline physical profiling to all regional beaches and align the various monitoring programs to better leverage one another.	Aligning Regional Monitoring	Obj. 3.2
			Extend Shoreline Profiling	Obj. 3.2
	Coastal Ecology and Ecological Regional Monitoring	Develop a Sandy Beach Habitat and Species Framework Analysis and expand baseline data collection of habitat and species conditions within the region.	-	**Goal 2**
		Develop draft scope of work for an Ecosystem Goals Program	-	**Goal 2**
	Human Use and Economics Data Collection and Monitoring	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.	Updating User Data	**Goal 7** Obj. 7.3
			Socio-Economic Data Portal	
			Develop Regional Recreational Goals	
Interdisciplinary Research Approach		Extend the CEVA framework analysis from Santa Barbara County to the Santa Barbara Littoral Cell encompassing Ventura County.	-	Obj. 2.4
Modeling		-	-	**Goal 3**
		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 extreme events.	Regional SLR-Climate Downscaling	Obj. 2.2
			Regional Beaches Vulnerabilty Modeling	Obj. 3.3
			Watershed Extreme Event Flood Modeling	**Goal 2**
		Continue to support data collection and modeling of sediment source, transport, and fate to help inform coastal adaptation activities (e.g. beach nourishment/beneficial use, prototyping shoreline stabilization projects, dredge material placement, identifying priority monitoring areas, etc.) This includes sediments of many grain sizes, from mud to sand and larger sizes such as cobble.	Sediment Fines-Transport&Fate Modeling	Obj. 1.1.1 Obj. 1.1.2
Prototyping and Demonstration Projects		Develop one or more new research project(s) focused on innovative sediment retention structures that are environmentally sound and provide resilient features.	-	Obj. 4.1 Obj. 4.2 **Goal 5** Obj. 5.1 Obj. 5.1.1 Obj. 5.1.2
			Beach-Dune LS	Obj. 4.3 Obj. 7.1
			Green Groins	**Goal 4**
			Reefs-Oil Piers Demo Pjt	Obj. 4.4

Figure 3. Crosswalk table of SAC Focus Areas, Research Agenda Early Implementation Actions, Nested Tasks, and BEACON Strategic Plan Goals and Objectives (see Appendix B) (BEACON, 2021c).

Research Agenda Focus Topics and Suggested Implementation Actions

The Draft BEACON Science Action Plan (2020a) 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 and further described below:

- *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 Approach*
- *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 structure, coastal management process, and 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.

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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 D-1 (Appendix D) 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.

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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 shorelines. 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 comprehensive climate and SLR update to the CRSMP (BEACON 2009) which includes considering potential opportunities for regional adaptation strategies. This builds off local efforts towards understanding SLR vulnerabilities and adaptation possibilities that BEACON member agencies have done. BEACON intends to continue coordinating and tracking local activities and initiatives (Appendix C) which will be used to inform how BEACON can promote regional activities to support local agencies.

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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.
- Continue to identify and keep up to date a catalogue of local jurisdiction assessment and planning documents that incorporate sea level rise and climate science into coastal resource management.
- Develop an update to the BEACON Coastal Regional Sediment Management Plan (CRSMP) that includes current climate and sea level rise information, in additional to adaptation strategies that can be taken at a regional level.

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. This effort requires a formalized review of all active monitoring programs in the BEACON region.

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 bluff-backed 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.

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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 the regional sediment management program and individual project impacts. While assessments of individual projects on coastal ecology have been helpful, they are often performed to achieve specific permitting requirements with narrow spatial and temporal scopes. Thus, they have been unable to provide a holistic view on the status and trends of regional coastal ecology, nor how management actions coupled with background climatic and seasonal changes alter these systems. 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).

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). These examples can help scope a path forward for BEACON to consider regional ecosystem goal setting relevant to coastal resources.

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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? The answers to these questions can lead BEACON towards better understanding current recreational activities and potential regional recreational goals.

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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 Approach

Translating scientific research into useful management actions requires an interdisciplinary approach and lens. Deconstructing silos and bridging gaps between fields is an approach that the BEACON SAC has identified as critical for supporting informed regional sediment management and sea level rise adaptation. Recent science activities (Appendix A) and local agency planning (Appendix C) both contain interdisciplinary research approaches. Going forward, the BEACON SAC supports projects with multi-disciplinary teams that help achieve regional sediment management challenges. For example, BEACON's programs and projects must address combined social and ecological systems 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 example framework can be implemented in Ventura County providing for a consistent analysis of ecosystem vulnerability for the BEACON region.

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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, including extreme events, that address coastal watershed and coastal ocean conditions affecting both sediment management and coastal adaptation.

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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 extreme events.
- Continue to support data collection and modeling of sediment source, transport, and fate to help inform coastal adaptation activities (e.g. beach nourishment/beneficial use, prototyping shoreline stabilization projects, dredge material placement, identifying priority monitoring areas, etc.) This includes sediments of many grain sizes, from mud to sand and larger sizes such as cobble.

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Prototyping and Demonstration Projects

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

Management and Decision Science

- 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

- 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
- Continue to identify and keep up to date a catalogue of local jurisdiction assessment and planning documents that incorporate sea level rise and climate science into coastal resource management.
- Develop an updated to the BEACON Coastal Regional Sediment Management Plan (CRSMP) that includes current climate and sea level rise information, in additional to adaptation strategies that can be taken at a regional level.

Regional Monitoring Programs

- 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 bluff-backed beaches, and align the various monitoring programs to better leverage one another.

Physical Shoreline Data Collection and Modeling

- 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

- Develop a Sandy Beach Habitat and Species Framework Analysis and expand baseline data collection of habitat and species conditions within the region.

Human Use and Economics Data Collection and Monitoring

- 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 Approach

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

Modeling

- 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 extreme events.
- Continue to support data collection and modeling of sediment source, transport, and fate to help inform coastal adaptation activities (e.g. beach nourishment/beneficial use, prototyping shoreline stabilization projects, dredge material placement, identifying priority monitoring areas, etc.) This includes sediments of many grain sizes, from mud to sand and larger sizes such as cobble.

Prototyping and Demonstration Projects

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

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Research Agenda Implementation Schedule 2021-2022

The implementation schedule below (Figure 4) 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.

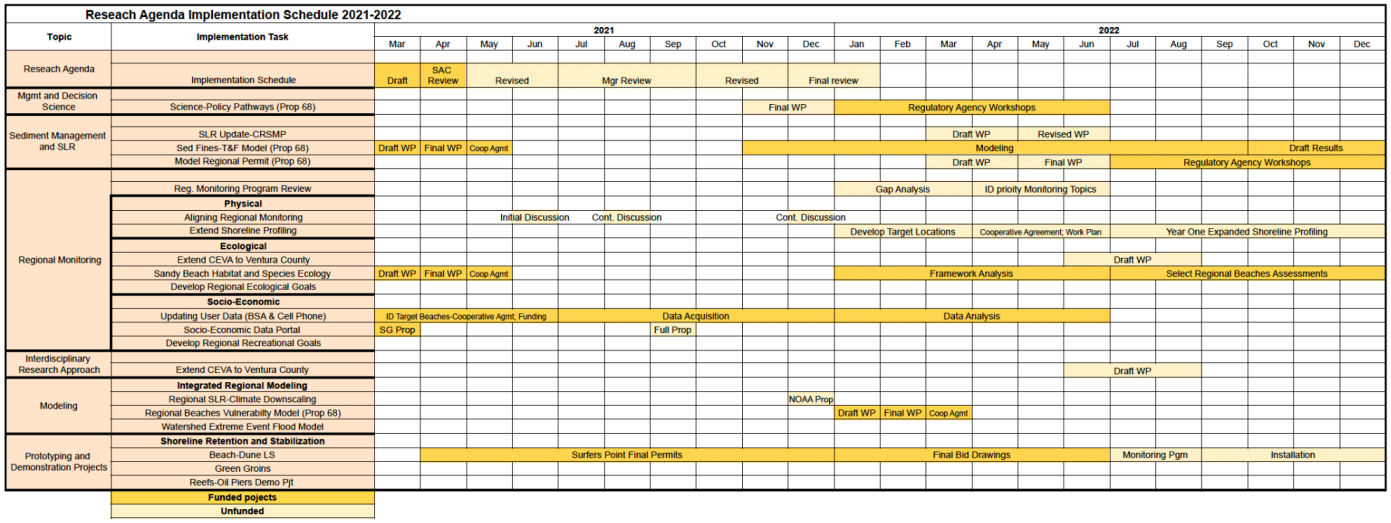

Figure 4. Research Agenda Implementation Schedule 2021-2022

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 Strategic Plan 2021-2026, Adopted March 19, 2021. https://beacon.ca.gov/wp-content/uploads/2021/03/Final-BEACON-Strategic-Planning-Goals-2021-26.pdf

BEACON. (2021d). BEACON SAC Managers Workshop, June 17, 2021 Workshop Summary. https://caseagrant.ucsd.edu/sites/default/files/users/nsadrpour/6.14.21_BEACON_Workshop_Summary.pdf

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.R. (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: Relevant Research 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 Resource
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, Cliff Failure, Coastal Groundwater Response	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-science_center_objects=0#qt-science_center_objects • https://ourcoastourfuture.org/ • https://www.usgs.gov/apps/hera/
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	https://www.resilientcoastlines.com/home
Permit Streamlining: Fine Sediment Transport/Fate, Ecological Impacts,	OPC, BEACON	Interdisciplinary sediment permitting	Santa Barbara	Marc Beyeler, Jon Warrick, Jenny Dugan, Nick Sadrpour,	2021-2023	Permit Streamlining: Fine Sediment Transport/Fate, Ecological	OPC, BEACON, SB County Flood Control	Santa Barbara County Flood Contol District	

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Placement Protocols, etc.				Maureen Spencer		Impacts, Placement Protocols, etc.			
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/
Coastal Resilience-Ventura/Santa Barbara	TNC	Coastal Hazards Modeling	Santa Barbara and Ventura	Bob Battalio	2013-Present	Coastal Hazards Mapping	TNC	ESA, BEACON, several	https://coastalresilience.org/project/santa-barbara-county/ https://coastalresilience.org/project/ventura-county/
Coastal User Assessment	BEACON/ MRCA/C ASG	Coastal use	Santa Barbara-Malibu	Kiki Patsch, Nate Merrill, Sean Anderson, Marc Beyelor, Elena Eger, Nick Sadrpour, Tom Ford	2021-Present	Coastal User identification	BEACON, MRCA,C ASG	BEACON, MRCA, CASG, CSUCI, Bay Foundation, EPA	
Impact of Sea-Level Rise on Groundwater Pollution Vulnerability in Shallow Coastal Aquifers	CSU COAST/ CASG	SLR flooding and groundwater	Oxnard	Ben Hagedorn, Matt Becker, Danielle Bram	2021-Present	Groundwater flooding impacts on toxic sites	CSU COAST/C ASG	CSULB, CSUN	
Community Science:									
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

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Appendix B- BEACON Strategic Plan Goals and Objectives (BEACON, 2021c)

Strategic Planning Work Plan Actions	1-2 years	3-5 years	Continuous
Goal 1 Promote Beach Preservation and Beneficial Use of Sediment			
Obj. 1.1 Preservation and Restorationof Natural Sand Supply			X
Obj. 1.1.1 Complete SB Debris Basin Project	*X*		
Obj. 1.1.2 Support Matilija Dam Removal Project	*X*		
Obj. 1.2 Support Harbor Sand By-pass Dredging			X
Obj. 1.2.1 CI Sand Bypassing	*X*		X
Obj. 1.2.2 Port of Hueneme Sand Dredging	*X*		X
Obj. 1.3 Opportunistic Sand-Regional Permit	*A1; A2*	A3; A4	
Goal 2 Expand Science Support to BEACON			
Obj. 2.1 Create Science Advisory Committee	*A1; A2; A3*		
Obj. 2.2 Integrate Climate/SLR Science in BEACON Policies	*X*		
Obj. 2.2.1 Complete SLR Update to CRSMP	*X*		
Obj. 2.3 Continue and Expand Regional Shoreline Monitoring			X
Obj. 2.4 Promote Interdisciplinary Science Research Efforts			X
Goal 3 Expand BEACON's Regional Sea Level Rise Coordination and Planning Activities			
Obj. 3.1 Develop Regional Climate and Sea Level Rise Adaptation Strategy	*X*		
Obj. 3.2 Investigate Establishing Regional Shoreline Monitoring Program	*X*		
Obj. 3.3 Pursue Regional-Level Sea Level Rise Studies, Projects and Funding	*X*		
Goal 4 Develop Innovative Sand Retention Projects			
Obj. 4.1 Seek funds to study innovative approaches	*X*		
Obj. 4.2 Identify and develop innovative demo projects			X
Obj. 4.3 Surfers Point Project-Complete Final Engineering	*X*		
Obj. 4.4 Oil Piers Reef Project-Update Feasibility Analysis		X	
Goal 5 Support Expanded Coastal and Marine Restoration			
Obj. 5.1 Support Natural Infrastructure Demo Projects			X
Obj. 5. 1.1 Expand Goleta Bay Kelp Demo Project	*X*		
Obj. 5.1.2 Dunes Demonstration Model Project		*X*	
Goal 6 Maintain and Enhance Coastal Water Quality	*X*		
Obj. 6.1 Integrate Water Quality Criteria in Projects			X
Goal 7 Support Coastal Access and Recreation			
Obj. 7.1 Support Completion of Surfers Point Project		A2	
Obj. 7.2 Complete Mondo's Cove Beach Access Project	*A1*	A2	
Obj. 7.3 Maximize Coastal Access and Recreation in BEACON projects			*X*
Goal 8 Improve Planning, Governance and Funding	*A1*		
Obj. 8.1 Develop Strategic Planning Goals and Objectives			
Obj. 8.2 Strengthen Governance Partnerships	*X*	A2	X
Obj. 8.3 Develop Expanded Local Funding	*A1*		X

Appendix C- BEACON Local Agency Coastal Vulnerability and Adaptation Planning Resources

Member Agency	Climate Planning Documents	Climate Action Plan	Regional Modeling	Vulnerability Assessment	Economic/ Fiscal impact	Governance	Adaptation Policy/ Strategy Planning	Regional Adaptation Policies and Strategies	BEACON Regional Consultation	Notes
City of Santa Barbara	Climate Action Plan (2017); Goleta Slough Area Sea-Level Rise and Management Plan (2015); Sea-Level Rise Vulnerability Assessment (2018); Updated Coastal Land Use Plan (2019); Draft Sea Level Rise Adaptation Plan and Vulnerability Assessment Update Public Review Draft (2020)	CAP: Appendix B. SB Sea Level Rise Study (2012)	P. Barnard-USGS; Santa Barbara County Coastal Hazard Modeling and Vulnerability Assessment (2015)	Sea Level Rise: Griggs & Russell (2012): Vulnerability Analysis (2015); Vulnerability Assessment Update (2018)	Cost-Benefit Analysis AECOM (2020)	SLR Adaptation Plan Subcommittee; City Staff Interdepartmental SLR Team	Prioritization and Selection of Adaptation Strategies (2018); Coastal Land Use Plan interim development review policies (2019); High Priority for Next Five Years (2020)	Shoreline Monitoring: Beach, Bluff, SLR, Groundwater, Flooding Events; Expand Beach Nourishment; Joint Studies; Regional Climate Collaborative: Research on case studies, law and policy on adaptation implementation; BEACON SLR Update to CRSMP; State Adaptation Funding	K. Traiberg; G. Comati-BEACON	ESA and AECOM; CoSMoS (USGS); Adaptation Principles
City of Goleta	City of Goleta Coastal Hazards Vulnerability Assessment and Fiscal Impact Report (2015)	City of Goleta Climate Action Plan (2014)	Santa Barbara County South Coast Coastal Resiliency ESA Modeling (2015); USGS Coastal Storm Modeling System (CoSMoS)	City of Goleta Coastal Hazards Vulnerability Assessment and Fiscal Impact Report (2015)	City of Goleta Coastal Hazards Vulnerability Assessment and Fiscal Impact Report (2015)		City of Goleta Coastal Hazards Vulnerability Assessment and Fiscal Impact Report (2015)		Anne Wells, Goleta; G. Comati; J. Baillard-BEACON	https://www.cityofgoleta.org/city-hall/planning-and-environmental-review/advance-planning-division
City of Carpinteria	General Plan/Local Coastal Plan Update; Sea Level Rise Vulnerability Assessment and Adaptation Project (2019)		CDSMos	D. Revell- Revell	P. King-Revell		D. Revell-Revell	Dune & Shoreline Management Plan: Living Shoreline Project (Phase 1: City Beach)	B. Brennan; J. Baillard	
County of Santa Barbara	Sea Level Rise & Coastal Hazards Vudnerability Assessment (2017);	Energy and Climate Action Plan (2015)	B. Battalio-ESA (South Coast); Coastal Resilence Santa Barbara (ESA) 2015; D. Revell-Revell (North Coast);	D. Revell-Revell					M. Beyeler-BEACON	
City of Oxnard	Local Coastal Plan Update: Sea Level Rise Vulnerability Assessment (2016); Sea Level Rise Adaptation (2018)			D. Revell-Revell	P. King-SFSU		S. Hecht-UCLA (Not completed)			
City of Ventura	Climate Action and Resilience Plan (2020)									Prop 84 Wildfire Recovery and Resiliencey Planning Grant (June 2020)
County of Ventura	Sea Level Rise Adaptation Strategies Report (2019)	2040 General Plan (Sept, 2020)	TNC/CCC Coastal Resilience Tool, ESA; B. Battalio-ESA; CoSMoS 3.0; Barnard-USGS;	County/D. Revell-Revell, 2018	P. King-Revell	Local Coastal Program Amendments led by Planning; CAP implementation Planning and CEO's Office, Climate Emergency Council	Adaptation Plan by County/Revell, 2019. Planning working with other agencies on adaptation projects, preparing Local Coastal Program(LCP) Amendments	Shoreline Management Plans, Beach Nourishment; Ephemeral Cobble Groin Pilot Project, sediment bypassing at Point Mugu, transport inland debris basin sediment to the coast, dune restoration, support Beacon updates to CRSMP, improve access, etc.	J. Baillard; M. Beyeler-BEACON	Planning Divison is Updating LCP with CCC Planning Grant, Harbor Dept. applied to Conservancy for dune restoration grant in Summer of 2020 for Hollywood Beach

Appendix D: Framework for Integration

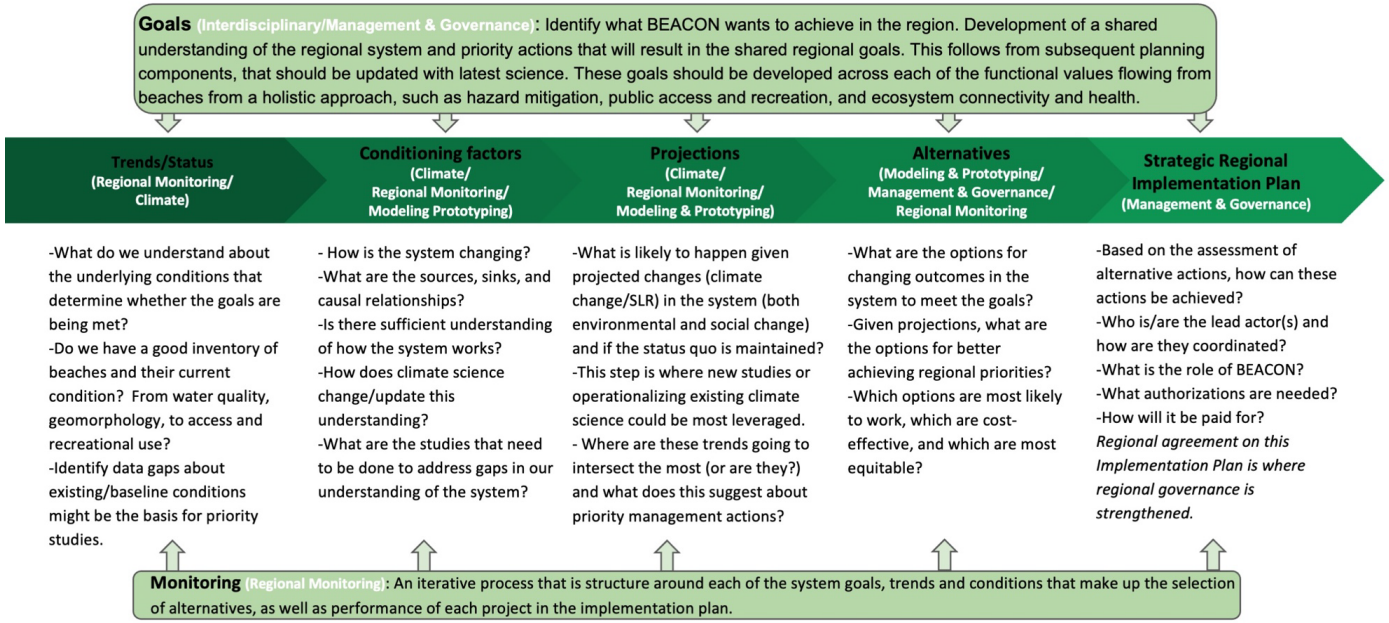

Figure D-1. A framework of an iterative process that can integrate management and governance science with the other major themes identified by the SAC: interdisciplinary research approach, climate science, modeling and prototyping, and monitoring, focused on regional goals.

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FINAL DRAFT
BEACON RESEARCH AGENDA

A Research Agenda for the Beach Erosion Authority for Clean Oceans and Nourishment (BEACON) Coast and the Santa Barbara Littoral Cell

Prepared by the BEACON Science Advisory Committee (SAC)
Final Draft December 2021

FINAL DRAFT
A Research Agenda for the BEACON Coast and the Santa Barbara Littoral Cell
2021-2026
BEACON Science Advisory Committee
December 2021

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BEACON Background

BEACON's policies, projects, and programs seek to accomplish important complimentary goals and objectives. BEACON's Coastal Regional Sediment Management Plan (BEACON, 2009) is intended to outline the ways and means to conserve and restore the valuable sediment resources along the Santa Barbara and Ventura Counties coastline.

BEACON's programs and projects seek to reduce shoreline erosion and coastal storm damages, protect sensitive environmental resources, increase natural sediment supply to the coast, preserve and enhance beaches, improve waterquality along the shoreline, and optimize the beneficial use of material dredged from ports, harbors, and other opportunistic sediment sources.

BEACON's primary objectives[1] are to:
A. Identify solutions to coastal erosion and environmental problems;
B. Coordinate the use of local, state, federal and private resources;
C. Facilitate design, financing, construction and maintenance of beach restoration, shoreline protection, and environmental protection and enhancement projects;
D. Collect and analyze data needed to facilitate the design projects and to monitor their performance;
E. Coordinate local government involvement and keep elected officials and citizens informed;
F. Support the preparation of contingency plans by Member Agencies to be ready in emergencies to direct public and private efforts to combat erosion and to take steps necessary to coordinate the protection of public and private property;
G. Spearhead local government lobbying efforts at the State and Federal levels;
H. Collect and analyze data addressing regional-level climate and sea-level rise impacts to coastal beaches, coastal beach access, and coastal structures;
I. Identify regional-level solutions to impacts resulting from changes in climate, weather, and sea-level rise that may affect BEACON member agencies beaches through coordinated regional planning; and
J. Coordinate regional-level responses among BEACON member agencies to climate, weather, and sea-level rise changes impacting beaches, coastal beach access, and coastal structures.

[1] BEACON Bylaws Article II Section 1

BEACON Mission, Vision, and Operating Principles

BEACON Mission

Provide venue for regional coordination of beach nourishment, coastal resources restoration, and protection of coastal water quality within Ventura and Santa Barbara counties to ensure that beaches are sustainably maintained and preserved, coastal shoreline resources are enhanced, coastal water quality protected, and coastal beach access provided.

BEACON Vision

The BEACON coast, its beaches, and its natural coastal resources are preserved, enhanced and sustainably managed in perpetuity through close coordination and collaboration among its member agencies, the public, and its community and private partners.

BEACON Operating Principles

Collaborative: Partnering with Others
Inclusive: Informing and Including all interested Stakeholders
Science-based: Utilizing the Best Available Science to Support
DecisionsTransparent: Open Communication of Intentions and
Plans Accountable: Documenting and Measuring Outcomes
Equitable: Ensuring Access and Resilience for all BEACON Communities and all Residents

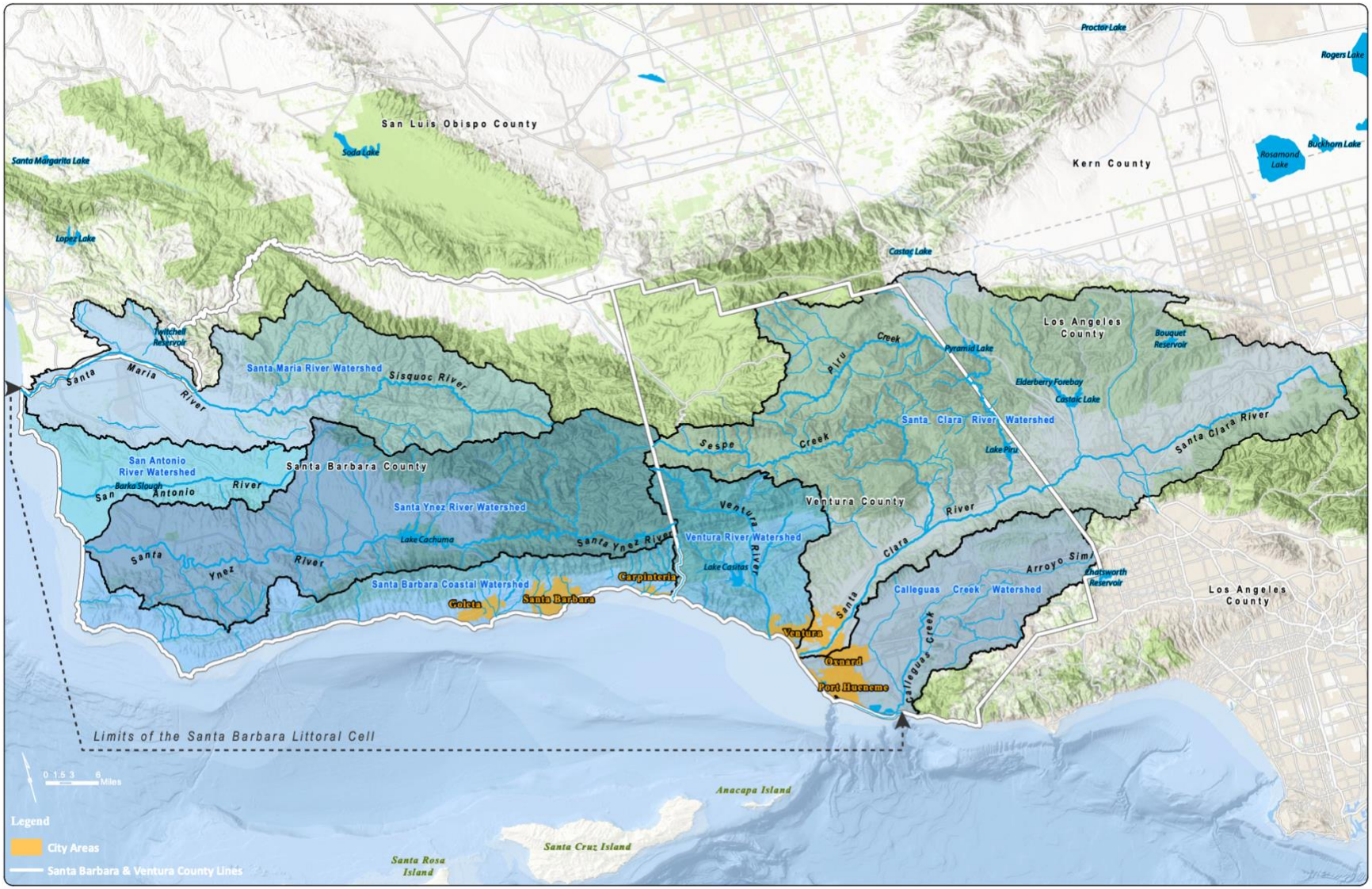

Figure 1. BEACON "Coast" and the Santa Barbara Littoral Cell

Summary: Linking Science Research and Regional Sediment Management and Climate Adaptation

This document outlines an initial Research Agenda for the Beach Erosion Authority for Clean Oceans and Nourishment (BEACON). This document is meant to be adaptable and updated over time as new opportunities, issues, and relevant coastal management needs arise. The information provided within was developed by the BEACON Science Advisory Committee (SAC) for the purposes of identifying key research and scientific actions that would advance BEACON's primary objectives of coordinated regional coastal resource management, including those specifically designated in the updated BEACON Strategic Plan (BEACON 2021c).

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 SAC and confirmed the initial leadership and membership of the SAC (BEACON, 2020a, 2020b, 2021a). 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.[2] The BEACON SAC's over-arching goal is to provide recommendations and guidance to the BEACON Board and executive staff for understanding the existing coastal conditions and anticipated future shifts to coastal resources based on climate and adaptation scenarios.

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 2021d, 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 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

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

a unique position to better connect science and policy as it acts in many important ways as a boundary organization[3] 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, there is an opportunity to solidify pathways between these science efforts and BEACON's programs and policies. The charge of the BEACON SAC members is to use their expertise and robust experience to inform the BEACON Board and staff on critical science activities to support the region as a whole.

Figure 2 highlights the overlap and illustrates the coordination and integration of science and perspectives from the SAC into BEACON activities. The development of this 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:

- Prepared a Science Strategy, identifying the need for the SAC and the need for a Science Action Plan;
- Identified the elements of a Science Action Plan; Established the SAC;
- Prepared a set of Science Goals and Objectives; Completed an initial Science and Data Gap Analysis;
- Developed priorities for an initial BEACON Research Agenda; Convened a Managers-Scientists Workshop;
- Prepared the BEACON Research Agenda, and developed 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, 2021c). This document serves as a framework for BEACON to continue supporting research and projects that help implement BEACON's Strategic Plan (BEACON 2021c).

[3] 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.

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 A outlines several relevant science initiatives that can be leveraged to better inform BEACON member agencies.

Figure 2. Diagram of activities and overlap amongst BEACON Board and staff, Science Advisory Committee, and relevant coastal natural resource managers.

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 establish pathways for science to inform decision-making, including in the areas of climate adaptation and coastal resilience. Figure 2 illustrates that an interdisciplinary approach is essential to the coordination and integration of science. Information from the local resource managers as well as the SAC can assist the BEACON Board and staff in providing resources and support that is helpful at the regional level.

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 and Ecosystem Services, and restoration science and practice (see Figure 3). These items address goals and objectives (Appendix B) identified in the BEACON Strategic Plan (BEACON, 2021c). It is important to note the emphasis of interdisciplinary efforts throughout many of the identified focus areas,

implementation actions, and nested. Additionally, it is important to note that any future research and science endeavors also need to nest within planning and implementation efforts taken by individual municipalities and jurisdictions in the region. Appendix C catalogues the local agency coastal vulnerability and adaptation planning resources. BEACON intends to keep the activities listed in Appendices A and C up to date going forward. The Research Agenda Early Implementation Actions reflect the prioritization made by the BEACON SAC to key areas where specific investment would benefit the coastal resources in the BEACON region. These Research Agenda Actions take into consideration ongoing science activities (Appendix A) and existing planning investments (Appendix C) all through the lens of BEACON's programmatic goals and objectives (Appendix B).

SAC Focus Area		Research Agenda Early Implementation Actions	Nested Tasks	BEACON Strategic Plan Goals and Objectives					
Management and Decision Science		-	-	**Goal 2**			Obj. 2.1		
		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	Build BEACON stakeholder network	Obj. 8.1					
		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.	Science-Policy Pathways (regulatory agency workshops)	**Goal 8**		Obj. 8.2		Obj. 8.3	
			Model Regional Permit	Obj. 1.1	Obj. 1.2	Obj. 1.2.1	Obj. 1.2.2	Obj. 1.3	
Integrating Climate Science into BEACON Policies, Programs and Projects		-	-	**Goal 1**					
		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.	-	Obj. 2.2					
		Develop an update to the BEACON Coastal Regional Sediment Management Plan (CRSMP) that includes current climate and sea level rise information, in additional to adaptation strategies that can be taken at a regional level.	SLR Update-CRSMP	Obj. 2.2.1			Obj. 3.1		
		Continue to identify and keep up to datea a catalogue of local jurisdiction assessment and planning documents that incorporate sea level rise and climate science into coastal resource management.	-	Obj. 2.2					
Regional Monitoring Programs	-	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 bluff-backed beaches, and align the various monitoring programs to better leverage one another.	Regional Monitoring Program Review	Obj. 2.3					
	Physical Shoreline Data Collection and Monitoring	Extend shoreline physical profiling to all regional beaches and align the various monitoring programs to better leverage one another.	Aligning Regional Monitoring	Obj. 3.2					
			Extend Shoreline Profiling	Obj. 3.2					
	Coastal Ecology and Ecological Regional Monitoring	Develop a Sandy Beach Habitat and Species Framework Analysis and expand baseline data collection of habitat and species conditions within the region.	-	**Goal 2**					
		Develop draft scope of work for an Ecosystem Goals Program	-	**Goal 2**					
	Human Use and Economics Data Collection and Monitoring	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.	Updating User Data	**Goal 7**			Obj. 7.3		
			Socio-Economic Data Portal						
			Develop Regional Recreational Goals						
Interdisciplinary Research Approach		Extend the CEVA framework analysis from Santa Barbara County to the Santa Barbara Littoral Cell encompassing Ventura County.	-	Obj. 2.4					
Modeling		-	-	**Goal 3**					
		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 extreme events.	Regional SLR-Climate Downscaling	Obj. 2.2					
			Regional Beaches Vulnerabilty Modeling	Obj. 3.3					
			Watershed Extreme Event Flood Modeling	**Goal 2**					
		Continue to support data collection and modeling of sediment source, transport, and fate to help inform coastal adaptation activities (e.g. beach nourishment/beneficial use, prototyping shoreline stabilization projects, dredge material placement, identifying priority monitoring areas, etc.) This includes sediments of many grain sizes, from mud to sand and larger sizes such as cobble.	Sediment Fines-Transport&Fate Modeling	Obj. 1.1.1			Obj. 1.1.2		
Prototyping and Demonstration Projects		Develop one or more new research project(s) focused on innovative sediment retention structures that are environmentally sound and provide resilient features.	-	Obj. 4.1	Obj. 4.2	**Goal 5**	Obj. 5.1	Obj. 5.1.1	Obj. 5.1.2
			Beach-Dune LS	Obj. 4.3			Obj. 7.1		
			Green Groins	**Goal 4**					
			Reefs-Oil Piers Demo Pjt	Obj. 4.4					

Figure 3. Crosswalk table of SAC Focus Areas, Research Agenda Early Implementation Actions, Nested Tasks, and BEACON Strategic Plan Goals and Objectives (see Appendix B) (BEACON, 2021c).

Research Agenda Focus Topics and Suggested Implementation Actions

The Draft BEACON Science Action Plan (2020a) 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 and further described below:

- *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 Approach*
- *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 structure, coastal management process, and 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 D-1 (Appendix D) 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 shorelines. 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 comprehensive climate and SLR update to the CRSMP (BEACON 2009) which includes considering potential opportunities

for regional adaptation strategies. This builds off local efforts towards understanding SLR vulnerabilities and adaptation possibilities that BEACON member agencies have done. BEACON intends to continue coordinating and tracking local activities and initiatives (Appendix C) which will be used to inform how BEACON can promote regional activities to support local agencies.

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.
- Continue to identify and keep up to date a catalogue of local jurisdiction assessment and planning documents that incorporate sea level rise and climate science into coastal resource management.
- Develop an update to the BEACON Coastal Regional Sediment Management Plan (CRSMP) that includes current climate and sea level rise information, in additional to adaptation strategies that can be taken at a regional level

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. This effort requires a formalized review of all active monitoring programs in the BEACON region.

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 bluff-backed 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 the regional sediment management program and individual project impacts. While assessments of individual projects on coastal ecology have been helpful, they are often performed to achieve specific permitting requirements with narrow spatial and temporal scopes. Thus, they have been unable to provide a holistic view on the status and trends of regional coastal ecology, nor how management actions coupled with background climatic and seasonal changes alter these systems. 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).

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). These examples can help scope a path forward for BEACON to consider regional ecosystem goal setting relevant to coastal resources.

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? The answers to these questions can lead BEACON towards better understanding current recreational activities and potential regional recreational goals.

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 Approach

Translating scientific research into useful management actions requires an interdisciplinary approach and lens. Deconstructing silos and bridging gaps between fields is an approach that the BEACON SAC has identified as critical for supporting informed regional sediment management and sea level rise adaptation. Recent science activities (Appendix A) and local agency planning (Appendix C) both contain interdisciplinary research approaches. Going forward, the BEACON SAC supports projects with multi-disciplinary teams that help achieve regional sediment management challenges. For example, BEACON's programs and projects must address combined social and ecological systems 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 example 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, including 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 extreme events.
- Continue to support data collection and modeling of sediment source, transport, and fate to help inform coastal adaptation activities (e.g. beach nourishment/beneficial use, prototyping shoreline stabilization projects, dredge material placement, identifying priority monitoring areas, etc.) This includes sediments of many grain sizes, from mud to sand and larger sizes such as cobble.

Prototyping and Demonstration Projects

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

Management and Decision Science

- 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

- 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
- Continue to identify and keep up to date a catalogue of local jurisdiction assessment and planning documents that incorporate sea level rise and climate science into coastal resource management.
- Develop an updated to the BEACON Coastal Regional Sediment Management Plan (CRSMP) that includes current climate and sea level rise information, in additional to adaptation strategies that can be taken at a regional level.

Regional Monitoring Programs

- 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 bluff-backed beaches, and align the various monitoring programs to better leverage one another.

Physical Shoreline Data Collection and Modeling

- 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

- Develop a Sandy Beach Habitat and Species Framework Analysis and expand baseline data collection of habitat and species conditions within the region.

Human Use and Economics Data Collection and Monitoring

- 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 Approach

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

Modeling

- 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 extreme events.
- Continue to support data collection and modeling of sediment source, transport, and fate to help inform coastal adaptation activities (e.g. beach nourishment/beneficial use, prototyping shoreline stabilization projects, dredge material placement, identifying priority monitoring areas, etc.) This includes sediments of many grain sizes, from mud to sand and larger sizes such as cobble.

Prototyping and Demonstration Projects

- 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 (Figure 4) 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.

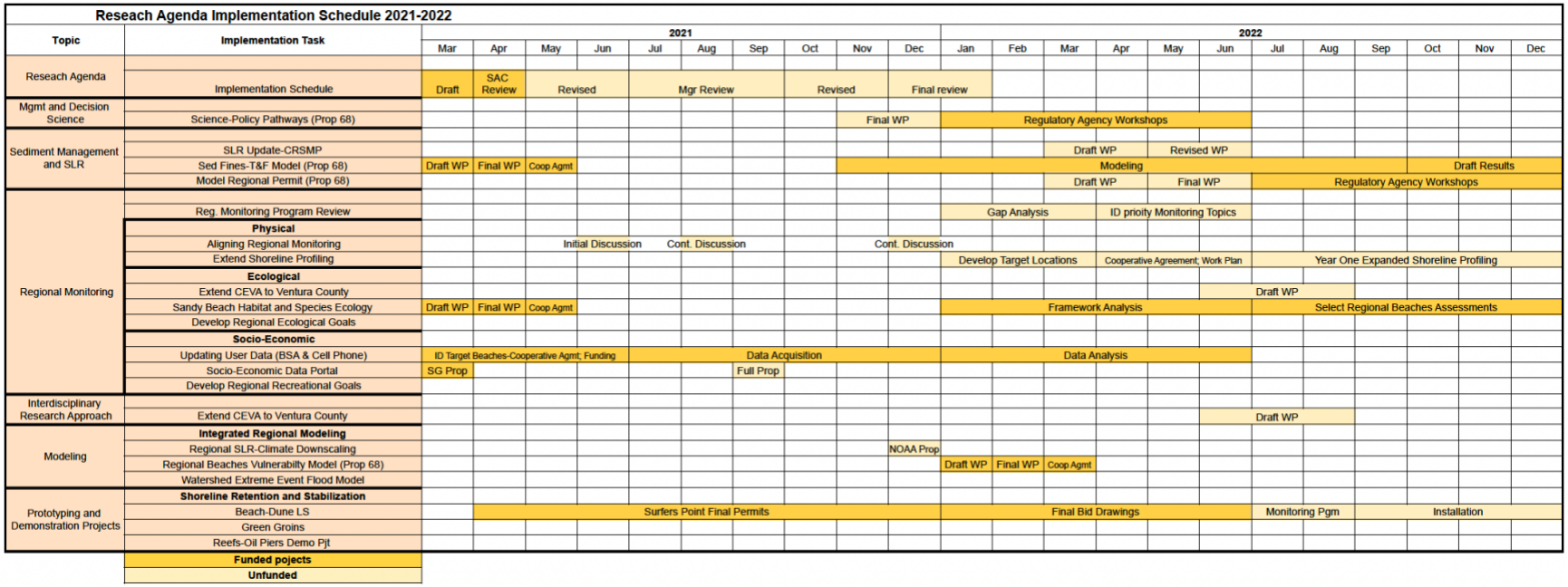

Figure 4. Research Agenda Implementation Schedule 2021-2022

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 Strategic Plan 2021-2026, Adopted March 19, 2021. https://beacon.ca.gov/wp-content/uploads/2021/03/Final-BEACON-Strategic-Planning-Goals-2021-26.pdf

BEACON. (2021d). BEACON SAC Managers Workshop, June 17, 2021 Workshop Summary. https://caseagrant.ucsd.edu/sites/default/files/users/nsadrpour/6.14.21_BEACON_Workshop_Summary.pdf

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.R. (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: Relevant Research 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 Resource
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, Cliff Failure, Coastal Groundwater Response	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-science_center_objects=0#qt-science_center_objects • https://ourcoastourfuture.org/ • https://www.usgs.gov/apps/hera/
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	https://www.resilientcoastlines.com/home
Permit Streamlining: Fine Sediment Transport/Fate, Ecological Impacts,	OPC, BEACON	Interdisciplinary sediment permitting	Santa Barbara	Marc Beyeler, Jon Warrick, Jenny Dugan, Nick Sadrpour,	2021-2023	Permit Streamlining: Fine Sediment Transport/Fate,	OPC, BEACON, SB County	Santa Barbara County Flood Contol District	

Placement Protocols, etc.				Maureen Spencer		Ecological Impacts, Placement Protocols, etc.	Flood Control		
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/
Coastal Resilience-Ventura/Santa Barbara	TNC	Coastal Hazards Modeling	Santa Barbara and Ventura	Bob Battalio	2013-Present	Coastal Hazards Mapping	TNC	ESA, BEACON, several	https://coastalresilience.org/project/santa-barbara-county/ https://coastalresilience.org/project/ventura-county/
Coastal User Assessment	BEACON/ MRCA/CASG	Coastal use	Santa Barbara-Malibu	Kiki Patsch, Nate Merrill, Sean Anderson, Marc Beyelor, Elena Eger, Nick Sadrpour, Tom Ford	2021-Present	Coastal User identification	BEACON, MRCA,CASG	BEACON, MRCA, CASG, CSUCI, Bay Foundation, EPA	
Impact of Sea-Level Rise on Groundwater Pollution Vulnerability in Shallow Coastal Aquifers	CSU COAST/ CASG	SLR flooding and groundwater	Oxnard	Ben Hagedorn, Matt Becker, Danielle Bram	2021-Present	Groundwater flooding impacts on toxic sites	CSU COAST/CASG	CSULB, CSUN	
Community Science:									
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

Appendix B- BEACON Strategic Plan Goals and Objectives (BEACON, 2021c)

Strategic Planning Work Plan Actions	1-2 years	3-5 years	Continuous
Goal 1 Promote Beach Preservation and Beneficial Use of Sediment			
Obj. 1.1 Preservation and Restorationof Natural Sand Supply			**X**
Obj. 1.1.1 Complete SB Debris Basin Project	***X***		
Obj. 1.1.2 Support Matilija Dam Removal Project	***X***		
Obj. 1.2 Support Harbor Sand By-pass Dredging			**X**
Obj. 1.2.1 CI Sand Bypassing	***X***		**X**
Obj. 1.2.2 Port of Hueneme Sand Dredging	***X***		**X**
Obj. 1.3 Opportunistic Sand-Regional Permit	***A1; A2***	**A3; A4**	
Goal 2 Expand Science Support to BEACON			
Obj. 2.1 Create Science Advisory Committee	***A1; A2; A3***		
Obj. 2.2 Integrate Climate/SLR Science in BEACON Policies	***X***		
Obj. 2.2.1 Complete SLR Update to CRSMP	***X***		
Obj. 2.3 Continue and Expand Regional Shoreline Monitoring			**X**
Obj. 2.4 Promote Interdisciplinary Science Research Efforts			**X**
Goal 3 Expand BEACON's Regional Sea Level Rise Coordination and Planning Activities			
Obj. 3.1 Develop Regional Climate and Sea Level Rise Adaptation Strategy	***X***		
Obj. 3.2 Investigate Establishing Regional Shoreline Monitoring Program	***X***		
Obj. 3.3 Pursue Regional-Level Sea Level Rise Studies, Projects and Funding	***X***		
Goal 4 Develop Innovative Sand Retention Projects			
Obj. 4.1 Seek funds to study innovative approaches	***X***		
Obj. 4.2 Identify and develop innovative demo projects			**X**
Obj. 4.3 Surfers Point Project-Complete Final Engineering	***X***		
Obj. 4.4 Oil Piers Reef Project-Update Feasibility Analysis		**X**	
Goal 5 Support Expanded Coastal and Marine Restoration			
Obj. 5.1 Support Natural Infrastructure Demo Projects			**X**
Obj. 5. 1.1 Expand Goleta Bay Kelp Demo Project	***X***		
Obj. 5.1.2 Dunes Demonstration Model Project		***X***	
Goal 6 Maintain and Enhance Coastal Water Quality	***X***		
Obj. 6.1 Integrate Water Quality Criteria in Projects			**X**
Goal 7 Support Coastal Access and Recreation			
Obj. 7.1 Support Completion of Surfers Point Project		**A2**	
Obj. 7.2 Complete Mondo's Cove Beach Access Project	***A1***	**A2**	
Obj. 7.3 Maximize Coastal Access and Recreation in BEACON projects			***X***
Goal 8 Improve Planning, Governance and Funding	***A1***		
Obj. 8.1 Develop Strategic Planning Goals and Objectives			
Obj. 8.2 Strengthen Governance Partnerships	***X***	**A2**	**X**
Obj. 8.3 Develop Expanded Local Funding	***A1***		**X**

Appendix C- BEACON Local Agency Coastal Vulnerability and Adaptation Planning Resources

Member Agency	Climate Planning Documents	Climate Action Plan	Regional Modeling	Vulnerability Assessment	Economic/ Fiscal impact	Governance	Adaptation Policy/ Strategy Planning	Regional Adaptation Policies and Strategies	BEACON Regional Consultation	Notes
City of Santa Barbara	Climate Action Plan (2012); Goleta Slough Area Sea-Level Rise and Management Plan (2015); Sea-Level Rise Vulnerability Assessment (2018); Updated Coastal Land Use Plan (2019); Draft Sea Level Rise Adaptation Plan and Vulnerability Assessment Update Public Review Draft (2020)	CAP: Appendix B. SB Sea Level Rise Study (2012)	P. Barnard-USGS; Santa Barbara County Coastal Hazard Modeling and Vulnerability Assessment (2015)	Sea Level Rise: Griggs & Russell (2012): Vulnerabilty Analysis (2015); Vulnerability Assessment Update (2018)	Cost-Benefit Analysis AECOM (2020)	SLR Adaptation Plan Subcommittee; City Staff Interdepartmental SLR Team	Prioritiization and Selection of Adaptation Strategies (2018); Coastal Land Use Plan interim development review policies (2019); High Priority for Next Five Years (2020)	Shoreline Monitoring: Beach, Bluff, SLR, Groundwater, Flooding Events; Expand Beach Nourishment; Joint Studies; Regional Climate Collaborative: Research on case studies, law and policy on adaptation implementation; BEACON SLR Update to CRSMP; State Adaptation Funding	K. Traiberg; G. Comati-BEACON	ESA and AECOM; CoSMoS (USGS); Adaptation Principles
City of Goleta	City of Goleta Coastal Hazards Vulnerability Assessment and Fiscal Impact Report (2015)	City of Goleta Climate Action Plan (2014)	Santa Barbara County South Coast Coastal Resiliency ESA Modeling (2015); USGS Coastal Storm Modeling System (CoSMoS)	City of Goleta Coastal Hazards Vulnerability Assessment and Fiscal Impact Report (2015)	City of Goleta Coastal Hazards Vulnerability Assessment and Fiscal Impact Report (2015)		City of Goleta Coastal Hazards Vulnerability Assessment and Fiscal Impact Report (2015)		Anne Wells, Goleta; G. Comati; J. Bailard-BEACON	https://www.cityofgoleta.org/city-hall/planning-and-environmental-review/advance-planning-division
City of Carpinteria	General Plan/Local Coastal Plan Update; Sea Level Rise Vulnerability Assessment and Adaptation Project (2019)		COSMos	D. Revell- Revell	P. King-Revell		D. Revell-Revell	Dune & Shoreline Management Plan: Living Shoreline Project (Phase 1: City Beach)	B. Brennan; J. Bailard	
County of Santa Barbara	Sea Level Rise & Coastal Hazards Vuolnerability Assessment (2017);	Energy and Climate Action Plan (2015)	B. Battalio-ESA (South Coast); Coastal Resilence Santa Barbara (ESA) 2015; D. Revell-Revell (North Coast);	D. Revell-Revell					M. Beyeler-BEACON	
City of Oxnard	Local Coastal Plan Update: Sea Level Rise Vulnerability Assessment (2016); Sea Level Rise Adaptation (2018)			D. Revell-Revell	P. King-SFSU		S. Hecht-UCLA (Not completed)			
City of Ventura	Climate Action and Resilience Plan (2020)									Prop 84 Wildfire Recovery and Resiliencey Planning Grant (June 2020)
County of Ventura	Sea Level Rise Adaptation Strategies Report (2019)	2040 General Plan (Sept, 2020)	TNC/CCC Coastal Resilience Tool, ESA.; B. Battalio-ESA; CoSMoS 3.0,; Barnard-USGS;	County/D. Revell-Revell, 2018	P. King-Revell	Local Coastal Program Amendments led by Planning; CAP implementation Planning and CEO's Office, Climate Emergency Council	Adaptation Plan by County/Revell, 2019. Planning working with other agencies on adaptation projects, preparing Local Coastal Program(LCP) Amendments	Shoreline Management Plans, Beach Nourishment; Ephemeral Cobble Groin Pilot Project, sediment bypassing at Point Mugu, transport inland debris basin sediment to the coast, dune restoration, support Beacon updates to CRSMP, improve access, etc.	J. Bailard; M. Beyeler-BEACON	Planning Divison is Updating LCP with CCC Planning Grant, Harbor Dept. applied to Conservancy for dune restoration grant in Summer of 2020 for Hollywood Beach

Appendix D: Framework for Integration

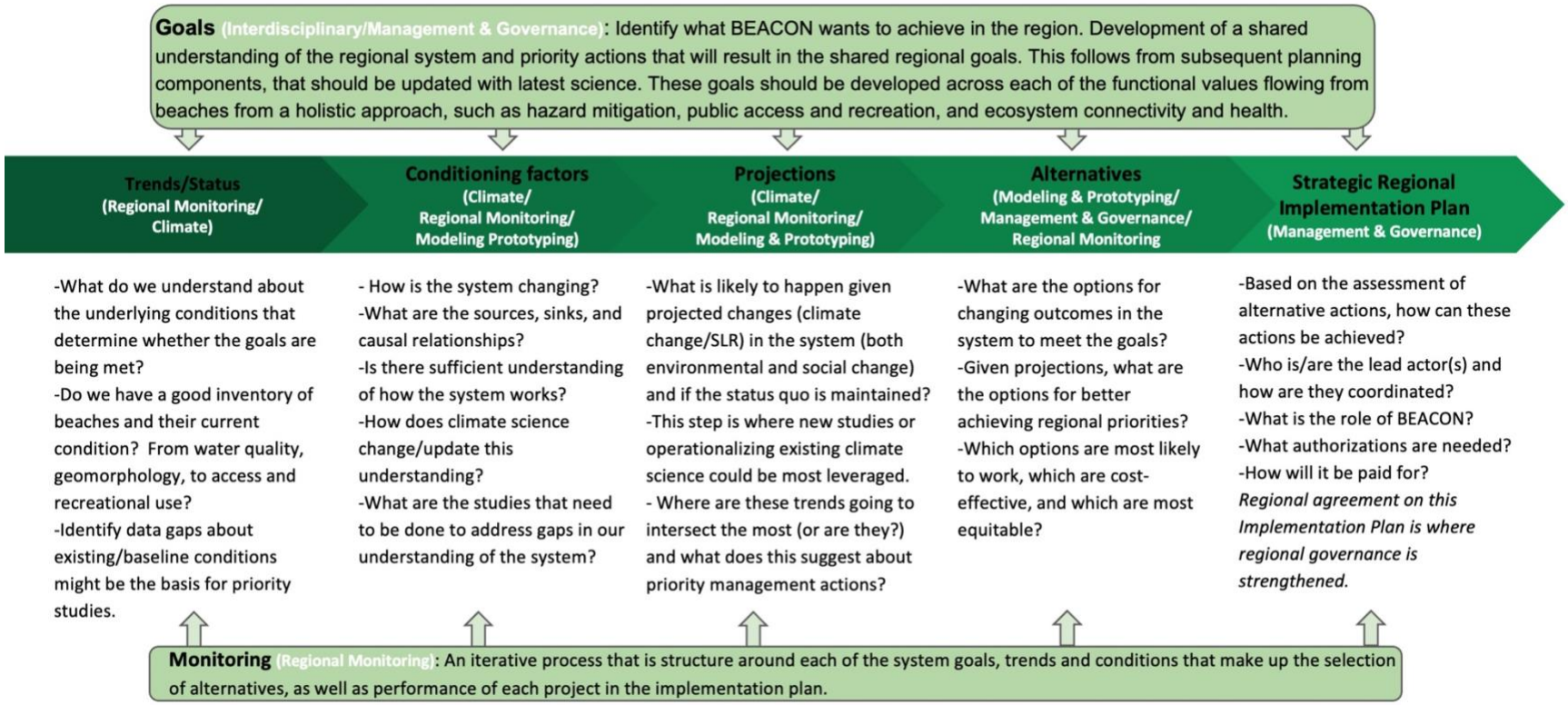

Figure D-1. A framework of an iterative process that can integrate management and governance science with the other major themes identified by the SAC: interdisciplinary research approach, climate science, modeling and prototyping, and monitoring, focused on regional goals.

Report Preparation

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