Midpeninsula Regional
Open Space District

R-20-05
Meeting 20-01
January 8, 2020

AGENDA ITEM 4

AGENDA ITEM

Science Advisory Panel Topics

GENERAL MANAGER'S RECOMMENDATIONS

1. Authorize the General Manager to direct the Science Advisory Panel to prepare scientific reviews for the following two topics, as unanimously supported by the Planning and Natural Resources Committee:

    - How can the District effectively and efficiently monitor changes in priority plant and animal populations at the landscape scale?
    - What are the visitation and recreational use benefits and trade-offs to fulfilling District goals, including natural resource protection and ecologically-sensitive public enjoyment and education?

2. Additionally, authorize the General Manager to direct the Science Advisory Panel to prepare a scientific review for the following topic:

    - Review of cattle grazing benefits and impacts:
        - What is the net climate impact of cattle grazing (e.g., potential increase in soil carbon minus cattle methane emissions)? What are the District's options, such as grazing regimes or dietary additives, to reduce emissions from cattle grazing?
        - What are the current scientific results on the effectiveness of managing grasslands and reducing fire risk with cattle grazing?

3. Retain the remaining 10 topics as reviewed by the Planning and Natural Resources Committee for future consideration when the Year 2 Science Advisory Panel work plan is discussed in 2020.

SUMMARY

The Planning and Natural Resources (PNR) Committee reviewed thirteen potential topics for the Science Advisory Panel on November 19, 2019 (R-19-149). The PNR Committee recommends two topics to the full Board of Directors (Board) for final selection and directed staff to work with the Science Advisory Panel (Panel) to evaluate the feasibility of including one or more additional topics in the first year's work plan, dependent upon the scope and level of effort required to address the selected topics.

BACKGROUND

The Panel will provide an independent, science-based review of the Midpeninsula Regional Open Space District's (District) open space management practices and decisions and serve as an important resource to inform regional management topics. The Board awarded a $100,000 contract to San Francisco Estuary Institute on August 28, 2019 (R-19-120) for Panel formation and first round of scientific review. The Board received two previous Panel presentations on December 6, 2018 (R-18-148) and March 27, 2019 (R-19-32).

DISCUSSION

Panel consultants, San Francisco Estuary Institute and Point Blue Conservation Science, facilitated a staff workshop to brainstorm and prioritize potential topics for the Panel on October 9, 2019. These topics were forwarded to the Board in an informational memorandum, through which staff solicited additional topics from Board members. Three additional topics were suggested by Board members, bringing the total number of suggested topics to 13.

The PNR Committee reviewed the thirteen potential Panel topics on November 19, 2019. The PNR Committee recommended forwarding to the full Board the approval of topics in a two-part motion that 1) identified two topics for research during the first year's work program, and 2) identified three additional topics that, depending upon further refinement of scope and effort, one or more could also be included in the first year's work program.

These topics are discussed in more detail below with additional information on the scope and the recommended timeline to accommodate the top two topics plus one additional topic (total of three) during the first year of work. The scope and timeline allow for full completion of at least one topic in the first year to better inform a subsequent assessment by staff of the entire Panel process that may identify areas where process improvements can be made in upcoming years.

Evaluation Criteria:

Topics were generated and prioritized using the following criteria:

- **Mission** - Topic is relevant for land management and District mission
- **Actionable** - Topic is answerable and would generate actionable information
- **Time Sensitive** - Topic is urgent/time-sensitive
- **Partner Benefit** - Topic benefits our partners and contributes to regional data needs
- **Return on Investment** - Topic yields a good return on investment (low costs, high benefits)
- **Public Perception** - Topic is perceived well by the public
- **Multiple Preserves** - Topic is broadly applicable to multiple preserves or issues
- **Science Fit** - Panel is best means available to address topic

Attachment 1 presents the evaluations results for each topic. Attachment 2 presents a summary table of the topic rankings as scored by staff using the evaluation criteria. This table also includes an assessment of cost and effort for the Panel to address each topic.

Topics Recommended by the General Manager and Unanimously Supported by PNR

1. **How can the District effectively and efficiently monitor changes in priority plant and animal populations at the landscape scale?**

Description: Research into this question will produce a plan for how to build a standardized, scientifically robust, and cost-effective monitoring approach that samples widely from both wildlife and plants, providing key information to inform District land management. Research will consider an array of monitoring methods (with the associated costs, strengths, and risks of each) and include a set of quantifiable goals for the various ecosystems and plant and wildlife populations represented within District boundaries. This will provide continual information for holistic, adaptive land management. This research would consider integrating innovative approaches not currently used by the District, potentially including passive monitoring and environmental DNA to monitor a broader array of wildlife more cost-effectively.

Value to District: By implementing a more robust yet cost-effective monitoring program, the District will contribute ecology information to the region, be better equipped to detect changes over time, and have regular data updates that will support management decisions. This information will be complementary to many existing work efforts such as the Early Detection Rapid Response invasive weed monitoring program; numerous rare, threatened, and endangered species monitoring efforts; and our efforts in identifying emerging threats to the natural resources within the region.

Proposed Scope/Approach: This topic presents a broad question that is being asked by many other land management organizations locally and nationally, across many environments. Because of the complexity of addressing landscape scale monitoring, and interest by the District to include additional topics in this first year of effort, the Panel is recommending addressing this question across a two-year work effort. The extended schedule would make time and funding available to include one (1) additional topic to the first year's work program.

During year one, the Panel will conduct a literature review to consider an array of monitoring methods and their associated costs, strengths and risks. These methods may include innovative approaches such as passive acoustic monitoring and environmental DNA, both of which enable cost-effective monitoring of a broad array of wildlife. The Panel will also develop a set of quantifiable goals for the various ecosystems, plant populations, and wildlife populations represented within the District's boundary. During year two, the Panel will conduct interviews with District staff to define and align on specific monitoring objectives. The Panel will assess opportunities for improvement and deliver a plan for a comprehensive monitoring program that will provide continual information for holistic, adaptive land management.

2. **What are the visitation and recreational use benefits and trade-offs to fulfilling District goals, including natural resource protection and ecologically-sensitive public enjoyment and education?**

Description: Research into this question will yield an understanding of the benefits and trade-offs on the visitor use experience and surrounding ecosystem by various types and quantities of low-intensity recreation (e.g. trails, hiking, equestrian, mountain biking, dog-walking, etc.). There are many benefits associated with visiting preserves, including physical health and mental

well-being. Research into this question will aim to address the tradeoffs associated with various types and quantities of visitation and recreation, the effects on the natural environment and, the ability to further District goals regarding stewardship and public enjoyment and education. We will also investigate the effects on visitor experiences from different recreational use types and visitor densities.

Value to District: This information can be incorporated into plans for land management units, by matching the appropriate recreational use types based on District goals, ecosystem sensitivity, and the ability to provide a variety of visitor experiences. In accordance with the District's mission, this information will help management incorporate science-based findings in land management decision-making.

Proposed Scope/Approach: As with Topic #1 discussed above, this topic also presents a complicated, broad question that would benefit from being structured as a two-year effort. The extended schedule would also facilitate the addition of the one (1) topic to the first year work program.

During year one, a literature review will yield an understanding of the benefits associated with visiting natural areas and from various types of recreation. During year two, the focus will shift toward the tradeoffs. A literature review will reveal the tradeoffs on the visitor use experience and surrounding ecosystem by various types and quantities of recreation. Because visitor experience can be both positively and negatively affected by other people, we will also investigate the effects on visitor experiences from different recreational use types and visitor densities. Finally, to tie the two years of research together, during year two, we will synthesize the full suite of information, weighing the benefits and tradeoffs, and developing rough guidelines for conditions in which benefits are likely to outweigh tradeoffs.

Selection of One Additional Topic to the First Year Work Plan

The PNR Committee recommended that staff return to the full Board with additional information regarding three other topics of interest selected by the PNR Committee for possible inclusion in the first year work program, as time and funding allows. Based on a recommended two-year schedule for the two recommended topics listed above, the Panel has concluded that one (1) additional topic can be added to the first-year work program.

The following three topics were identified for evaluation of potential inclusion in the first year work program. These three topics are being forwarded by the PNR for Board review and selection. However, in light of recent public interest in the District's Conservation Grazing Program for managing over 7,000 acres of grassland habitat, the General Manager recommends the selection of Topic #5 below with an expanded scope to include a scientific review of research findings on the effectiveness of livestock grazing for managing grassland resources and reducing wildfire risk.

3. **What are the benefits (biodiversity, ecosystem services, survival rate, mitigation effectiveness, etc.) and costs of restoration planting compared to seeding or other revegetation options? How does this vary by species?**

Description: This question will review existing revegetation methods (including planting, seeding, and others) to provide information on short- and long- term costs and benefits as well as

guidance on metrics that would determine a successful restoration program. This information may lead to suggestions of which revegetation method is preferable for a given budget, vegetation community, or target plant species.

Value to District: With this information, staff would be positioned to select the mitigation techniques specific to the plant community that would likely be most successful and cost-effective. The results would also help staff negotiate alternative mitigation plans with regulatory agencies. The District currently spends significant funds on restoration planting, so this information could lead to cost savings if more cost-effective methods are identified while also increasing ecosystem resiliency.

Proposed Scope/Approach: A panel of restoration scientists and practitioners will be engaged to provide expert opinion on this question. A literature review will also be conducted; however, we anticipate very few published works on this topic. Expert opinion will provide a preliminary understanding of the existing revegetation methods and information on the short- and long-term costs and benefits of each. Given additional information from District staff regarding the priority vegetation communities, the Panel would also provide guidance on metrics that would determine a successful restoration program based on case studies and suggestions of which revegetation method is preferable for a given location, ecosystem, and target plant species.

4. **What is the status of the soils in the various ecosystems of the District (chaparral, oak woodland, redwoods, grazing, farm lands, wetlands, etc.,) and what steps can the District take to improve and/or maintain them?**

Description: Soils are the complex "foundation" for plant and all life. Soil is a mixture of mineral particles, organic materials, air, water, and living organisms. An inventory and monitoring of soils from different ecosystems will give the District a baseline in which to assess ecosystem health.

Value to District: As we understand more, the District can implement adaptive management techniques to restore and protect our lands, such as amending or altering degraded soils.

Proposed Scope/Approach: There are numerous metrics for evaluating soil health. The most appropriate metrics for use will depend on how the District would like to target its adaptive land management for soil health, as different types of land use and land cover are susceptible to different types of soil degradation. For instance, the District could consider land management to improve soil health in agricultural areas (e.g. measured as compaction and nutrient retention), for stability (as opposed to erosion along stream banks), for climate change mitigation (e.g. measured as carbon storage), and for human health (e.g. measured as contamination from historic or current land use). Research into this topic would yield a guidance document outlining informative and commonly used soil sampling techniques and metrics of soil health. This information would be tailored to develop a specific soil monitoring plan that could be carried out by a local consulting firm, with guidelines outlining what conditions are likely indicators of soil health and degradation. This information can be built into a Request for Proposals by the District, targeted for local environmental consulting firms. Future proposals should provide a robust plan for standardized soil monitoring plan to assess the status of the soils in the various ecosystems and/or land use types of the District. Proposals should also identify steps the District can take to improve and/or maintain them.

5. **What is the net climate impact of cattle grazing (potential increase in soil carbon minus cattle methane emissions)? What are the District's options, such as grazing regimes or dietary additives, to reduce emissions from cattle grazing?**

   What are the current scientific results on the effectiveness of managing grasslands and reducing wildfire risk with cattle grazing?

Description: A literature review would provide scientific evidence of changes in soil carbon storage and greenhouse gas emissions due to conventional and alternative practices in rangeland management, which occurs on 17 percent of the District's land. Additionally, research has been conducted for many years regarding the resource management effects of livestock grazing on grassland habitats, which is a natural extension of this topic.

Value to District: This topic emerged from the District's Climate Action Plan efforts to assess and reduce emissions from cattle. This information would help the District implement best practices over thousands of acres of rangeland to curb emissions of carbon dioxide and methane, both greenhouse gases that contribute to global warming and climate change. Because of recent public interest in the District's Conservation Grazing Program and use of cattle to manage grassland habitats, the General Manager recommends including a more general review of the current scientific findings on the effectiveness of livestock grazing for managing grassland resources and reducing wildfire risk.

Proposed Scope/Approach: The Panel would conduct a literature review to provide scientific evidence of changes in soil carbon storage and greenhouse gas emissions due to conventional and alternative practices in rangeland management. This analysis would also provide an updated scientific review of the effectiveness of livestock grazing on grassland habitat health and reduction of wildfire risk.

Topics for Potential Future Study:

Through the process of developing potential topics for the Panel, a total of 13 topics were suggested through both the staff brainstorming workshop as well as by the Board in advance of the PNR Committee review. These additional topics are presented in Attachment 3. If approved by the Board, any remaining topics not chosen for the first year work plan would be retained and considered during PNR review of the second year work plan in late 2020.

FISCAL IMPACT

There are sufficient funds in the adopted Fiscal Year (FY) 2019-20 operating budget to cover the cost of Panel formation, topic selection process, and initiation of the first round of research. Additional funds will be requested as part of the FY2020-21 Budget and Action Plan process to cover the completion of the first round of research, along with an evaluation of the Panel's effectiveness and, if successful, the initiation of a second round of topic selection and research.

The Panel is not funded by Measure AA.

BOARD COMMITTEE REVIEW

The Planning and Natural Resources Committee (PNR) reviewed the potential topics for the first year of the Science Advisory Panel on November 19, 2019. The recommendations in this report reflect PNR actions.

PUBLIC NOTICE

Public notice was provided as required by the Brown Act.

CEQA COMPLIANCE

This item is not a project subject to the California Environmental Quality Act.

NEXT STEPS

Following selection of the topics for the Panel, staff will assemble internal subject matter expert teams to work with the Panel on each topic. Research results (or interim reports, as appropriate) will be shared with the Board in fall 2020.

Attachments

1. Evaluation of Science Advisory Panel Potential Topics
2. Summary of Science Advisory Panel Potential Topics Rankings
3. Topics for Potential Future Study

Responsible Department Head:
Kirk Lenington, Natural Resources Manager

Prepared by:
Kirk Lenington, Natural Resources Manager

Attachment 1. Evaluation of Science Advisory Panel Potential Topics

Topics	Mission	Actionable Info	Time-sensitive	Partner Benefits	Return on Investment	Public Perception	Multiple Preserves	Science Panel Fit
1. Monitoring	●	◒	◒	●	○	●	●	●
2. Visitor threshold	●	●	◒	◒	◒	●	●	●
3. Restoration type	●	●	●	◒	●	○	◒	●
4. Soils	●	○	○	○	○	◒	●	○
5. Grazing GHGs	●	●	◒	●	○	●	◒	●
6. Quarry operations	◒	●	●	○	◒	◒	○	○
7. Fish & climate change	●	●	○	◒	◒	◒	○	●
8. Species movement & climate change	●	◒	○	●	◒	◒	◒	●
9. Invasive Species	●	●	●	◒	●	◒	●	●
10. Nutrient cycles	●	◒	○	◒	○	◒	●	○
11. Forest management	●	◒	○	◒	◒	◒	◒	●
12. Plant sourcing	●	●	●	◒	●	○	◒	●
13. Beavers	◒	○	○	◒	○	●	○	●

Note: ○ = low, ◒ = medium, ● = high

Attachment 2. Summary of Science Advisory Panel Potential Topics Rankings

Topics	Assessment of cost and effort	Rank based on staff votes	Rank based on criteria	PNR Committee Interest
1. Monitoring	High	1	3	✓
2. Visitor threshold	High	2	2	✓
3. Restoration type	Medium	3	3	✓
4. Soils	High	na	8	✓
5. Grazing GHGs	Low-Medium, very focused question	8	1	✓
6. Quarry operations	High	na	6	✓
7. Fish & climate change	Low, very focused question	6	4	✓
8. Species movement & climate change	Medium-High, depending on how many species to assess	7	4	✓
9. Invasive Species	Medium	na	3	
10. Nutrient cycles	Medium-High	na	6	
11. Forest management	Low-Medium, depending on end product	4	5	
12. Plant sourcing	Medium	5	3	
13. Beavers	Medium	9	7	

Attachment 3: Topics for Potential Future Study

Through the process of developing potential topics for the Panel, a total of 13 topics were suggested through both the staff brainstorming workshop as well as by the Board in advance of the PNR Committee review. This attachment presents those topics not recommended for the first year of study as these topics may be considered in future years.

This list of topics is presented in two sections; the first section includes those topics that received PNR Committee interest, and the second section are the additional topics.

Potential Topics for Future Year's Work Program with Committee Interest:

This selection of topics would also include those topics not selected by the Board, yet were recommended as potential topics (i.e. Topics for Potential Inclusion, Subject to Scope Refinement: Topics 3,4, and 5) that were not able to be included in this year's study.

6. **What does a "sustainable" or "restorable" quarry operation and reclamation plan look like?**

Description: If we assume some amount of need for cement for the Bay Area, what are the best possible processes that will allow for minimal, but successful restoration. Are there areas where a mine location would least impact key hydrological functions and least harm the ecosystem?

Value to District: Answers to these questions may inform District negotiations with Lehigh Cement Plant and Quarry and our advocacy with Santa Clara County.

7. **Where on the San Mateo Coast should the District focus fisheries restoration efforts in light of climate change?**

Description: Research into this topic would yield a comprehensive report detailing restoration techniques beyond barrier removal, such as sediment removal, reducing streambank erosion, and streambed improvements. Fisheries restoration is a particular challenge in agricultural areas, where water is diverted from creeks for agricultural use.

Value to District: This information will help the District develop policies and prioritize projects that enhance stream restoration and management for Coho Salmon and Steelhead Trout.

8. **What are land conservation and management options to enable climate change-induced species migration and minimize species loss?**

Description: Research into this topic will identify species that are likely to require assisted migration and compile existing projections of species distributions under climate change. Based on the habitat requirements of a suite of focal species, the District can then design stewardship strategies that enable species movement and acquisition strategies that emphasize tracts that are a high priority for conservation.

Value to District: This information will help the District form strategies that are proactive rather than reactive to changes in plant and animal distributions as a result of climate change, and thereby be better positioned to seek grants that would fund efforts to assist species migrations (e.g. improving permeability and connectivity across the landscape). However, this question may be answered in part by the current Santa Cruz Mountains Climate Resilience Project.

Additional Topics Raised through Staff and Board Input:

9. **How should the District and partners decide on the most cost-effective strategy for invasive species management across District and private properties?**

Description: Research into this topic would yield a report of the costs and benefits of different invasive species management approaches. Using examples such as Slender False Brome and Sudden Oak Death, this research would examine whether approaches like up-front early detection and rapid response treatment or ongoing adaptive management are more cost-effective strategies to eradicate or manage invasive species or invasive ecosystems (sets of species) that may cross preserve boundaries.

Value to District: The District expends significant resources on invasive species management. This topic could save the District staff time and dollars by developing tools to either deal with an invasive species across multiple properties or within one property or preserve.

10. **What is the status of ecosystem cycles for the Midpeninsula area, or perhaps for the nine-county Bay Area? What are the most important and low hanging steps we could take to improve them?**

Description: The three main cycles of an ecosystem are the water cycle, the carbon cycle and the nitrogen cycle. These three cycles working in balance are responsible for carrying away waste materials and replenishing the ecosystem with the nutrients necessary to sustain life. If any of these three cycles should become unbalanced, the effects on the ecosystem can be catastrophic.

Value to District: Sustainability is a seven generation and longer commitment to continue providing in the future, what our natural environment provides us and itself today - or rather yesterday given the recent degradation. The District can help provide to local leaders and residents information on (a) how we are doing in overall sustainability from the water/carbon/nitrogen cycle point of view, (b) how the District is contributing to improving this sustainability, and (c) how the District can improve its operations.

11. **How do fire and habitat resilience, carbon sequestration, and biodiversity develop and emerge as co-benefits from late-seral forest management?**

Description: Research into this topic would yield a report of the ecosystem services that a healthy, managed late-seral forest provides. It would include an evaluation of fire response under different fuels treatments, habitat improvements for a diverse wildlife community, and capacity to store carbon in different forest types.

Value to District: The District is currently drafting a forest management plan for La Honda, which could incorporate findings from this research on late-seral forest management. While this question would not likely provide new information for staff, a synthesis report could be useful to demonstrate the benefits of forest management to the public.

12. **How should the District select plant propagule sites, factoring in climate change, genetic integrity and diversity, disease resistance, and inbreeding/outbreeding? Should we be planting seeds from future climate analog sites rather than current analog sites? How does this selection vary by species?**

Description: A review of the latest research on climate-analog mapping and propagule sourcing (e.g. locating the source of seed for revegetation) will provide a current understanding of the potential benefits (e.g. disease resistance, climate resilience, fire resilience) and costs (e.g. loss of local genetic integrity) of importing non-local propagules during restoration plantings. Climate-analog mapping pinpoints a modern comparable environment that matches the potential future climate of a restoration site. This research will also highlight which species are most vulnerable, and therefore in need of assistance to persist further into the future.

Value to District: By implementing a new strategy for propagule selection specifically for climate resilience, the District would likely improve the odds of success of current restoration efforts to endure the change in climate. The District will be able to manage proactively rather than reactively to changes in plant and animal distributions as a result of climate change.

13. **What is the historical ecology of beavers on the San Mateo Coast?**

Description: This line of research would yield a compilation of the habitat requirements of beavers, a mapping of the historical range of beavers on the San Mateo Coast, and a description of their role as ecosystem engineers. By felling trees and building dams, beavers have a great influence on ponds, wetlands, salmon, birds, and aquifer recharge. It would also highlight examples of using beaver dam analogs in areas without beavers to alter flow and create habitat.

Value to District: This information would provide guidance for the potential reintroduction of beavers to San Mateo County as well as a framework for incorporating beaver dam analogs to assist with recovery of fish such as Coho Salmon in the absence of beavers.