STRATEGIC PLAN 2018–2023

California Fish Passage Forum

Updated October 2021

Cover photo: The Carpinteria Creek fish passage project was supported by the California Fish Passage Forum in 2014. The project addressed the last major barrier to steelhead migration in the Carpinteria Creek watershed. The project created access to at least 1.27 miles of habitat by removing the undersized bridge and concrete channel to meet fish passage criteria for all steelhead life stages. The project also replaced the existing bridge with a longer spanning bridge and natural stream channel that now provides steelhead access to the perennial habitat in the headwaters of Carpinteria Creek.

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EXECUTIVE SUMMARY

The California Fish Passage Forum is a collaborative entity formed among state, local, and federal agencies, fisheries conservation groups, researchers, restoration contractors, and other interested parties to explore and develop an effective methodology, and plan to restore and recover anadromous fish populations by improving fish passage at man-made barriers. The Forum's mission is to protect and revitalize anadromous fish populations in California by restoring connectivity of freshwater habitats throughout their historic range.

The Forum's primary goal is to restore the connectivity of freshwater habitats throughout the historic range of anadromous fish. This goal is to be achieved through eight objectives including barrier remediation, collaborative work among Forum signatories and partners; funding, permitting, monitoring, policy, education and outreach and science-based applications of fish passage principles.

Forum structure and operation is founded on By-Laws. Participation in the Forum as a signatory is established through a Memorandum of Understanding whereby signatories commit to developing and implementing cooperative strategies aimed at restoring fish access to spawning and rearing habitat. The MOU formally recognizes the Forum's voluntary collaboration and provides mutually agreed upon guidance through its stated goals and objectives, The Forum meets at least bi-annually in different locations in California. During the meetings, issues are resolved, decisions are made, and strategic topics are discussed. Members also form smaller, focused working groups and committees in which specific goals and tasks are addressed.

The Strategic Plan outlines Forum goals and objectives in the recognition that anadromous fish habitats in California have been detrimentally impacted by human-caused and natural disturbances. Man-made barriers to anadromous fish migration include road-stream crossings, irrigation diversions, dams, lack of flow, adequate migration flows, and in-stream structures. Passage impediments affect adult and juvenile fish by delaying or preventing upstream and downstream migration, preventing the use of available habitat, and possibly inflicting injury or

death. Thus, the objectives that the Forum seeks to implement focus on identifying and remediating these barriers to improve native aquatic species' connectivity.

Addressing connectivity has been consistently identified as a high priority, cost-effective approach to protecting and restoring anadromous fish populations. State and federal action plans and recovery plans identify fish passage and connectivity as major limiting factors for listed salmonids in California. It is estimated that 45 percent of California's salmon, steelhead, and trout are likely to become extinct in the next 50 years if present trends continue, and 74 percent will likely be extinct in the next 100 years if present trends continue (Moyle et al. 2017).

During the next five years, the Forum seeks to focus on improving the accuracy and functionality of the Passage Assessment Database; supporting a diversity of projects associated with anadromous fish passage barrier remediation; expanding its membership to include more non-governmental entities; launching, promoting, refining, and maintaining its barrier optimization tool; engaging with other fish habitat partnerships and fish passage practitioners to achieve mutual goals; expanding the diversity and scope of anadromous fish passage projects it supports; increasing the diversity of funding sources to support all initiatives; and supporting migration and connectivity via instream flows.

The Forum also seeks to establish mechanisms that report on monitoring to ensure that projects are appropriately designed and implemented. Effectiveness monitoring, and publicizing such data in case studies and other venues, is important to evaluate the success of barrier remediation. Lessons learned from monitoring will improve design of fish passage structures, optimize their implementation statewide, and inform adaptive management to benefit anadromous aquatic species.

OVERVIEW

The development of this Plan incorporates the work of the numerous organizations that comprise the Forum, including the US Fish and Wildlife Service (USFWS), the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS), US Forest Service (USFS), California Department of Water Resources (DWR), California Department of Fish and Wildlife (CDFW), California State Coastal Conservancy (SCC), Pacific States Marine Fisheries Commission (PSMFC), California Trout (CalTrout), Trout Unlimited, and California Department of Parks and Recreation (State Parks). Together, the Forum signatories comprise the Forum Steering Committee. Committees formed within the Forum to implement Strategic Plan objectives operate according to work plans which are updated annually and progress reported out during Forum Steering Committee meetings.

The Forum is a collaborative effort among state, local, and federal agencies, fisheries conservation groups, researchers, restoration contractors, and other interested parties to explore and develop an effective methodology and plan to restore and recover anadromous fish populations by improving fish passage at man-made barriers. This framework helps to advance California's State Wildlife Action Plan (SWAP) and Steelhead Restoration and Management Plan (SRMP) (Appendix 1), the numerous other plans that address anadromous fish barriers, the goals and objectives of the National Fish Habitat Action Plan, and the vision and leadership of Forum representatives.

This framework defines the vision and goals, strategic objectives, conservation priorities, and strategic actions that will guide the future of the Forum, with a focus on facilitating partnerships related to data gathering, information sharing, planning, prioritizing, implementing, and monitoring fish passage efforts.

The Forum will use this framework as a guide to focus efforts at all scales to advance strategic, efficient, credibly funded, accountable investments in fish passage initiatives in California.

Finally, this framework will further the Forum's efforts to coordinate with other conservation and recovery efforts in the western United States. The collaborative nature of the Forum has led to improved cooperation among entities working on fish passage in the anadromous waters of California. The Forum has also contacted fish passage groups from other states as well as other fish habitat partnerships, including the Pacific Marine and Estuarine Fish Habitat Partnership and the Western Native Trout Initiative.

GEOGRAPHIC SCOPE OF THE FORUM

Figure 1. The geographic scope of the Forum encompasses the anadromous waters of California.

FORUM MEMBERS

The organization of the Forum is based on a Memorandum of Understanding (MOU; Appendix III), through which Forum signatories (Figure 8) commit to developing and implementing cooperative strategies aimed at restoring fish access to spawning and rearing habitat. The MOU formally recognizes the Forum's voluntary collaboration and provides mutually agreed upon guidance through its stated goals and objectives. The MOU also confirms the intent of state and federal fishery resource agencies and other interested parties to participate in and support Forum activities.

Forum members represent a diverse group of agencies and entities with a common interest in fish habitat restoration and fisheries recovery in the state of California. MOU signatory members include:

- Federal agencies
    - US Fish and Wildlife Service (USFWS)
    - NOAA National Marine Fisheries Service (NMFS)
    - US Forest Service (USFS)

- State agencies
    - California Department of Fish and Wildlife (CDFW)
    - California Department of Parks and Recreation (State Parks)
    - California Department of Water Resources (DWR)
    - State Coastal Conservancy

- Nonprofit organizations
    - California Trout
    - Trout Unlimited

- An interstate marine fisheries commission
    - Pacific States Marine Fisheries Commission (PSMFC)

The Forum focuses on four distinct regions in California, each with its own anadromous fish population characteristics, challenges, and issues: North Coast, Central Coast, South Coast, and Central Valley regions. These regions also contain other species of interest that are considered in Forum activities. Although the state and federal MOU signatory members have jurisdictions across these regions, Forum members and partners vary in each region based on their specific jurisdictions and levels of involvement.

Although Forum members develop unique prioritization lists and treatment prescriptions in each of the four distinct California regions, the Forum develops standardized data management systems, assessment protocols, design manuals, and outreach programs that span the full geographic extent of the Forum and address the Forum's strategic planning process.

The Forum meets at least bi-annually in different locations in California. During the meetings, issues are resolved, decisions are made, and strategic topics are discussed. Members also form smaller, focused working groups and committees in which specific goals and tasks are addressed. The Forum's bylaws, which govern the membership and decision-making process, are included in Appendix II.

Parties that have not signed the MOU may participate in Forum activities and attend regular Forum meetings. These members represent local communities and organizations, landowners and utility owners, land and water districts, and others. Though not signatories, these members are an important component of the partnership, and their contributions, in terms of experience and expertise, are important to achieving the Forum's objectives.

FORUM MISSION, GOAL, & OBJECTIVES

Mission

To protect and revitalize anadromous fish populations in California by restoring connectivity of freshwater habitats throughout their historic range.

Goal

Restore the connectivity of freshwater habitats throughout the historic range of anadromous fish.

To achieve the mission and goal, the California Fish Passage Forum will:

- Improve coordination of existing agency programs, rule and guideline efforts, and private sector activities across jurisdictions to improve the timeliness and cost-effectiveness of fish passage restoration efforts.

- Facilitate collaboration, coordination, and communication among state, federal and local agencies, researchers, restoration contractors, landowners and other interested stakeholders on fish passage improvement programs, funding programs, and projects.

- Expedite implementation of on-the-ground projects by identifying and addressing institutional barriers.

- Educate and increase the public and agency awareness of fish passage issues to develop support for solving problems and preventing new ones.

Objectives

1. Remediate barriers to effective fish migration.

2. Facilitate coordination, collaboration and communication among agencies, agency staff, and other entities that may propose, review, or promulgate fish passage projects within California.

3. Coordinate funding mechanisms to remove fish passage barriers.

4. Support state and federal permit coordination and efficiencies.

5. Facilitate plans to monitor and evaluate fish passage restoration effectiveness to ensure accountability.

6. Encourage existing state/national policy and actions that support fish passage improvement in California.

7. Implement education and outreach activities, targeting both the public & fish passage practitioners.

Objective 1: Remediate barriers to effective fish migration

I. Obtain and increase funding sources and coordinate and support efforts to remove fish passage barriers in California.

II. Diversify the locations, types and numbers of projects funded by the Forum.

III. Identify, assess, and prioritize the removal of fish passage barriers.
   a. Facilitate the use of the statewide fish passage barrier inventory—the Passage Assessment Database (PAD)—and continue to populate it with new data take steps to update and maintain it on a regular basis.
      i. Outline funding sources for PAD maintenance through 2023.
      ii. Support and guide enhancements of the PAD including online applications of data analysis and reporting, and a document library.
      iii. Implement an annual process to update barrier data and the status of projects to the PAD by region.
      iv. Promote and support continued public access to the PAD data, including regular releases of the PAD.
      v. Encourage entities in California to use the PAD and contribute regional updates to the PAD.
      vi. Improve the functionality of the PAD by incorporating additional elements of passability.
      vii. Link the PAD with prioritization efforts.
      viii. Fund a series of annual assessments to update the PAD by region and reinvest in that effort every decade to ensure the PAD is accurate.
      ix. Every other year, survey fish passage practitioners in California to determine how they are using the PAD and to create opportunities for them to update the PAD.
      x. Of the unknown barriers in the PAD, highlight those that exist within the range of anadromy in California, and initiate a focused effort to assess those barriers.

xi. Track the chronology of each project in the PAD.
xii. Expand opportunities to add lamprey data to the PAD.

b. Develop and communicate consistent protocols for prioritizing fish passage restoration at barriers.
    i. Launch FISH*Pass* and work with entities throughout anadromy in California to use the tool to prioritize barrier remediation.
    ii. Publish an annual report of statewide barrier priorities and accomplishments.

c. Identify gaps in watershed and barrier information using the PAD and other resources and develop a plan to fill those gaps. The Forum will continue to work with its members to coordinate funding and staff for inventories. Convene an Assessment Working Group to help standardize methods and coordinate funding.
    i. Annually publish a report identifying remaining data gaps in the PAD and priorities for barrier inventories and fish passage assessment.
    ii. In watersheds where insufficient barrier data exist, identify and contact entities involved in field data collection and solicit barrier inventories and passage assessments.
    iii. Work with willing private landowners to identify and inventory potential barrier sites.
    iv. Distribute data collection protocols and methodologies to ensure standardized approaches to data collection.
    v. Ensure PAD data is up to date and contains the best available information.

d. Develop an online interface for FISH*Pass* and share that interface and the FISH*Pass* product with fish passage practitioners. Maintain and improve the datasets and inputs associated with FISH*Pass.*

e. Provide guidance for fish passage practitioners associated with fish passage investments, monitoring and planning.

Objective 2: Facilitate coordination, collaboration and communication among agencies, agency staff, and other entities that may propose, review, or promulgate fish passage projects within California

I. Ensure that emerging national, interstate, and state fish passage-related design standards and guidelines are brought to the attention of Forum members in a timely manner.

II. Expand Forum membership to include additional active participating signatories that are non-governmental and can help move the Forums goals and objectives forward.

III. Hold Steering Committee Forum meetings bi-annually or more as needed, and hold recurring meetings of the Governance Committee, Science and Data Committee, Public Outreach Committee and Policy & Permitting Committee.
    a. Generate annual Work Plans for each committee
    b. Report out progress towards Forum goals from each committee during Forum Steering Committee meetings

Objective 3: Coordinate funding mechanisms to remove fish passage barriers.

I. Work with project managers, grant recipients, agencies, and others to develop a database of cost information for fish passage barrier repair and replacement activities.

a. Design a Passage Project Cost Database, including a minimum set of data fields, and ensure data compatibility and easy data transfer with existing related databases.
b. Identify sources of relevant information for fish passage project cost including details for all phases of fish passage project (design, permitting, construction) typical for California.
c. Continue data compilation into the Cost Database.

II. Identify funding sources for projects that support fish passage within the geographic scope of the Forum and administer a funding program for projects once funding is secured.
    a. Depending on funding levels, address 5–15 barriers per year.
    b. The Forum will use the PAD, the expertise of Forum members, potential funding from other sources, and the passage criteria to strategically fund high priority projects.

Objective 4: Support state and federal project permit coordination and streamlining.

I. Identify and support opportunities for improved interagency cooperation and permit streamlining.

II. When appropriate, support programmatic and regional permitting for fish passage projects.

III. Form a Policy & Permitting Committee within the Forum with an annual Work Plan.

Objective 5: Facilitate plans to monitor and evaluate fish passage restoration effectiveness to ensure accountability.

I. Establish mechanisms to report on monitoring to ensure that projects are appropriately designed and implemented.

II. Establish mechanisms or programs to evaluate changes in habitat use that result from fish passage improvement projects.

III. Establish ways to publicize monitoring results from fish passage projects. The Forum will work with the state and federal agencies and others to gather reporting information and data that document population and habitat changes. A working group will help to coordinate this effort and report back to the larger group.

IV. Develop three annual case studies focused on effectiveness monitoring and share via the Forum website and listserv.

Objective 6: Encourage state and national policy that supports fish passage improvement in California.

I. Coordinate with other Western States to share ideas and promote fish passage policy and efforts. The Forum will work to facilitate joint meetings with other Pacific States.
    a. Plan an interstate Fish Passage Workshop for California, Oregon, and Washington to discuss fish passage issues with national relevance such as fish passage jump height requirements for salmonids.

II. Coordinate with the National Fish Habitat Action Plan program on developments or changes they are working on regarding national policies that support fish passage through federal programs.

Objective 7: Implement education and outreach activities, targeting both the public and fish passage practitioners.

I. Support development and implementation of effective education and outreach programs to engage and inform the public and private landowners about aquatic habitat fragmentation and fish passage improvement opportunities.

II. Create and distribute fish passage outreach material that succinctly demonstrates fish passage issues in California and the Forum's history and purpose.

III. Communicate fish restoration activities to other agencies, landowners, watershed groups and others within each basin.

IV. Implement workshops to train local agency field crews or other interested groups to properly conduct fish passage evaluations.

V. Promote FISH*Pass*, an online tool to optimize the selection of fish passage barriers to remediate, by presenting the tool at conferences and conducting workshops with fish passage practitioners.

VI. Host at least one annual outreach event that promotes the need and benefits to anadromous fish passage barrier remediation efforts in California.

VII. Compile fish passage barrier remediation progress annually among Forum member agencies and organizations and share with policy makers and others to garner continued support and funding for these efforts.

VIII. Engage with the Pacific lamprey FHP, Pacific Marine and Estuarine FHP (PMEP), Western Native Trout Initiative (WNTI), and coastal FHPs to promote and support projects of mutual interest.

IX. Conduct outreach to agencies, organizations and tribal nations that may develop passage criteria, regulations, or guidelines to include the Forum in scoping, comments, and other public/agency coordination.

X. Take steps to engage and inform fish passage engineers in all aspect of fish passage barrier remediation.

RECOMMENDATIONS AND GUIDANCE FOR REGIONAL-SCALE PROJECTS

On a regional scale, the Forum will continue to implement and further develop the following tasks:

- Facilitate coordination and communication among Forum members.
- Improve the State's ability to implement fish passage restoration projects by coordinating agency and private sector efforts.
- Coordinate and secure adequate funding for fish passage restoration.
- Expedite implementation of on-the-ground projects by coordinating, and, where possible, streamlining agency permitting processes while ensuring that restoration programs comply with the State and/or Federal Endangered Species Act requirements for protecting listed species and any other applicable state or federal laws.
- Facilitate regional plans to monitor and evaluate fish passage restoration effectiveness to ensure accountability.
- Work to promote state and national policy that supports fish passage.
- Implement education and outreach, targeting both the public and fish passage practitioners to develop support for solving problems and preventing new ones.

RECOMMENDATIONS AND GUIDANCE FOR LOCAL-SCALE PROJECTS

At the local scale, the Forum will provide guidance and assistance to partners as they identify and implement restoration projects and activities to maintain, restore, or enhance habitat for anadromous fish species.

- Improve and Maintain Habitat Quality and Quantity
    - Establish comprehensive strategies to prevent the loss or reduced quality of habitat for anadromous fish by removing passage barriers.
    - Promote additional habitat improvements that complement restored connectivity, including, but not limited to restoration of natural flow and temperature regimes, natural sediment supply, physical channel and structural habitat restoration such as reconstructing natural meander patterns, addition of large woody debris, and non-native species control.

- Enhance and/or Restore Connectivity beyond the Removal of Manmade Passage Barriers
    - Identify and implement strategies to minimize and mitigate the negative effects of water development projects and stream diversions to connectivity.
    - Identify existing in-stream modifications (past mining activity) that may inhibit movements and develop strategies and projects to mitigate or remove elements that contribute to habitat fragmentation.

CLIMATE CHANGE AND THE FORUM

The impacts of climate change vary among species and populations, and depend on multiple and diverse factors (Dalton et al. 2013); however, climate change pace currently exceeds the rates at which species can colonize new suitable habitat (Comte and Grenouillet 2013). The following are some documented effects of climate change:

- Introduces new stressors and compounds existing stressors on fish as well as increases the frequency and magnitude of extreme floods (Jospe 2013).

- Decreases carrying capacity (Walters et al. 2013) and affects disease resistance, development rates, spawning and migration timing and other biological events, and ocean survival of anadromous fish (Crozier et al. 2011).

- Affects productivity, species distributions, recruitment, and community structure (Osgood 2008), and causes altitudinal shifts, population collapse, local extinctions, failure to migrate, and changes in food availability and food web structure (Portner and Farrell 2008).

- Affects water temperature and the magnitude and timing of stream flows, which affect all aspects of salmon development, rearing, and migration (NOAA-NWFSC 2008).

- Affects nutrient cycling and reciprocal terrestrial-stream subsidy balances (Wenger et al. 2011).

- Affects sea level, air temperature, ocean temperature and circulation patterns, precipitation patterns, air and ocean chemistry (acidification), tropical storm intensities and frequencies, and species abundance and distribution (NOAA 2010).

- Exacerbates non-climate stressors, such as pollution or overharvesting, thus affecting adaptive capacity (Seney et al. 2013).

- Causes habitat loss or alteration, distribution changes, geographic isolation or extirpation of populations unable to adapt or migrate, new interspecific interactions, shifts in phenology, disrupted predator-prey interactions, reduced food supply, increased stress, disease susceptibility, and predation (Seney et al. 2013).

- Increases stream temperatures in rivers. The threat to salmon recovery is great in locations where temperatures are near lethal or sub-lethal thresholds for salmon, but not as significant in rivers where current temperatures are well below those thresholds (Beechie et al. 2012). Altered stream flows and warmer temperatures affect survival and passage through tributaries for anadromous fish that require river systems and coastal regions for all or a portion of their life cycle (Osgood 2008).

- Warms waters, reducing habitat for cold-water species, promotes the introduction and establishment of non-native species typically found in warmer areas, and exacerbates existing stressors, such as habitat loss, pollution, invasive species and disease (NOAA 2010).

- Changes salinity levels for prolonged periods of time, resulting in habitat loss for some species (Burkett and Davidson 2012). Changes in salinity may also facilitate invasion by nonnative species better adapted to salinity variations (Hoy et al. 2012).

- Changes water temperatures, flow regimes and salinity concentrations and may result in reduced target species use of restored habitats (e.g., diadromous fish) (NOAA 2010).

- Raises sea level, warms ocean temperatures, and changes freshwater flows, contributing to significant changes in estuarine habitats (Bottom et al. 2005).

- Increases flooding and flash flooding from more intense rainfall events that may cause degradation of the habitat through increased channel erosion, siltation, and destruction of pools and riffles (NOAA 2010).

Increasing connectivity by removing barriers may be one of the most effective ways to mitigate the effects of climate change on aquatic systems, but it is important to remove the most limiting barriers (Jospe 2013), which requires an understanding of connectivity within stream networks (McClurg et al. 2007; Palmer et al. 2008) (Figure 8).

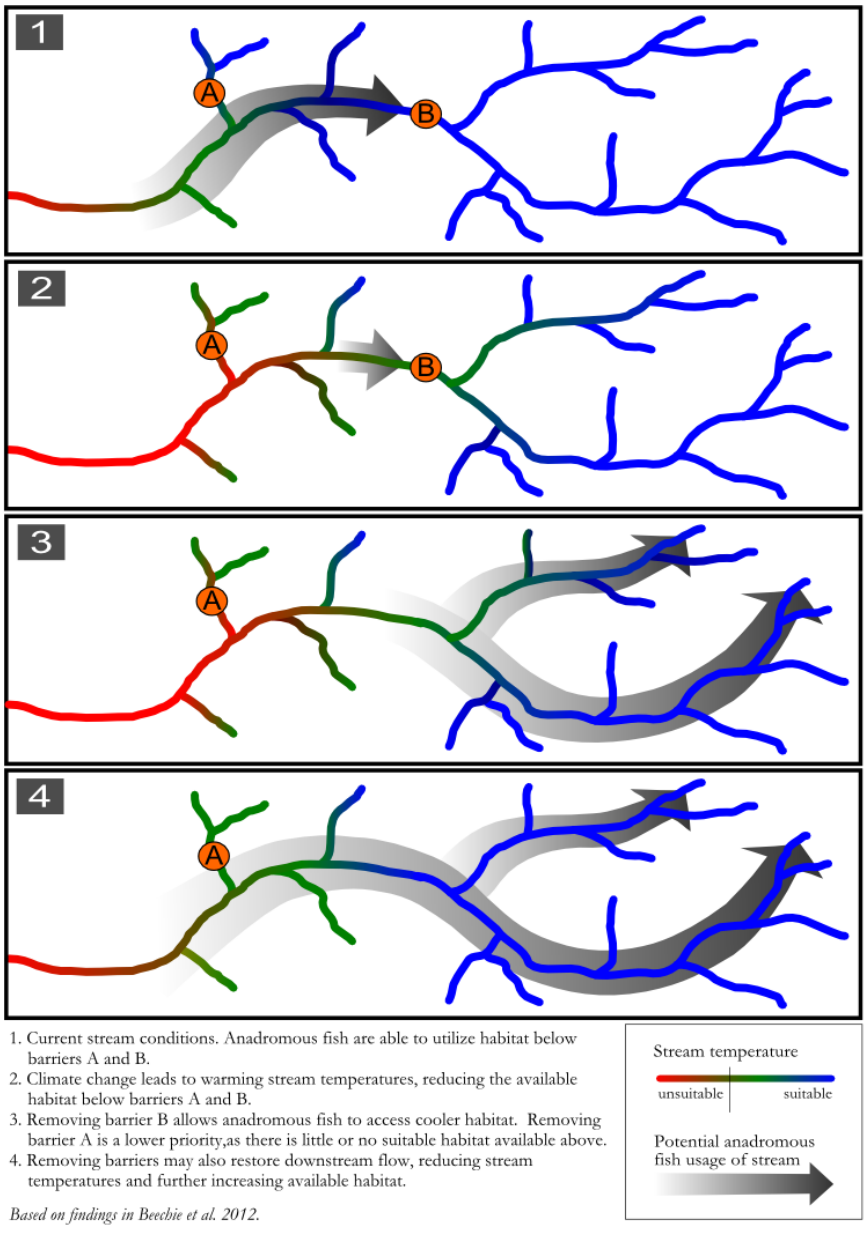

Figure 8. Removing fish barriers may restore downstream flow, reduce stream temperatures, and increase available habitat.

The following management recommendations are based on the life history needs of anadromous fish in California and the anticipated effects of climate change on fish:

- **Conduct a coordinated and comprehensive fish passage improvement program** to restore unimpeded passage for aquatic organisms in anadromous systems (California Fish Passage Forum 2013). Improving connectivity within aquatic ecosystems requires a strategic approach to identifying and prioritizing barrier removal.

- **Prioritize geographic regions and restoration project types** to express a larger suite of life-history strategies, important for species persistence and recovery. Improvements in habitats that support the spectrum of life-history strategies would further support recovery (Jorgensen et al. 2013). Understanding which types of restoration actions are robust to climate change is critical for effective recovery of federally listed populations (NOAA-NWFSC 2008). Because restoration actions focused on in-stream stabilization are unlikely to ameliorate climate change effects, it is important to understand current recovery needs; whether climate change effects will likely alter those needs; whether restoration actions can ameliorate climate change effects; and whether restoration actions can increase ecosystem resilience (Beechie et al. 2013) and ultimately improve overall connectivity within systems.

- **Enhance connectivity by restoring and protecting key ecosystem processes and features** to moderate effects of changes in climate and advance the recovery of endangered species (Boughton and Pike 2013).

- **Offset predicted increases in stream temperatures** by maintaining stream flows and protecting and restoring riparian habitats (Wenger et al. 2011).

- **Where inventory in watersheds is lacking,** carefully review projects predicted to support spawning and rearing habitats (Rieman and Isaak 2007).

- **Focus regional priorities** on the potential for short-term loss of ecological and evolutionary significance in marginal populations and the potential for long-term persistence in core habitats (Rieman and Isaak 2007).

- **Protect intact freshwater ecosystems by protecting large geographic areas** that serve as buffers and help to promote resilience (Dudgeon et al. 2006). Protection of large areas helps to ensure connectivity among and within stream systems.

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