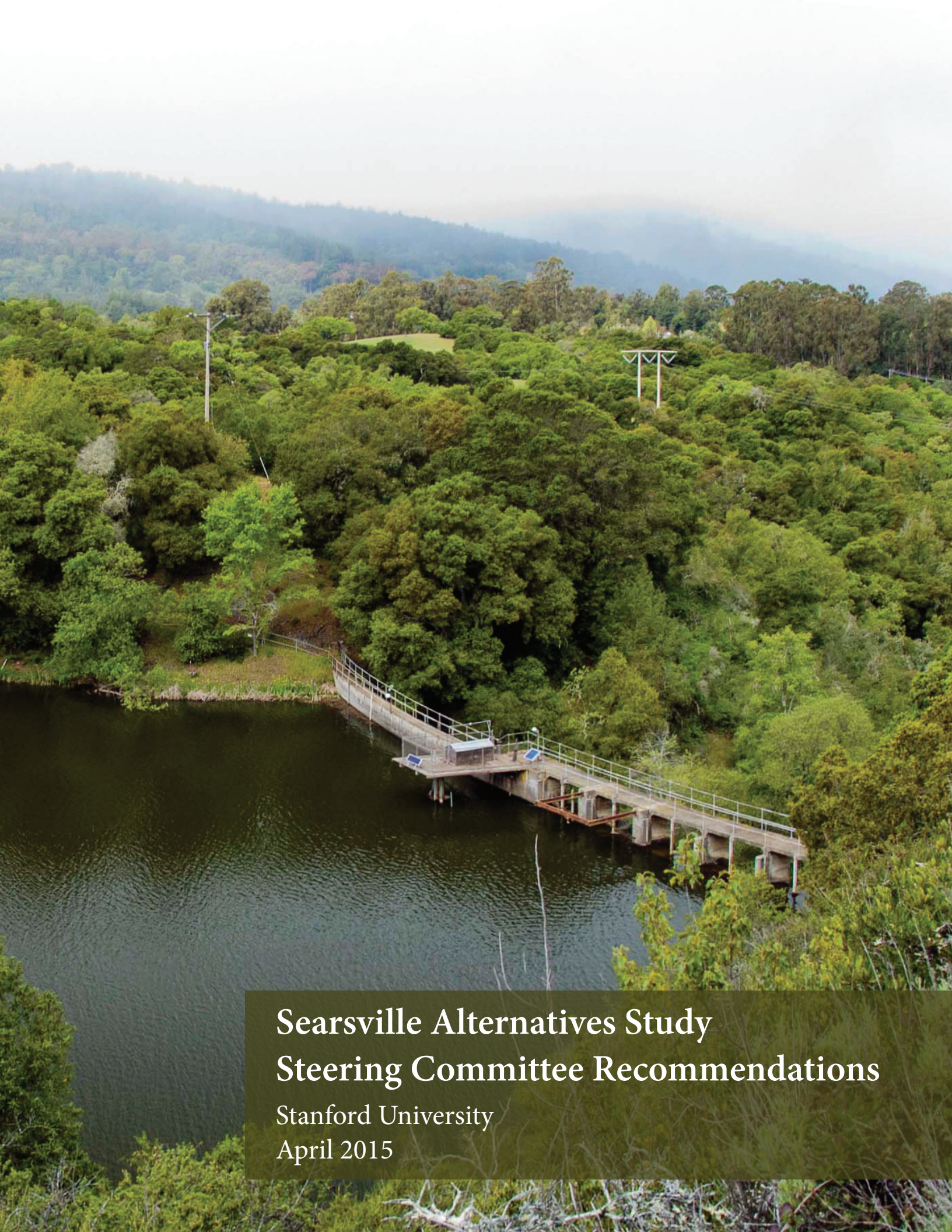


Searsville Alternatives Study Steering Committee Recommendations

Stanford University

April 2015

Cover photo credit: Philippe S. Cohen, Executive Director, Jasper Ridge

Stanford University

Dear President Hennessy and Provost Etchemendy:

In 2011, Stanford University formed a faculty/staff Steering Committee to develop a recommended course of action to address the future of Searsville Dam and Reservoir. The Searsville Alternatives Study Steering Committee considered technical studies provided by an expert engineering and environmental consulting team, plus contributions from an external Advisory Group representing community and resource agency perspectives. The Steering Committee's recommendations, and a summary of the study process, are presented in this report. The Advisory Group's advice to the Steering Committee is included as well.

The Steering Committee process began with defining the goals for the future of the San Francisquito Creek watershed and then moved to evaluating, refining, and further evaluating a number of possible alternatives. The Steering Committees recommends the following for further development and consideration:

1. *Develop and evaluate, in collaboration with the resource agencies and the San Francisquito Creek Joint Power Authority (JPA), two alternative ways to achieve fish passage, while avoiding an increase in downstream or upstream flooding and also preserving/providing riparian and wetlands habitat in the vicinity of the Dam and Reservoir and in Corte Madera Creek.*

   The first of these two alternatives, preferred by the Steering Committee, would modify the Dam with an opening at its base to provide fish passage and attenuation of high flows. This alternative depends on the availability of feasible and acceptable methods to stabilize much of the coarse accumulated sediment and to transport much of the accumulated fine sediment from behind the Dam to San Francisco Bay through flushing/sluicing. Feasibility and acceptability will be determined based on further evaluation by local communities, the regulatory agencies, and Stanford. This alternative does not preclude the ultimate removal of the Dam if certain conditions can be met.

   The second alternative becomes relevant if transporting significant amounts of the accumulated fine sediment to the Bay in streamflow is not feasible or acceptable to the local communities, the regulatory agencies, or Stanford. This alternative would allow the Reservoir to ultimately fill completely, with coarse and fine sediment retained behind the Dam. Fish passage would be provided by a fish ladder over or around the Dam or a fish way or rerouted creek around the Dam, based on further evaluation.

   Both alternatives are practical only if downstream conditions are adapted to increased natural annual sediment loads that will no longer be trapped by Searsville Dam, once an opening has been installed at the base of the Dam, or when the creek flows are carried through a fish ladder or re-routed creek.

2. *Develop and evaluate, in collaboration with the resource agencies and the San Francisquito Creek Joint Powers Authority, an approach that allows the natural annual sediment loads to flow downstream.*

   Searsville Dam has trapped naturally occurring annual sediment loads behind the Dam since 1892 and is now substantially filled with sediment. The Steering Committee considered habitat,

sustainability, natural processes of the system, and disturbance to Jasper Ridge Biological Preserve, and determined that ongoing dredging to keep the Reservoir from filling with sediment is not a desirable long-term management action. Thus, in both of the alternative approaches described in this report, annual sediment loads originating from the watershed upstream of Searsville Dam will be allowed to flow unimpaired into the downstream channel.

The naturally occurring fine sediment loads will almost entirely flow to San Francisco Bay, but coarse sediments have the potential over time to reduce channel capacity downstream. Stanford will work with the natural resources agencies and watershed communities to address the effects of natural sediment mobilization on channel capacity downstream of the Dam.

3. *Create a replacement water diversion downstream, and relocate the Searsville water storage functions to an expanded Felt Reservoir.*

   The original purpose of the Dam and Reservoir was for water supply. Searsville has been and continues to be an important source of water supply for the University. This recommendation creates a new point of diversion downstream and shifts water storage from Searsville to Felt Reservoir. This recommendation is intended to preserve Stanford's ability to capitalize on a sustainable source of non-potable water, exercising existing rights to creek water diversion (under suitable flows) and storage, considering the effects of climate change, population growth, and drought on the region's water sources.

Next steps

The next steps in determining a course of action for Searsville will be:

- to proceed with intensive discussions with the appropriate resource agencies and local watershed interests regarding these alternatives;
- to identify and conduct more detailed engineering design and cost analyses of the specific actions to be taken regarding water supply and storage, sediment management, flood-risk management, fish passage, and habitat preservation, leading to a preferred project; and
- to consider the sequence and timing of their implementation.

Modifications to Searsville Dam and Reservoir will require comprehensive and coordinated collaboration with federal, state, and local agencies, including the San Francisquito Creek Joint Powers Authority (JPA), its local government members, and local communities and residents in the San Francisquito Creek watershed. Because this project may require expenditures of up to or even more than $100 million, finding ways to address the financial responsibilities will be one of the top priorities. Efforts on all of these fronts will inform the selection and preparation of a preferred project description, environmental review, and permit applications.

Sincerely,

Jean K. McCown
Assistant Vice President
Director of Community Relations
Office of Government &
Community Relations

Christopher Field
Director, Department of Global Ecology,
Carnegie Institute for Science and
Melvin and Joan Lane Professor for
Interdisciplinary Environmental Studies

Searsville Alternatives Study
Steering Committee Recommendations
April 2015

Planning for Searsville Dam and Reservoir in the San Francisquito Creek watershed involves a diverse set of values, opportunities, and challenges for Stanford University, neighboring communities, local species, and ecosystems. Key issues include environmental quality, flood risk, and water resources. After evaluating a wide range of information and perspectives since the Searsville Alternatives Study commenced in 2011, the Steering Committee concludes that options for the future of Searsville should be considered in the following framework.

- Future changes to Searsville Dam and Reservoir should be developed through a comprehensive, collaborative, and coordinated effort with federal and state agencies, the local San Francisquito Creek Joint Powers Authority (JPA), its local government members, and local communities and residents in the San Francisquito Creek watershed. Some of the options for Searsville Dam and Reservoir become feasible only with enabling actions by other entities.
- The decision pathways and management options for Searsville Dam and Reservoir depend critically on whether it will be possible to release sediments accumulated in the Reservoir to San Francisco Bay via San Francisquito Creek.
- The preferred options for exercising Stanford's rights to creek water diversion and storage involve shifting the existing point of diversion at Searsville to a downstream location, and expanding the capacity of Felt Reservoir to allow storage of seasonal flows.
- The Steering Committee's recommendations, and the evaluation of other Alternatives to those described in this report, received the benefit of information, discussion, consideration, and advice from the Advisory Group to the Steering Committee. The Advisory Group and Steering Committee — and the process of the Study effort — are more fully described in Appendix 1. The Advisory Group's recommendations and supplementary materials provided to the Steering Committee are included as Appendix 2.

A number of possible Alternatives consisting of a broad range of actions at the Dam and Reservoir were developed to meet the Study's goals (see Appendix 1). These options were evaluated and refined through the Study process, and the Steering Committee is recommending three aspects for further development and evaluation.

1. Develop and evaluate, in collaboration with the resource agencies and the San Francisquito Creek Joint Power Authority (JPA), two alternative ways to achieve fish passage, while avoiding an increase in downstream or upstream flooding, and also preserving/providing riparian and wetlands habitat in the vicinity of the Dam and Reservoir and in Corte Madera Creek.

The existence of Searsville Dam and Reservoir has resulted in the retention and accumulation of approximately 2.7 million cubic yards of sediment. The potential for sediment loading in San Francisquito Creek, after 120 years of sediment trapping behind Searsville Dam, is not well understood at this time, and predicting the potential effects of Searsville options is significantly uncertain. Because the San Francisquito Creek alluvial fan has been intensively developed subsequent to the construction of Searsville Dam, caution and care must be exercised in the design and implementation of any changes. Stanford does not want to proceed with actions that could negatively affect our downstream or upstream neighbors, or increase the risk of liability claims against Stanford.

The possible effects of mobilized accumulated sediment represent a key determining factor when considering the two Alternatives described below. After evaluating this issue, the Steering Committee concluded that mechanical excavation, requisite drying of the dredged material, and ultimate hauling and disposal of the accumulated sediment would not be acceptable due to extensive disturbance to surrounding communities and at Jasper Ridge Biological Preserve. Accordingly, a threshold determination is whether sluicing/flushing fine sediment downstream will be feasible and acceptable to the local communities, the regulatory agencies, and Stanford. If not, the accumulated sediment will need to be primarily stabilized in place. More extensive evaluation and study of this issue is required, beyond the scope of the analyses performed to date.

The Searsville Alternatives Steering Committee has developed two Alternatives:

1-A. Modify the Dam with an opening at its base to provide fish passage and attenuation of high flows.

Alternative 1-A assumes that there are feasible and acceptable methods to remove much of the fine sediment through flushing/sluicing and to stabilize much of the coarse accumulated sediment. Also, this alternative assumes that downstream conditions will need to adapt to increased natural annual sediment loads that will no longer be trapped by Searsville Dam once an opening has been installed at the base of the Dam.

If flushing/sluicing or stabilizing the accumulated sediment is found to be feasible and acceptable, then the Dam would remain and an opening would be installed at the bottom of the Dam. This opening would be at grade with the creek upstream and downstream of the Dam and would permit unimpaired creek and sediment flows in most flow conditions. Fish passage would be achieved through this opening, connecting Corte Madera Creek below Searsville Dam to a riparian channel leading to upper Corte Madera Creek. Leaving the Dam in place with this opening at its bottom establishes a "check dam" function for the attenuation of runoff from large storm flows, i.e., to moderate peak flows downstream of the Dam. In addition, some of the upstream wetlands might be preserved by employing seepage cutoff walls.

In order to avoid an increase in the risk of downstream flooding when the Reservoir is no longer trapping sediment, additional coordination with the resources agencies and the JPA will be necessary to address, among other things, downstream creek channel constrictions and periodic downstream sediment removal.

This Alternative 1-A, if feasible, is the Steering Committee's first-choice recommendation.

This option does not preclude the ultimate removal of the Dam. If future downstream conditions and management are such that the check dam flow attenuation function is not deemed necessary, and it is determined that complete removal of the Dam will not cause unacceptably high negative biological impacts in the watershed, then full removal of the Dam might be warranted. However, this action would need to be determined at a later date.

1-B. Stabilize the sediment in place behind the Dam and provide fish passage with a fish ladder or fish way/rerouted creek.

Alternative 1-B assumes that releasing significant amounts of the accumulated sediment downstream is not feasible or acceptable to the local communities, the regulatory agencies, and Stanford. This Alternative would allow the Reservoir to ultimately fill completely, with sediment retained behind the Dam. Fish passage would be provided by, for example, a fish ladder over or around the Dam, or a fish way or rerouted creek around the Dam, to connect to a riparian channel formed through the current Reservoir area to upper Corte Madera Creek. The Alternative might also include lowering or notching of the Dam. This Alternative may retain a larger portion of the existing wetlands forest as compared to Alternative 1-A. In order to avoid an increase in the risk of downstream flooding when the Reservoir is no longer trapping sediment, additional coordination with the resources agencies and the JPA will be necessary to address, among other things, downstream creek channel constrictions, periodic downstream sediment removal, and new offsite storm water detention facilities.

2. Develop and evaluate, in collaboration with the resource agencies and the San Francisquito Creek Joint Powers Authority, an approach that allows the natural annual sediment loads to flow downstream.

Searsville Dam has trapped naturally occurring annual sediment loads behind the Dam since 1892. Two options for addressing the annual sediment have been identified: (1) dredge the Reservoir so that it can continue to trap annual sediment loads, or (2) allow the annual sediment loads to flow past the Dam site. The Steering Committee considered habitat, sustainability, natural processes of the system, and disturbance to Jasper Ridge Biological Preserve, and determined that ongoing dredging to remove trapped annual sediment loads at Searsville Dam is not a feasible or appropriate long-term management action. Thus, in both of the alternative approaches described above, annual sediment loads originating from areas of the watershed upstream of Searsville Dam will be allowed to flow unimpaired through the existing Reservoir area to the downstream channel.

The naturally occurring fine sediment loads in the San Francisquito Creek watershed will almost entirely flow to San Francisco Bay, nourishing salt marsh habitat. Coarse sediments have the potential over time to reduce channel capacity downstream. Stanford will work with the natural resources agencies and watershed communities to address the effects of natural sediment mobilization on channel capacity downstream of the Dam.

3. Create a replacement water diversion downstream, and relocate the Searsville water storage functions to an expanded Felt Reservoir.

The original purpose of the Dam and Reservoir was for water supply, and Searsville has been and continues to be an important source of water supply for the University.

This recommendation creates a new point of diversion downstream and shifts water storage from Searsville to Felt Reservoir. Water diversions currently made at Searsville would most likely be moved to the existing San Francisquito Creek Pump Station, approximately 4.5 miles downstream of Searsville Dam. Diverted water would be stored at an expanded Felt Reservoir in order to meet the existing seasonal water needs of the University. The recommendation regarding water diversion and storage is intended to preserve Stanford's rights to creek water diversion and storage considering the effects of climate change, population growth, and drought on the region's water sources.

Next steps

The next steps in determining a course of action for Searsville will be:

- to proceed with intensive discussions with the appropriate resources agencies and local watershed interests regarding these Alternatives;
- to identify and do more detailed engineering design and cost analyses of the specific actions to be taken regarding water supply and storage, sediment management, flood risk management, fish passage, and habitat preservation; and
- to consider the sequence and timing of their implementation.

Modifications to Searsville Dam and Reservoir will follow comprehensive and coordinated collaboration with federal, state, and local agencies, including the San Francisquito Creek Joint Powers Authority (JPA), its local government members, and local communities and residents in the San Francisquito Creek watershed. These organizations and stakeholders have long-standing commitments to the ecological health and responsible management of the watershed for the benefit of native species and biological communities, protection of life and property, water supply, and cultural resources, and their participation in the Searsville effort is essential. Because this project may require expenditures of up to or even more than $100 million, finding ways to address the financial responsibilities will be one of the top priorities. Efforts on all of these fronts will inform the selection and preparation of a preferred project description, for which environmental review and permit applications with the various agencies will be made.

Appendix 1
Stanford Searsville Alternatives Study Process
2011–2015

Overview

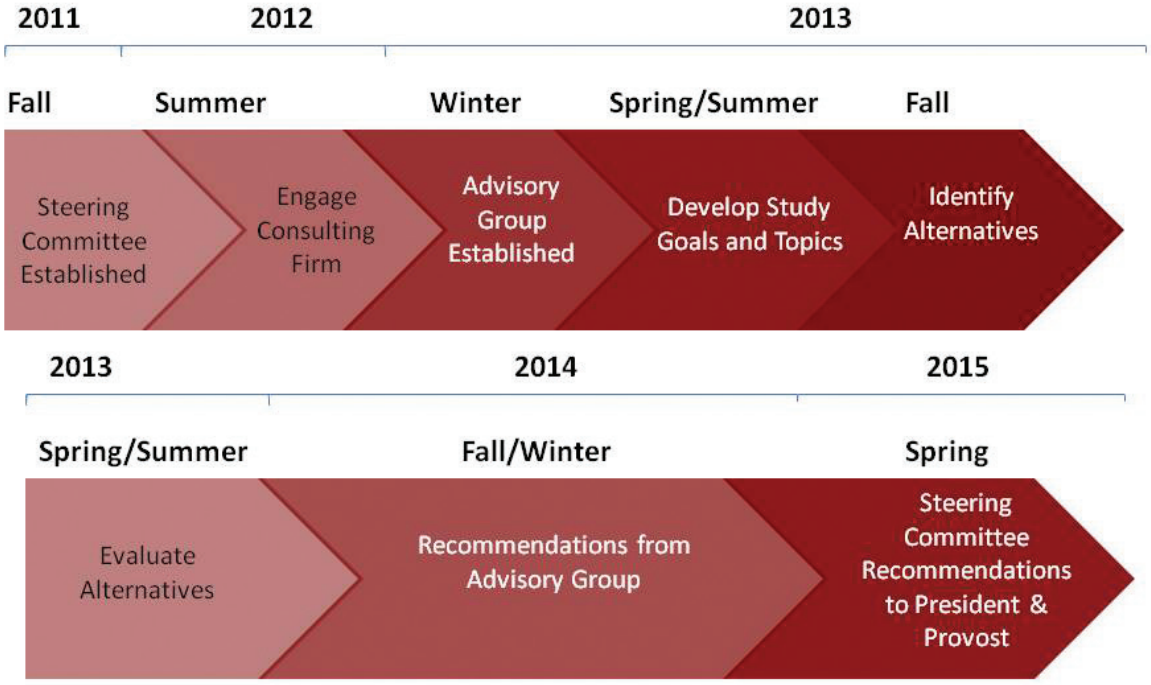
In 2011, Stanford University embarked on the Searsville Alternatives Study to develop a recommended course of action to address the future of Searsville Dam and Reservoir, taking into account its continued sedimentation issues, the surrounding environmental resources, and the associated San Francisquito Creek watershed.

The Searsville Alternatives Study process, more fully described in this Appendix, included:

- Creation of an internal Working Group composed of technical and administrative staff
- Formation of a Stanford University Steering Committee of senior faculty and administrators
- Hiring of an expert team of consultants, including specialists in environmental, engineering, and project facilitation
- Formation of an external Advisory Group comprised of local, state, and federal agencies, non-governmental organizations, and community interests
- Development of Study goals for actions regarding Searsville
- Preparation and presentation of technical information on all the various facets of issues pertaining to Searsville to the Steering Committee and Advisory Group
- Development of eight potential Alternatives, with variations covering a range of possible actions pertaining to the Dam, sediment, water supply, and fish passage
- Extensive analysis and evaluation of those Alternatives to arrive at Study recommendations

The Working Group, Steering Committee, and the Advisory Group received information and analysis from Stanford's consultant team as well as many other sources before discussing and making their respective recommendations on the Alternatives. The Advisory Group's group recommendations, and supplementary suggestions made by individual members, were provided to the Steering Committee late in 2014, before the Steering Committee began its consideration and development of its recommendations. Both the Steering Committee recommendations and the Advisory Group's recommendations to the Steering Committee were provided to Stanford's President and Provost.

Stanford Searsville Alternatives Study Timeline



Study Initiation and Steering Committee

In January 2011, Stanford University Provost John Etchemendy initiated the Searsville Alternatives Study, and a staff Working Group was formed to begin the Study effort. The Working Group included:

Philippe Cohen, Executive Director, Jasper Ridge Biological Preserve

Alan Launer, Conservation Program Manager, Land Use and Environmental Planning

Catherine Palter, Associate Vice President, Land Use and Environmental Planning

Tom Zigterman, Director of Water Resources and Civil Infrastructure

Jean McCown, Assistant Vice President, Director of Community Relations

Eric Wright, Senior University Counsel, Legal Services

In the fall of 2011, a faculty and staff Steering Committee was convened to direct the Study and develop recommendations regarding the appropriate course of action for Searsville Dam and Reservoir, to be considered by the University President and Provost.

The Steering Committee is comprised of 12 Stanford University administrators and prominent faculty, including specialists in conservation, land use, environmental sustainability, and water conservation. Members of the Steering Committee are:

Chris Field, Co-Chair of Committee; Faculty Director, Jasper Ridge Biological Preserve; Professor, Biology

Jean McCown, Co-Chair of Committee; Assistant Vice President, Director of Community Relations

Tina Dobleman, Assistant Vice President for Risk Management

David Freyberg, Associate Professor, Civil and Environmental Engineering

Jeffrey Koseff, Professor, Civil and Environmental Engineering; Perry L. McCarty Director, Woods Institute for the Environment

Pamela Matson, Professor, School of Earth Sciences; Chester Naramore Dean of the School of Earth, Energy, and Environmental Sciences; Senior Fellow, Woods Institute for the Environment

Bill Phillips, Senior Associate Vice President, Real Estate Operations

Bob Reidy, Vice President, Land, Buildings and Real Estate

Joseph Stagner, Executive Director, Sustainability and Energy Management

Barton H. Thompson, Professor, Law School; Perry L. McCarty Director, Woods Institute for the Environment

Richard White, Professor, History

Eric Wright, Senior University Counsel, Legal Services

In 2012, Stanford University engaged consultant teams to assist with the Searsville Alternatives Study Process: an expert environmental engineering firm, URS, with Balance Hydrologic as a sub-consultant, to provide technical services on the Alternatives' development, refinement, and analysis; and Kearns & West to establish and facilitate an external Advisory Group.

Advisory Group

To ensure that the Study process had the benefit of a broad range of community perspectives and expertise, Stanford University, with assistance from Kearns & West, invited a group of agency representatives and community members to participate in the Searsville Advisory Group. The Advisory Group provided input and recommendations for consideration by the Steering Committee and University decision makers.

The Advisory Group was comprised of local elected officials, community members with knowledge of the San Francisquito Creek watershed and flood considerations, environment and conservation interest groups, and representatives of resource agencies. The list of members is below.

Ruben Abrica, East Palo Alto City Council; Board Member, San Francisquito Creek Joint Powers Authority (JPA)

Junko Bryant, Stewardship Program, Watershed Program, Acterra

Pat Burt, Palo Alto City Council; Chair, San Francisquito Creek JPA

Norma Camacho, Chief Operating Officer, Santa Clara Valley Water District

Setenay Frucht, Engineer, San Francisco Bay Regional Water Quality Control Board (alternate)

Bill Gomez, Docent, Jasper Ridge Coordinating Committee (alternate)

Corinne Gray, Water Rights Coordinator, California Department of Fish and Wildlife

Diane Hart, Board Member, Santa Clara Valley Audubon Society (alternate)

Jerry Hearn, Docent, Jasper Ridge Coordinating Committee; Advisory Group Co-Chair

Cameron Johnson/Greg Brown, US Army Corps of Engineers

Alice Kaufman, Legislative Advocate, Committee for Green Foothills (alternate)

Kirsten Keith, Menlo Park City Council; Vice Chair, San Francisquito Creek JPA (alternate)

Shani Kleinhaus, Environmental Advocate, Santa Clara Valley Audubon Society

George Mader, former Portola Valley Town Planner; Ladera resident; Chairman, Board of Trustees of Geohazards International; Advisory Group Co-Chair

Len Materman, Executive Director, San Francisquito Creek JPA

Kerri McLean, Associate Director of California River Restoration, American Rivers (alternate)

Trish Mulvey, Community Volunteer, San Francisquito Watershed Council Convening Member

Ann L. Riley, Watershed and Stream Protection Advisory, San Francisco Bay Regional Water Quality Control Board

Tom Rindfleisch, Resident, Palo Alto Crescent Park Neighborhood; Member, Crescent Park Neighborhood Flood Group

Lennie Roberts, Legislative Advocate, Committee for Green Foothills

Carlos Romero, East Palo Alto resident, former City Council member and Mayor

Steve Rothert, California Regional Director, American Rivers

Ann Stillman, San Mateo Public Works, Engineering and Resource Protection

Matt Stoecker, Beyond Searsville Dam

Stu Weiss, Stanford Weekend Acres

Study Goals

In mid-2013, the Steering Committee established six goals and other considerations to guide the Searsville Alternatives Study. These goals and considerations were revised based on Advisory Group and Working Group review. Each Study Alternative was designed to meet all goals, to the extent possible.

1. Protect and enhance Jasper Ridge Biological Preserve's academic mission and programs.
2. Contribute to the long-term sustainability of Stanford University's water supply.
3. Support and enhance the ecological health of the San Francisquito Creek watershed, with particular attention to species of conservation concern.
4. Do not contribute to an increase in flood risk affecting life and property in the watershed and the floodplain, and explore opportunities to reduce flood risk.
5. Preserve important cultural resources.
6. Maintain land use flexibility to support the University's unknown future needs to accomplish its mission.

In the course of meeting the goals, the following considerations need to be included:

- Address both accumulated and future sediment load, including options such as removal, disposal, and/or pass-through.
- Focus on fiscally feasible actions that Stanford can take to fulfill its stewardship responsibilities; to the extent broader objectives are achieved that are shared with others, then share responsibilities accordingly.

Study Topics

Throughout 2013 and 2014, both the Steering Committee and Advisory Group met multiple times to review the technical studies and information developed by the URS team of experts, Stanford University staff, and some of the Advisory Group participants. Topics presented included:

- Biological Conditions
- Fish Passage Options
- Water Diversion and Storage Options
- Upstream Model Development
- Dam Modification/Removal Options
- Sediment Removal Options
- How The Watershed System Would Respond if No Action is Taken
- How the Watershed System Would Respond if Reservoir Storage is Recovered
- How the Watershed System Would Respond if the Water Surface is Modified
- How the Watershed System Would Respond if the Dam is Removed
- Cultural Resource Survey of the Searsville Reservoir Area
- Report of Archaeological Findings, Damkeeper Site

Alternatives Formulation and Considerations

The Searsville Steering Committee and Advisory Group studied a number of Alternatives in order to develop recommendations. The following table describes the eight Alternatives, including a number of variations, which were developed, analyzed, and evaluated in 2014. URS presented technical information on what the Alternatives consist of, what effects would be expected, and how these possible Alternatives would meet the established Study goals.

Alt. ID	Alternative Title	General Description
1	No action	Take no action with the Dam or sediment; continue ongoing operations.
2	Maintain Searsville storage capacity	Leave the Dam as is; remove accumulated sediment to maintain current Searsville Reservoir storage.
3	Restore Searsville storage capacity	Leave the Dam as is; remove accumulated sediment to restore Searsville Reservoir storage.
4	Reroute Corte Madera Creek	Leave the Dam as is; reroute Corte Madera Creek around the existing Dam to provide fish passage.
5	Passive flow management	Modify the Dam by adding an orifice (or hole) at the base of Dam to provide peak flow attenuation and fish passage.
6	Active flow management	Modify the Dam by adding an orifice (or hole) with an operable gate at the base of Dam to provide peak flow attenuation and water storage.
7	Recreate a confluence valley	Remove the Dam and all accumulated sediment; recreate a creek valley habitat.
8	Create a Corte Madera Creek channel and Middle Lake	Remove the Dam and some accumulated sediment; stabilize remaining accumulated sediment; create Middle Lake.

Recommendations

After evaluation, analysis, and discussion of these eight Alternatives, in December 2014 the Advisory Group adopted a set of recommendations on which Alternatives to suggest for the Steering Committee's consideration. In addition, individual Advisory Group participants provided supplementary comments. In April 2015, the Steering Committee provided a recommended course of action on the Alternatives to the University President and Provost.

Appendix 2

STANFORD SEARSVILLE ALTERNATIVES STUDY

Searsville Alternatives Study
Advisory Group Recommendations

Overview

This summary, drafted by the co-chairs with the facilitation team for the Advisory Group, provides an overview of the Advisory Group process and a review of the outcomes of Advisory Group meetings held on November 3rd and 13th.

The Searsville Alternatives Study Advisory Group (Advisory Group) was established to provide input and recommendations for consideration by Stanford's faculty/staff Steering Committee and University decision makers regarding the future of Searsville Dam and Reservoir, considering among many issues continued sedimentation, its surrounding resources, and the associated watershed impacts.

The Advisory Group is comprised of approximately 25 public members, including local elected officials, residents concerned with upstream and downstream flooding risks, environmental and conservation interest groups, regulatory agencies, and other prominent community figures.

The Advisory Group is co-chaired by Jerry Hearn, Jasper Ridge Coordinating Committee, member, and George Mader, former Portola Valley Town Planner and former adjunct Stanford professor. The Advisory Group has met 13 times through 2013 and 2014 and received information covering the following technical topics:

- Biological Conditions
- Fish Passage Options
- Water Diversion and Storage
- Upstream Model Development
- Dam Modification/Removal Options
- Sediment Removal Options
- How the watershed system would respond if no action is taken
- How the watershed system would respond if reservoir storage is recovered
- How the watershed system would respond if the water surface is modified
- How the watershed system would respond if the dam is removed
- Cultural Resource Survey of the Searsville Reservoir Area
- Report of Archaeological Findings, Damkeeper Site

Throughout the Searsville Alternatives Study process, the Advisory Group has also provided input on the Study Goals and has received presentations from URS on the Alternatives development and analysis.

Alternative Selection

The Advisory Group met on Monday, November 3rd to provide initial thoughts on their preferred Alternatives and to discuss what information was still needed in order to make a final recommendation. The Group requested information on the impacts of open water on various habitats, the issues associated with the gate proposed in Alternative 6, the sizing of an orifice to maximize flood management and fish passage, methane emission impacts, and flood attenuation benefits of Alternatives 7 and 8, among other issues.

The Advisory Group met again on Thursday, November 13th to receive an updated presentation from URS on Alternatives analyses and results and to discuss the eight Alternatives under consideration.

The Advisory Group discussion focused around support for the following three sets of Alternatives.

Alternative 9: Modified Alternatives 3 and 4
An Advisory Group member proposed the consideration of a modified alternative that incorporates aspects of both Alternative 3 (Restore Searsville Storage Capacity) and Alternative 4 (Reroute Corte Madera Creek). This modified Alternative, Alternative 9, would restore Searsville storage but not to full capacity; it was proposed that perhaps storage could be restored up to the causeway so the change is still significant but would not impact as much habitat. It was also suggested that the Steering Committee consider adding a notch or spillway at the top of the dam to assist with flood management. Alternative 9 would incorporate the idea of a bypass channel from Alternative 4, but at a smaller scale and as a natural fishway rather than installing a fish ladder. This would be an experimental approach for fish passage.

Other characteristics of Alternative 9 include considering a weir that could control flows into the bypass channel and allow high flows to go into the reservoir and/or over the spillways, and to use Searsville reservoir for storage or use new Felt Lake capacity instead.

Nine Advisory Group members expressed support for this modified Alternative, noting that this Alternative could be implemented incrementally and could be reversed – a benefit for Stanford since the University will be able to use adaptive management to discover what works and what does not over time and adjust accordingly. Other benefits of this Alternative include less impact on habitat in the wetlands area compared to other Alternatives and that all of the goals are achieved, particularly flood management, water supply, fish passage, and ecosystem support and enhancement.

Since this Alternative is a modification of two Alternatives, a complete feasibility analysis will need to occur to see if the different components can be implemented. The Group noted that URS and Stanford should analyze the feasibility of the rerouted creek to determine where it could be located in relation to the Jasper Ridge Biological Preserve and whether it can be built so fish are not entering the reservoir. Advisory Group members shared concerns about whether the construction time of this Alternative would be doubled compared to the originally proposed Alternatives 3 and 4, what would be the effect of this Alternative on downstream sediment, how effective the channel would be for fish passage, and whether this Alternative could be permitted under the Endangered Species Act (ESA). Advisory Group members agreed that Stanford should fully investigate the impacts of this Alternative on Middle Reservoir.

If the fishway route around the reservoir in Alternative 9 is deemed infeasible, the Advisory Group members who originally supported Alternative 9 expressed support for the following instead:

- 1 Advisory Group Member for Alternative 5
- 1 Advisory Group Member for a modified Alternative 2 that included Felt Lake for more water storage and open water for habitat.
- 2 Advisory Group Members for modified Alternatives 2 & 3 (with a notch)

- 2 Advisory Group Members for a modified 3 (with a notch)
- 1 Advisory Group Member would prefer modified 3, with no fish passage
- 1 Advisory Group Member for Alternatives 7 & 8 (8B).

Alternative 5: Passive Flood Management (orifice)
Two Advisory Group members expressed support for Alternative 5. A significant benefit of Alternative 5 is the flood protection it provides compared to the other Alternatives, specifically the downstream flow attenuation at Middlefield Road. This is important to consider because the San Francisquito Creek Joint Powers Authority (JPA) flood management plans for the middle reach (Hwy 101 to Middlefield Road) indicate that Middlefield Road Bridge will be the only point subject to overbanking in a 100-year flow. All sections downstream of Middlefield would pass the maximum flow that can get through the Middlefield Road Bridge (approximately 7,200 cfs). Other benefits of Alternative 5 expressed by the supportive Advisory Group members include fewer wetlands impacts compared to Alternatives 7 and 8, benefits for fisheries and fish passage through the implementation of an orifice, and that this Alternative could also be reversed by fully or partially plugging the orifice or by installing a gate for active flow management.

Advisory Group members expressed concern over the effectiveness of the orifice with a 50 foot culvert; specifically its impacts on fish passage and the potential performance and maintenance problems if the orifice gets plugged with sediment and/or debris. With the orifice, the reservoir would be drained except during flooding, so Steelhead could move downstream and upstream without a high predatory risk from non-native species currently in the reservoir. Similar to Alternative 9, Advisory Group members also questioned how permittable this Alternative would be under the ESA and suggested that Stanford University might also evaluate the litigation risk associated with this Alternative.

Alternative 8 B: Alternative 7: Recreate a Confluence Valley/Modified Alternative 8: Create a Corte Madera Creek Channel and Middle Lake
Advisory Group members proposed merging Alternative 7 and a modified Alternative 8 to make a new Alternative, referred to as Alternative 8B. Alternative 8B would modify Alternative 8 to include a downstream detention basin so that detention would be achieved at both Middle Lake and the Old Boething site. Advisory Group members also suggested that URS and Stanford review these two Alternatives (7 and 8) to determine where/how they could merge on certain components. Five Advisory Group members expressed support for Alternative 8B because it addresses all of the Study goals and is particularly beneficial for fish passage. A large issue facing adult and juvenile Steelhead is their ability to move downstream and upstream through the reservoir without a high predatory risk or through the dam with a 50-foot culvert; both these issues would be addressed if Alternative 8B is selected.

In addition to the fish passage benefits associated with Alternative 8B, the Alternative also includes benefits for flood protection, although not as much as under Alternative 5, and for water supply and ecosystem restoration. With Alternative 8B, Advisory Group members felt there would be less concern about whether the Alternative would be more easily permitted under the ESA which, in turn, reduces the University's litigation risk. The Regional Water Quality Control Board staff present preliminarily confirmed the permittability benefit and shared that the Board has supported dam removal for over a decade. Other benefits expressed included downstream detention which could help increase flood mitigation capacity. A couple of Advisory Group

members felt there would be long-term benefits from selecting Alternative 8B, one being that it is better to have a longer construction time (with a definite time-period) than to rely on long-term dredging that would have to occur periodically over 50 years. They also shared that the Searsville Alternatives Study process is an opportunity to take a bold step to remove the dam and that may not happen again later.

Concerns about Alternative 8B included its permanence and irreversibility compared to other Alternatives, its impacts on wetlands and the ecosystem, its impacts on downstream sediment, and its limited flood attenuation. URS and Stanford University will also need to complete an analysis to determine whether it is feasible to add a detention basin to Alternative 8. It was noted that the dam could be removed incrementally, which would also result in an incremental release of sediment (as opposed to dredging) so that the sediment could return to its natural locations over time instead of all at once. Finally, there was concern about the impact of the long construction and habitat restoration times for this Alternative on the research program and operation of the Jasper Ridge Preserve.

Other Values Expressed

The Advisory Group had a rich discussion about the Alternatives and the next steps in the Searsville Alternatives Study process. Some Advisory Group members expressed frustration that not all information could be shared with them, thereby affecting the input they could provide to the Steering Committee.

To further inform the Steering Committee's recommendation, key points from the discussion are captured below:

- Alternative 1 (No Action) and Alternative 6 (Active Flow Management – orifice with gate) were not supported.
- One Advisory Group member supported Alternative 4.
- No Advisory Group member supported implementation of fish ladders; expressing concerns over their effectiveness.
- Creating new diversion and water storage at Felt Lake seems to be a desirable way to achieve the future water supply goal.
- Since the majority of the sediment is fines, it may not need to be removed and trucked, and might be sluiced instead, which could decrease the project duration for several alternatives. However, should subnormal rainfall continue, sluicing may not be a realistic accelerating option because it can only be done effectively during high flows that will carry the fines into the Bay and such flows may become less frequent.
- The Jasper Ridge Biological Preserve provides world-class education and research opportunities. In the context of the Searsville Alternatives Study, it is just one factor but there is a bigger picture impact of what happens to Jasper Ridge to consider – especially for alternatives that require lengthy periods of construction and re-establishment of a stable environment in the reserve.
- The JPA's proposed and funded projects will provide downstream flooding benefits. The impacts of these projects should be considered, and plans should be developed jointly for the watershed. Trade-offs are being made for a conservative flooding analysis that might not be necessary when factoring in future JPA projects that could be constructed.
- Should the higher than normal production of methane in reservoirs such as Searsville be borne out by further research as having a significant effect on global warming, Alternatives

5 and 8B would minimize the residual reservoir size and therefore any further contribution from Searsville.

Additional comment letters have been provided by Advisory Group members and were compiled into a separate package.

FR: Trish Mulvey
ON: December 2, 2014
RE: Searsville Alternatives

I am pleased that the Searsville Advisory Group is presenting a limited and refined set of conceptual alternatives to the Searsville Dam Steering Committee. In my experience, it is helpful to offer more than a single, "take-it-or-leave-it" recommendation in this sort of decision process; and I like the fact that these alternatives provide distinct choices between "just do it" and incremental-change with adaptive management.

From the notes in the Alternative Study Recommendations, I am writing to highlight the following additional information needs for Steering Committee attention:

- Impacts to Jasper Ridge – please solicit JRBP staff and JR advisory committee perspectives related to project implementation for all the factors and criteria from the evaluation table: Research & Education; Education & Outreach; Community; and Facilities. Our Searsville Advisory Group focus was largely on truck trips and various sediment management facilities.
- Implementation feasibility and timelines – there were divergent opinions about the number of years implementation will take (particularly related to JRBP impacts) and about the reasonability of expectations for successfully sluicing fine sediments to the Bay via an intermittent creek (compared with examples from perennial rivers).
- Permitting – Please see if during an "interagency Meeting" of all the appropriate regulatory and resources agencies staff might be willing to offer perspectives on the conceptual alternatives in advance of a permit application – especially about the feasibility and information needs for the least environmentally damaging practicable alternative (LEDPA). The Searsville Advisory Group benefitted from participation by staff from the California Department of Fish and Wildlife and the San Francisco Bay Regional Water Quality Control Board; but by the time we got to considering alternatives, we were missing the federal agencies: Army Corps of Engineers, Fish and Wildlife Service, and NOAA-Fisheries.
- Liability – please be mindful that the Searsville Advisory Group did not discuss this issue.
- Creek channel maintenance – It will be important to have clarity on expectations for funding and implementation of creek channel maintenance activities (coarse and fine sediment removal and erosion repair) that were not discussed by the Searsville Advisory Group,

Stanford Searsville Alternatives Study

RECOMMENDATION TO STEERING COMMITTTEE

Submitted By Matt Stoecker, Beyond Searsville Dam, Searsville Advisory Group

Thank you Searsville Steering Committee members for your time and consideration of the below Searsville alternative recommendation and concerns. Please contact me with any questions you may have.

This letter is divided into four sections:

1) Recommendation to Steering Committee- Alternative 7 or 8 (8b hybrid)

2) Advisory Group Recommendation Summary Document- Comments

3) Evaluation Results Table- Comments and Requests

4) Actions Table- Comments and Requests

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1) Recommendation to Steering Committee- Alternative 7 or 8

Introduction

Stanford University elected not to disclose key information regarding fish passage, habitat conditions, and other issues relevant to threatened and endangered species in the San Francisquito Watershed to the Advisory Group due to ongoing litigation risk. As a result, the Advisory Group was unable to assess the relative value of the various alternatives with respect to the key study goal for steelhead, habitat conditions, climate change, flood attenuation, and other key issues. Therefore, all advisory group recommendations must be considered carefully in light of this missing information and analysis. Without supporting data, and contrary to earlier discussions about the many problematic issues related to fish passage feasibility for Alternatives 1-6, consultants told Advisory Group members that fish passage was feasible and would likely be permitted by resource agencies for all alternatives. From the limited, but important, information we did receive, along with stakeholder and agency input, it is clear that fish ladder options are not supported and that the roughened channel and orifice

alternatives appear to be unfeasible for a variety of reasons outlined below. Of the alternatives present, only 7 and 8 have been clearly identified as providing effective steelhead (and all other species) migration and not suffering from clear regulatory, engineering, water availability, water quality, and biological constraints. Additionally, the only agency to vote on an alternative recommended Alt 7 or 8 (dam removal) and speculated that other resource agencies felt the same way. Furthermore, the steering committee has not been able to benefit from the Advisory Group comments and insights related to these important issues that could otherwise have been provided by members of the advisory group were the information disclosed.

I have worked as a consulting fish biologist for, and co-author with, NMFS, CDFW, and other resource agencies specifically on steelhead assessment, fish passage, and migration barrier studies and design projects for over 20 years. I also grew up within, and have worked within, the San Francisquito Creek watershed on aquatic biological assessment and restoration projects for 16 years. Based on my professional experience, I believe that options 7, 8, and 8B are the only viable options from a fish and aquatic ecology perspective, as I will discuss below. As my colleagues at American Rivers will further describe in their separate letter, I also believe that these alternatives (7, 8, 8b) are the only ones that effectively meet the other long-term ecosystem and Jasper Ridge goals while ensuring flood protection and water storage needs. Thank you for considering this information as you make your final recommendation to the President, Provost, and Board of Trustees.

<u>Reasons to Select a Dam Removal Alternative (Alt. 7,8, and 8B)</u>

- Provides the most effective, and proven passage conditions for all life phases of steelhead over the broadest range of flows.
- Are the only alternatives that provide unimpeded migration connectivity for all other native fish and at risk wildlife species.
- Only alternatives that can eliminate ongoing steelhead (and other species) litigation, regulatory oversight, and ongoing “take” mitigation measures.
- Does not require complex and likely unfeasible fish passage facility flows to facilitate upstream and downstream passage and habitat conditions.
- Eliminates water evaporation from the main reservoir, enabling more creek flows within and downstream of the reservoir area.
- Eliminates documented and elevated turbidity duration downstream due to the reservoir.
- Are the only alternatives that can achieve a long-term, self-sustaining, and effective fish population and other wildlife passage, flow, and water quality solutions.

- Enable resumption of unimpeded beneficial sediments and woody debris to degraded downstream habitats and Bay wetlands (with problematic course material removed and/or stabilized and flood protection measures already in place).
- Most effective way to eliminate non-native species and harmful vector control spraying practices at the reservoir.
- Only alternatives that result in miles of newly restored stream, floodplain, and wetland forest habitat within the reservoir area.
- Supported by Regional Water Quality Control Board and preferred alternative for NMFS and CDFW per agency fish passage guidelines.

Problems Associated with Other Alternatives

Alternatives that retain the Searsville Reservoir (Alt. 1, 2, 3, 4 and 9)

- Lethal water quality conditions in the reservoir based on temperature, dissolved oxygen, etc.
- Predation of steelhead (and other species) that must migrate through the open water reservoir harboring non-native predatory species.
- Ongoing dispersal of non-natives downstream and upstream
- Ongoing, documented elevation of downstream turbidity duration and water quality problems caused by the reservoir.
- Ongoing depletion of beneficial downstream sediments and woody debris
- Ongoing evaporation of reservoir water and reduction in downstream flow and diversion availability
- Not supported by regulatory agencies, who have not even seen the data on other problematic issues besides upstream fish passage (ie reservoir migration/predation /entrapment, delta subsurface flows, thick delta vegetation, etc.)
- Permitting feasibility and turbidity issues (plus methane release) associated with ongoing dredging and channel clearing operations.
- Additional lands flooded and/or reservoir elevation change problems for steelhead migration and methane emissions.
- Ongoing dam safety liability and retrofitting / replacement costs moving forward.

Alternatives that use a fish ladder (Alt. 2 and 3)

- Even based on the minimal information we received from URS, the AG members overwhelmingly opposed fish ladders for this project.

- Do not function properly in a flashy system such as San Francisquito.
- Exhaust the fish right before they face predators in the reservoir, reducing open water success rates.
- Do not pass all types or life stages of fish.
- Not supported by AG and agencies.
- Require significant maintenance and debris removal.
- There are significant fish attraction issues at both outlet and inlet.
- Consultants acknowledged the problem with fluctuating reservoir elevation and did not show that it was feasible. We noted that the reservoir elevation is recorded to change as much as 12 feet of more in DSOD survey documents. Far more than URS said was feasible with a fish ladder.

Alternatives that use a fish bypass channel (Alt. 4 and 9)

- Bypass channels have gradient limitations and a footprint that would require massive earth moving at JRBP upland habitat and disruption to natural areas and potentially cultural sites. And potential loss of a key JRBP road.
- Roughened channels require much more water to function than fish ladders and consultants were never clear that this acknowledged problem and water limitation at Searsville could be overcome.
- Roughened channels, especially the “nature-like” type we were described require constant monitoring and maintenance by agencies and JRBP staff.
- As with ladders, there are significant fish attraction issues at both outlet and inlet locations.
- As proposed by AG members, Alternative 9 is infeasible, if it is intended to bypass the entire reservoir, transverse Dennis Martin, Sausal, and Alambique creeks and provide access to Corte Madera. URS seemed to agree with this assessment. We see no possible way to operate such a massive and long channel with existing water constraints and no feasible way to prevent downstream reservoir entrapment and death of steelhead. There are major additional fish passage problems exacerbated by reservoir level fluctuations associated with operating a notched dam for flood protection.
- Alternative 4 has all the same problems that Alternative 2/3 have as far as lethal reservoir water quality, non-natives, permitting, etc.

Alternatives that include an orifice in the dam (Alt. 5 and 6)

- Requires highly engineered fish passage facilities within the bottom of 50-foot orifice, and engineered upstream and downstream creek channel structures. Fish passage features required within the orifice (and potentially at the inlet)

would catch significant debris, trap sediment in the reservoir area precluding restoration and require ongoing removal, elevate flood and dam failure risk, and block fish migration during debris blockage/clearing (which occurs during migration flows).

- Results in massive, chronic fine sediment discharge downstream during and following high flows and sediment trapping and removal.
- Requires extensively engineered channel hardening and energy dissipation features in the downstream channel to prevent scour from the high discharge velocity from the orifice. These features compromise creek habitats and fish passage.
- Most disruptive, ongoing, and restoration averse alternative for the watershed and JRBP.
- Despite constant requests during the AG process, consultants never presented an example of a similar, recently permitted orifice type flood retention facility that discharges into listed critical habitat for steelhead and passes fish.
- Recent NMFS Jeopardy Decision against Santa Barbara County orifice type dams shows the numerous problematic legal/ESA issues associated with such a facility and raises questions about the feasibility of effectively operating and permitting such a modification to Searsville.
- Many problematic fish passage issues associated with the orifice options were discussed in AG meetings, but have not been evaluated: 1) passage conditions within the orifice (length, slope, darkness, attraction flows, downstream scour and jump height), 2) migration flow window, 3) downstream grade control structures and hydraulic stability, 4) inlet debris blockage and removal during migration flows, 5) flood basin storage, discharge plan, and trapping/stranding of outmigrating steelhead, 6) reservoir and downstream water quality and turbidity impacts from operations, 7) upstream migration issues during reservoir drawdown operations and upstream attraction flow issues, 8) post-flood reservoir sediment/debris removal, disposal, and duration of turbidity downstream and within reservoir area and impact on fish migration delays, water quality, and spawning/egg incubation downstream.

Note- This letter does not include all comments and requests previously submitted and is intended to capture some of the key issues and recommendations related to the alternatives.

2) Advisory Group Recommendation Summary Document Comments

Below are comments on the “Searsville Alternatives Study Advisory Group Recommendations” document that was recently produced by K & W / Stanford, but without input from or approval by Advisory Group members. There are significant concern about this important document, which implies Advisory Group consent, and the multiple errors and critical omissions, described below.

Alternative 9

- The draft states: "Alternative 9 would incorporate the idea of a bypass channel from Alternative 4, but at a smaller scale and as a natural fishway rather than installing a fish ladder." This is not accurate. This alternative was described to include a much larger scale bypass channel than Alt 4, either wrapping around the entire main reservoir on the east side or the west side of Searsville Reservoir and crossing multiple tributaries to connect to Corte Madera Creek. Additionally, URS acknowledged that this engineered fishway could not be "natural" but rather highly engineered and potentially unfeasible due to a variety of reasons, including insufficient water available to provide adequate fish passage in this water intensive option, problems with fishway intake and reservoir elevation changes, reservoir water quality, and fish migration attraction issues between the fishway and tributaries. The above statement misleads the reader into thinking that the fishway would be smaller scale than with Alt 4, that the fishway would be "natural" and that such an unstudied concept could be feasible despite noted consultant uncertainty and doubt among AG fish passage experts and resource agency representatives.

- The next sentence states: "This would be an experimental approach for fish passage." Due to the AG not being presented with critical information about fish passage options and effectiveness, the AG was not able to make an informed assessment of the effectiveness of an Alt 4 bypass channel for fish passage. However, as noted above, URS described the Alt 4 fishway as perhaps the most unfeasible fish passage option of all alternatives. Dramatically extending this fishway around the reservoir and past tributaries, or maintaining the Alt 4 connection to a reservoir now modified for flood control (and more dramatic reservoir elevation changes) make the Alt 9 fish passage proposal even more unrealistic. Moving an unstudied alternative forward that has the most problematic and "experimental" fish passage option does not meet one of the project's primary objectives and therefore does not pass the evaluation criteria and intent of the AG to recommend an alternative that meets all of the main goals at some level; including effective fish passage.

- The report states “Nine Advisory Group members expressed support for this modified Alternative (9)”. This is misleading. Alt 9 was proposed at the very end of the last AG meeting as a hybrid that some folks wanted to have studied to see if it was feasible. As discussed, and acknowledged by the consultants, it remains to be seen how feasible several of the features of such an alternative are, with particular doubt about the feasibility of providing upstream and downstream fish passage for all life stages with

such a scenario.

- The report states that Alt 9 would have benefits including “less impact on habitat in the wetlands area compared to other Alternatives and that all of the goals are achieved, particularly… fish passage, and ecosystem support and enhancement.” I disagree with several components of this statement and the conclusion here of achieving goals is not supported with any assessment of Alt 9 by the consultants. To start, and as supported by numerous studies and reports I have sent by leading scientific institutions, an alternative with the ongoing presence of the dam and reservoir has a far greater, and negative, impact on the former wetlands of the reservoir area and watershed than alternatives that would eliminate the dam and reservoir and restore effective fish passage and extensive stream and riparian habitats currently submerged. Again, there has been no assessment or conclusion by the consultants that Alt 9 could provide effective and agency criteria requirements for fish passage and ecosystem enhancement goals, as stated above.

Alternative 5

- This summary leaves out that AG members expressed concern regarding the safety risks associated with this alternative. In particular, modification and operation impacts on the structural stability of the dam, reservoir induced seismicity impacts caused by the rapid filling and draining of the reservoir, and debris removal and dam overtopping maintenance issues. Concern was also expressed by AG members regarding the ecological impacts of the extensive upstream and downstream engineered channel work needed and habitat implications caused by reservoir area inundation, sediment deposition, inlet debris blockage, and chronic turbidity problems within and downstream of the reservoir. Based on a recent ESA Jeopardy Decision against Santa Barbara County for numerous negative impacts caused by such orifice type dams on listed steelhead and critical habitat downstream, AG members doubted that an orifice flood control structure on, and flowing into, listed critical habitat could ever be permitted and would be vulnerable to litigation. AG members also commented that this type of modification and operation would be the most disruptive ongoing alternative to JRBP and averse to habitat restoration upstream.

Alternative 8 B

The document does not include the AG member and consultant acknowledgement that this alternative (8b) would also include flood attenuation benefits at the restored floodplain and overflow areas within the former reservoir area, and that Upper Marsh could be fitted with an outlet control to provide additional flood attenuation. The document incorrectly states “Alternative (8b) also includes benefits for flood protection, although not as much as under Alternative 5”. Based on the provided flood attenuation benefits of the Beothing detention basin and other features noted above, AG members

pointed out and consultants acknowledged that this Alt 8b combination could provide as much flood attenuation benefit, and potential more depending on how Upper Marsh and floodplain features are designed, than any other alternative.

The document states that Alt 8B would have a “longer construction time” than other alternatives, but this is not true. As detailed in the next chapter section (3), AG members and consultants agreed that the more preferable, and common, method to remove the dam in a phased approach, with some course material stabilized on site and much of the fine sediment safely released during high flows to the Bay could reduce construction duration, truck trips, and costs by more than half of the Evaluation Table estimates. Consultants acknowledged that these more effective dam removal alternative have not yet been studied. The presented single phase dam removal with all sediment removed and trucked away was widely viewed by AG members as being unrealistic, ineffective, costly, and counter to all significant dam removal projects discussed to date that are not constrained by having toxic sediment. Multiple AG members were very frustrated that consultants had not assessed and presented these other superior dam removal and sediment management alternatives as we had identified and agreed to at the earliest AG meeting.

Other Values Expressed

The document states “since the majority of the sediment is fines, it may not need to be removed and trucked, and might be sluiced instead…” This term “sluiced” was not accurate used in some of the AG discussion and here. The term should be “transported downstream” or “released downstream”. ‘Sluicing’ refers to piping sediment downstream and the discussion and recommendations was for managed fine sediment transportation downstream with dam lowering/removal and not the use of pipes and off-stream disposal sites. The document also incorrectly states that fine sediment transport (sluicing) may be unrealistic if subnormal rainfall continues. High flows during the deconstruction window are ideal, however, as discussed in the AG meeting, some fine sediment can be temporarily stabilized onsite as part of the restoration project and designed to be released only during specified high flow events at a later date.

AG members noted that all alternatives, including dam removal, will have adaptive management plans and that flood protection benefits can always be increased in the future, if needed, by expanding or installing additional off-stream detention basins.

3) Evaluation Results Table- Comments and Requests

Dam Deconstruction and Sediment Management Options Not Evaluated

AG members expressed deep concern and frustration that the consultants only evaluated a single phased dam removal approach with removal and trucking/disposal of all accumulated sediment for Alt 7 and 8. This ignores multiple, earlier AG requests, and URS agreement, to assess multi-phase dam removal / incremental notching as well as determining the maximum amount of accumulated sediment stabilization on site and safe transport of fine sediment downstream during flushing flows and to the Bay (where wetlands need it). Because these preferable, and more commonly used, dam removal and sediment management options were not included, AG members pointed out that the current construction duration and truck trips/greenhouse gas emission (and relative cost) estimates on the evaluation results table were dramatically over inflated and unrealistic. Based on previously discussed/cited dam removal project examples, the listed construction duration (8-9 years) and highest truck trips and greenhouse gas emissions estimates for Alt 7/8 are not realistic for the most likely and effective dam removal design. URS even acknowledged that these estimates could be cut in half, or more, by implementing more commonly used and effective dam removal and sediment management approaches described above. The evaluation table misleadingly only includes the most ineffective, time consuming, greenhouse gas emitting, and expensive dam removal and sediment management option. This is an unprecedented oversight I have never encountered on the dam removal projects I have worked on or researched. In addition, AG members pointed out that dam removal is a one time construction, trucking, emissions, cost and that the estimates for Alt 1-6 must include ongoing (for at last the described 50-year approach to this Searsville decision making process) sediment management, dredging, emissions, debris blockage removal, monitoring, disturbance/construction costs and impacts. When properly evaluated and compared, dam removal (Alt 7-8) construction duration and truck trips / emissions can be reduced to comparable levels for other alternatives and even less when factoring in a true 50-year project window.

Climate Change Evaluation is Severely Inadequate

The climate change category ignores the other critical factors we have identified as important to evaluate in early AG meetings including; total reservoir greenhouse gas emissions (CH4, CO2, others), reservoir area restoration carbon capture equivalent, exacerbated reservoir and downstream water quality projections with climate change, exacerbated reservoir area evaporation rates and downstream flow impacts with climate change projections, SF Bay wetland sediment needs and sea-level-rise projections, dam/reservoir exacerbating wildlife migration corridor limitations for sensitive species, reservoir exacerbated non-native species expansion, and species adaptation limitations caused by the dam/reservoir's physical, thermal, and biological barriers.

Flood Protection Evaluation Is Flawed

AG members noted, and the consultants acknowledged, that the enhanced flood

protection provided by Alt 8b (enhanced flood storage at Middle Reservoir, within reservoir restoration area, and Beothing / Other off-stream basin storage) could be equal to or even exceed the flood protection benefits of all other alternatives.

Steelhead Habitat and Passage Evaluation Is Inadequate
As Riley mentioned, the Regional Water Board, and other resource agencies, will be using steelhead as their primary species metric to evaluate project impacts, so an alternatives with an "experimental" or potentially unfeasible fish passage and habitat outcome should not be pursued and would be vulnerable to regulatory and legal challenges. To date, the only alternatives that have been shown to be feasible from a steelhead passage and habitat standpoint are Alt 7 and 8. No other alternative has been shown with data or evaluation to adequately pass adult and juvenile life stages and provide adequate habitat conditions to support steelhead.

Dam Safety Evaluation Absent
Despite constant requests from AG members for a detailed dam safety evaluation for all alternatives, this table continues to ignore dam safety. As agreed by all, dam safety is of paramount importance and must be evaluated for each alternative. As previously submitted, this evaluation should include assessing dam stability, reservoir induced seismicity potential, earthquake, concrete deterioration, retrofitting estimates, overtopping, spillway sizing, and other issues over a 50-year time frame for each alternative.

Ignores Impact on Reservoir and Downstream Water Availability and Quality
The table includes Stanford water supply and storage, but completely excludes evaluating alternative impacts on downstream flow availability, quantity, and quality. As we have discussed at all AG meetings, these are critical issues and each alternative has dramatically different water outcomes that impact everything from steelhead passage feasibility, to downstream habitat conditions, to lethal reservoir and water releases downstream. AG members were extremely frustrated that this critical information was excluded form the evaluations table.

"Baseline" Conditions and Alternatives "Effect" are Misguided
The evaluation table incorrectly considers the current dam/reservoir and No Action alternative as being the "baseline" conditions and with "0" "effect", while restoring the area to its more natural "baseline" conditions has the largest "effect". As discussed, the table should be describing the current conditions and No Action as being "effected" dramatically by the dam / reservoir. In addition, No Action and other alternatives are not static and the table does not capture changes over the 50 years of this project evaluation.

Ignores Key Habitats Created
The table does not include wetland / riparian / stream / open water and other sensitive habitats created with Alternatives 4-8 due to expansion of Felt Reservoir, addition of off-

stream flood detention and wetland basins, and restoration of miles of stream currently submerged under Searsville Reservoir.

Sensitive Species Habitat and Key Ecology Categories Excluded

AG members questioned why the table includes new avian species "wildlife habitat" impacts that we have never identified or discussed (with the exception of bats), while excluding previously identified sensitive species habitat for red-legged frog, pond turtle, SF garter snake, and tiger salamander. The table excludes key ecology categories that the AG has previously identified as an evaluation need including non-native species occurrence and dispersal impacts and SF Bay wetland impacts at the creek mouth.

Cost, Permitting, Litigation Issues Excluded

The AG was frustrated to not be presented with even rough cost estimates for the different alternatives as we had requested. However, even without cost estimates, AG members and consultants acknowledged that some alternatives (Alt 7-8) require no, or far less, ongoing maintenance costs, while other alternatives require high ongoing maintenance, monitoring, and eventually dam retrofitting / replacement costs within the next 50 years of this project scope. Construction and ongoing costs should therefore be estimated for at least a 50-year timeline, with retrofitting, replacement, litigation, and liability insurance cost projections factored in. Finally, as has been seen across the country, there is great potential for projects to receive funding when proposing less harmful flood protection and broad ecosystem restoration benefits. Such project funding and permitting partnerships can greatly reduce costs for implementation, ongoing operations, ESA legal challenges and flooding/dam safety liability for Stanford. As noted in AG meetings, CDFW and other resource agencies are averse to funding highly engineered fishway projects due to a lack of monitoring funds and effectiveness issues. Dam removal projects, on the other hand, are attracting millions of dollars due to their desired and more effective ecosystem benefits. Similarly, off-stream detention basins and floodplain restoration projects can attract far more funding and permitting interest than maintaining or modifying an on-stream flood protection facility such as a dam. Finally, environmental groups currently seeking removal of Searsville Dam have offered to help Stanford (and related downstream projects) with obtaining permits and funding to implement an effective dam removal, flood protection, and sustainable water use alternative and avoid future litigation. We remain committed to this offer and believe we can help to gain funding and agency support for a multi-purpose dam removal alternative such as 7 / 8 or 8b.

4) Actions Table- Comments and Requests

Dam Structure
CDFW acknowledged at a recent AG meeting that all alternatives, including no action, would be subject to Code 5937 and require downstream flows for fish. Therefore, No Action is not feasible and Alt 2-6 & 8 (if it contains a new Middle Reservoir dam) require an "action" to modify the dam structure to facilitate releases for downstream flows. Only alternative 7, and potentially 8, would require no action to facilitate required downstream fish and wildlife flows.

Accumulated Reservoir Sediment
Alt 4-8 must include accumulated sediment use for onsite restoration needs, stabilization, sale of, and managed fine sediment transport downstream.

Incoming Sediment
Alt 3 should include "eventual removal" of sediment. Alt 5/6 must include "removal of sediment in the main reservoir and orofice/inlet/baffles." Alt 7/8 must include "some sediment accumulation on restored floodplain area during large events".

Flood mitigation upstream
Alt 2-6 must include "*Ongoing* excavation of CM and Sausal channels..." Alt 7 / 8 must include "*One time* excavation..."

Detention at Searsville
Alt 7/8 must include "maximizing flood attenuation at Middle Reservoir, Upper Marsh, floodplain restoration area".

Detention at Downstream Location
Alt 8(b) must add action "Build downstream detention facility..."

Water Supply
For Alt 2-3, see above flow release action need described for "Dam Structure".

Water Storage
Alt 3 must add "will require eventual removal of sediments again."

Steelhead Passage
This row omits major issues and needed actions for Alt 2-6 to be potentially feasible. Currently, only a potential upstream adult steelhead passage option is listed. Alt 2-6 must list actions needed for upstream and downstream adult and juvenile steelhead migration within the reservoir and fish passage facility, water quality improvements within the reservoir and/or downstream, turbidity and sedimentation / debris blockage removal measures, non-native species control (Alt 2-3), surface flow and vegetation control at porous delta sediment deposits (Alt 2-3), attraction flow issues at all fishway

features, flow releases and critical riffle limitations (Alt 2-6). Include actions to provide fish passage to Sausal and Alambique Creeks (Alt 7-8).

Open Water

Alt 4-8 descriptions must have “additional open water habitat created with Felt Reservoir expansion, maintenance of Upper Marsh open water, and permanent/seasonal open water with off-stream detention basin and floodplain restoration within the former reservoir area.”

American Rivers Recommendation to Steering Committee

Stanford Searsville Alternatives Study

Submitted By Steve Rothert and Kerri McLean

This document describes American Rivers' recommendation to the Steering Committee on the future of Searsville Dam as a supplement to the November 26 report to the Steering Committee written by the Advisory Group co-chairs (Co-Chair Report). The Advisory Group had no opportunity to review or comment on the Co-Chair Report before finalization.

RECOMMENDED SOLUTION: ALTERNATIVE "8B"

We recommend implementation of Alternative 8: Recreate Corte Madera Creek and Maintain Middle Reservoir, with the two modifications explained below. The two goals established by the Advisory Group (AG) that are most central to our decision are flood protection for downstream and upstream communities and protection of Endangered Species Act listed steelhead trout and other aquatic species. Unlike many of the other study goals, these two goals are not adequately achieved by the other alternatives. We believe that solution "8B" satisfies all of the goals of the study (as discussed in detail below), and we choose this alternative in particular because we believe it is the best long-term and sustainable approach to managing flooding and fish. We note that four other AG members also chose Alternative 8B. In addition, if the newly conceived Alternative 9 proves infeasible, the number of AG members supporting 8B would increase to six, bringing the AG's preference equally split between dam removal and dredging options.

Comments on "Alternative 9"

Before providing our rationale for recommending Alternative 8B, we would like to offer comments on "Alternative 9", which was created at the AG meeting on November 13, 2014 and described in the Co-Chair Report.

Alternative 9 would require a much longer bypass channel -- The current bypass channel design shows the channel meandering through the reservoir area, much like it did before the dam, until near the dam where it would cut through the north canyon wall to get around the dam. In order to re-create meaningful flood attenuation or water supply storage capacity in the reservoir as hoped for with Alternative 9, the bypass channel would have to go around most of the reservoir, likely adding one-third of a mile or more of new, engineered channel. This would cause several impacts. First, excavation of rock and soil for the bypass channel would increase dramatically from the estimated 300,000 cubic yards for the current design, possibly doubling or more. Second, excavation costs would go up proportionately. Third, the bypass channel would then cut through as much as a half-mile or more of upland areas of the Jasper Ridge preserve, possibly disturbing more ongoing research.

Alternative 9 would pose challenges for fish passage and sediment management. Although the Co-Chair Report concedes that Alternative 9 would be "experimental" with respect to fish passage, it also states that it would achieve the fish passage goal. This statement is not supported by any analysis or data. In fact, a cursory consideration of the alternative reveals several challenges to achieving successful passage. First, downstream migrating juvenile and adult steelhead would need to be prevented by fish screens from entering the reservoir area when the reservoir is closed and being filled for water supply. Fish screens can be costly to construct and cleaning and maintaining them can be time and cost intensive. Second, fish screens would force coarse sediment and debris into the bypass channel which would require monitoring and maintenance, of what likely would be a ½ - mile long fishway channel, to ensure it functions properly. Third, Stanford would have to design and operate the bypass channel as a formal fishway that must comply with National Marine Fisheries Service (NMFS) criteria for upstream fish passage for adults and juvenile steelhead. The NMFS fishway criteria specify several metrics that must be met, including channel slope, water depth, water velocities, jump heights and others. There is a range of designs of the bypass channel, but it would likely involve at least a ½ mile long channel that is more than 30 feet deep and 100 feet wide in places. Stanford would have to ensure the entire channel could meet fish passage criteria in perpetuity.

A thorough examination of Alternative 9 would certainly identify other challenges to the concept that would prevent it from achieving one or more of the priority goals of the process.

American Rivers' Proposed Modifications to Alternative 8:

1) **Addition of the downstream flood detention basin at the Boething site and potentially additional attenuation at Upper Marsh and within the restored Corte Madera Creek floodplain.**

   Reason: With the addition of these flood reduction (and sediment trapping) measures, alternative 8B performs comparably to alternative 5 (passive orifice) with respect to flood reduction for downstream communities, including at Middlefield Road.

2) **Implementation of incremental dam removal with fine sediment sluicing and stabilizing some portion of coarse sediment onsite.**

   Reason:

   a. It is Safe and Established Practice

   Well-managed downstream transport/sluicing of fine materials will have little or no impact on public safety or flood risk downstream because the material will pass directly to the bay, if released during adequate flow conditions. Based on examples such as Glines Canyon and Condit Dam and the plans for Matilja and Klamath Dam removals, case studies demonstrate that agencies will permit the associated, short-term water quality disturbance even where listed fish are present because of the long-term species benefits.

b. Saves time, money, and impacts

Downstream fine sediment transport would greatly reduce the amount of sediment trucked out, perhaps by as much as half. According to the 2004 report of Northwest Hydraulic Consultants to the JPA, fully 75% of Searsville sediments are fine-grained and will be delivered to the bay. This would shorten the length of the project by many years, reduce programmatic impacts on Jasper Ridge, reduce greenhouse gas emissions, and save considerable cost. The incremental nature of this approach would provide for maximum sediment transport control and support adaptive management practices. Additionally, other removal projects demonstrate that a portion of the coarse sediment can be usually be stabilized onsite and utilized for restoring the creek and floodplain habitat.

Why Alternative 8B Best Satisfies the Goals of the Project:

1. **Jasper Ridge:**
    - Some downstream transport/sluicing of fine sediment and stabilization of some course sediment will greatly reduce the construction timeframe, minimizing program disturbances.
    - Dam removal presents a major opportunity for scientific research.
    - After construction, there is significantly less ongoing disturbance to JRBP and O&M for fish passage etc., than with the other alternatives.
    - Best complies with Stanford's Core Sustainability Principle to, "preserve and manage environmental resources to allow the functioning of natural ecosystems and the long-term persistence of native species."
    - Aesthetically pleasing, natural appearance and ecosystem function desirable for a biological preserve.
2. **Water Supply and Storage:**
    - Increases Stanford water supply and storage capacity by 590 acre feet, the second best of all alternatives.
    - This new water storage system, unlike the option to dredge Searsville Reservoir, has much more sustainable capacity and will not fill with sediment at high rates.
    - Does not require water storage and supply for a fish passage facility that requires the dedication of significant flows for its operation.
3. **Steelhead:**
    - Dam removal is clearly the most effective, and potentially the only feasible, fish passage option for the threatened steelhead.
    - Dam removal restores natural conditions and requires the least ongoing maintenance and human intervention.
    - Solves Stanford's long-term Endangered Species Act litigation risk and liability.
    - Eliminates technical/biological passage challenges as well as the water quality and non-native species predation problems associated with other alternatives.

4. **Watershed Ecology:**
    - Eliminates the most artificial habitat supporting invasive and non-native species.
    - Retains and creates significant open water, wetlands, additional stream reaches, and associated native habitats.
    - Reconnects wildlife habitats in a divided watershed and restores natural conditions.
    - Restores critically needed fine sediment transport to threatened SF Bay wetlands.
    - Improves downstream water quality and flow by eliminating degraded reservoir conditions and evaporation.
5. **Flooding:**
    - With the addition of the Boething detention site, this alternative would perform comparably to the passive orifice alternative, which shows the greatest reduction to downstream flooding. Performance of option 8b might be further improved with additional attenuation features at Upper Marsh and within the reservoir floodplain area.
    - Due to its location, Stanford could easily transfer/share responsibility for operations/management of the detention site, and therefore potential flood liability, to another entity (such as the JPA).
6. **Stanford Land Use:**
    - Dam removal creates significant new usable land on Jasper Ridge that is currently under the reservoir.
7. **Time to Build:**
    - By implementing downstream transport/sluicing of fine sediment and stabilizing some coarse material on site, this alternative could reduce its construction window by as much as half of the estimated 8 years.
8. **Climate Change:**
    - By implementing transport/sluicing of fine sediment and stabilization of some coarse sediment, this alternative could reduce the number of truck trips, perhaps by as much as half or more, greatly reducing the estimated greenhouse gas emissions.
    - This alternative eliminates the ongoing methane (and other) emissions associated with the reservoir.
    - This alternatives increases carbon capture and storage in native vegetation that would be restored within the reservoir area.
    - This alternative ensures maximum wildlife connectivity and therefore adaptation and resiliency to climate change.

Recommendation Regarding Future Collaboration with JPA and American Rivers and other Stakeholders:

American Rivers encourages Stanford to collaborate with the JPA and the conservation community to expedite permitting, explore potential public funding sources, and reduce its

long-term liability exposure. If Stanford elects to pursue a dam removal option, American Rivers and others could advocate for Proposition 1 funding to support this important project and can work directly with the agencies to obtain permits and other approvals more efficiently. Furthermore, through collaboration with the JPA, Stanford may be able to generate flood risk reduction funding through a more integrated watershed-scale project that further spreads ownership and therefore liability for the flood-mitigation aspects of the project. We are eager to support Stanford in implementing such a project and addressing its ongoing legal obligations under state and federal law.

Stanford University