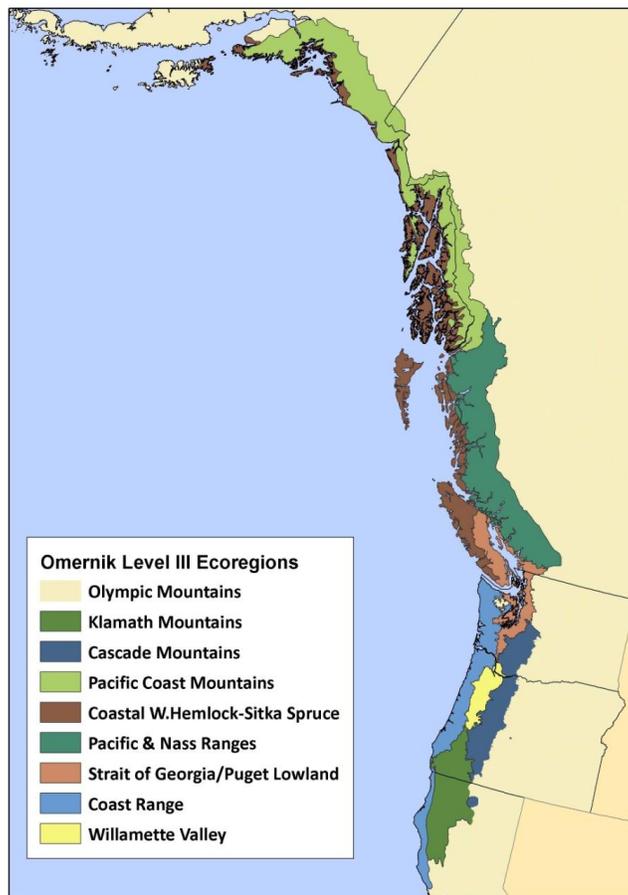




Implementation Plan
for the
NPLCC Science and Traditional Ecological Knowledge
Strategy, 2013-2016



Focus on 2015-2016 Priorities
November 2014

S-TEK Strategy Implementation Plan

Executive Summary

This *Implementation Plan* describes actions that the NPLCC Science and Traditional Ecological Knowledge Subcommittee will undertake in 2015 and 2016 to support and implement the *NPLCC Strategy for Science and Traditional Ecological Knowledge, 2013-2016* (S-TEK Strategy). This Implementation Plan has been expanded slightly from previous versions, reflecting the progress the NPLCC and the S-TEK subcommittee has made and a new focus on ensuring the benefits of previously funded work are realized for the NPLCC Partners. The S-TEK Subcommittee areas of focus included in this Plan are:

1. Review and revise, if necessary, S-TEK directions
2. Adaptive learning from past project
3. Identify new priority activities/projects
4. Communicate S-TEK project results

The actions included in this Implementation Plan are consistent with all the NPLCC guiding documents, including the Conservation and Sustainable Resource Management Conservation Goals and Objectives adopted by the Steering Committee in 2014. S-TEK direction has been modified only by increasing focus on adaptive learning and communication that is described in this Plan.

In 2015, the S-TEK Subcommittee will begin implementation of the Project Management and Accountability Practices adopted by the Steering Committee in 2014. This will include a focus on evaluating both the quality and impacts of past and ongoing projects, identifying opportunities to maximize benefits from the work, and providing advice and assistance to the project managers in communicating the results of their work effectively.

The Subcommittee identified several priority activities for 2015-2016, representing areas where the NPLCC will seek to identify and fund projects. Four activities were selected, including three that will be supported in 2015: (a) data and information sharing and synthesis, (b) support the use of vulnerability assessment and resilience studies in adaptation planning and management, and (c) conduct, support, or facilitate regionally-specific landscape-scale conservation planning exercises. The fourth activity is targeted for support in 2016: (d) develop and/or improve information on how climate change and associated adaptation actions will affect linkages between ecological and human resources.

Finally, the S-TEK Subcommittee is committed to working with the project leads, the NPLCC Communications specialist, and the NPLCC Communications and Outreach Subcommittee to identify opportunities to apply project findings to decisions addressing conservation actions and to promote the value of NPLCC project information in management decision making.

I. Introduction

Background

The North Pacific Landscape Conservation Cooperative (NPLCC) is one of [22 cooperatives in North America](#) (click to follow link) established to respond to climate change and other conservation challenges faced by natural resource managers and conservation professionals. The NPLCC addresses these challenges in a coastal geographic region extending from the Kenai Peninsula in Alaska, southward along the west coast of British Columbia, to Bodega Bay in Northwestern California.

Like all LCCs, the NPLCC is guided by a Steering Committee which established the direction and priorities of the LCC. The NPLCC Steering Committee established the [mission and goals of the Partnership](#) (click to follow link), and set up a subcommittee charged with developing and implementing a Strategy for Science and Traditional Ecological Knowledge (S-TEK). Through the S-TEK Subcommittee, the NPLCC established the [NPLCC Strategy for Science and Traditional Ecological Knowledge, 2013-2016](#) (S-TEK Strategy; click to follow link). The S-TEK Subcommittee implements this Strategy under Steering Committee guidance through periodic review and updates to funding priorities, and through a variety of ongoing activities related to adaptive learning from past work and communicating the results of that work to interested partners and stakeholders.

Figure 1 illustrates the various documents and policies that guide NPLCC S-TEK activities. All activities support the NPLCC Mission and Goals and the Priorities and Guiding Principles of the S-TEK Strategy; they support the [NPLCC Conservation and Sustainable Resource Management Goals and Objectives](#); and ultimate project selection and funding decisions are made through the processes outlined in the [NPLCC Project Management and Accountability Practices](#). Links in this paragraph and in Figure 1 will take the reader to these guiding and implementing documents.

Implementation Plan Overview

The initial *S-TEK Implementation Plan* was adopted in [March of 2013](#), with an emphasis on 2013 and 2014 funding priorities and updated in [November 2013](#), for 2014 funding priorities. The initial Implementation Plan focused primarily on identifying activities and projects to be funded by the NPLCC. As the NPLCC has matured and previously funded projects are being completed, the S-TEK Subcommittee is increasing its focus on maximizing the learning and benefits from those projects and ensuring adequate communication of products and lessons learned. Accordingly, this version of the S-TEK Implementation Plan has been expanded to include discussion of all four elements of the S-TEK Subcommittee's work.

The first and third areas of focus were discussed in previous iterations, while the other two (2 and 4) represent new areas in which the Subcommittee will be working in 2015 and 2016:

1. Review and refine (as necessary) the S-TEK direction and priorities (Section II)
2. Adaptive learning from past projects (Section III)
3. Identify new Priority Activities/Projects (annually or biannually) (Section IV)
 - Develop project descriptions or RFPs to identify specific projects for funding
4. Communication (Section V)

This *Implementation Plan* covers the final two years of the four-year planning horizon included in the S-TEK Strategy. Some flexibility in annual implementation is useful as some activities require multi-year efforts, and previously supported projects may identify new or expanded areas for future work. Additionally, the NPLCC has a Communications and Outreach Subcommittee, a Tribal/First Nations Committee and robust partnerships with Climate Science Centers (CSCs), adjacent LCCs, and other partners. Input from these groups may lead to changes in the priorities established in this *Implementation Plan*. Some of this work is periodic (annual) in nature, and some of it reflects the ongoing activities of the subcommittee.

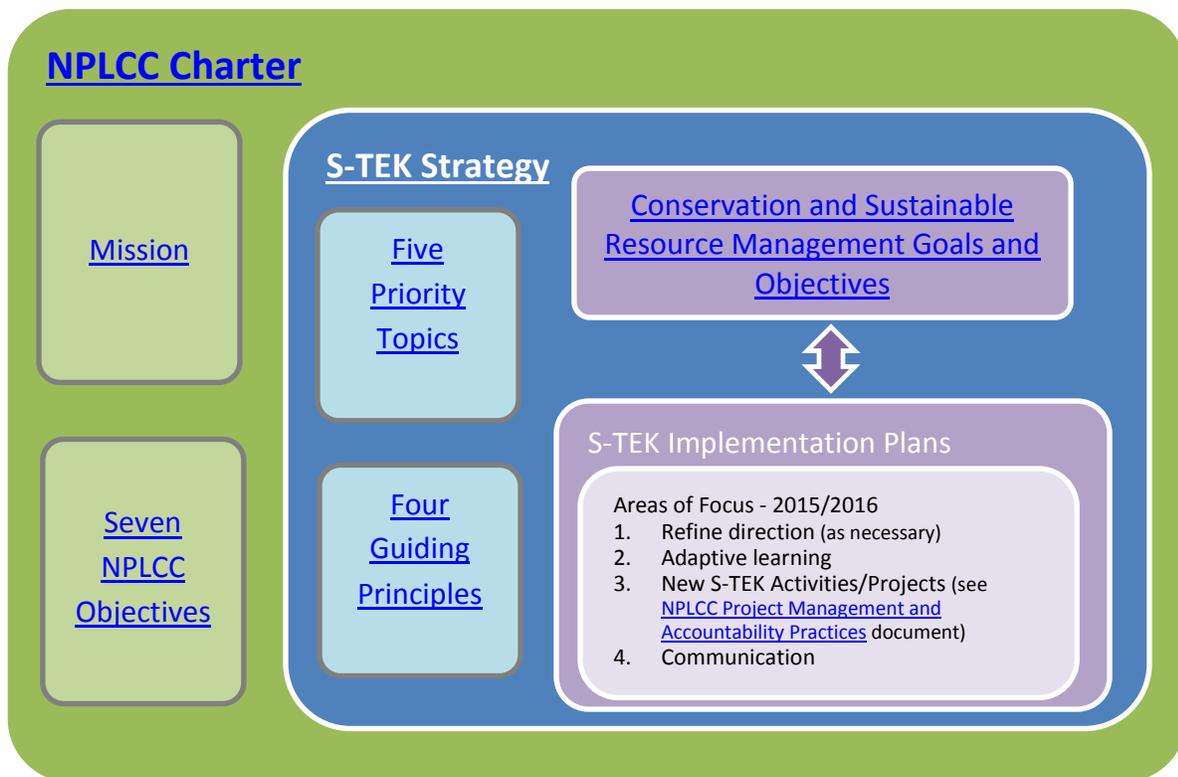


Figure 1. Relationships Among NPLCC Planning and Guidance Documents (click links in graphic).

II. S-TEK direction, 2015-2016

As mentioned above, S-TEK subcommittee areas of focus to date have been on establishing the S-TEK Strategy, developing and implementing a process for soliciting and selecting projects to be funded, and managing that work as it is conducted and completed. Over the last two funding cycles, the NPLCC has continued to mature and previously funded projects are being completed.

In 2015 and 2016, the S-TEK Subcommittee plans to increase its focus on maximizing the learning and benefits from previously funded and completed projects, reflecting a slight change in direction for the S-TEK subcommittee from previous years.

In addition to the initial guiding documents described above, the NPLCC Steering Committee has adopted a set of [Conservation and Sustainable Resource Management Goals and Objectives](#) (click to follow link) that provide additional guidance for what kinds of activities the NPLCC should be supporting. The S-TEK Subcommittee included consideration of those Goals and Objectives in making recommendations for the new Priority Activities described below. As part of continuing to refine S-TEK directions, the subcommittee will also work towards refining goals and developing measurable objectives for priority resources and S-TEK activities that support these overall Conservation and Sustainable Resource Management Goals.

III. Adaptive Learning From Past Projects

As the NPLCC matures, the S-TEK Subcommittee is turning its attention to understanding (and communicating) what is being learned from work funded by the NPLCC previously. This will include:

- Full implementation of the NPLCC project tracking system
- Implementation of [Project Management and Accountability Practices document](#)
 - Evaluating the quality and impact of past and ongoing projects
 - Implementing the peer review process. Some funding may be required to implement the peer review process (e.g., a small honorarium for reviewers, based on expertise needed). The need and amount still needs to be determined.
- Development and implementation of a framework for evaluating the benefits, use, and lessons learned from past projects
 - May involve identifying opportunities for additional incremental investments to past projects that will improve their relevance and use.
- Implementation of results from previous projects, as appropriate. Several past projects included a focus on identifying decision-maker's information needs (e.g., TEK-related projects, decision-maker and researcher workshops, project lessons learned). The Subcommittee will review the results of these projects and may recommend new areas of focus or potential activities to be funded based on results or recommendations.

IV. Priority Activities/Projects, 2015-2016

Planning Process

For this 2015-2016 update of the Implementation Plan, the S-TEK Subcommittee modified slightly the approach used to develop the Implementation Plan for 2013-2016 and the 2014 update. The S-TEK Subcommittee selected Activities that should be priorities using a four-step process, as shown in Figure 2. Each of these steps, as well as the detailed activities and consolidated activity categories considered are described in more detail in Appendix A.

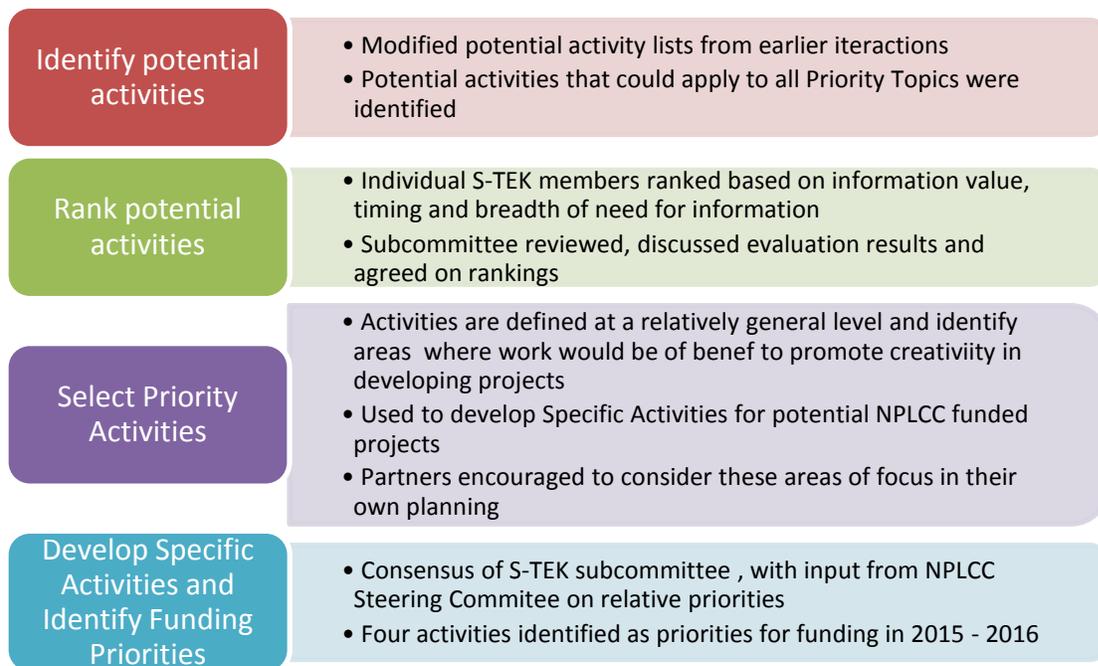


Figure 2. Four-step Process for Identifying Areas of Focus and Priority Activities for Funding

Traditional Ecological Knowledge (TEK)

The S-TEK Strategy recognizes the importance of considering both western science and TEK, and the NPLCC has funded [multiple projects](#) (click to view projects) related to TEK in the past. The S-TEK Strategy also recognizes that Tribes and First Nations have proprietary rights to their TEK, and individual Tribes and First Nations will decide if they want to share that knowledge and, if so, what TEK to share and how and with whom to share it. Therefore, identifying and promoting opportunities to use TEK to inform partner and stakeholder decisions is limited to when and where it is desired by tribal owners of the information.

S-TEK Activities for 2015/2015

Table 1 summarizes the seven Priority Activities for NPLCC-related S-TEK work identified for 2015-2016. From its beginning, the NPLCC partners recognized that effective natural and cultural resource conservation in a changing climate will require the strengths and resources of many organizations

working together. Actions that can be accomplished jointly with both NPLCC and partner support are particularly important and have been the focus of work in both 2013 and 2014.

The Priority Activities in Table 1 were developed from the five highest-ranking potential activities (including ties) based on vote count for each Priority Topic, S-TEK subcommittee evaluation, and review by the S-TEK subcommittee. Activities identified as particularly fruitful areas for collaboration with Partners are shown with yellow and blue shading.

During planning, the S-TEK Subcommittee also identified two Activities that would be highly useful to the NPLCC partners, but rated as less important for the NPLCC itself to support directly. Similar to earlier iterations of this Implementation Plan, those activities were:

- Develop downscaled / improved climate models and forecasts of changes in the resources, at appropriate scales; Develop specialty climate or topic models
- Evaluate relationships between existing infrastructure and infrastructure planning and projected changes in the hydrological regime (e.g., road and trail access; hatcheries, etc.)

These recommendations and the Activities indicated in Table 1 as areas important for action by both the NPLCC and Partner entities are not intended to define or limit NPLCC collaborations with partners, nor are they intended to summarize what partners do (such summaries are available in each partner organizations own planning documents). Rather, the partner designations are seen as fertile ground for some new ways organizations might effectively work together over the next two years.

New Priority Activities for Project Development and Funding, 2015-2016

Considering the Priority Activities from Table 1 and the type and results of work funded by the NPLCC previously, the S-TEK subcommittee identified four Activities for NPLCC support in 2015 and 2016. Table 2 lists these Activities and indicates which will be supported in each year, and the planned funding mechanism for each. The number of projects that will be funded depends on the total funding available to the NPLCC in each year.

NPLCC staff and the S-TEK subcommittee will follow the procedures described in the [NPLCC Project Management and Accountability Practices](#) document to define scopes of work and RFPs and to identify specific projects to carry out each of the Priority Activities. The specific amount of funding necessary for each Activity, as well as appropriate funding mechanism (e.g. contracts or grant agreements) will be determined during detailed project planning. While this plan is intended to cover both 2015 and 2016 selected Activities, 2016 needs may be updated based on results of previously funded NPLCC Projects, Adaptive Learning findings of the S-TEK subcommittee during 2015 and/or opportunities to leverage NPLCC funding with partners such as CSCs, other agencies, non-governmental organizations and others.

Table 1. Priority Activities for NPLCC-related S-TEK work, 2015-2016⁽¹⁾

<p>Yellow color shows Priority Activities for NPLCC support, where those activities are unlikely to be conducted without such support</p> <p>Yellow and blue color indicates Priority Activities where entities other than the NPLCC may have specific interests or expertise and where collaboration and joint project funding might be particularly beneficial</p>	<p>Activity code from Appendix A</p>	<p>Priority Topic A: Effects of hydrological regime shifts on rivers, streams, & riparian corridors</p>	<p>Priority Topic B: Effects of changes in air temperature & precipitation on forests</p>	<p>Priority Topic C: Effects of changes in sea levels & storms on marine shorelines, the nearshore, & estuaries</p>	<p>Priority Topic D: Effects of changes in the hydrologic regime on anadromous fish</p>	<p>Priority Topic E: Invasive species, diseases, & pests & their effects on biological communities</p>
<p>Data and information synthesis and sharing. Identify, compile, collate and integrate existing data and information concerning climate impact data and modeling, monitoring, and monitoring networks, TEK, etc. Focus areas include addressing special cross-border challenges; linking information and data across disciplines and habitats, and providing the information and data to decision makers in a way that makes it useful to them. (Information and data sharing to be as desired by Tribes / First Nations for TEK).</p>	<p>1 & 2</p>	<p>Yellow</p>	<p>Yellow</p>	<p>Yellow</p>	<p>Yellow</p>	<p>Yellow</p>
<p>Assess vulnerability and resilience of resource(s) to projected climate change. Identify critical stressors, valued/necessary resources (including Tribal and First Nations valued resources, corridors and refugia, etc.), anticipated changes, and locations of more vulnerable and less vulnerable resources. Include consideration of the effects of multiple stressors on the resource(s)</p>	<p>7</p>	<p>White</p>	<p>Blue</p>	<p>Blue</p>	<p>Blue</p>	<p>Blue</p>
<p>Further clarify decision-maker needs for S-TEK information. Convene managers, scientists, and tribes to discuss specific sub-topics; review and summarize existing planning documents, etc. Identify management decisions and actions, share information on existing data, models, etc.; identify gaps and common needs</p>	<p>12</p>	<p>Yellow</p>	<p>Yellow</p>	<p>Yellow</p>	<p>White</p>	<p>Yellow</p>
<p>Identify indicators of change: focal indicators, processes or thresholds that can serve as indicators of change, can be used to track climate change impacts, and can be used to assess the effectiveness of management actions (to indicate where changes in management actions may be necessary).</p>	<p>10</p>	<p>Blue</p>	<p>White</p>	<p>White</p>	<p>Blue</p>	<p>Blue</p>
<p>Conduct, support, or facilitate landscape conservation planning exercise(s) in a particular geography or region</p>	<p>9</p>	<p>White</p>	<p>White</p>	<p>Yellow</p>	<p>White</p>	<p>White</p>
<p>Develop tools and/or assist partner entities in applying existing tools to identify and inform managers of high priority conservation and/or restoration targets (species, locations, etc.).</p>	<p>8</p>	<p>White</p>	<p>White</p>	<p>Yellow</p>	<p>Yellow</p>	<p>White</p>
<p>Conduct or support adaptation planning exercises to assist management decisions related to specific sub-topics, considering uncertainties in future climate / climate impacts. Identify how restoration activities and strategy development can/should be modified to account for climate-related changes (E.g., scenario planning exercises, triage analyses, contingency planning, etc.)</p>	<p>11</p>	<p>White</p>	<p>Blue</p>	<p>White</p>	<p>White</p>	<p>White</p>

Table 2. Activities/Projects for NPLCC support in 2015 and 2016.

Activity	Activity Timing and Funding Mechanism
<p>1. Data and information synthesis and sharing. Identify, compile, collate, and integrate existing data and information concerning climate impact data and modeling, monitoring networks, TEK etc.</p>	
<p>Includes continued support for the data management platform</p>	<p>2015 and 2016 Salary/Contracts</p>
<p>Potential projects should focus on:</p> <ul style="list-style-type: none"> - addressing special cross-border challenges; - linking information and data across disciplines and habitats - providing the information and data to decision makers in a way that makes it useful to them. -tracking and evaluating use 	<p>2016 Contracts/Agreements/ Salary</p>
<p>2. Support the use of vulnerability assessments and resilience studies in adaptation planning and implementation</p>	
<p>Potential projects may include:</p> <ul style="list-style-type: none"> – Enhancing existing conservation plans to facilitate development and/or implementation of adaptation strategies (e.g. State Wildlife Action Plans, Forest Plans, etc.) – Projects identified in past NPLCC workshops 	<p>2015 and 2016 Contracts/Agreements</p>
<p>3. Conduct, support, or facilitate landscape-scale conservation exercise(s) in a particular geography or region</p>	
<p>Geographic areas of focus may include:</p> <ul style="list-style-type: none"> – South-central and/or Southeast Alaska with a focus on National Forest and adjacent lands). – Cascadia Partner Forum’s transboundary region – Coastal Washington and Oregon (northern and southern extent to be defined by partners) and the lower Columbia River – Humboldt Bay and/or Klamath Basin (in cooperation with the GB LCC or CA LCC) <p>Projects likely would include facilitated partner workshops at the start to help define the goals and objectives.</p>	<p>2015 and 2016 Contracts / Agreements/Salary</p>
<p>4. Develop / improve information on how climate change and associated adaptation actions will affect linkages between ecological and human resources (including tribal and First Nations subsistence activities)</p>	
<p>Projects will be defined using an RFP (released in 2015 for pre-proposals) and/or through review and evaluation of activities generated during the Tribes/First Nations meeting or 2014 training conducted by Institute of Environmental Tribal Professionals.</p>	<p>2016 Agreements</p>

V. Communication

S-TEK work must be communicated to managers through appropriate channels if it is to have significant, positive impacts on resource management. Although communication of project results has always been a requirement for NPLCC funded projects, history suggests that translating the results into more effective action through communication of results to a broader audience is an area in which the project leads could use support and guidance from the NPLCC. The S-TEK subcommittee considers this communication aspect to be central to maximizing the benefits of NPLCC funded work. The Sub-

committee is committed to working with the project leads, the NPLCC Communications specialist, and the [NPLCC Communications and Outreach Subcommittee](#) to identify opportunities to apply project findings to decisions addressing conservation actions and to promote the value of NPLCC project information in management decision making.. Specific areas in which the S-TEK subcommittee will focus in 2015 include:

- Identifying opportunities during project implementation to raise awareness of the work
 - A S-TEK “liaison” may be identified for currently-funded projects
- Promoting / helping project PIs communicate project results:
 - To natural resource managers, by helping to identify managers who could benefit from the work and, where possible, facilitating meetings or briefings
 - To NPLCC partner entities, through Subcommittee member interactions with those entities as part of their normal course of work.

VI. 2015 Funding

The total funding available to the NPLCC in 2015 from U.S. Fish and Wildlife Service (USFWS) for S-TEK actions is estimated to be approximately \$200,000. This is significantly less funding than has been available in past years. As a result, the S-TEK subcommittee is recommending primarily directed work for new activities in 2015 or using very limited scopes of work when releasing a Notification of Funding Availability. A RFP for pre-proposals to support Priority Activity 4 (Develop / improve information on how climate change and associated adaptation actions will affect linkages between ecological and human resources) will be released in 2015 to solicit projects to be funded in 2016, or earlier if additional funding becomes available.

Table 3. Estimated 2015 funding distribution¹.

S-TEK Areas of Focus	Estimated funding ²
1. Refine direction, if needed	\$0
2. Adaptive Learning <ul style="list-style-type: none"> • Peer review • Establishment of an evaluation framework • Investment in projects generated through past projects • Reinvestment in past project – additional communication and/or translations 	\$75,000
3. New Activities/Projects	
<ul style="list-style-type: none"> • Data Information synthesis and sharing 	\$10,000 (beyond salary of Data Coordinator)
<ul style="list-style-type: none"> • Use of vulnerability assessments 	\$50,000
<ul style="list-style-type: none"> • Landscape-level conservation actions 	\$60,000
4. Communication	\$5,000
1. Depends on total amount of funding provided for the NPLCC 2. Based on estimated funding from the USFWS only, and partner matching funds have not been included and would allow support of additional actions.	

Appendix A. Additional detail on potential actions considered

This appendix provides additional detail on the process used to develop the *Implementation Plan*, in particular the first two steps of identifying and ranking potential actions within each Priority Topic.

Updating the Implementation Plan

For this 2015-2016 update of the Implementation Plan, the S-TEK Subcommittee repeated, with slight modifications based on lessons learned, the approach used to develop the Implementation Plan for 2013-2016. Figure A-1 illustrates the general approach undertaken to identify the Priority Activities for this *Implementation Plan*, and the Activities for NPLCC support in 2015 and 2016. Additional detail is provided in Appendix A.

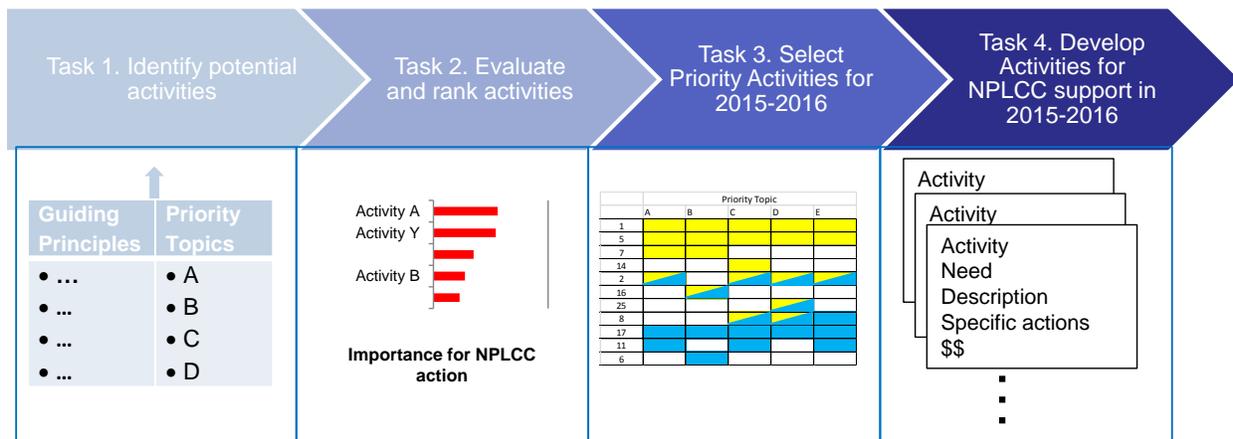


Figure A-1. Process used to develop implementation priorities

Task 1: Identify potential activities that could be pursued over 2015-2016, consistent with the Guiding Principles and the Priority Topics described in the S-TEK Strategy. Using the activity list developed for the initial Implementation Plan, and based on some of the lessons learned in developing activities for 2013 and 2014 funding, the S-TEK Subcommittee developed a revised version of the “long list” of activities that could be conducted to provide management-relevant information for each of the Priority Topics. As was done previously, the detailed list of activities was consolidated and re-organized into about 20 generic activities potentially relevant to all of the Priority Topics (Appendix A).

Task 2: Rank the potential activities for each Priority Topic. S-TEK Subcommittee members independently evaluated the activities identified in Task 1 for each Priority Topic. A modified “dot voting” approach was used for the evaluation, with each person allocating 12 points across the activities

identified in Task 1, considering the importance of that activity for each Priority Topic separately. Individuals were asked to consider three factors as they assigned points:

- The degree to which the potential activity will produce information or tools needed to support natural resource management decisions in the NPLCC.
- The timing of the need for this information or support: is it time-critical? Would it be particularly valuable if started in FY15 or FY16?
- The breadth of need for this type of information or tools across the partnership: will the entire NPLCC partnership benefit, or only a relatively small minority of Partners?

For every potential activity they indicated was a priority (by assigning it at least one point), the evaluators were then asked to provide an indication of how important *direct support by the NPLCC* was for the activity. This second question provides an additional “filter” to help identify activities for direct NPLCC support, as well as activities that are of value to the partnership but which might better be supported by other entities or through joint funding arrangements. Activities were ranked based on the total number of points assigned by the S-TEK Subcommittee.

Task 3: Identify Priority Activities for each Priority Topic in 2015-2016. A broad range of activities and multiple approaches and methods related to each of the Priority Topics exist that could provide useful information to NPLCC partners, as illustrated by the results of Task 1. This *Implementation Plan* seeks to describe priorities in enough detail to provide useful guidance for those seeking to support NPLCC efforts, without over-prescribing how the work should be accomplished. Therefore, the priority activities identified for 2015-2016 are defined in relatively broad terms, at the level of the generic activities evaluated in Task 2, not at a project-specific level. This allows for creativity, innovation and flexibility in how activities are carried out, so NPLCC partners will be able to define specific projects that both meet their own internal needs and provide useful information to the NPLCC partnership. The highest ranked activities from Task 2 were selected as the Priority Activities. (See Section IV).

Task 4: Develop activities for potential NPLCC funding in 2015 and 2016. The final step in developing this *Implementation Plan* was to identify and define a set of Activities for the NPLCC to pursue in 2015. Four activities were identified by consensus of the S-TEK subcommittee based on discussion of the identified Priority Activities and the potential activity list, and based on input from the NPLCC Steering Committee on relative priorities. (see Section IV). The ability of the NPLCC to implement these projects will depend on the availability of funding.

Identification of potential activities

Table A-1 (starting on p. A-5) lists the 19 potential activities (in no particular order) that were evaluated and ranked for each Priority Topic, as well as the detailed, specific examples that were identified during S-TEK discussions. The detailed examples represent the “long list” described above, and the 19 enumerated activities comprise the “short list” of potential activities that were evaluated and ranked.

While it would certainly be possible to expand these lists, the S-TEK subcommittee felt that these lists provided a sufficient basis to develop the more general list of potential actions shown in Table A-1.

Ranking of Potential Actions

S-TEK subcommittee members individually ranked the list of potential actions for each Topic following a simple “dot voting” process. They were provided with a set of tables (one for each Priority Topic), listing the potential activities and asked to assign points to each of those potential activities based on their assessment of which potential activities would provide the most valuable information or support for decision-making. They were asked to consider three factors as they completed their rankings:

- The degree to which the potential activity will produce information or tools needed to support natural resource management decisions in the NPLCC.
- The timing of the need for this information or support: is it time-critical? Would it be particularly valuable if started in FY15 or FY16?
- The breadth of need for this type of information or tools across the partnership: will the entire NPLCC partnership benefit, or only a relatively small minority of Partners?

In a modification to the approach used for the initial Implementation Plan, participants provided only this one ranking of each list, and then as a second activity they provided input on how important they believe direct NPLCC support for each prioritized activity to be. This was intended to provide an additional level of prioritization to help identify areas where the NPLCC support is most critical. Each activity was rated according to the following scale:

- 4) The NPLCC is uniquely suited to carrying out these activities: no other existing entity can address the relevant issues
- 3) It is unlikely that activities such as these will be undertaken without direct NPLCC support
- 2) Activities are better suited to existing entities: they could carry out the activities as well or better without NPLCC support
- 1) Inappropriate for direct NPLCC support (uniquely suited to another entity)

Fifteen subcommittee members completed the scoring exercise, and the results were discussed as an S-TEK subcommittee meeting on January 7th and 8th, 2014. Almost every potential action received at least one vote for at least one Priority Topic, affirming that work within any of these areas on any of the Priority Topics would be useful to the Partnership. Figure A-2 summarizes the ranking results for all topics. Each column is color-coded so that the potential actions receiving the most votes are green and those receiving the least votes are red. By inspection, three types of potential activity emerged as high priority for NPLCC action across most of the five Topics. These are the first three Priority Activities shown in Table 1 of the main text.

Within each of the Priority Topics, additional actions were highly ranked, and different actions emerged as high priorities for the different topics. Table 1 in the main text summarizes those results and indicates the Activities selected for this Implementation Plan for 2015/2016.

		Topic A	Topic B	Topic C	Topic D	Topic E
1	Improve cross-boundary data availability, integration, synthesis, and sharing	15	13	12	15	25
2	Identify, compile, collate and integrate existing data and information concerning climate impact data and modeling, monitoring and monitoring networks, TEK, etc. Make this information readily available for decision-makers (as desired by Tribes/First Nations for TEK).	12	16	16	11	15
3	Evaluate existing datasets, models, and TEK (as appropriate) for climate relevance: how well do they take into account climate change and climate change impacts	3	5	3	1	2
4	Identify existing tools and approaches being used to support decision-making. Evaluate the usefulness of those tools for: (a) providing decision-relevant insights, and (b) aiding in the development of adaptation or mitigation response actions. Include consideration and use of TEK where desired by Tribes. Use insights from this review to develop guidance for future tool/support development; provide training for resource managers in how to use existing tools	9	12	10	10	10
5	Identify and document tangible examples of climate change adaptation or mitigation response actions; evaluate their successes and failures, and develop "best practices" guidance documents on how to incorporate successful approaches in existing management practices. Include consideration of TEK in developing these examples and in guidance documents	6	0	2	9	1
6	Develop case studies to enhance practicality and utility of existing tools / previous studies through direct engagement of decision-makers: illustrate how a particular type of study or model can provide useful information for a specific type of decisions (e.g., use a vulnerability assessment to directly inform on potential adaptation response actions)	4	3	5	7	3
7	Assess vulnerability and resilience of the resource(s) to projected climate change: identify critical stressors, valued/necessary resources (including Tribal and First Nations valued resources, corridors and refugia, etc.), anticipated changes, and locations of more vulnerable and less vulnerable resources. Include consideration of the effects of multiple stressors on the resource(s)	10	17	16	20	18
8	Develop tools and/or assist partner entities in applying existing tools to identify and inform managers of high priority conservation and/or restoration targets (species, locations, etc.).	7	5	16	14	6
9	Conduct, support, or facilitate landscape conservation planning exercise(s) in a particular geography or region	9	10	12	8	10
10	Identify focal indicators, processes or thresholds that can serve as indicators of change, can be used to track climate change impacts, and can be used to assess the effectiveness of management actions to indicate where changes in management actions may be necessary.	11	12	11	13	14
11	Conduct or support adaptation planning exercises to assist management decisions related to specific sub-topics, considering uncertainties in future climate / climate impacts. Identify how restoration activities and strategy development can/should be modified to account for climate-related changes (E.g., scenario planning exercises, triage analyses, contingency planning, etc.)	9	16	7	4	5
12	Conduct workshops to further clarify decision-maker needs: Convene managers, scientists, and tribes to discuss specific sub-topics. Identify management decisions and actions, share information on existing data, models, etc.; identify gaps and common needs	16	17	13	10	17
13	Conduct or support stakeholder outreach workshops and meetings, either convened by the NPLCC or by NPLCC partners. Goals of such outreach activities could include: communicating information on projected impacts to interested stakeholders; supporting with local community planning by conveying information on local impacts and on the availability of adaptation and mitigation actions, etc.	5	6	8	7	14
14	Improve information on how climate change will affect linkages between ecological and human resources (including tribal and First Nations subsistence activities)	7	10	7	11	0
15	Collect data to improve basic understanding, to provide baseline information, to provide a basis for long-term monitoring, to support modeling, etc.	9	4	6	10	6
16	Develop standard quality assurance and quality control measures, other protocols, and data stewardship guidance for topic-related data collection and monitoring, with special provisions as necessary in consideration of climate-related changes	4	3	3	3	9
17	Coordinate ongoing and future data collection activities among NPLCC partners who have related needs, interests and expertise (esp. for cross-border data)	7	5	10	6	9
18	Develop downscaled / improved climate models and forecasts of changes in the resources, at appropriate scales; Develop specialty climate or topic models	14	14	11	7	5
19	Evaluate relationships between existing infrastructure and infrastructure planning and projected changes in the hydrological regime (e.g., culverts and fish passage; road and trail access; hatcheries, etc.)	13	0	0	0	0

Figure A-2: Relative ranking of potential activities for NPLCC action. Green shading indicates higher priority, red shading indicates lower priority

In the table below, rows highlighted in green show the 19 activity categories that were evaluated (the “short list”). White rows list the detailed activities that were identified by the S-TEK Subcommittee (the “long list”)

Table A-1. List of detailed activities and consolidated activity categories

Activity code	Activity Category / Detailed Activities	Priority Topics
1	Improve cross-boundary data availability, integration, synthesis, and sharing	
	Improve cross-boundary data availability, integration and synthesis	A, B, C, D, E
	Coordinate and share data collection activities, research results, tools, and management lessons for cross-border datasets	C, D, E
	Assess stream gauge information being collected to determine what data is being collected, where, and if it is coordinated with anadromous fish information. Assess if similar systems are in place in both B.C. and the U.S. and what coordination efforts are in place.	D
2	Identify, compile, collate and integrate existing data and information concerning climate impact data and modeling, monitoring and monitoring networks, TEK, etc. Make this information readily available for decision-makers (as desired by Tribes/First Nations for TEK).	
	Systematically compile, collate and integrate existing data and information on hydrologic regimes affected by precipitation, glaciers, and groundwater and make it available for decision-makers. Intensively monitored watersheds are an example of an ongoing effort that could serve as a pilot for improved coordination and collaboration.	A
	Systematically compile, collate and integrate existing data and information on forest and forest species distribution, the predicted effects of climate on both, and make that information available to decision-makers. Inventory of existing monitoring networks and monitoring entities may be a precursor	B
	Systematically compile and integrate existing data for water quality, especially temperature, and make it available to decision-makers	D
	Collate existing data on monitoring networks; Provide a single location / database for sharing and accessing information [one or more of the Priority Topics - mentioned specifically for invasives, pests, pathogens, and diseases]	C, D, E
	Develop a data portal or “climate clearinghouse” with a brief description of people, their projects, and how to contact them	Other / cross-topic
	Assess existing coastal geomorphologic, hydrologic, hydrographic and meteorological data and oceanographic models (e.g., transport and circulation and sea-level rise) for their application to projecting effects of climate change on NPLCC estuaries and nearshore marine	C
	Assess stream gauge information being collected to determine what data is being collected, where, and if it is coordinated with anadromous fish information. Assess if similar systems are in place in both B.C. and the U.S. and what coordination efforts are in place.	D
	Leverage related initiatives related to data platform, data sharing, coastal resilience, etc. E.g., WCGA, National Ocean Council, other regional planning bodies	C
	Consolidate a unified hydrology for SE Alaska	A

Activity code	Activity Category / Detailed Activities	Priority Topics
3	Evaluate existing datasets, models, and TEK (as appropriate) for climate relevance: how well do they take into account climate change and climate change impacts	
	Evaluate existing hydrologic models for climate change applications in the NPLCC.	A
	Evaluate the effectiveness of current forest monitoring, including instrumentation, for forecasting climate change effects.	B
4	Identify existing tools and approaches being used to support decision-making. Evaluate the usefulness of those tools for: (a) providing decision-relevant insights, and (b) aiding in the development of adaptation or mitigation response actions. Include consideration and use of TEK where desired by Tribes. Use insights from this review to develop guidance for future tool/support development; provide training for resource managers in how to use existing tools	
	Identify and evaluate existing tools and approaches being used to support decision-making regarding flow management as to their usefulness in: (a) adapting to impacts of climate change on flows, and (b) providing insights on the ecological impacts of changes in flow regimes.	A
	Assess how forest management practices can affect water management (e.g., improve snowpack retention)	B
	Assess how forest management practices can increase resilience to large catastrophic wildfires exacerbated by climate change.	B
	Assess how to align local to landscape “Strategically Planned Landscape Area Treatments [SPLATs]” with climate change mitigation strategies implemented with forest and fire management practices. How does TEK inform managers with prioritization and selection of the areas to be treated, considering tradeoffs for the identified Val	B
	Compare decision-support tools and share datasets	C
	Synthesize lessons learned, methodologies, etc. across watersheds that have been addressed to draw conclusions about applicability to other watersheds in the NPLCC (tide-water glacier valleys versus valley glaciers versus dams & water diversions, salmon runs present, etc.)	D
	Provide trainings to decision-makers and demonstrations of available tools	Other / cross-topic
	Support special analyses and syntheses to support the understanding of and ability to use relevant information in decision-making (help in using information appropriately and effectively). Examples include: On-the ground changes, such as hydrologic regimes and water temperatures, that are closer to affecting the actual resource	A
5	Identify and document tangible examples of climate change adaptation or mitigation response actions; evaluate their successes and failures, and develop "best practices" guidance documents on how to incorporate successful approaches in existing management practices. Include consideration of TEK in developing these examples and in guidance documents	
	Inventory and evaluate existing adaptation options	C, D
	Provide “actionable-level” information and tangible examples of progress or success with climate change adaptation (ex. case studies). Examples (for Forests) include: Identification of the types of hazardous fuels reduction treatments being implemented and how they align with adaptation strategies given predicted climate change impacts to forests	A, B

Activity code	Activity Category / Detailed Activities	Priority Topics
	Identify tools that can be provided to managers (e.g., scenario planning, data sources, management menus, improving resilience/ adaptation) to address management decisions generically in the absence of good site-specific data. Potential topics include the following: Evaluating the effectiveness of management actions at reducing sedimentation; Evaluating the effectiveness of management options for reducing non-point-source contamination under future climate conditions; Evaluating the effectiveness of flow management options on anadromous fish, including habitat quality and quantity, and linkages to life histories of species (at which stage are they most vulnerable, e.g. coho juveniles-summer, fall Chinook-fall); Effects of changes in flow and in flow management on migration, habitat, species health (e.g., diseases and parasites likely to increase with changes in water quality/quantity); Riparian corridor management options and effects on water temperature	D
	Assess possible changes to the network of corridor and refugia to enhance climate-resilience in the region given the expected climate induced changes in forest composition, fuel loading (vegetation mortality/productivity), and increase in wildfire occurrence.	B
	Provide guidance documents with best management practices or how to incorporate climate change into existing practice. Ensure that these documents include examples based on tribal/First Nations subsistence activities where such knowledge exists and can be share, such as conservation tenants or related adaptive practices to maintain resources.	A, B,C,D, E
6	Develop case studies to enhance practicality and utility of existing tools / previous studies through direct engagement of decision-makers: illustrate how a particular type of study or model can provide useful information for a specific type of decisions (e.g., use a vulnerability assessment to directly inform on potential adaptation response actions)	
	Connect science to practical implementation. Eg., Using existing/previous vulnerability assessments – but work with decision-makers to model a specific problem and illustrate how vulnerability assessment can inform adaptation (hatchery vulnerability assessment could be an example)	A
	Develop concrete example(s) of how improved information (on any one of the above items) can be used to inform decisions: about adaptation, restoration, etc	B
	Provide “actionable-level” information and tangible examples of progress or success with climate change adaptation (ex. case studies; indicators of change that can be easily communicated to the public). Examples include: management action to protect cold-water refugia; examples of treatments for invasives, diseases, or pests that have been use in the past, including an evaluation of their effectiveness (past and future)	C, D, E
	Develop tools, based on existing information, to help managers predict and address the impacts of changes in forest species distribution, their retention of water, and potential impacts on aquatic systems. Could include generic models to help assess impacts/vulnerability at local/regional scale; menu of options to address issues	B

Activity code	Activity Category / Detailed Activities	Priority Topics
7	Assess vulnerability and resilience of the resource(s) to projected climate change: identify critical stressors, valued/necessary resources (including Tribal and First Nations valued resources, corridors and refugia, etc.), anticipated changes, and locations of more vulnerable and less vulnerable resources. Include consideration of the effects of multiple stressors on the resource(s)	
	Conduct vulnerability assessments for ecological resources associated with any/each priority topic. Examples cited include: Determine which forest species are susceptible to change due to changes in fog, rain, and snow ; wetland vulnerability to SLR, comparing management options, identifying high-value area; Consider vulnerability of different fish populations and the linkages of hydrology, water quality, fish health, and fish population viability. E.g., If particular thresholds are met more often. For example, warmer river temperatures during salmon migration increase disease and predispose fish to stress and other parasites. Vulnerability of different fish populations-linkages of hydrology, water quality, fish health, and fish population viability.	A, B, C, D, E
	Develop generic modeling tools to assess stream/river impacts (vulnerabilities) from climate change.	A
	Conduct habitat assessments and develop habitat criteria models.	D
	Synthesize information on habitat requirements for growth and survival of key (indicator) aquatic biota (plant and animal). E.g., Include thermal bioenergetic criteria - Use as a baseline to evaluate confirmed distributional shifts from recent climate trends and potential climate change; Identify and describe corridors and refugia	A
	Assess habitat and resource vulnerability to changing patterns of invasion and disease	E
	Assess possible changes to the network of corridor and refugia to enhance climate-resilience in the region given the expected climate induced changes in forest composition, fuel loading (vegetation mortality/productivity), and increase in wildfire occurrence.	A, B
	Study the interaction of multiple stressors (including fire with other disturbance regimes such as insects, pathogens and disease) given current and potential future climate change effects	B
	Assess the connections of land use stressors to refugia and associated adaptation strategies	B
	Assess the effects of seawater incursion on coastal hatcheries	C
	Study climate change effects on the Pacific salmon lifecycle and on other tribal subsistence species (sturgeon, lamprey) and map current and projected salmon habitats to assess habitat viability and inform management decisions (vulnerability assessments). Consider all climate related changes (e.g., climate induced drought)	D
	Vulnerability maps and downscaled models of hydrology, air and stream temperature, and fish habitat change in order to inform the prioritization of restoration and adaptation strategies	C
	Assess the locations and sizes of protected lands and projected habitat changes due to climate change to assess the adequacy of the current reserve system.	B
	Map and characterize the intertidal zone and associated habitats in light of SLR and coastal storms	C

Activity code	Activity Category / Detailed Activities	Priority Topics
	Identify and map areas vulnerable to sea level changes and coastal erosion, including coastal communities, wildlife habitats, federal, state, provincial, tribal and First Nations lands.	C
	Identify areas of “thermal refugia”; identify areas of “thermal blockage” along migration routes (under future climate conditions). Consider effects of wildfire smoke/inversions on buffering solar radiation/heating of river/water quality.	D
	Identify areas where increased environmental contamination or contaminant mobilization may be a concern. E.g., From glacial melt; From increased sedimentation after forest fires	D
	Identify the corridors invasive species, pests, pathogens, and diseases are likely to use in response to changes in climate	E
	Develop tools, based on existing information, to help managers predict and address the impacts of changes in forest species distribution, their retention of water, and potential impacts on aquatic systems. Could include generic models to help assess impacts/vulnerability at local/regional scale; menu of options to address issues	B
	Compile and communicate options for addressing sea level rise – tools for local communities to better understand those options. E.g., “roadshow” underway to communicate National Academy of Science results – can we	C
8	Develop tools and/or assist partner entities in applying existing tools to identify and inform managers of high priority conservation and/or restoration targets (species, locations, etc.).	
	Develop tools to identify and inform management of high priority conservation targets	A, B, C, D, E
	Identify potential areas for restoration. E.g., Flood plains, upstream, etc	A
	Address how climate change will affect old growth reserve priorities.	B
	Combine storm data with SLR knowledge to inform conservation decisions about shoreline habitats and sites	C
	Vulnerability maps and downscaled models of hydrology, air and stream temperature, and fish habitat change in order to inform the prioritization of restoration and adaptation strategies	C
	Translate new knowledge related to SLR to shoreline conservation issues and site specific impacts.	C
	Identify conservation opportunities for shoreline and coastal salt marsh areas such as wetlands that have the opportunity to migrate	C
	Evaluate and compare effectiveness of management options for wetland protection given SLR	C
	Identifying potential areas for restoration, given species-specific considerations and considering the effects of future climate on the effectiveness of restoration	D

Activity code	Activity Category / Detailed Activities	Priority Topics
	Identify tools that can be provided to managers (e.g., scenario planning, data sources, management menus, improving resilience/ adaptation) to address management decisions generically in the absence of good site-specific data. Potential topics include the following: Evaluating the effectiveness of management actions at reducing sedimentation; Evaluating the effectiveness of management options for reducing non-point-source contamination under future climate conditions; Evaluating the effectiveness of flow management options on anadromous fish, including habitat quality and quantity, and linkages to life histories of species (at which stage are they most vulnerable, e.g. coho juveniles-summer, fall Chinook-fall); Effects of changes in flow and in flow management on migration, habitat, species health (e.g., diseases and parasites likely to increase with changes in water quality/quantity); Riparian corridor management options and effects on water temperature	Topic D
9	Conduct, support, or facilitate landscape conservation planning exercise(s) in a particular geography or region	
	Conduct, support, or facilitate landscape conservation planning exercise(s) in a particular geography or region	Cross-topic
10	Identify focal indicators, processes or thresholds that can serve as indicators of change, can be used to track climate change impacts, and can be used to assess the effectiveness of management actions to indicate where changes in management actions may be necessary.	
	Identify focal indicators to track climate change and assess management options	A, C, D, E
	Identify focal indicators to track climate change and assess management options. Consider key indicators from both a western science and TEK perspective, and identify similarities and differences between the indicator species or processes identified by science and tribes	Topic B
11	Conduct or support adaptation planning exercises to assist management decisions related to specific sub-topics, considering uncertainties in future climate / climate impacts. Identify how restoration activities and strategy development can/should be modified to account for climate-related changes (E.g., scenario planning exercises, triage analyses, contingency planning, etc.)	
	Conduct scenario planning workshops to assist with planning for one or more subtopics	A, C, D, E
	Conduct scenario planning workshops to assist with planning for one or more subtopics. Possible subtopics include: landscape-level changes in vegetation composition; How to integrate predicted Climate Change impacts identified by scientists, managers, and tribes/First Nations with wildfire management frameworks for assessing threats (by	B
	Identify how restoration activities related to estuaries can/should be modified to account for climate-induced changes. E.g., Tidal cycles / tide gates / levies / dikes and effects on estuary systems	C
	Support strategy development for forest harvest & forest regeneration after cutting., E.g., drier/warmer summers → lower natural regeneration, Changes in harvest locations/policies, Align with hazardous fuels and wildland fire treatments to protect Values at Risk (valued natural and cultural resources or infrastructure)	B

Activity code	Activity Category / Detailed Activities	Priority Topics
12	Conduct workshops to further clarify decision-maker needs: Convene managers, scientists, and tribes to discuss specific sub-topics. Identify management decisions and actions, share information on existing data, models, etc.; identify gaps and common needs	
	Conduct workshops specific to one or more detailed sub-topics. Specific examples identified include: Convene managers, scientists, and tribes to discuss specific topics relative to this Priority Topic to identify management decisions and actions, needs and gaps. ; Scientists communicating their results/information to stakeholders,	A, B, C, D, E
13	Conduct or support stakeholder outreach workshops and meetings, either convened by the NPLCC or by NPLCC partners. Goals of such outreach activities could include: communicating information on projected impacts to interested stakeholders; supporting with local community planning by conveying information on local impacts and on the availability of adaptation and mitigation actions, etc.	
	Compile and communicate options for addressing sea level rise – tools for local communities to better understand those options. E.g., “roadshow” underway to communicate National Academy of Science results – can we	C
	Assistance for local community planning for climate change: What are local impacts? What tools are available (and what can those tools do and what do they NOT do)	C
	Conduct workshops specific to one or more detailed sub-topics. Specific suggestions included: Convene managers, scientists, and tribes to discuss specific topics relative to this Priority Topic to identify management decisions and actions, needs and gaps; Scientists communicating their results/information to stakeholders: e.g., Restoration strategies to mitigate climate effects (flow/temp) on species (e.g., salmonids)	D, E
	Assist regional partners with outreach and delivery of data on invasives, pests, and disease	E
14	Improve information on how climate change will affect linkages between ecological and human resources (including tribal and First Nations subsistence activities)	
	Identify linkages between change in hydrologic regimes and human/wildlife health. E.g., Klamath River toxic algae and summer/fall low flow conditions expose tribal fisherman and ceremonial practitioners (bathing) to increased risks; Algae die offs can impact wildlife and domestic animals.	A
	Carry out fire regime / fire management research to assess changes in fire regimes, the interaction of fire with other disturbances, and the combined effects of those changes on subsistence resources, basketry resources, watershed conditions and processes. Include consideration of TEK and fire management, and the impacts on Tribal and First Nations subsistence, ceremonial, and economic interests and values	B
	Improve information on how climate change will affect linkages between streams, rivers, wetlands, etc and the surrounding forest (riparian-water interactions)	B
	Relate changing forest conditions to productivity of key aquatic species (e.g., anadromous fish).C	B
	Assess climate effects on pest infestation and potential damage (disease and parasites; insects, and small mammals).	B

Activity code	Activity Category / Detailed Activities	Priority Topics
	Assess the degree to which existing riparian and coastal buffers are resilient to climate change; are they adequate to provide temperature protection on streams	B
	Examine relationship between potential changes in migrational timing and production events in the coastal sea, and any affects on the growth and survival of anadromous fish	D
	Put restoration efforts and climate-induced changes in hydrology into an NPLCC-wide context that considers effects on salmon species across their range rather than on a watershed-by-watershed basis.	D
	Identify potential impacts or changes to tribal/First Nations subsistence activities linked with hydrological regime changes which affect anadromous fish and or related safety issues (e.g., fishing under more extreme/adverse conditions).	D
15	Collect data to improve basic understanding, to provide baseline information, to provide a basis for long-term monitoring, to support modeling, etc.	
	Acquire additional data to support the modeling efforts described below. Examples include streamflow data for watersheds in Alaska, empirical data on the effects of changes in flow regimes on fish distributions, collection of weather data, including snow and other precipitation across a range of elevations, support refinement of National Hydrology Dataset (NHD) or development of NHDPlus for Alaska portions in NPLCC	A
	Assess and monitor the responses of wildlife habitat, food webs, and nutrients to climate change effects	B
	Characterize and track climate change effects on physical, chemical, and ecological processes in the intertidal zone and marine nearshore. For example: Effects of increasing storm frequency and storm surge on wildlife habitats at the land-sea interface; Effects of changing estuarine conditions on the growth and survival of salmon during early phases of their seaward migration; Effects of changing estuarine habitat conditions on productivity, food webs, and nursery values for key marine fishes; Role of large scale-atmospheric pressure systems and ocean conditions on regional and local scale oceanographic conditions and storm events	C
	Conduct baseline data on sea-level rise to inform decisions about where to place tidal gauges, as well as restoration planning and permitting.	C
	Baseline data collections to inform modeling and monitoring efforts. Data needs include: Vertical elevation data (to support models examining the effects of sea level on specific local marine shorelines);Environmental contaminants (e.g., persistent organic compounds and other emerging contaminants) remobilized by sea level rise on coastal habitats and species, and their effects	C
	Map and characterize the intertidal zone and associated habitats in light of SLR and coastal storms	C
	Effects of flow changes (timing and amount) on migration timing, corridors, and freshwater rearing/spawning habitat conditions, including effects of invasive species, pests, disease, competition and predation. Note that effects may be different in different parts of the ranges of the various species (esp. warming effects at the southern extremes of the ranges)	D

Activity code	Activity Category / Detailed Activities	Priority Topics
	Assess how changes in temperature will influence metabolic demands in fish, and how those changes will affect species distribution	D
	Effects of changes in water temperature on spawning behavior and physiology (increasing water temperature may cause a mismatch between egg development and spawn timing leading to reduced egg viability)	D
	Identify potential impacts or changes to tribal/First Nations subsistence activities linked with hydrological regime changes which affect anadromous fish and or related safety issues (e.g., fishing under more extreme/adverse conditions).	D
	Evaluate the interactive effects of changes in invasives, pests, and diseases with other large-scale stressors Effects of multiple stressors (e.g, environmental contaminants, realignment of community organizations etc) on organismal and population health and condition	E
	Study the genetics of species hybridization	E
	Develop research partnerships to study fish and bird disease	E
16	Develop standard quality assurance and quality control measures, other protocols, and data stewardship guidance for topic-related data collection and monitoring, with special provisions as necessary in consideration of climate-related changes	
	Develop standard quality assurance and quality control measures, other protocols, and data stewardship for hydrologic monitoring that consider climate-related changes.	A
	Assist regional partners in ensuring an adequate monitoring plan for invasive species is designed	E
17	Coordinate-ongoing and future data collection activities among NPLCC partners who have related needs, interests and expertise (esp. for cross-border data)	
	Coordinate and share data collection activities, research results, tools, and management lessons for cross-border datasets	A, B, C, D, E
	Facilitate the coordination of available data and modeling projections for expected climate change influence on the flood/drought fluctuation or variation on rivers and streams. This may be prioritized by LCC sub-regions where existing research modeling indicated vulnerability	A
18	Develop downscaled / improved climate models and forecasts of changes in the resources, at appropriate scales; Develop specialty climate or topic models	
	Create downscaled climate models and forecasts of hydrologic change for specific regions within the NPLCC. Particular areas of near-term interest include: snowmelt, glacier melt, and ice melt watersheds (Alaska, North Cascadia); the fog belt	A
	Improve information and predictions of forest species distribution - include combining climatic effects with disturbance regimes (fires, insects, diseases, etc.)	B
	Improve information and understanding of how timing and amount of precipitation impacts forests or culturally important forest plants. E.g., Huckleberries: as a result of changes in soil moisture, drought stress, and lack of berry maturation/development. A lack of vaccinium sp. (different types) across the NP this summer/fal	B

Activity code	Activity Category / Detailed Activities	Priority Topics
	Improve information and predictions of forest cover distribution (including forest, subalpine, wetlands, etc). A potential focus is on changes in alpine-dependent species on islands and the effects on biodiversity and/or potentially shrinking alpine habitats in general	B
	Assess how projected climate change effects will affect sustainable forest harvest levels and forest practices with the NPLCC	B
	Effects of flow changes (timing and amount) on migration timing, corridors, and freshwater rearing/spawning habitat conditions, including effects of invasive species, pests, disease, competition and predation. Note that effects may be different in different parts of the ranges of the various species (esp. warming effects at the southern extremes of the ranges)	D
	Assess how changes in temperature will influence metabolic demands in fish, and how those changes will affect species distribution	D
	Effects of changes in water temperature on spawning behavior and physiology (increasing water temperature may cause a mismatch between egg development and spawn timing leading to reduced egg viability)	D
	Model climate effects on invasive species, pathogens (e.g, Such a Phytophthora. SOD and Port Orford Cedar root rot), and diseases: their introduction, establishment, spread, and effects	E
	Model climate-related changes in disease ecology (reservoirs, vectors, pathways, epidemiology of infectious diseases)	E
	Create watershed ecosystem models (headwaters to nearshore marine) linking hydrologic changes to patterns of species abundance and health, habitat quality, quantity, and use, material transport, and aquatic productivity	A
	Improve snow models – accumulation, dissipation throughout winter (SE Alaska) to assess effects such as: Wildlife survival and mortality (e.g., impact of sustained heavy snowpack on Sitka black-tailed deer) ; Storage capacity and retention of water (e.g., for hydro facilities)	A
	Develop generic modeling tools to assess stream/river impacts (vulnerabilities) from climate change.	A
	Develop approaches and models to characterize the ecosystem goods and services associated with the hydrologic regime, and changes in the hydrologic regime	A
	Improve predictions of changes in soil moisture/chemistry changes and improve models of the effect of these changes on species distributions and growth rates. Include a focus on valued plant resources.	B
	Improve information and prediction of changes in fog patterns and fog-associated hydrologic regimes and how they relate to species distribution and the effects to coastal redwood forest health and resilience (esp. growth rates). This also pertains to non-summer riverine/valley fog patterns and low elevation forests adjacent to	B
	Develop tools, based on existing information, to help managers predict and address the impacts of changes in forest species distribution, their retention of water, and potential impacts on aquatic systems. Could include generic models to help assess impacts/vulnerability at local/regional scale; menu of options to address issues	B

Activity code	Activity Category / Detailed Activities	Priority Topics
	Conduct habitat assessments and develop habitat criteria models.	D
	Model and monitor adaptive management outcome.	E
19	Evaluate relationships between existing infrastructure and infrastructure planning and projected changes in the hydrological regime (e.g., culverts and fish passage; road and trail access; hatcheries, etc.)	
	Evaluate the effectiveness of existing culverts and fish passage structures given projected changes in hydrology. Address sizing of culverts and other infrastructures, and how these will affect fish migration (Currently sized to historic data). E.g. 100 year floods (how will they change); Mean high / mean low levels (and how will	A
	Build on existing work on assessing predicted changes in hydro regimes and their effects on road and trail access and infrastructure on NPS and FS lands to better understand the distribution and characteristics of areas of increasing risk. Examine ways to increase resilience to maintain access under a changing climate	A
	Identify at-risk infrastructure – including where hatcheries are at risk from changes in flow (reduced flows, increased flows, changes in flow timing) -- (work is currently underway on this)	A