



**Western Alaska
Landscape Conservation Cooperative**

Strategic Science Plan

**Approved by the
Western Alaska LCC Steering Committee
13 May 2014**



Cover photo: Selawik National Wildlife Refuge by Steve Hillebrand

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1 Introduction

Climate change is causing rapid and diverse changes in the habitats, ecological communities, and, ultimately, the human communities of western Alaska (Brubaker et al. 2012, Fienup-Riordan and Reardon 2012¹, Jorgenson 2012, State of Alaska 2010). Maintaining the resiliency of the region's natural and social systems in the face of these landscape-level changes requires development and implementation of landscape-scale adaptation strategies (Chapin et al. 2009a, National Fish, Wildlife and Plants Climate Adaptation Partnership 2012). Climate adaptation strategies identify robust management strategies for ameliorating, mitigating, or adapting to the expected impacts of climate change on valued resources, including both natural and human systems (Cross et al. 2012a, Stein et al. 2013). Developing and synthesizing the relevant landscape-scale science for such strategies, and translating the results into forms usable by land and resource managers, Tribes and other stakeholders², are charges no single organization or entity in western Alaska is prepared to address. Similarly, while every management entity has their own mandates and authorities, the geographic scale of expected climate change impacts is such that adaptation strategies will be more effective if approached as collaborative and cooperative efforts among all the relevant decision-makers and stakeholders (Cross et al. 2012b, National Fish, Wildlife and Plants Climate Adaptation Partnership 2012, Jacobson and Robertson, in review). All of these tasks require unprecedented communication and collaboration, both among the region's science and traditional knowledge communities as well as between them, the resource management decision makers, Tribes and other stakeholders (Folke et al. 2009).

The Western Alaska Landscape Conservation Cooperative (LCC) was initiated in 2010 to help advance this communication and collaboration among public agencies and private organizations in their efforts to understand, predict, and respond to the impacts of landscape-scale stressors, especially climate change³ while respecting each partner's⁴ management authorities. Land and resource managers developed the concept of the *Landscape Conservation Cooperative* from previous conservation efforts at 'large spatial scale' collaboration, such as the migratory bird joint ventures⁵ and fish habitat partnerships⁶ (Austen 2011). Collaborative landscape conservation has been identified as a critical step in addressing conservation concerns by the State of Alaska, the U. S. Departments of Interior, Commerce, and Agriculture and many non-profit organizations. In 2010, the Department of Interior began funding the establishment of LCCs across the country. The Western Alaska LCC is one of five LCCs in Alaska (Figure 1).

¹ See, especially, the last chapter entitled '*Yun'i Maliggluki Ella Ayugucimitun Ayuqenrirtuq The World is Changing Following its People*'.

² The use of the term "stakeholder" should be broadly interpreted to mean Tribes, agency personnel, organization staff and others that may be interested in LCC products but are not currently directly engaged in LCC activities.

³ See the LCC's Charter, available at <https://westernalaskalcc.org/governance/SitePages/governance.aspx>.

⁴ The use of the term "partners" implies agencies, Tribes, organizations or others that are directly involved in LCC activities and the LCC governance.

⁵ <http://www.fws.gov/birdhabitat/JointVentures/index.shtm>

⁶ <http://fishhabitat.org/>



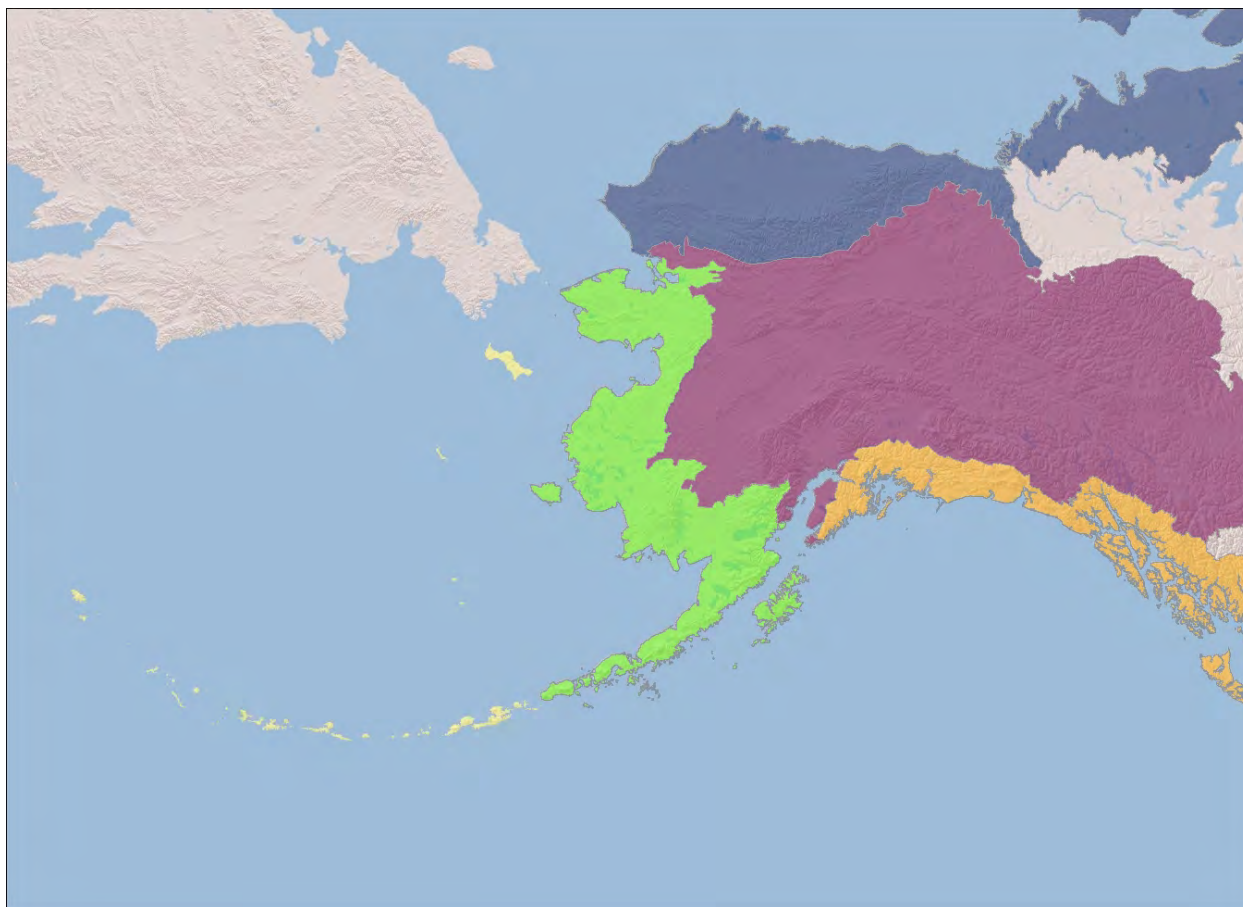


Figure 1 – The five LCCs in Alaska: Arctic LCC (blue), Northwest Boreal LCC (magenta), Western Alaska LCC (green), Aleutian Bering Sea Islands LCC (yellow), and North Pacific LCC (peach), which stretches to northern California.

The Western Alaska LCC geography spans approximately 1400 kilometers from north to south, contains 1820 km of coastline, and includes a wide range of ecological conditions - permafrost-dominated landscapes, glacier-covered mountains, complex river deltas, volcanoes, forests, nearshore marine habitats, low shrublands, and large lake systems⁷. These landscapes comprise habitat for five herds of caribou, as well as populations of moose, brown and black bears, and wolves. The region contains a diverse array of plant communities, including forests, tundra and wetlands, and includes one of the world's most important breeding areas for migrating and breeding waterbirds (Spencer et al. 1951, Gill and Handel 1990). Western Alaska streams are home to the world's largest natural runs of Pacific salmon. In the marine ecosystem, pollock, cod, flatfish, halibut, crab, and salmon are abundant and these fisheries provide more than half of the seafood consumed in the United States. Millions of seabirds from more than 30 different species breed and summer here. Tens of thousands of marine mammals, including sea otters, seals, Pacific walrus, and whales depend on this important region.

⁷ This paragraph describing the Western Alaska LCC is from Reynolds and Wiggins (2012).



Western Alaska has supported human communities for thousands of years (Fienup-Riordan 2000). The region's 116 Alaska Native tribes have a strong and enduring connection to the landscape (Fienup-Riordan and Reardon 2012), with villagers throughout the region practicing a subsistence way of life that is dependent upon the continued health of terrestrial, freshwater and marine systems. In part, this lifestyle reflects and reinforces many features of the area's unique cultural heritage. The region's population in July 2013 was an estimated 67,309.⁸

Historically, development pressure in the region has been limited by its remoteness, climate, and logistical challenges of transportation. A major economic source has been the over one hundred years of commercial fishing, with most development centered on coastal communities and regional hub communities associated with major river systems. Since the Alaska National Interest Lands Claim Act (ANILCA) in 1980, large portions of the region have been under management by the Federal government or the State of Alaska as various types of conservation units (Figure 2; Table 1). There is continued development of a strong sport and recreational economy, especially in southwest Alaska where, in 2009, an estimated \$60 million was spent in Alaska in association with recreational fishing in the Bristol Bay region (Duffield et al. 2013). Western Alaska is receiving increasing attention in the form of proposals or activities associated

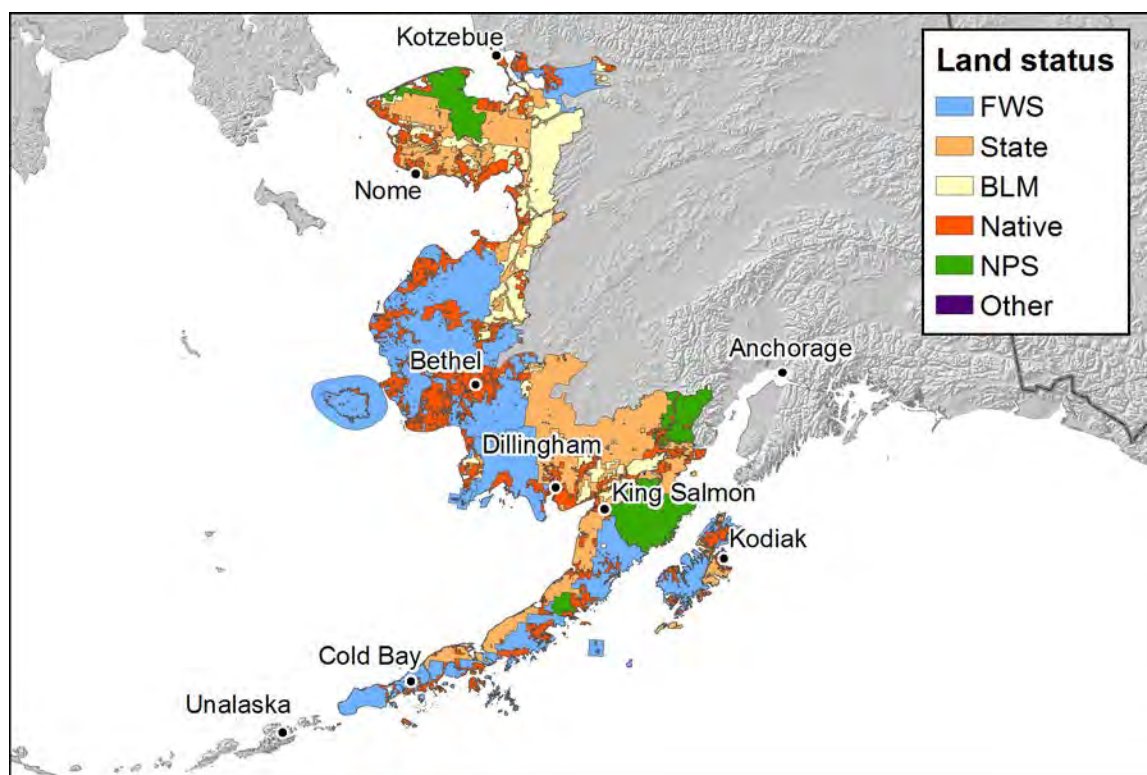


Figure 2 – Land status in Western Alaska LCC (BLM 2013, US FWS 2010). See caption of Table 1 for definitions of State, Native, and Other lands. The marine boundary of U.S. Fish and Wildlife Service National Wildlife Refuge lands is shown.

⁸ Population estimate by borough and census areas, Alaska Department of Labor and Workforce Development, Research and Analysis Section; laborstats.alaska.gov/census/maps.htm, accessed 13 Feb 2014.

Table 1. Land status in the Western Alaska LCC (BLM 2013, USFWS 2010). Ownership categories are ordered by total area in the Western Alaska LCC. *State Lands* are lands that have been conveyed to or are under selection by the State. *Native Lands* are lands that have been conveyed to or selected by a Native corporation or village. *Private Lands* are lands that have been conveyed to entities other than the State of Alaska, Native individuals, or Native associations. *Other* lands include U.S. Forest Service lands and Military lands. Note that U.S. Fish and Wildlife Service land area includes the marine boundaries of the National Wildlife Refuges as depicted in Figure 1.

Land Owner	Acres	Hectares	% of Total
U.S. Fish and Wildlife Service	32,795,448	13,271,859	34.8
State of Alaska	23,204,909	9,390,702	24.6
Native	18,965,339	7,675,007	20.1
Bureau of Land Management	10,504,739	4,251,121	11.1
National Park Service	8,760,567	3,545,279	9.3
Other	43,802	17,726	<1
Private	7,127	2,884	<1
Total	94,281,930	38,154,577	

with renewed mineral development, energy development and transmission, and increased transportation plans (e.g., chapter 7 of Southwest Alaska Municipal Conference, 2010; Environmental Protection Agency 2014).

The logistical challenges of access have also limited advancement of science on the region's geophysical, biological, ecological, and anthropological sciences. The region's 38 million hectares of land (Table 1) includes just 1451 km of roads⁹. Western Alaska is among, if not *the* least instrumented and studied regions in the United States. For example, NOAA maintains only four active National Water Level Observation Network stations along the full Bering Sea coast of western Alaska compared to six active stations in the Narragansett Bay of Rhode Island¹⁰.

The region's land and resource managers, Tribes, communities, and stakeholders have to respond to the relatively rapid changes in climate and other landscape-scale stressors. Subsequently, there is a growing need to better understand the expected impacts of these drivers of change and to develop adaptation strategies that will sustain the *resilience* of the region's natural and cultural systems, that is, their capacity to sustain their fundamental function, structure, and feedbacks when confronted with perturbations (Chapin et al. 2009b).

Yet addressing these needs requires strategic focus. The geographic area encompassed by the Western Alaska LCC is large and diverse, myriad science priorities have been identified with respect to improving understanding of expected climate change impacts (e.g., Reynolds and Wiggins 2012), and yet relatively limited additional financial resources should be expected for addressing these needs. This combination of factors makes strategic focus both difficult and

⁹ Alaska Department of Transportation, DOT_RoadSystem_090313.shp.

¹⁰ See <http://tidesandcurrents.noaa.gov/map/index.shtml?type=PreliminaryData®ion=Alaska>, accessed 29 Oct 2013. Further discussions of data needs in western Alaska are available in, for example, Meehan et al. (2012) and Reynolds and Wiggins (2012).



essential; they also imply collaboration is essential for success.

The strategic challenge is to identify the nexus of:

- the *information needs* of the region's land and resource management decision makers
- the *priority science needs* associated with the landscape-scale stressors, especially climate change, and
- the *leveraging opportunities* among the planned activities of the Western Alaska LCC's partners, neighboring LCCs and the Alaska Climate Science Center (CSC), and other statewide, national, and international entities, including the National Network of LCCs.

This document describes the Western Alaska LCC's ten-year Science Strategy. This framework will guide the Western Alaska LCC's activities as it seeks to address the shared, priority science and information needs of the region's resource decision makers, scientists, local knowledge experts, and stakeholders (Reynolds and Wiggins 2012). The framework lays out a schedule of two-year science programs following a sequence of themes (Coastal Processes, Freshwater Processes, Terrestrial Processes), and details the steps that will be taken to further refine each program's strategic activities in two-year Science and Operating Plans. This strategic plan also summarizes the Western Alaska LCC's challenges and initial directions with respect to various elements of the organization's business practices: communication; performance measurement; resource leveraging; project solicitation, selection, and funding; staffing capacity; and a schedule for review and modification of the strategy.

2 Background on the Western Alaska LCC & its Science Planning

2.1 LCC Governance, Mission and Goals

The Mission of the Western Alaska LCC is *to promote coordination, dissemination, and development of applied science to inform landscape level conservation, including terrestrial-marine linkages, in the face of landscape scale stressors, focusing on climate change*. The Western Alaska LCC is comprised of the partners that participate in LCC activities. The Western Alaska LCC is governed by its Steering Committee, which is currently comprised of the State of Alaska, eight federal agencies, and six seats to represent Alaska Native perspectives. The Steering Committee is led by a Chair and Vice Chair positions that alternate between federal and non-federal members of the steering committee. Most Steering Committee members hold unit or program leadership positions within their agencies/organizations (e.g. Park Superintendent, Refuge Manager etc.). The full Steering Committee Charter is posted on our website – westernalaskalcc.org.

Universities and non-governmental organizations (NGOs) are also important partners in the Western Alaska LCC. It is from these groups, as well as agency staff and other conservation partnerships that the Western Alaska LCC seeks assistance to develop important recommendations for the Steering Committee. Although still early in their development, the Western Alaska LCC charter describes a "Science and Traditional Ecological Knowledge Community" and a "Partnership Community" which will eventually become the backbone of future workgroups for the Western Alaska LCC.



A major goal of the Department of the Interior in creating the LCC network was to help DOI agencies “work together, and with other federal, state, tribal, and local agencies to develop landscape-level strategies for understanding and responding to climate change impacts” (Department of Interior 2009). This is reflected in the goals the Western Alaska LCC set for itself (Box 1). A key component underlying achievement of these goals is to better reconcile the ‘supply’ of scientific information with the ‘demand’ for it by the region’s decision makers (Sarewitz & Pielke 2007, National Research Council 2009). Reconciliation requires continual and sustained communication with, and between, both these groups (the science ‘suppliers’ and the region’s decision makers).

Box 1. Western Alaska LCC Guiding Principles & Goals

Guiding Principles

- Consider and respect each participating organization’s unique mandates and jurisdiction.
- Coordinate with other committees, workgroups or organizations that add mutual value, maximize capacity, avoid redundancies, and leverage resources.
- Focus on solving biological, physical, and sociological issues to promote scientifically sound, outcome-based, adaptive management.
- Respect social, political and legal limitations while promoting solutions to landscape-level stressors (climate and related) that benefit the greater Western Alaska conservation community.
- Be transparent in operations and ensure access to the Western Alaska LCC process and products.

Goals (not presented in priority order)

- Promote communications to enhance understanding regarding effects of climate change in Western Alaska
- Support coordination and collaboration among partners to improve efficiencies in their common science and information activities,
- Identify and support research, and data collection, analysis, and sharing that address common information needs of land and resource management decision makers,
- Enable synthesis of information at landscape and larger spatial scales,
- Enhance resource management in western Alaska through applied science and technology transfer.

2.2 Previous Science Planning Steps

This Strategy is the culmination of a number of previous planning steps by the LCC. These steps are briefly summarized here, along with key lessons learned. For steps denoted with ‘*’, the full report from the planning event is available on the LCC’s website.



The Western Alaska LCC has been funded since Federal Fiscal Year (FY)2011. The first three years were focused on determining where and how the LCC could make the greatest contribution to address science needs related to natural resource management and conservation. During our first year we took three major steps in determining how to focus LCC activities.

First, we visited hub communities in western Alaska in fall 2010, before the LCC was even officially funded, to find out what potential LCC partners thought would be a useful niche for the LCC. Appendix A provides a summary of the findings from these meetings and the full report can be found [here](#).

This was followed by a Management Framing Workshop* (Feb 2011) with the land and resource management agencies (see Appendix B for the Executive Summary). This workshop focused on identifying the main audience for the LCC's science and information products (Box 2), the types of decisions they make, and the outcomes of interest to these groups (Figure 3). The workshop reinforced that even though partners differ in their decision-making and outcomes of interest, there is often overlap in the key uncertainties limiting each of their decision-making. Further, by focusing the LCC's science activities on providing information and tools that reduce those uncertainties we can benefit multiple partners, and the resources and systems they manage, by improving the desired outcomes affected by their decisions.

Box 2. Primary audience for the LCC's Science and Information Products

The Decision Framing Workshop clarified that the primary audience for the LCC's science and information products consists of

- (i) those entities that have land and resource management responsibilities and the authority to make specific decisions about how those resources are used (e.g., ADF&G, USFWS, US BLM, US NPS, NOAA NMFS, Alaska Native regional corporations and other)
- (ii) those entities that have responsibilities and make decisions that have physical impacts on the landscape, which can affect resource conservation (e.g., federal and state departments of transportation, ADNIR, other regulatory agencies, etc.) (Jenni and Neiman 2012).

The LCC will keep in mind the information needs of 'decision-influencers' (entities having a significant role in land and resource management but which is mainly exercised through influence on the former groups of entities) and other stakeholders (ibid), but these are of secondary influence in the LCC's planning. Throughout the rest of this document, 'decision-makers' refers to the main audience for the LCC's activities, unless otherwise noted.



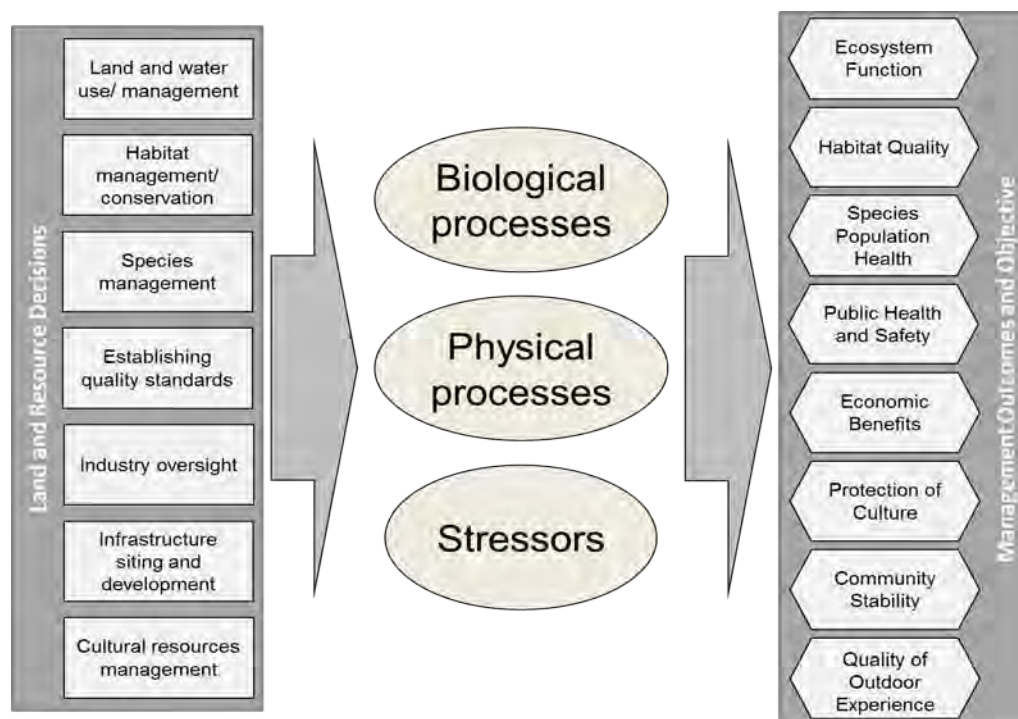


Figure 3. Decision support framework developed at the Framing Workshop and used to structure the Science Workshop discussions. Rectangles on the left represent types of land and resource management decisions Western Alaska LCC science is intended to support; hexagons on the right represent broad management objectives or outcomes of interest to decision makers. Ovals in the center represent major categories of scientific uncertainties that make it difficult to predict the outcomes of a particular decision on the management objectives. For further details see Jenni and Neiman (2012).

The results of the Framing Workshop were used to help establish the structure for our Western Alaska LCC Shared Science Needs Workshop (April 2011) (see Appendix C for the Executive Summary). This workshop sought to communicate the current state of the science with regards to expected climate change impacts in western Alaska, identify priority uncertainties in climate change impacts on coastal and landscape processes as well as the biological/ecological processes they support, and identify species of ‘importance’ and priority science needs related to climate change impacts for each of five major taxa groups. The workshop produced a synthesis of over fifty science needs, including strategies (see Chapter 5, Reynolds and Wiggins 2012). The workshop also revealed that in western Alaska, the most important questions about how the ‘higher’ system levels (e.g., landscapes, fish and wildlife, and people) will respond to changes in the climate predominantly stem from uncertainties in how components of land and ocean physical processes will likely change (Figure 4). For further details, see Chapter 6 of Reynolds and Wiggins (2012). The results and recommendations from the Science Needs Workshop were used by the Steering Committee when they selected projects to support in FY2011 from the proposals received in response to the LCC’s broadly phrased RFP¹¹.

¹¹ The projects funded in FY2011 are described on the LCC’s webpage: <https://westernalaskalcc.org/projects/SitePages/2011projects.aspx>



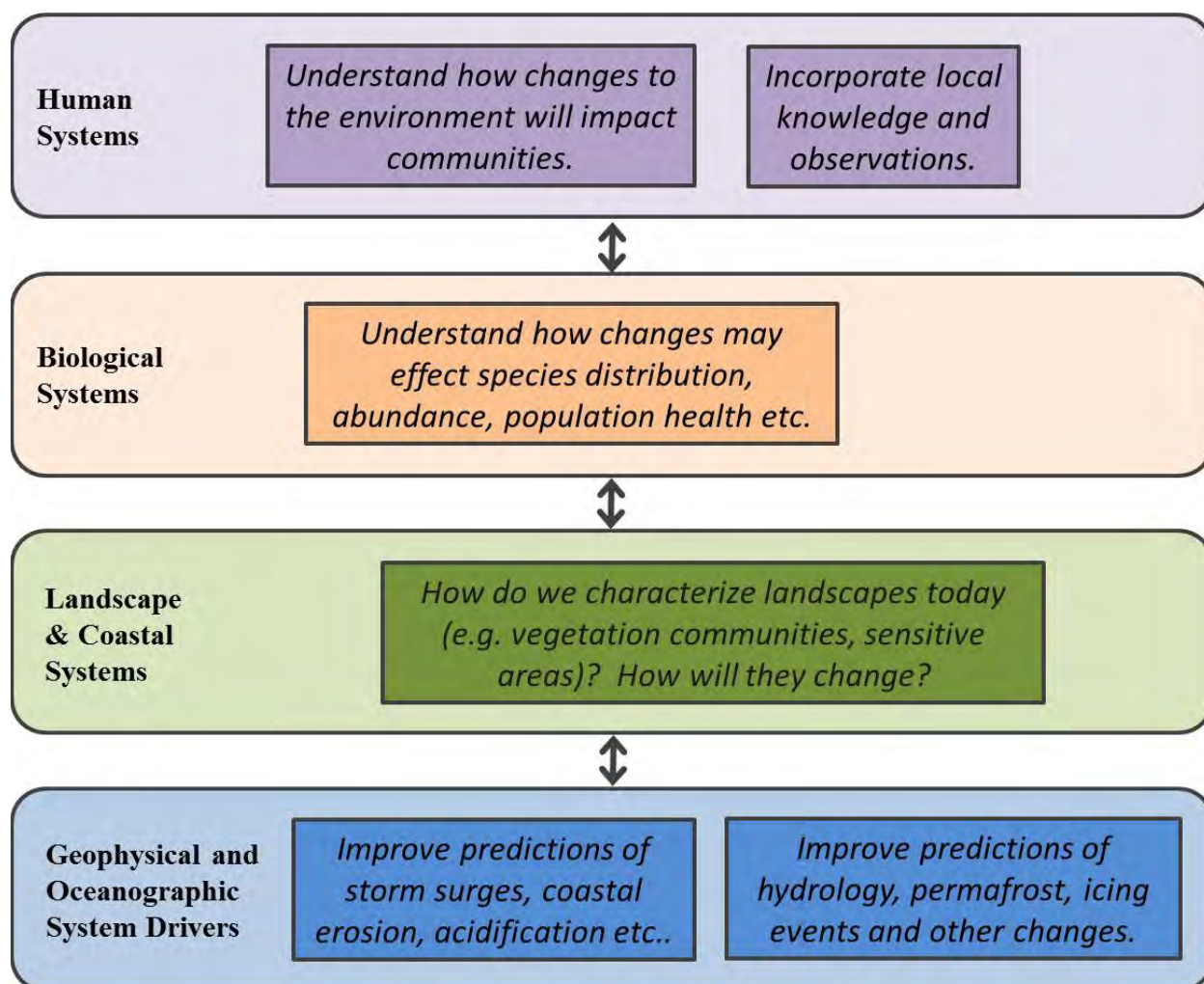


Figure 4. In considering climate change impacts in western Alaska, it is helpful to distinguish these four *levels* of the region's social-ecological systems. The levels tend to operate at distinct temporal and spatial scales, require distinct methods of measurement and study, and be the domains of distinct fields of specialists. However, improving our understanding of the impacts of climate change at any 'higher' levels tends to require some understanding of the directions, if not magnitudes and rates, of changes in processes in the immediately preceding level. (Linkages are not shown between non-neighboring levels.)

In FY2012 and 2013 the LCC focused the majority of its science activities on a pilot program around the topic *Changes in Coastal Storms & Their Impacts*¹². This program demonstrated that, with appropriate planning and thought, projects focused on 'lower', physical processes (Figure 4) can provide important information for land and resource managers and communities in two ways: directly, in terms of predicting expected changes in the physical system levels, and indirectly, through providing a foundation for understanding how these changes will impact 'higher' system levels once the relationships among levels have been identified. The most effective way to develop these foundations for understanding higher-level impacts is through

¹² For more details, see our FY2012-2013 Science and Operating Plan at <https://westernalaskalcc.org/science/SitePages/operatingplan.aspx>.



integrative studies bringing together experts in the different fields in a collaborative effort. For an example of such integrative projects, see the descriptions of projects 1 (Grumbine), 2 (Ravens), and 9 (Saalfeld) on the FY2012 projects page of the LCC's website.

Further, the program demonstrated that by focusing its activities on a particular topic, the LCC could promote interdisciplinary projects and create synergy among collaborators and their activities. There has been a clear increase in the excitement, engagement, integration, and 'spin-off' opportunities identified among the projects funded under our 'Coastal Storms' topic compared to that associated with the less topic-focused projects from 2011. Focusing on a specific topic also enhanced our ability to generate and make available tools, data, and knowledge that noticeably impact decision-makers interested in the selected topic (Table 2), naturally provided for a mix of short- and long-term products, and allowed the LCC to create 'more bang for its buck'.

Table 2. Information needs of a range of decision-makers and decision contexts will be addressed by the products from projects the LCC funded under the FY2012/2013 program on *Changes in Coastal Storms and Their Impacts*. The example products shown here will help inform forecasting and emergency preparedness, community safety, infrastructure siting and development, and species management planning.

OCEANOGRAPHIC DATA ACQUISITION AND STORM SURGE MODELING

- Provides vital input for accurate storm surge and wave generation models
- Contributes data for surge model assessment
- Increases efficiency of data collection and robustness of data
- Begins to fill existing data gaps in operational models, improving the ability to forecast coastal storm surge and investigate historic and potential future impacts on communities and resources

IMPACTS ON COMMUNITIES AND BIOLOGICAL RESOURCES

- Assists decision makers in protecting communities, infrastructure, and lands in Western Alaska
- Contributes to the development of village and borough comprehensive plans
- Aids in long term planning for waterbirds by identifying vulnerable habitats as well as risk and changes to critical habitats

COASTLINE MAPPING

- Provides a baseline for evaluation of ongoing change, including changes resulting from coastal erosion or oil spills
 - Informs the evaluation of coastal erosion and coastal construction projects
 - Useful for examining coastal conditions near landfills at risk of eroding into marine waters
 - Useful in planning community relocation and barge access routes
 - Allows for improved delineation of management area boundaries
 - Inventories natural and cultural resources to inform response planning for oil spills, shipping accidents, flooding, etc.
 - Provides a better understanding of critical habitat occurrence
-



Lastly, the LCC conducted a number of surveys of its Steering Committee (Spring/Summer 2012) to identify major elements of their long-term vision of the LCC, priorities among the types of science activities or services the LCC could pursue, and preferences regarding major elements of this Strategy's framework.

2.3 The LCC Network Science Planning

Simultaneous to the science planning within the Western Alaska LCC, discussions were underway to determine the Vision, Mission and Goals of the LCC Network. When the DOI initiated funding of LCCs across the United States the concept was described with two major components. First, the individual LCCs would be "self-directed partnerships" meaning that the individual LCCs would be governed by partners who represented and understood the conservation/management needs specific to the LCC's geography. Secondly, the collection of 22 LCCs would form a network to improve conservation at even broader geographic scales. Just as individual LCCs are meant to help address landscape challenges too big for any one partner to address on its own, there are challenges that are too big to address by one LCC alone.

These two concepts can be both complementary and potentially conflicting. They are complementary in that while the Western Alaska LCC seeks to add value to addressing large landscape-scale science needs (especially climate change related needs) in western Alaska, the LCC Network seeks to accomplish the same thing across the continent. The concepts are potentially at odds if local, statewide and continental needs conflict. Fortunately, the initial direction of both the LCC Network and the Western Alaska LCC are compatible at many levels.

LCC Network planning and direction is developed through a mix of LCC Staff decisions, Steering Committee input, and feedback gained from LCC Network meetings. The LCC Network Vision is for "*Landscapes capable of sustaining natural and cultural resources for current and future generations*" (See Appendix D for LCC Network Vision, Mission and Guiding Principles). The use of the term "sustaining" is not intended to imply the maintenance of the status quo. Given the vast changes anticipated from climate change, it is possible that future landscapes with healthy natural resources may have a different mix of species or communities than they have today.

The LCC Network national science priorities are being developed. Similarly, the U.S. Fish and Wildlife Service is developing a *Science Investment and Accountability Schedule* for assessing performance of, and their investment in, individual LCCs and the LCC Network (these are discussed further in Section 5). The Western Alaska LCC staff will remain actively engaged in these efforts with the goal of maintaining appropriate alignment between the Western Alaska LCC's Strategic Science Plan and activities and these national network efforts. Throughout the expected life of the Western Alaska LCC's Strategic Science Plan, staff will consider how best to contribute to Network efforts to support the shared goals of both the Network and the LCC.

2.4 Key Lesson's Learned: Science & Operational Strategies

Science Lessons

While still in early stages of development, the LCC has increasingly focused on identifying and promoting activities that help our partners develop climate adaptation strategies that seek to maintain the resilience of western Alaska's physical, biological, and cultural systems (Chapin et



al. 2009b, National Fish, Wildlife and Plants Climate Adaptation Partnership 2012). Resilience of western Alaska systems is defined here as: their capacity to sustain their fundamental function, structure, and feedbacks when confronted with perturbations (Chapin et al. 2009b). While the LCC does not make resource management decisions, it can help identify and address priority science and information needs associated with better understanding the expected impacts of climate change on priority resources, conducting vulnerability assessments, and developing adaptation strategies. Broadly, this involves three types of science activities - baseline monitoring, identifying relationships among system components, and projecting future states – along with associated information science activities that advance long-term data curation and sharing.

Our partners each tend to focus their scientific endeavors on a particular system level (Figure 4) – such a physical processes (e.g., US Army Corps of Engineers) or biological/ecological processes (e.g., US Fish & Wildlife Service) – at a particular management unit or community. Given our Goals and Mission, the LCC can fill a unique niche in western Alaska through its ability to promote:

- Coordinated baseline monitoring of priority resources over large spatial scales, e.g., through promotion of common standards, data management systems, strategic sampling design, and raising awareness of gaps or deficiencies in foundational data sets such as coastal water level monitoring or the National Hydrography Dataset, etc.; and
- Integrative, interdisciplinary science activities that focus on identifying the relationships among system levels - the linkages from physical to biological to ecological and social systems (Figure 4, page 9), especially those that allow for projecting impacts of climate changes and other landscape-scale stressors.
- Data sharing among partners and other entities, e.g., through promotion of common data collection and data management standards, project metadata catalogs for data discovery, and data management systems that meet the needs of multiple partners while providing a platform for regional-scale syntheses.
- Best practices in landscape-level analyses and development of adaptation strategies.

Operational Lessons

Similarly, the LCC has learned a number of key operational lessons during these early stages of development. These lessons establish sideboards and considerations to be addressed in the step-down Science and Operating Plans.

- Regular communication must be maintained with all our potential partners and interested tribal governments within the LCC's geography.
- Communities and local residents are to be engaged in all stages of our efforts (as stakeholders, as partners in LCC-sponsored projects, participants in LCC-sponsored activities, local observers, as audiences for our information products, etc.) (Hopkins et al. 1990, Harvey et al. 2013).



- Connecting the information needs of decision-makers with existing or forthcoming science and knowledge is a continuous process. It requires regularly considering both the priority needs (near and long-term) of decision-makers and the priority science needs, then identifying the intersection where the LCC can have the greatest impact. This includes frequently revisiting the information needs of resource management decision-makers and other stakeholders to ensure that our efforts are properly aligned and that our products are useful.
- Appropriate data management and data sharing outlets must be promoted for all LCC-funded projects to garner the greatest utility of LCC-sponsored data products.
- Coordinating activities with the Alaska Climate Science Center, neighboring LCCs, and other partners can increase our strategic impact and efficiency, especially on topics that are relevant beyond the LCC's geographic boundary.
- The LCC's geographic boundaries should be flexible and perceived as problem-dependent.
- The LCC should emphasize fostering collaboration and cooperation in its activities to overcome existing organizational barriers to functional collaboration.

These lessons emphasize the fundamental importance the LCC places on fostering dialogue and promoting engagement, cooperation, and collaboration among partners. This is reflective of the growing recognition of the role of innovation and social learning in successful landscape-scale conservation and adaptation planning (Chapin et al. 2009a, National Fish, Wildlife and Plants Climate Adaptation Partnership 2012, Jacobson and Robertson in review).

3 LCC Science Framework & Development of FY Science & Operating Plans

Strategic focus is essential for the LCC to prioritize among the myriad science and information needs in this large and diverse geographic area, given the relatively limited financial resources under the LCC's direct control. Strategic focus also enhances the LCC's ability to promote partnerships and collaborative solutions through letting others better understand our interests, upcoming activities, and opportunities for alignment and collaboration.

The strategy derives from the LCC's *Vision of Success* for the next 10 years.

The LCC uses collaborative partnerships to identify and address applied science and information needs of decision-makers for use in developing and implementing adaptation strategies that promote resilience-based management of western Alaska's natural and cultural resources. Such management seeks to maintain a system's capacity to sustain its fundamental function, structure, and feedbacks in the face of perturbations.



This vision places equal emphasis on both the goals of the LCC (social-ecological systems managed for resilience in the face of climate change) and the preferred means of achieving them (collaborative partnerships, applied science, informing adaptation strategies). Indeed, the Steering Committee's greatest emphasis is on promoting collaboration and partnerships.

This section describes the LCC's strategy for addressing the priority science and information needs in western Alaska in a way that achieves this vision and builds from the lessons learned by the LCC's early years of development. This Strategy will be reviewed and potentially modified no later than 2022 (as described further below).

Considering the standard lexicon for classifying biodiversity conservation threats (Salafsky et al. 2008), the greatest threat to the long-term resilience of western Alaska's social-ecological systems is climate change. Further, the most important questions about how the 'higher' system levels (e.g., landscapes, fish and wildlife, and people) will respond to changes in the climate predominantly stem from uncertainties in how components of land and ocean physical processes will likely change (Figure 4).

3.1 Science Framework: Focal Themes, Identification of Priority Topics, Resources & Activities.

Based on the successes of the LCC's program on *Changes in Coastal Storms and Their Impacts*, the LCC has adopted a strategy of:

- i. two-year concerted activities and funding *programs*,
- ii. each with a theme from the predetermined sequence *Coastal Systems, Freshwater Systems, Terrestrial Systems* (Table 3),
- iii. each focused on a specific *topic* within the theme, with the topic determined through a collaborative planning process initiated approximately six to twelve months prior to the program's first funding year, and
- iv. requiring that all projects funded under the topic be completed no later than four years from the start of the funding cycle (Table 3).
- v. Each program will be detailed in a two-year Science & Operating Plan, including justification for the priority topic, resources, and activities; collaboration and partnership strategies; outreach and communication; and key actions by the LCC and its partners for creating a strongly integrated program.

For example, in federal fiscal years (FY) 2012 and 2013 we started with an interest in the theme of *Coastal Systems*. We convened an 'organizing team', consisting of resource management decision makers, scientists, and local knowledge experts familiar with western Alaska's coastal systems and/or expected climate change impacts on coastal processes, and they collaboratively identified the priority topic of "*Changes in Coastal Storms and their Impacts*", as well as recommended priority activities the LCC should consider.

Table 3 illustrates the workflow timeline, including the "Planning Phase" to refine the theme to a particular topic. Selecting three themes and a four year project window gives us 12 to 18 months to evaluate project results and usefulness, including gathering feedback from interested stakeholders, before we begin the next funding cycle for that theme. This allows us



Table 3. Calendar for the two-year program funding cycle with a four-year project duration. The long-term strategy will be revisited and revised in 2020-2022.

	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021
Coastal Systems	Funding Year	Funding Year	Coastal Projects Completed							
Freshwater Systems		Planning Phase	Funding Year	Funding Year	Freshwater Projects Completed					
Terrestrial Systems				Planning Phase	Funding Year	Funding Year	Terrestrial Projects Completed			
Coastal Systems						Planning Phase	Funding Year	Funding Year	Coastal Projects Completed	
Freshwater Systems								Planning Phase	Funding Year	Funding Year
Terrestrial Systems										Planning Phase

to assess regularly the effects of our past efforts and update our understanding of decision maker needs.

This strategy and its rotational schedule of themes has a number of benefits for the LCC, its partners and stakeholders. For the LCC, the strategy focuses our thinking and efforts; promotes collaboration and development of integrative suites of projects within each program to create synergy among activities and products; accelerates our impact addressing shared needs under a given topic; and allows for flexibility in addressing the overwhelming number of priority science and information needs associated with managing the region's resources in the face of climate change and other landscape scale stressors. For the region's decision-makers and stake-holders affiliated with a particular theme, the strategy provides for regular assessments of information needs during the program's planning phase; accelerated resolution of information needs associated with a chosen topic; and time for incorporating the resulting information products into decision-making processes prior to the LCC revisiting a theme. For our partners, the strategy's calendar of themes promotes collaboration and partnerships through alignment and leveraging of efforts; and its rotation among themes increases partner engagement and buy-in by allowing for dynamic selection of priorities for each two-year program, as well as flexibility in addressing new opportunities and issues.

The two timing elements of this strategy are essential: a rotating cycle of three themes, each the focus of a two-year program. Dedicating two years to a program provides enough time for engaging partners, identifying priority needs, and undertaking strategic actions. Combined with a cycle of three themes, this allows the LCC to revisit a theme after just six years. Using four themes, or three-year programs, would delay re-visitation to eight or nine years, which is too long for maintaining momentum among the various partnerships.



3.2 Why these themes?

No set of three high-level organizing themes will perfectly partition all the uncertainties and information needs the LCC would consider addressing. However, these three themes (Coastal, Freshwater, and Terrestrial Systems) strongly reflect the priority science and information needs identified at the LCC's Science Workshop: two of the top five priorities were better understanding of expected changes in Coastal Processes and Hydrological Processes (Chapter 5 of Reynolds and Wiggins 2012). Further, the themes capture major distinctions in driving processes and expected changes in the region's dominant landscapes (see the conceptual models of expected changes in landscape processes, Chapter 3, Reynolds and Wiggins 2012). Lastly, these three themes allow the LCC to capitalize in FY2014/2015 from its already initiated efforts on stream & lake temperature monitoring (initiated FY2012).

One of the challenges with this approach is that not all of the questions we will want to answer fit cleanly into one of these three themes. While it is not always easy to separate these "systems" because they are all integrated, we will essentially consider topics which are either dependent on habitats in the current theme (coastal, freshwater or terrestrial) or that explore the effects of changes in processes occurring in these systems. Thus, most fish-related questions/topics would likely arise under the freshwater theme, except for habitat/life phases of interest occurring in the near-shore coastal environment. Topics related to freshwater wetlands and the species that depend upon them would also arise under the freshwater theme. Projects focused on a terrestrial species that frequently utilize wetlands and riparian areas, such as moose, may arise under either a terrestrial or freshwater theme depending upon the specific topic.

We recognize that these three themes are not independent and that some issues are cross-cutting, such as air quality monitoring. The LCC does not view these themes as rigid but rather general domains that nonetheless provide further, scheduled focus and refinement. Many topics may fall between or across themes but still warrant study. With these three themes, the LCC recognizes the need to intentionally include: wetlands in Freshwater systems, estuaries in Coastal systems, and explicitly ask for cross-cutting projects that link these systems.

Additionally, as described below, the LCC's overall science strategy includes features to retain flexibility to address other topics as timely opportunities arise. The Steering Committee will review these themes and the full strategic framework and revise as necessary no earlier than 2019 and no later than 2022.

3.3 Selecting the Priority Topic Within a Focal Theme: what system components or issues should the LCC focus upon?

Preceding the first FY of LCC activities within a theme, the LCC will undertake a planning phase of six to twelve months to identify the priority *topic*, *resources*, and (at least initial) *strategic activities* to focus on during the next two-year program (Table 3). The LCC staff will engage partners in collaboratively developing recommendations. The development process will use relevant information needs, strategic plans and activities of partners, shared science needs identified at the 2011 Science Workshop, and other appropriate resources, and focus on the



goal of strategic actions to advance development of adaptation strategies. The Steering Committee selects the final topic.

In all cases, topic development should involve consideration of three components (Figure 5), each of which may require their own development efforts:

1. The priority *information needs* of decision-makers and priority outcomes of interest related to the theme. Specifically, the LCC should place priority on those topics and associated activities that allow the decision-makers to better understand the potential impacts of climate change, and their decisions, on the common outcomes of interest (Figure 3). Ideally, the needs should include both near- and long-term elements.
2. The associated priority *science needs* - major sources of uncertainty regarding impacts of landscape scale stressors, focusing on climate change, on priority outcomes of interest, or activities necessary to improve understanding of these impacts and meet the information needs of the decision-makers.
3. Strategic opportunities for *leveraging* and *promoting collaborative partnerships* in addressing the science and information needs – among partners operating within the LCC, with local communities, with neighboring LCCs, the Alaska CSC or other statewide entities and organizations, etc.

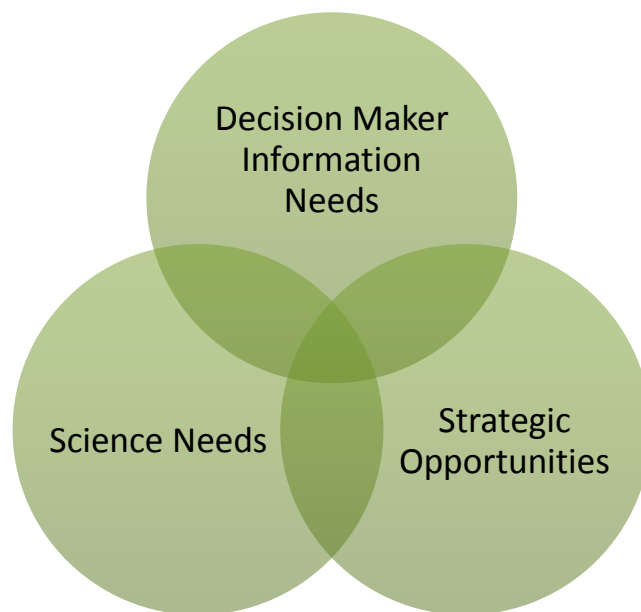


Figure 5. Selecting the topic of each two-year Science & Operating Plan requires consideration of (i) the near and long-term priority information needs of the region’s natural and cultural resource management decision makers (with respect to managing in the face of climate change), (ii) the major science needs and sources of uncertainties underlying the common information needs (data collection, data management and access, data integration, climate impact projections, vulnerability assessments, etc.), and (iii) the strategic opportunities arising for leveraging partner assets, resources and activities, and/or promoting collaborative solutions to address the identified decision maker and science needs. The final selection may end up weighing these three areas of consideration differently depending on circumstances.



Each of these components provides an entry point for initiating the topic development. While the LCC chose to focus on *Coastal Systems* for FY2012/2013 to a large degree because of priority science needs, the final topic selection was undoubtedly influenced by the severe Bering Sea storm season of Fall 2011, which helped highlight priority information needs of a variety of decision makers (emergency forecasting, community preparedness, coastal resource managers, infrastructure development, etc.) as well as opportunities for leveraging and partnerships. The final topic selection for the LCC's *Freshwater Systems* program of FY2014/2015 was strongly influenced by both priority science needs and recognized opportunities for leveraging and partnerships. Regardless of the entry point, the LCC's planning must consider all three components to ensure its applied science activities address decision-maker information needs.

At each planning phase, the LCC Staff and Steering Committee will decide on the best method for engaging partners, collaboratively identifying these three components, and developing topics and strategic activities recommendations. Regardless of method, in the early stages of development the LCC will consider recommendations and findings from our partner's existing strategic planning efforts (e.g., Alaska Department of Fish and Game 2006, National Fish, Wildlife and Plants Climate Adaptation Partnership 2012¹³, FWS's Alaska Region Conservation Frameworks, BLM's Rapid Ecological Assessments¹⁴).

For the LCC's *Coastal Systems* program of FY2012/2013, the topic was collaboratively developed by an ad hoc 'organizing team' of resource management decision makers, scientists, and local knowledge experts familiar with western Alaska's coastal systems and/or expected climate change impacts on coastal processes. Team members were nominated by the Steering Committee after each Steering Committee member consulted with their network of colleagues. The team identified a topic recommendation, outlined the linkages between the topic, the decision-maker information needs and science needs, recommended specific priority activities and identified leveraging opportunities.

For the LCC's *Freshwater Systems* program of FY2014/2015, the topic grew from ideas emerging from a wide variety of sources:

- i. freshwater-related proposals submitted to either the LCC's first, broad RFP (Spring 2011¹⁵) or the LCC's call for Pilot Program Topics (Fall 2011),
- ii. freshwater-related priority shared science needs identified at the Science Workshop (April 2011),
- iii. current projects focused on or involving freshwater temperature monitoring funded from the LCC's first RFP,
- iv. current and planned freshwater-related strategic activities and initiatives among partners and stakeholders, including agencies and NGOs,

¹³ For ease in future program planning, Appendix E contains a cross-walk between this Strategic Science Plan and the strategic actions of the National Fish, Wildlife and Plants Climate Change Adaptation Strategy.

¹⁴ http://www.blm.gov/wo/st/en/prog/more/Landscape_Approach/reas/seward.html, accessed 3 March 2014

¹⁵ <https://westernalaskalcc.org/projects/SitePages/rfp.aspx>



- v. collaborative discussions and recommendations emerging from the November 2012 *Stream and Lake Temperature Monitoring Workshop*¹⁶ co-sponsored by the Western Alaska LCC, the Northwest Boreal LCC, and the Alaska CSC, and
- vi. discussions with the National Fish Habitat Partnership programs in Alaska, neighboring LCCs, and the Alaska CSC.

This approach, driven more by priority science needs and leveraging opportunities, required adequate attention to clearly developing linkages to priority information needs of decision-makers.

Identifying relevant decision-maker information needs is an on-going activity for the LCC given its importance to developing well aimed, usable science (Sarewitz and Pielke 2007, National Research Council 2009). The LCC compiles these from a variety of sources, including workshops, partner planning products, surveys and direct dialogue. An informal needs assessment that the LCC will continue to employ, as appropriate, is to require proposals on certain RFP topics to include contact information for decision-makers for whom the proposed products are expected to be of direct use. The LCC will then present these individuals, or individuals in similar positions, with the proposal title and summary (but without information about the applicant), and have them

- i. assess the expected value of the proposed work to their mid-term and long-term decision making information needs, as well as
- ii. identify their priority information needs associated with the RFP topic.

This information will help improve alignment of science projects with decision maker needs and, in the long run, help identify priority needs and interested decision-makers for future planning efforts. Note that these needs assessments are also of value to partners in identifying potential interested users of the partner's information products (see *Western Alaska Stakeholder needs (handout)*, item 17 under the May 2012 Coastal Hazards Workshop, www.aoot.org/workshops-and-reports/).

3.4 Priorities within a Topic

In identifying strategic activities under a specific topic, further refinement will come from the LCC's choice of *priority resource suites*¹⁷, e.g., those interconnected species, habitats, ecological processes and services that the LCC has identified as being of particular interest for the current topic (as described above). For an initial list of key species, the LCC will rely on the 'important species' identified at the Shared Science Needs Workshop (Chapter 5, Reynolds and Wiggins 2012). While 'important' was defined uniquely for each taxa group, participants generally considered whether species were of common interest to managers and decision makers, whether they were necessary to support those species of common interest, and whether they were expected to be particularly vulnerable to, or an indicator of, climate change. This list is not meant to be exclusive and is expected to evolve as our understanding improves or new

¹⁶ The workshop report is available at <https://westernalaskalcc.org/science/SitePages/streamlakewshp.aspx>

¹⁷ The use of the term "priority resources" is specific to the shared goals of the Western Alaska LCC. Partner agencies/entities within the LCC may have different priorities based on different criteria and mandates.







Oceanographic Drivers	Coastal Feature	Key Species	Human Systems
			
Drivers: Sea Ice change and Coastal Storms	Features: coastline, nearshore habitats, coastal plains and inundation zones	<u>Waterbirds:</u> Greater White-fronted geese, Emperor geese, black brant, red-throated and yellow-billed loons, black scoter, spectacled eiders	Primary Nexus: coastal communities and infrastructure; human safety; subsistence access
Changes in occurrence, intensity, duration and effects; changes in protective barriers provided by sea ice berms and barrier islands	Changes in erosion, salinity, frequency, depth and duration of inundation	Exposure to salinity, altered vegetation, potential shift in breeding distribution	Coastal erosion putting communities at risk, weak real-time forecasting models to guide safety response, safety concerns over traditional access to subsistence species
Applications: storm forecasting; wave dynamics; ocean habitat modeling	Applications: coastal vulnerability assessments; emergency response planning	Applications: species vulnerability assessments, predictive modeling, subsistence opportunities	Applications: emergency forecasting, community planning, adaptation strategies, safety plans
LCC Projects: ocean circulation models; wave buoy data; storm surge models; sea ice berm formation	LCC Projects: Coastal mapping; nearshore bathymetry; tidal benchmarks; storm surge models; coastal erosion mapping	LCC Projects: breeding waterbird vulnerability to historical and predictive storm surges and sea level rise.	LCC Projects: Local observer training; local input to sea ice berm formation models; community vulnerability; erosion mapping; emergency response tools

Figure 6. Suite of priority resources for the FY2012/2013 program on ‘Changes in Coastal Storms and their Impacts’



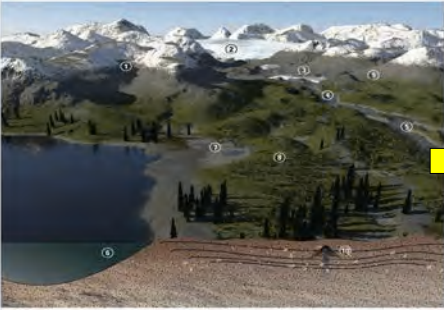



Hydrological Driver	Landscape features	Key Species	Human Systems
			
Priority Drivers: water temperature change (*major uncertainty in relationship to climate variables)	Features: lakes, streams and rivers	<u>Fish:</u> sockeye salmon, chinook salmon, other salmonids, whitefish and sheefish <u>Bears:</u> brown and black bears (lower priority in FY14-15)	Primary Nexus: changes in species variability and distribution. Economic, subsistence and ecosystem management links. Algae in community water sources.
Links to snowpack (1); glacial retreat (2); sedimentation (5); lake/stream dynamics: flow, turnover, chemicals (6); changes in perched lakes; vegetation colonization.	Changes in water temperature linked to stream flow, primary productivity, contaminant(s) availability.	Potential shifts in habitat suitability for spawning, rearing, and over-wintering fish species.	High dependence of Alaskan communities on fisheries resources; on marine transport of nutrients to support bear populations; water treatment challenges.
Applications: predictive models of system change. Change in variability of system types.	Applications: habitat suitability and vulnerability.	Applications: stock assessment, ecosystem health	Applications: fisheries management for subsistence, commercial, recreation uses
LCC Projects: goals/objectives linked to climate change; water temp data standards; snow contributions to stream chemistry; identification of monitoring units	LCC Projects: Large lake and lagoon temperature; Demonstration of regional climate analyses with water temperature data	LCC Projects: Impact of water temperature change on sockeye salmon embryo development; snow input into stream characteristics and changes on fish availability	LCC Projects: two of five subregions are starting water temperature monitoring network implementation plans; community vulnerability assessments.

Figure 7. Suite of priority resources for FY2014/2015 program on ‘Changes in Freshwater Temperature and its Impacts’



information becomes available. The LCC also considers as priority resources the habitats of the species or assemblages, as well as the supporting ecological processes and services.

Combining the key species with their habitats, ecological processes, and ecological services that these species/systems provide to humans, defines the LCC's priorities associated with a topic. For example, Figures 6 and 7 illustrate the suite of priorities that are the focus of our current Coastal Systems and Freshwater Systems work, respectively.

Specific components of the LCC's strategy will use the priority resource suite as a guide to outcomes or impacts of interest to the LCC and in reviewing proposals for LCC-funding. These strategies will be described within the two year Science and Operating Plan being implemented at the time¹⁸. The priority resources will not be interpreted as strictly exclusionary, however, and proposals addressing another relevant resource (e.g. landscape, species, or different human connection) of regional importance will be considered when sufficient justification is provided. Similarly, the LCC may choose to consider as priority resources those associated with important regional near-term information needs.

The priority resource suites are currently the LCC's main mechanism for incorporating culturally important resource considerations into its strategic planning, e.g. through resources associated with subsistence practices, public health and safety, and local economic sustainability (Figure 3, page 8, outcomes of interest)

3.5 Priorities among Strategic Activities

The choice of strategic activities for the two-year program will be heavily influenced by the selected topic and its associated opportunities for leveraging and collaboration (Figure 5). The LCC will also consider a variety of programmatic goals identified during these initial stages of development. These programmatic goals reflect lessons learned by the LCC, its partners, and other LCCs, science needs identified at the Science Workshop (Chapter 5, Reynolds and Wiggins 2012), and surveys of the Steering Committee's vision and preferences for the LCC. The Steering Committee does not consider the programmatic goals as exclusionary or binding and will review and amend the list when it updates this Strategy document.

Preference will be given to activities that

- *Address an information need that would not otherwise be addressed (because it requires broad partnership support to address, or occur in the 'gaps' between partner missions).* Example activities include advancing establishment of the Alaska Hydrography system for improving the National Hydrographic Dataset in Alaska while better serving local information needs.
- *Inform a range of decisions; e.g., information that is critical to multiple partners and/or stakeholders.* Example activities include development of (i) high spatial resolution storm surge models in areas that will inform community infrastructure development,

¹⁸ See the FY14-15 Science and Operating Plan for examples at:
<https://westernalaskalcc.org/science/SitePages/operatingplan.aspx>



emergency forecasting, and natural resource management adaptation planning and (ii) data collection standards that serve both local and landscape-scale information needs.

- *Have potentially high information value and impact; e.g., addresses key uncertainties or are a prerequisite to addressing other high priority information needs.* Example activities include advancing water level measurements and expanding the network of vertical benchmarks in coastal western Alaska, including re-occupying existing ones, so as to allow better characterization of local tides and relative sea level change, calibration of models of storm surge and open water hydrodynamics, etc. (Meehan et al. 2012).
- *Advance our ability to predict impacts of changes in climate and landscape processes on biological, ecological, and social processes, reflecting the importance of vulnerability assessments in adaptation planning.* Example activities include assessments of a priority resource's exposure, sensitivity, and/or adaptive capacity in the face of the changes related to the chosen topic (Stein et al. 2013) and integrative efforts that advance understanding of the linkages among system levels.
- *Promote landscape conservation design activities, including development of spatially explicit data, modeling vulnerabilities, and predicting climate change response, for use by partners in individual or collective planning efforts.* Example activities include development of the Integrated Ecosystem Model for Alaska and Northwest Canada¹⁹ and the LCC-wide assessment of coastal change²⁰.
- *Promote engagement by local communities in all phases (including design, implementation, and outreach).* Example activities include community-based observations, and assessments of community vulnerability to climate change²¹.
- *Contribute to an integrative suite of activities during the two-year program.* Example activities include promoting natural alignments and linkages among projects so as to improve project efficiencies and/or our understanding of the impacts on higher system levels of changes on lower system levels. Where appropriate, Requests for Proposals will include a broadly phrased 'open' component with explicit language encouraging integrative projects that focus on linkages between physical and biological/ecological/social systems.
- *Promote data collection and field instrumentation, reflecting the limited baseline data from western Alaska on most of the priority science needs identified at the Science Workshop (Chapter 5 of Reynolds and Wiggins 2012).* Example activities include leveraging planned field efforts to expand data collection (in time or space); strategic capital investments in instrumentation and upgrades; development and promotion of common data collection standards and protocols, training, data management tools, and other efforts aimed at advancing collaborative monitoring at landscape or larger scales.

¹⁹ <https://csc.aslask.edu/projects/integrated-ecosystem-model>, accessed 25 Feb 2014.

²⁰ <https://westernalaskalcc.org/projects/sitePages/2013projects.aspx>, 'Extensive mapping of Bering Sea Coastal change by Landsat time series trend analysis, 1985-2012', accessed 3 March 2014.

²¹ <https://westernalaskalcc.org/projects/SitePages/2011projects.aspx>, see project 12, accessed 3 March 2014.



- *Promote data sharing among partners.* Example activities include developing an online inventory site for stream and lake temperature monitoring projects²² and development of base data collection standards for fresh water temperature.

3.6 Long Term Monitoring

In these early years of development while the LCC is still initiating engagement with partners and clarifying its strategic role in western Alaska, the LCC will not assume any long-term funding commitment, such as taking responsibility for collecting long-term monitoring data. Doing so would be counter to the Strategic Science Framework described in this document. The Steering Committee will revisit this decision when updating this Strategic Plan if they have not done so sooner as dictated by circumstances.

However, the LCC recognizes both the importance and the challenges of long-term data collection in western Alaska, especially its importance for assessing status and trends and establishing relationships with climate patterns. The LCC will consider activities in support of monitoring of priority resources, especially activities that reduce our partners' costs from logistics and time associated with planning, data collection, analysis and data management and sharing. For example, the LCC can facilitate coordination and linkages across partner long-term monitoring programs, fund capital investments, develop standardized protocols, support data integration and program assessment and design efforts, support intensive inter-disciplinary monitoring 'pulse' events, and promote strategic expansion of monitoring networks. The LCC can also facilitate sharing of long-term monitoring data through data exchange tools and platforms, promote existing long-term data curation and discovery sites²³, promote engagement of local communities in all phases of monitoring efforts, promote assessments of existing monitoring designs and survey effort levels to improve efficiency, and engage in other activities that advance monitoring of priority resources without requiring funding commitments over unlimited time frames. Examples of such activities can be found in our FY2014/2015 Science and Operating plan, which focuses to a large degree on the promotion of a statewide, voluntary, freshwater temperature monitoring network.

3.7 Project Data Management

The LCC requires Data Management Plans (DMP) for all relevant LCC-funded projects and works with the project leads both to develop an adequate DMP as well as locate appropriate repositories for long-term curation of data products. The LCC requires that all LCC sponsored projects that generate data products address the full data lifecycle, including documentation, QA/QC, , data discovery, sharing and access where not limited (e.g., by legal restrictions). The LCC promotes the use and expansion of established data curation and discovery portals for the long-term curation of all LCC-funded projects, as appropriate. Preference is given to regional, statewide or circumpolar/Arctic sites participating in the Alaska Data Integration Working Group, but national, and international sites are all candidates with the final decision being

²² <http://aknhp.uaa.alaska.edu/aquatic-ecology/akoats/>

²³ For example, the Alaska Online Aquatic Temperature Site (AK-OATS, <http://aknhp.uaa.alaska.edu/aquatic-ecology/akoats/>) is a searchable online catalog of water temperature monitoring projects throughout Alaska.



dictated by that site most appropriate to those data products with respect to their discovery and access by future users. The LCC works with neighboring LCCs, the Alaska CSC, ACCER, and established data repositories (Table 4) to minimize redundancy among and improve leveraging of LCC-funded data management efforts, such as Imiq, the database of arctic Alaska hydrology-related data (<http://ine.uaf.edu/werc/projects/lccdatalibrary/index.html>) and the Alaska Online Aquatic Temperature Site (AK-OATS, <http://aknhp.uaa.alaska.edu/aquatic-ecology/akoats/>).

Table 4. A selection of the primary data repositories and project tracking systems in Alaska, compiled by the Alaska Data Integration Working Group (Gaylord 2009).

Acronym	Description	URL
AOOS	Alaska Ocean Observing System – the eye on Alaska’s coasts and oceans. AOOS supports a number of data discovery, exploration and sharing tools and is a main portal for oceanic and coastal data sources.	www.aos.org
UA GINA	Geographic Information Network of Alaska – the University of Alaska-housed portal for sharing geospatial data and technological capabilities among Alaskan, Arctic, and world communities. Central portal for remote sensing and aerial imagery; topography, bathymetric, and digital elevation models; web mapping services; etc.	www.gina.alaska.edu
ARMAP	Arctic Research Mapping Application – searchable geospatial database of project metadata for Arctic research efforts; data access; collaborative workspace for coordinating field logistics.	www.armac.org
ACADIS	Advanced Cooperative Arctic Data & Information Service – data discovery, curation, and access for projects funded by NSF’s Arctic Science program (though others may contribute as well).	www.aoncadis.org
ScienceBase	A collaborate scientific database enhancing scientific inquiry and acuity, managed by USGS. Provides discovery, access, and curation of project metadata, data products (geospatial data, tabular data, etc.), and project publications, as well as provides community collaboration spaces.	www.sciencebase.gov
LC MAP	The Landscape Conservation Management and Analysis Portal. Hosted within ScienceBase, provides data sharing and geospatial analysis tools. Users can discover, assess, edit, analyze, and model common data themes.	http://Greatnorthernlcc.org/lcmap

3.8 Steps to promote Integration among projects

The LCC will promote integration among its funded projects, and related activities of partners, with the goal of improving the efficiency and cost-effectiveness of their individual efforts. As



appropriate, when the LCC selects a suite of projects for funding from a Request for Proposals, it will consider not only the merits of each individual proposal but also the potential interactions and linkages among projects that would provide the most informative, integrative suite of activities and products.

In the early stages of project activities, once agreements are in place, the LCC will host a closed webinar among the lead investigators of all the program's projects. Each investigator will be given 7-10 minutes to provide a brief overview of their project goals and planned activities and the webinar will be structured and run with the goal of promoting interaction among the project leads, establishing common interests and potential linkages among efforts, and sharing of resources, data sources, etc. The webinar will be repeated in Year 3 or 4 of the program.

For each program, the LCC will consider hosting a small workshop of topic-relevant decision makers, stakeholders and experts (including researchers, local knowledge experts, and field staff) for identifying priority shared science and information needs associated with that topic and recommended strategic actions. The LCC has found such settings good venues for promoting interactions among participants, integration among existing projects, generation of new integrative efforts, and, ultimately, promoting co-development of research agendas through clarification of user needs (Science Policy Assessment and Research on Climate 2010). Ideally, such workshops would be scheduled during the program's planning phase and would be co-hosted with key partners interested in the specific topic, such as neighboring LCCs, the Alaska CSC, etc. For examples, see the summary reports from the Coastal Processes Workshop of May 2012 co-hosted by AOOS, Western Alaska LCC, and Alaska CSC (<https://westernalaskalcc.org/science/SitePages/coastalwkshp.aspx>) and the Stream & Lake Temperature Monitoring Workshop of Nov 2012 co-hosted by the Western Alaska LCC, the Northwest Boreal LCC, and the Alaska CSC (<https://westernalaskalcc.org/science/SitePages/streamlakewkshp.aspx>).

3.9 Necessary Steps at end of a Program - setting the stage for next time

According to the framework's calendar (Table 3, page 15), the LCC will begin planning its next program under a specific theme a little over three years after shifting its attention away from the current program under that theme. A natural starting point for that next iteration of planning is to assess the progress made in the intervening years in terms of decision-maker use of products and findings from earlier funded projects (both LCC-funded and others), as well as changes in priorities among decision-maker information needs and science needs. In order to set the stage for these assessments, the LCC will complete two key products by the end of its current program.

The LCC will create a document summarizing the findings from its various activities surveying decision-maker information needs for the current program, ideally with linkages to the associated science needs, as well as current priority science needs. See, for example, the May 2012 Coastal Hazards Workshop Report (<http://www.aos.org/workshops-and-reports/>), especially Appendix 15.

The LCC will create a synthesis document highlighting how current projects (both those funded by the LCC as well as other activities related to the program topic) inter-relate in their



cumulative efforts to address the region's priority information and science needs for the current theme. For example, in FY2014 the LCC has contracted development of a 20-30 page document summarizing the priority needs identified at the Coastal Hazards Workshop, the sixteen LCC-funded coastal change projects, and other coastal projects in the region, including subsistence and Traditional Ecological Knowledge projects, monitoring studies as well as research projects.

These documents will serve as baseline references for guiding the LCC's planning activities when it returns to the Coastal Systems theme in FY2018/2019. Such activities will start with assessing whether enough progress has been made on the former topic to warrant shifting to a new one.

3.10 Competitive Funding and Flexibility for responding to unanticipated issues

The LCC will use Requests for Proposals (RFP) and other competitive mechanisms for accomplishing tasks whenever appropriate and reasonable (see further details in Section 6.3). When the LCC is scheduling an RFP at the beginning of a program, the LCC will aim to have the announcement in autumn of the program's first FY, ideally September and partway into October. In scheduling the RFP, the LCC will coordinate with the neighboring LCCs, the Alaska CSC, and other partners and consider means of aligning timing and jointly addressing shared needs.

The LCC will hold back approximately 10% of its expected project funding monies when making funding decisions in the autumn of a given FY. Those monies will be retained without commitment until around March to provide the Steering Committee with flexibility to address:

- unique, time sensitive opportunities,
- emergency project assistance,
- cross-LCC projects, including those not synchronized with the LCC's current program topic.

The Steering Committee can assess current conditions and, if found necessary, amend the Operating Plan and program topic as appropriate.

4 Communication & LCC Science Activities

Achieving the vision of the LCC demands both the production of well-aimed applied science *and* the use of these science products by decision-makers and stakeholders in maintaining the ability of the region's social-ecological systems to absorb change yet sustain their fundamental function and structure (Chapin et al. 2009b). Thus, the LCC must balance its efforts in identifying needs and promoting science to address them with adequate attention to the delivery of those science products to the intended users and sharing with the community at large. This makes communication essential to all of the LCC's activities.

The LCC engages with a variety of audiences during each of its major science activities, and employs a variety of mechanisms as appropriate to the goal and audience (Table 5). As with many LCCs at similar stages of development, our attention is increasingly focused on these



Table 5 Major audiences for LCC communication efforts. Different audiences will likely require different forms and styles of communication. Some organizations may belong to multiple audiences for a given communication goal. Some goals, e.g., ‘promotion of LCC-identified shared priorities’, will only target specific audiences.

Audiences	Roles
Partners	Organizations engaged in LCC activities.
Primary decision makers	Organizations whose decision-making could be directly influenced by LCC science (Jenni & Nieman 2012). See Box 2.
Stakeholders: Decision Influencers	Organizations who have a significant role in land and resource management but whose role is exercised mainly through influence on the primary decision makers (Jenni & Nieman 2012). See Box 2.
Stakeholders: Impacted groups	Those who will be affected by the land and resource management decisions made by others and those who will be affected by climate change in the region but who do not directly make decisions that would be informed by LCC science (Jenni & Nieman 2012).
Tribes, Villages and Rural Alaskans	(Including Local Knowledge Community) Engagement in participatory project planning, project activities, community-based monitoring, and an audience with specific communication goals & considerations.
Science Community	(Regional, statewide, national, international; including agency, academic, NGO, and private industry staff scientists) Guidance on science needs, strategic opportunities, target audience for RFPs and LCC-sponsored science activities.
Project PIs	Project Investigators funded by the LCC
Internal (Governance)	Steering Committee, advisory groups, neighboring LCCs, Alaska Climate Science Center, Alaska Climate Change Executive Roundtable, Climate Change Coordinating Committee, LCC Network

many communication tasks and challenges. We briefly mention current challenges and strategies, focusing just on the Science-related communication roles. The LCC intends to take initial steps toward developing a formal Communication Strategy during FY2014/2015.

4.1 Communication Challenges

The LCC staff seeks to regularly engage with a wide variety of audiences throughout its activities (Table 5). The LCC’s staff are seeking solutions to help address the growing demands associated with maintaining active communication with this variety of audiences, including production of information products such as flyers, posters, webinars, etc.. So far most of our efforts have focused on identification of shared needs and strategic opportunities and activities. As our initial projects conclude we will increasingly need to communicate and distribute the resulting science and information products. These efforts will need to vary in form and medium as required to impact different audiences. Attention will be especially required to develop jargon-less language products and strategies aimed at Tribes, villages, and rural Alaskan stakeholders; as well as non-scientific audiences (Harvey et al. 2013).



We are seeking solutions that will improve efficiency of our communication with partners, especially Steering Committee members who are requested to review and provide feedback on documents and materials in between the LCC's meetings. This is especially important for Steering Committee members from entities that have created advisory groups to better distribute and collate information from the LCC to the entity's personnel. One action the LCC will take to improve this situation is to help produce, for each suite of projects funded by the LCC, a document aimed at partners and that summarizes the importance of the two-year program topic ('Why is it important to understand these changes?') and the expected products and their uses from the funded projects.

There is growing recognition of the need for and challenges of improved engagement in and participation of tribes and villages in the research activities occurring in their regions (Harvey et al. 2013, Hopkins et al. 1990). The requests to meet with various scientists (some funded by the LCC) and participate in project outreach efforts can outpace availability, and coordinating timing that doesn't interfere with subsistence activities and other demands of rural life can be difficult. The LCC will review, and consider adopting and promoting, the *best practices* being identified for improving local engagement while simultaneously reducing the current communication challenges (Harvey et al. 2013).

As the five LCCs in Alaska further develop their programs and activities, we will continue pursuing ways of improving coordination so as to make engagement easier and more efficient for the science community active in these regions. The LCC will continue working with its neighboring LCCs and the Alaska CSC to synchronize RFPs and coordinate activities so as to minimize redundancies and reduce the communication challenges. For example, the LCC's 2014 RFP included a brief update on Arctic LCC's expected RFP activities and a specific topic open to proposals for joint funding from the Western Alaska and Aleutian-Bering Sea Islands LCCs. Additionally, we need to consider strategies for improving the outreach efforts and information delivery products of those scientists we've funded for LCC science activities, such as jointly-sponsored webinar series and jointly-hosted 'LCC science' symposia. The LCCs will also consider jointly-sponsored communication training opportunities for LCC-funded investigators and perhaps developing common project summary templates targeted to different key audiences.

5 Metrics of Success

Performance measures are important for guiding the LCC's development, improvement, and resource allocations, as well as for general documentation of its activities and outcomes (Hatry 1999). However, the LCC's mission and goals present specific challenges to developing and implementing effective performance measures (Hatry 1999, Koopman et al. 2013).

While we have control over and can more easily measure our *outputs* (e.g., partner participation in workshops; number of funded projects and their deliverables; datasets; reports and other communication products), our fundamental objective is in influencing specific *outcomes* (Figure 3, page 8, far right column) of the region's land and resource management decision makers (Figure 3, far left column). While we can strive to make sure, via our communication strategy, that the region's decision makers are within our sphere of influence



(Figure 8), they are clearly outside our sphere of control. The outcomes of fundamental interest (e.g., ecosystem function, habitat quality, etc.) are beyond both our spheres of control and of influence as they are affected by many other factors than just the land and resource management decisions; this makes it very difficult to determine the degree of impact on specific outcomes that should be attributed to specific LCC's activities (Koopman et al. 2013). Also, it is important to recognize the inherent challenges of developing performance metrics focused on outcomes that are difficult and expensive to measure (e.g., 'ecosystem function') and for which there may be a long delay before an impact is observed (Hatry 1999), making assessments of impact tenuous.

Given those challenges, developing successful performance measures will require consistent and sustained commitment from the LCC. The LCC will approach this effort as an opportunity to demonstrate an adaptive learning culture analogous to what we are promoting for management of the region's natural and cultural resources (Williams et al. 2012) – establishing clear goals and objectives, identifying the areas of strategic influence available to the LCC and feasible indicators for monitoring the impact of the LCC's activities, committing to the necessary monitoring of effectiveness, reporting and actively learning and guiding improvement of the measures. The LCC may need to develop specific measures and monitoring tools for each two-year science program. At least initially, the LCC will likely have to rely on qualitative summaries and narratives of impact on endpoints in our Spheres of Influence and Interest (Figure 8).

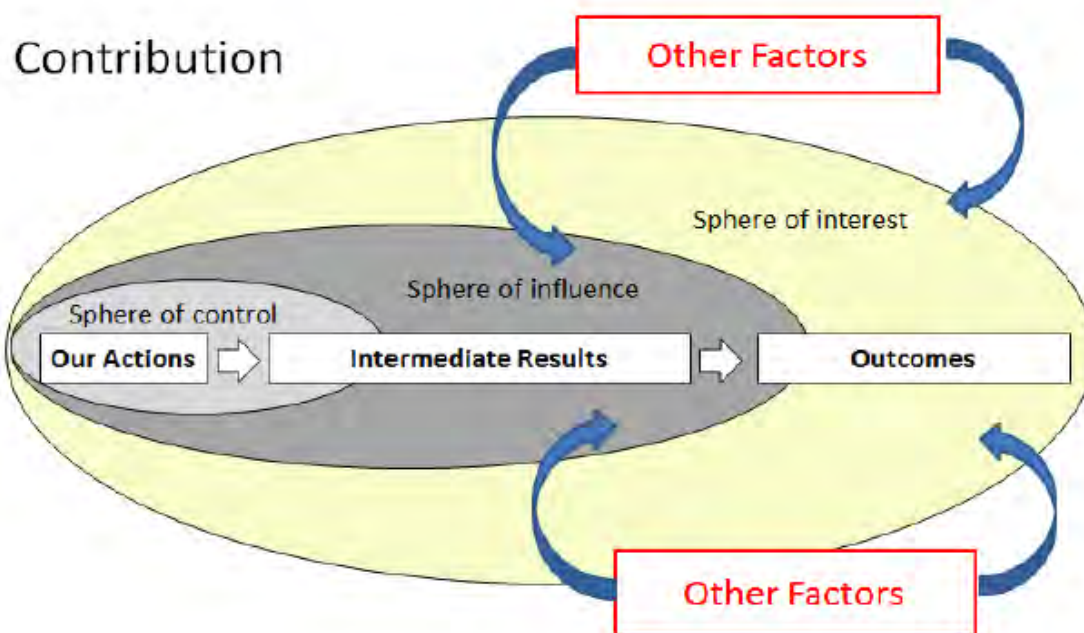


Figure 8. Distinguishing spheres of control, influence, and interest in relation to developing outcome-oriented performance metrics. The LCC will act to extend its Sphere of Influence to include the region's land and resource managers, stakeholders, and science and local knowledge communities. The LCC's Sphere of Interest includes social-ecological outcomes of interest (Figure 3, far right column) as well as the social networks within the science and local knowledge communities and their linkages to the land and resource management communities. Figure from Koopman et al. 2013, as adapted from Chipimbi & Hearn 2009.

A first suite of performance metrics will be developed with a goal of incorporating them into our FY2016/2017 Science and Operating Plan, with the knowledge that these will evolve as the LCC develops. Some potential categories and indicators are presented in Figure 9, focusing on key outputs for each objective with an eye toward identifying strategic actions to improve the influence of our activities under a specific two-year science program. In addition, the LCC will consider developing metrics associated with its organizational practices, focusing on monitoring and improving efficiencies of our current business practices.

The LCC will continue to track and incorporate, where appropriate, the recommendations of the active national-level efforts focused on performance metrics for the whole LCC Network, namely, the Network-funded effort by Koopman et al.²⁴ and the U.S. Fish and Wildlife Service / LCC Performance Measures Working Group's *Science Investment and Accountability System* (SIAS), as well as the related efforts of the National Climate Change and Wildlife Science Center (Doug Beard, pers. comm. 23 Oct 2013) and other LCCs. The initial suite of metrics should be small in number, feasible to implement, and to simultaneously satisfy the management needs of the LCC as well as the reporting requirements of the LCC National Network (e.g., U.S. Fish and Wildlife Service's *Performance Tracking and Reporting*, Department of Interior's *High Priority Performance Goals*) and the partners currently directly funding LCC activities (e.g., SIAS metrics).

6 Business Practices & Strategic Growth of the LCC

This section documents key considerations to be followed in developing each biennial Science & Operations Plan, as well as already identified directions for strategic growth of the LCC staff. The LCC's operations and activities for each two-year science program will be detailed in the Science and Operations plan, including LCC activities to leverage resources - both those under direct control of the LCC and those under direct control of its partners - to expand the LCC's influence and better address the shared needs of the cooperative.

6.1 Budgetary Assumptions

The LCC's budgets support the current staff of three and seed money for projects. Under current budget levels there are inadequate funds to support additional staffing. Project funding has varied, ranging from approximately \$1 million (FY2011) to \$350,000 (FY2014). Future budgets are uncertain due to current political climate and the fact that the National Network is currently revising its methods for assessing performance of individual LCCs and allocating funding.

6.2 Resource Leveraging to address shared priorities

The LCC will allocate its resources among its direct activities and its funded projects to try to maximize the overall impact and influence of these investments. The LCC will continue seeking opportunities for strategic collaboration with our partners, especially our Steering Committee member entities, neighboring LCCs, other climate-based entities (e.g., the Alaska CSC), and

²⁴ <http://lccprojects.org/?gid=871>, accessed 4 March 2014.



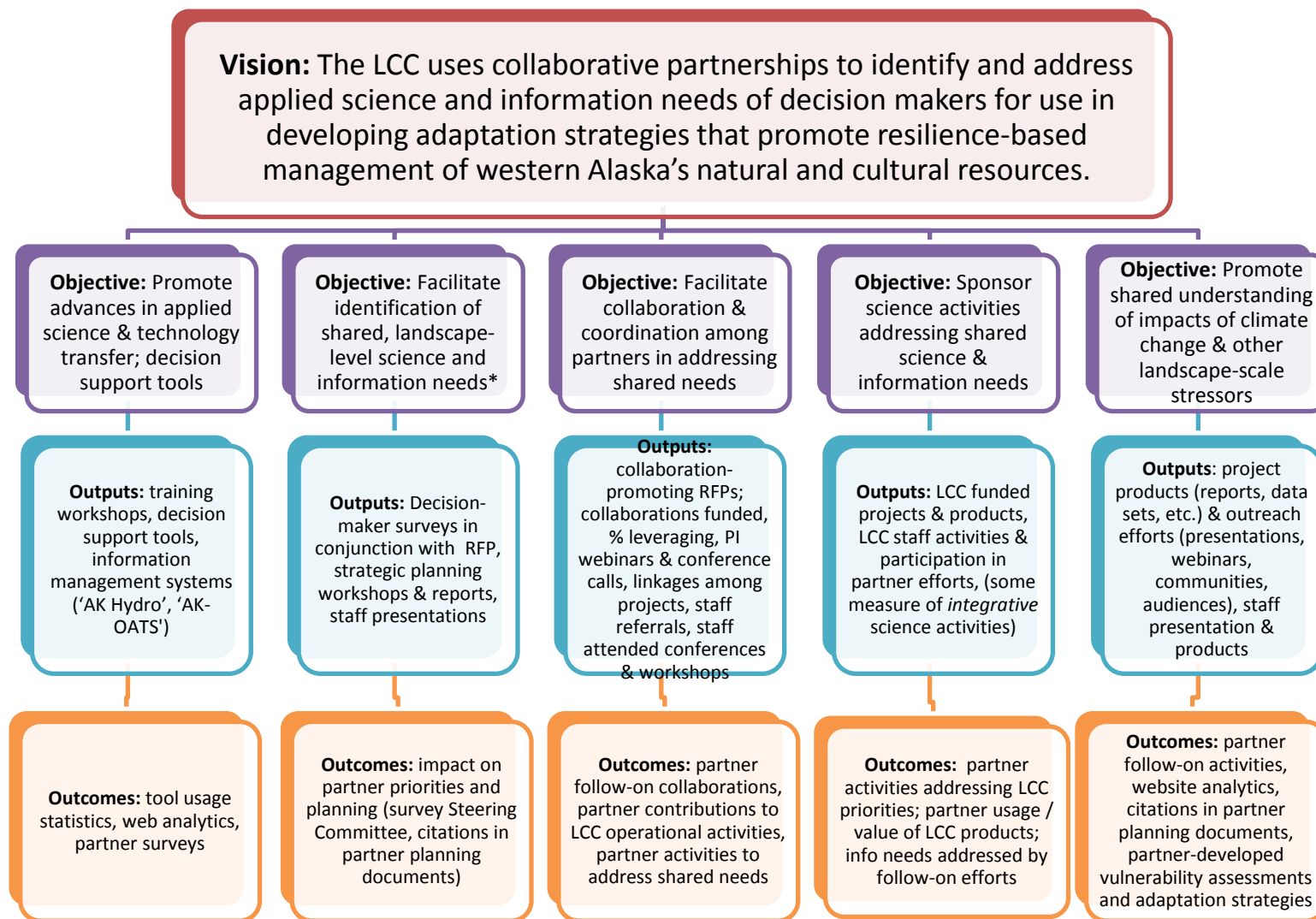


Figure 9. Objectives hierarchy with (proposed) LCC vision, step-down objectives (developed from the LCC's goals – Box 1), and (potential) associated performance measures. The center three goals all aim at addressing shared landscape-scale science needs of the region's natural and cultural resource decision makers. Performance measures focused on business operations are not shown.



others addressing jointly held priorities. The USGS, Alaska CSC and BLM have all provided short-term staff and/or project dollars directly to the LCC to support its activities.

LCC staff will work with Steering Committee members and other partners to promote priority needs and activities identified by the LCC (See Box 3). Most LCC efforts on this topic have been focused on hosting workshops to identify priority needs then promoting those needs through a variety of channels (reports, presentations, RFPs, etc.). As the LCC's science program develops and focuses on different Topics, the priority needs will accumulate. The LCC will seek effective strategies to address this communication task as part of its Communication Strategy development. One avenue that LCC staff will continue pursuing is to seek opportunities to promote these shared priority needs and activities during planning stages of large science initiatives such as NASA's Arctic Boreal Vulnerability Experiment (ABoVE, above.nasa.gov), NSF's Study of Environmental Arctic Change (www.arcus.org/search), etc.

Box 3. The LCC's is a forum for collaboratively identifying and addressing shared landscape-scale conservation science needs

While the LCC's current resources provide for a limited 'sphere of control' (Figure 8), their influence can be greatly magnified through strategic choice of activities. By providing a forum for identifying and addressing shared landscape-scale science and information needs, the LCC helps individual partners;

- recognize the mutual goals their activities can help achieve, and
- seize opportunities for collaboration and cooperation, thus leveraging each other's contributions and increasing the efficiency of their mutual efforts.

In this way the LCC partnership is able to influence partner planning, priorities, and activities, and thus help address the shared challenges facing western Alaska.

For example, the LCC provided seed money for developing a storm surge model for western Alaska coupling wind, waves, tides, and sea ice (see project 1 of the FY2012 projects on the LCC's webpage). This project is already serving as a foundation for leveraging additional storm surge warning improvement projects:

- the National Weather Service's Alaska Region is using an intermediate product to improve storm surge guidance in western Alaska;
- the outcomes of that effort will be used by NOAA's Alaska Region and the Alaska Department of Natural Resources to improve the information provided to communities in the path of inundation-producing storms (e.g., 'the water may reach your generator and school, but likely not your fuel tanks'); and
- in light of the need for better tidal information to assess the new modeled predictions stemming from the LCC project, the Alaska Ocean Observing System is considering funding annual tide stations to expand the limited number in western Alaska.

By raising awareness of important shared needs and using its funds to seed strategic activities, the LCC can greatly broaden its influence and impact.



LCC staff will work with neighboring LCCs, and/or the Alaska CSC and others to identify and promote strategic priority needs jointly held by multiple LCCs in Alaska, such as statewide priorities associated with better understanding climate change impacts on hydrology. For example, the LCC has jointly-sponsored events or activities in each of our initial years of operation. The April 2011 *Shared Science Needs Workshop* was jointly funded by the U.S. Fish and Wildlife Service, the U.S. Geological Service's Alaska Climate Science Center, the Bureau of Land Management, and the LCC. The May 2012 *Coastal Hazards Workshop* was jointly funded by AOOS, USGS, Alaska CSC, and the LCC. The November 2012 *Stream and Lake Temperature Monitoring Workshop* was jointly funded by the Alaska CSC and the Northwest Boreal and Western Alaska LCCs. Also, the LCC has jointly funded projects with the USGS Alaska CSC, the USGS ASC (e.g., FY2014 Outreach RFP), and the Arctic and Northwest Boreal LCCs²⁵. The LCCs will consider co-hosting a joint 'Alaska LCC Steering Committee / Alaska CSC Meeting' at semi-regular intervals to promote products, activities, and advances in landscape-scale science.

Staff will work with neighboring LCCs and/or the Alaska CSC to develop a formal process for identifying priority multi-LCC collaboration opportunities and priority needs, such as updating of the National Hydrography Dataset in Alaska. Staff will work with the relevant neighboring LCCs / Alaska CSC to develop strategic recommendations and proposals addressing these statewide needs and present them to appropriate entities for action or funding, e.g., the Climate Change Coordinating Committee of the Alaska Climate Change Executive Roundtable (<http://www.aos.org/adiwg/accr/>) or the National LCC Network call for proposals.

6.3 Project Solicitation, Selection, and Funding

The LCC will strive to use competitive funding mechanisms, e.g. Request For Proposals (RFP), for addressing identified strategic needs *when* this mechanism is reasonable and feasible. The LCC Steering Committee may decide to not to have an RFP every fiscal year if there are more efficient and/or effective means of selecting projects to fund. For example, when deciding on project funding for the second year of a two-year program, the Steering Committee will give initial consideration to projects identified from the previous year's RFP that were not funded, or not fully funded. The LCC will consider ways it can help support the competitiveness of smaller partner organizations (e.g., watershed councils, regional NGOs) in our funding processes, including promoting other resources that may help them meet their needs more directly (e.g., Rasmuson Foundation).

The LCC will strive to coordinate with neighboring LCCs and the Alaska CSC, to the extent reasonable and feasible, to synchronize RFP activities and calendars, reducing burden on the intended audiences, including the region's science communities.

6.3.1 Proposal Review and Selection

Proposals received in response to an LCC RFP will be reviewed by staff and the Steering Committee, potentially supplemented with technical reviews from 'external' technical experts

²⁵ The Integrated Ecosystem Model for Alaska and Northwest Canada, <http://csc.alaska.edu/projects/integrated-ecosystem-model>



and/or staff that Steering Committee members recruit from internal to their organizations. All reviewers must follow the LCC's Conflict of Interest Guidelines (Appendix F) and sign a recusal form. External technical reviewers will either comply with same guidelines or be provided 'blinded' proposals from which, to the extent reasonable, identifying information on principal investigators and collaborators has been removed. All proposal reviewers will follow the LCC's Proposal Evaluation Guidelines (Appendix G).

Except when not relevant, RFP topic calls will require investigators to submit the name, position, and contact information for three land or resource management decision makers in the region whose decision making the investigator perceives will be influenced by the products of the proposed activity. LCC staff will present those individuals, or other individuals the staff perceives to have similar decision making responsibility, with 'blinded' versions of the proposal summary and assess their interest in and perceived usefulness of the project & products (both near-term and long-term) as well as their priority information or science needs related to the RFP topic.

For each proposed project, the results of all Steering Committee reviews, external technical reviews, and decision maker reviews will be summarized and shared with the Steering Committee prior to their selection of a suite of projects for funding. The Steering Committee will select the final suite of projects with attention to both the individual project reviews as well as attention to maximizing integration and collaboration among proposed project activities and products. Projects will be funded in a sequence determined by consideration of both priority, as determined by Steering Committee, and budget availability.

6.3.2 Out-year Funding of Federal Partners

The Western Alaska LCC staff funding and primary project support comes through the U.S. Fish & Wildlife Service with additional contributions (both in-kind and monetary) from participating partners. All project funding must meet the funding agencies' requirements and be managed accordingly. One of the challenges faced by the Federal agency partners is the rule set governing the time period that a federal agency can utilize federal funds. The allocations to the Western Alaska LCC are "two year funds" which means that there is a 24 month window of opportunity for most federal agencies to expend those funds. In contrast, when an agreement is developed with a non-federal agency partner they can have up to five years to expend the funds. To ameliorate this discrepancy, the Western Alaska LCC Steering Committee has agreed to forward commit LCC funds for Federal projects that successfully compete for selection, if they require funding beyond their legislative access window. As an example, a four year project could be funded to the National Park Service for a total of \$200,000.00, with \$100,000 for the first two years, but \$50,000.00 needed in each of the third and fourth project years. If the project is funded in FY14, the Steering Committee would issue \$100,000.00 for FY14 and FY15, but would wait to issue the remaining \$100,000.00 until FY16 (for use in FY16 and FY17). The timeframe differs based on different agency regulations, for instance, because the current LCC funding comes through the U.S. Fish & Wildlife Service, that agency must spend all of the funding in one fiscal year.



6.4 Preserving Flexibility

In order to respond to unique, time-sensitive opportunities that may or may not fit into the current two-year program, the Steering Committee will withhold at least 10% of its available project funds for distribution during the middle of the fiscal year (March or April). The following steps will be taken to ensure that the use of these ‘flexibility funds’ is best for the LCC as a whole.

1. During the evaluation and selection of project proposals at the beginning of the fiscal year, projects will be sorted by priority and a suite of the highest priority projects identified that fit within the known available funding level.
2. These projects will be sorted as to their urgency with regards to funding early in the year. E.g., can a particular project wait for later funding after federal budgets are resolved?
3. Additional high priority projects that we intend to fund, pending availability of federal funds, will be listed and sorted based on their ‘urgency’ of funding.
4. Among new project opportunities that arise but are unrelated to the current two-year program, Staff will identify the most promising ones and request a short proposal be developed for Steering Committee evaluation. The Steering Committee will then assess the priority of each relative to the additional projects identified in bullet #3 and decide which, if any, represent the best use of the LCC funds to meet its mission and goals.
5. If no new opportunities have been raised, or if none successfully compete with the ‘additional high priority projects’ related to the current two-year program, the funds will be applied toward the ‘additional high priority projects’ or other program-related priorities.

6.5 Organizational Capacity: Current Staffing & Desired additions

The LCC currently has three full time staff and shares in supporting an administrative assistant and an outreach specialist with three other LCCs and the USFWS Climate Change Coordinator in the Office of Science Applications, USFWS, Alaska Region.

The LCC has identified pressing needs for additional staffing in three areas: Communications, website and Sharepoint design and programming, and data management. The pressing communication needs were defined throughout the last three Sections, especially Section 4. Website and Sharepoint needs reflect our dominant reliance on those platforms for communication, project information delivery, Steering Committee document archiving, and project management. The data management position is needed to work with LCC-funded project PIs to help with development of their data management plans, submission of project metadata into online catalogs promoting project discovery and meeting federal funding regulations (Alaska Data Integration working group project cataloging, ScienceBase or data.gov, and others as appropriate), identification of suitable online long-term curation sites for data hosting at the end of the project, as well as for helping LCC staff on its project tracking and administrative data management tasks.



Given current budgets and downscaling, the LCC will focus on working with Steering Committee members to identify alternative strategies for addressing these staffing needs. Potential options include leveraging partner staffing, pursuing short-term staffing loans (details), or outsourcing for key activities. The LCC will also continue exploring the potential for shared staff with the three other LCCs jointly headquartered in Anchorage.

6.6 Organizational Capacity: Standing Committees and Working Groups

The LCC has not yet initiated any standing committees, restricting its efforts to temporary working groups convened for specific tasks, such as helping identify the two-year program Topic for the LCC's Coastal Systems program of FY2012 and FY2013. The LCC has considered initiating a standing Science Committee for proposal, report, and data reviewing but has refrained in consideration of the limited size of the science community active in the State and the increasing demands placed on it for engaging in and reviewing LCC efforts. The LCC will track the performance metrics it develops associated with project reviewing and report, at least biennially, to the Steering Committee for consideration and possible action to reduce these demands.

7 Modifying this ten year Strategic Science Plan & developing the next

The LCC Steering Committee intends to follow this plan at least through FY2021 and conclusion of the second year of the second program under the '*Freshwater Systems*' theme (Table 3). However, they may choose to modify any component of this plan at any time after FY2017 and the conclusion of at least one two-year program under each of the three themes identified in Section 3.

If the Steering Committee has not done so already, in FY2021 they will assess the impacts, outcomes, and efficiency of the LCC's activities under this Strategic Plan and consider necessary modifications. The Staff will be responsible for summarizing and assessing the previous performance metrics to identify areas of need and strategic improvements as well as efficiency of business operations and adequacy of current staffing and partner engagement. The Staff will also assess the Steering Committee's current *vision of success*, identify current priorities among the LCC's goals and activities, and develop, in conjunction with the Steering Committee and partner input, necessary modifications and revisions of the elements of this Strategic Plan. Special attention will be given to the framework components detailed in Section 3.



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Appendices



9 Appendix A: Summary of ‘Synthesis Report of the 2010 Local Meetings’

Full report available at: <https://westernalaskalcc.org/science/SitePages/decisionneeds.aspx>



Western Alaska Landscape Conservation Cooperative (LCC) Synthesis Report of Local Meetings

INTRODUCTION

The Western Alaska Landscape Conservation Cooperative (LCC), one of five LCCs in progress or planned for Alaska, was recently launched in 2010 in an early pilot stage. The Western AK LCC will share expertise and capacity to achieve common landscape conservation goals. The LCC will bring together federal, state, tribal, and local governments, academia, and other partners to develop tools, synthesize information, and provide a forum for collaboration to land and resource managers to understand and respond to climate change.

One of the first activities of the Western AK LCC was to convene a series of local meetings throughout the region to gather input on LCC directions. This report summarizes common themes and suggestions for the LCC that emerged from the local meetings.

ABOUT THE LOCAL MEETINGS

Western AK LCC staff held a series of nine (9) meetings in October and November 2010 throughout the western Alaska region to speak with potential partners and solicit input on early directions for the LCC. Meetings were held in Cold Bay, King Salmon, Dillingham, Anchorage, Kodiak, Bethel, Fairbanks, Kotzebue, and Nome.

The meeting agendas, notes and participants for each meeting are summarized in the Appendices. See the full [Synthesis Report of Local Meetings](#) posted on our website to view the appendices.

Over 100 people participated in the series of local meetings, including representatives of federal and state agency staff, non-profit organizations, Alaska Native organizations, academia, and local residents. A list of local meeting participants is included in Appendix B.



Map of the Western AK LCC Region

The Western Alaska LCC is committed to collaborating with partners in order to build on each other's efforts. The Rapid Ecoregional Assessment (REA) process, led by the Bureau of Land Management (BLM), is a complementary effort that will provide additional insight on important management questions in the northern region of the LCC. The LCC local meetings in Fairbanks, Kotzebue, and Nome were held in conjunction with the REA to avoid duplication of effort. More information about the REA, including the REA local meeting notes, can be found at: <http://www.blm.gov/wo/st/en/prog/more/climatechange/reas/seward.html>.



SUMMARY HIGHLIGHTS FROM LOCAL MEETING DISCUSSIONS

In each of the meetings, LCC staff presented general information about Landscape Conservation Cooperatives and then input was solicited on several topics related to the LCC effort.

Several overarching and common themes emerged from the discussions; these are summarized below in the following categories: Observed Biological and Landscape Changes, Data and Information Needs, Collaboration Needs, Communication and Outreach Needs, and Other Issues.

An "issues matrix" of input provided by local meeting participants is included in Appendix C, which provides an at-a-glance summary of topics discussed.

Observed Biological and Landscape Changes

Scientists and local residents are observing landscape and ecosystem changes throughout Western Alaska in the terrestrial and marine domains. Many of these changes are of considerable concern to Alaskan communities due to their impacts on subsistence and living conditions. Listed below are several landscape changes discussed by meeting participants.

Caribou: Declining caribou populations and changing migration patterns have been observed throughout the region. These changes in caribou populations are a significant concern to resource managers and local residents, given the subsistence and cultural importance of the species.

Hydrology: Hydrological changes, specifically drying ponds and wetlands, have been observed; these changes have potential impacts to wildlife habitat quality and quantity.



Cold Bay, Alaska

Coastal Erosion: Coastal erosion is being observed in several villages in the region and is an important concern due to impacts to housing and infrastructure.

Vegetation Changes: A variety of vegetation changes are being observed in Western Alaska. Meeting participants specifically noted an increase in shrub growth (e.g., alder and willow) in current tundra areas, which may signify a loss of caribou habitat.

New or Introduced Species: Several meeting participants mentioned sightings of species formerly not seen in an area (e.g., skates present in a bay and beaver on the Seward Peninsula), or new behaviors (e.g., more overwintering Brant), as well as introduced (e.g., Bison in Kodiak area) or invasive species.

Other Observations of Change: Other observations of biological or landscape changes that were mentioned in the local meetings include changes in fish populations (e.g., declining catches in halibut and salmon), wind and weather changes, and changes in the marine environment (e.g.,



ocean acidification, seal population distribution changes and disease). It was also noted that human activities (e.g., energy development, deforestation) should be included when considering regional landscape change.

Data and Information Needs

A significant portion of the local meeting discussions focused on data and information needs for informed decision-making and resource management.

Baseline Data and Monitoring of Key Species and Habitat: Several participants stressed a large gap in—and critical need for—baseline data and ongoing monitoring of species and habitat, especially for subsistence species such as caribou and salmon. Participants expressed a need for long-term data that can be used to detect and understand landscape changes at scales useful for decision-making.

Habitat and Species Models: Meeting participants generally agreed on the need for habitat and species models to predict how climate change will affect the distribution, range, and habitat of species (specifically subsistence species). Development of these models and translation of the resulting information to decision-makers will require collaboration across disciplines and geographic regions.

Climate Patterns and Changes at Local and Regional Scales: Another information need discussed was downscaling of climate change models and predictions at regional and local scales. Local communities and decision-makers expressed the need to understand how climate change and other drivers will affect their local landscapes in the next decades.

Subsistence Use and Trends: Subsistence use of landscape resources is a critical issue throughout Western Alaska, and meeting participants noted the need for more information on subsistence patterns, as well as better information on how the distribution and abundance of subsistence species may change in the future. Specific information needs include potential changes in travel distances for subsistence harvest and adaptation of subsistence patterns to changes in species.

Hydrological Data and Mapping: Hydrological data was discussed as a key information gap in understanding changes in the hydrological cycle as well as potential impacts on wildlife and water resources. Specific examples of hydrological data needs include expansion of hydrological monitoring stations and mapping of lake boundaries.

Permafrost: Permafrost data was cited as a need for understanding how climate change is affecting permafrost and how those changes may impact hydrology, coastal erosion, vegetation patterns, and infrastructure.

Geospatial Baseline Mapping: Baseline mapping was also discussed as a basic data need, including coastline/erosion mapping, topographic data and elevation models, and satellite and aerial photography.



Other: Other information needs that were discussed included: wildlife contaminants and disease, human impacts and development (e.g., population growth, energy development), ocean acidification, the ocean-land interface (e.g., shoreline and intertidal processes), climate change effects on public health, fire frequency and severity, and pests and invasive species.

Collaboration Needs

There are urgent needs for integrated landscape-level observations and modeling, yet no one agency or organization has the capacity to meet these needs. Many local meeting participants recognized the value of the LCC in facilitating improved collaboration and leveraging of existing efforts and resources. Several specific suggestions for collaborative needs and activities are listed below.

Clearinghouse to Discover, Exchange, and Access Information and Data: One of the most frequent suggestions was for the development of an online portal or clearinghouse where relevant information and data could be found, including search and discovery of scientific data, information on ongoing and planned projects, publications, and a directory of experts. This would provide "one-stop-shopping" for a variety of audiences to learn about, and better coordinate with, LCC-related efforts.

Improved Coordination Within and Between State and Federal Agencies: Several meeting participants suggested improved coordination of science activities and data collection within and between state and federal agencies, as well improved communication and collaboration overall.

Collaboration on Monitoring Protocols and Joint Field Planning: Participants noted that scientific collaboration would be strengthened by coordinating monitoring protocols and joint field efforts; for example, collaboration in monitoring sites would result in complementary studies with improved spatial and geographic coverage.

Fully Integrate Indigenous Knowledge and Participation of Local Residents: Local residents emphasized the need for the LCC to fully integrate Traditional Ecological Knowledge (TEK)/Indigenous Knowledge as a core component of science activities. In addition, the LCC was encouraged to engage in two-way communication with local residents from the beginning to end of LCC activities.

Define Clear Roles and Structure of the LCC: Since several organizations and agencies are conducting or planning efforts relevant to LCC goals, meeting participants stressed the need to clearly define and communicate the activities and structure of the LCC as well as its role in relation to existing agency efforts and programs.

Include NGOs and Other Non-Federal/State Entities in the LCC Process and Structure: In order for the LCC to be viewed as a truly collaborative effort, it was suggested that the LCC fully include non-governmental organizations (NGOs), Alaska Native organizations, and other groups in the LCC organizational structure.



Communication and Outreach Needs

Several suggestions related to communication and outreach of LCC activities and science.

Public Outreach: Several meeting participants discussed the need to provide local communities and Alaskan residents information on science and resource management that is easily understandable and can be used to inform decision-making. A related suggestion was to make a concerted effort to engage and inform the broader public/taxpayers on the value of the LCC and its relevance.

Outreach to Agencies, Policy-Makers, and the Science Community: Specific suggestions for outreach to the scientific, agency, and resource management communities included a brochure geared to upper-level policy-makers, a newsletter, and regular communications on LCC activities.

K-12 and College Student Outreach and Training: Another outreach suggestion was to engage students through targeted educational activities to encourage science as a career, or LCC internships.

Other Issues

Other input provided through the local meetings focused on LCC organizational issues, including the following suggestions:

- The LCC should ensure that long-term funding will exist for LCC activities; this should be communicated to potential partners and collaborators to encourage participation in the effort.
- The LCC should design LCC decision-making processes (selecting of committee representatives and working groups, funding decisions, etc.) to be clear and transparent, and the decision-making processes should be communicated to those outside the LCC structure.
- The LCC should consider ways to provide information to decision-makers that can facilitate decisions in the short-term; science and research can be a long process, but decision-makers need information immediately.

NEXT STEPS

The series of local meetings convened by Western Alaska LCC staff provided an excellent forum for discussing community needs throughout the region. The issues raised and discussed in the local meetings will be reviewed and discussed by the LCC interim Steering Committee and will help formulate the agenda and goals for a Western AK LCC science workshop to be held in April 2011. This science workshop will bring together land and resource managers (from state, federal, and Native Alaskan management entities), field specialists, researchers, conservation organizations, academia, and others to help identify early science needs for the new Western Alaska LCC.

More information on the Western Alaska LCC can be found through the LCC website at: <http://westernalaskaLCC.org>.



10 Appendix B: Executive Summary of ‘Decision Analysis Framing and Structuring for the Western Alaska Landscape Conservation Cooperative’

February 16-17, 2011

Full report available

at: <https://westernalaskalcc.org/science/SitePages/framingwkshp.aspx>



Executive Summary

The Western Alaska Landscape Conservation Cooperative (LCC) held two workshops in the spring of 2011, a “Framing Workshop” with the Steering Committee in February, followed by a “Science Workshop” with very broad participation from the scientific community in April. The main goal of the Framing Workshop described in this report was to clearly define a decision support context for the LCC that could be used to structure and guide discussions about data and information needs at the Science Workshop. Having this explicit decision context also provides a basis for logically evaluating and prioritizing the identified science needs.

The mission of the Western Alaska LCC is *to promote coordination, dissemination, and development of applied science to inform landscape level conservation, including terrestrial-marine linkages, in the face of changing climate and related stressors*. Identifying the most useful applied science requires “beginning with the end in mind.” Here that meant starting by developing a clear understanding of what kinds of resource management and conservation decisions are being and will be made in Western Alaska for which future climate is relevant, and what the desired outcomes of those management decisions are. Understanding the broad management goals of LCC partners leads naturally to identification of common management or conservation outcomes of interest: these become outcomes that LCC science should be designed to measure, estimate, or predict.

The Framing Workshop began with Steering Committee members listing the various resource management agencies and stakeholders (partners) who will potentially benefit from LCC-supported science. Primary decision makers were identified as (i) agencies that have land and resource management responsibilities, and the authority to make specific decisions about how those resources are utilized (e.g., US FWS National Wildlife Refuge System, Alaska Department of Fish and Game, National Oceanic and Atmospheric Administration/ National Marine Fisheries Service, Alaska Native Regional Corporations, among others), as well as (ii) agencies who have responsibilities and make decisions which have physical impacts on the landscape that can affect conservation (e.g., Federal and State Departments of Transportation, etc.). These are organizations whose decision making could be directly influenced by LCC science. As such, they represent the main audience for that science and those whose information needs will most strongly direct LCC priorities. Decision “influencers” (agencies, groups, or individuals) were identified as those having a significant role in land and resource management, but whose role is exercised mainly through influence on the primary decision makers.

Workshop participants next identified a variety of decisions that they considered illustrative of the types of conservation and land and resource management decisions the agencies identified above make on a regular basis. The goal was not to develop a comprehensive list of every decision that each management agency makes, but instead to identify the types of decisions which may be of interest to multiple LCC partner agencies. For example, several of the agencies identified above have land and resource management responsibilities for specific



areas (e.g, National Wildlife Refuges, National Parks, State-owned lands). The types of decisions that each agency makes with regard to lands under their regulatory purview are likely to be similar, and to benefit from similar information regarding the impacts of climate change on those lands. The list of examples was organized into seven broad types of decisions, shown at the right.

The next step in the framing process was to clearly identify the broad management objectives of the identified decision makers.

“Objectives” as used here describe the outcomes that the decision maker hopes to achieve more of (or conversely, to avoid) when making management and conservation decisions. Specification of objectives thereby provides a framework for determining the type of information that would help them make an informed choice. Just as each partner organization has unique decisions, each also has its own unique set of objectives driven by its various roles, responsibilities, mission and history. At a high level, though, organizations making similar types of decisions often share the same or very similar general objectives. Workshop participants generated a list of specific objectives for various agencies, and then grouped and reorganized them into a set of eight high-level objectives or outcomes of management interest, as shown on the bottom right.

LCC science is intended to add to the understanding of how climate will impact each of these objectives, in order to provide that information to the decision-making agencies so that they can consider it in carrying out their missions.

The final step of this Framing Workshop, to be continued in the Science Workshop, was to identify and develop “attributes:” potentially measureable indicators of the impact of climate change on the high-level objectives (e.g, the species composition at different trophic levels is a potential indicator of ecosystem function). These attributes will then provide a tangible link between data and information “needs” as identified by scientists, and the information and data that decision-makers truly feel they need to make better, more informed decisions. This structure, particularly the identified outcomes of management interest common to LCC partners was used to guide discussions at the Science Workshop (documented separately).

Seven types of decisions commonly made by LCC partner agencies

- *Decisions about land and water use*
- *Decisions directly affecting habitat*
- *Decisions directly affecting species*
- *Decisions about setting quality standards*
- *Decisions about industry oversight*
- *Decisions about infrastructure and community development*
- *Decisions about cultural resources*

Eight broad outcomes of management interest common to LCC partner agencies

- *Ecosystem function*
- *Habitat quality*
- *Population health (for individual species)*
- *Public health and safety*
- *Economic benefits*
- *Protection of culture*
- *Community stability*
- *Quality of outdoor experience*



Appendix C: Executive Summary of ‘Science Needs’ Workshop

April 26-27, 2011

Full report available at:

<https://westernalaskalcc.org/science/SitePages/sciencewkshp.aspx>



Executive Summary

Climate change is one of the greatest conservation challenges of the 21st century and the communities of Western Alaska are already feeling its effects. Understanding climate change effects and responding effectively will require unprecedented communication among researchers, managers, decision makers, resource users and other stakeholders from across public agencies and private organizations. The goal of *Landscape Conservation Cooperatives (LCCs)* is to facilitate this landscape-level collaboration and communication to help manage effectively in the face of climate change. The mission of the Western Alaska Landscape Conservation Cooperative (WALCC) is to ***promote coordination, dissemination, and development of applied science to inform landscape level conservation, including terrestrial-marine linkages, in the face of a landscape scale stressors with a focus on climate change.***

The goals of the WALCC are to:

- Promote communications about climate change effects in Western Alaska;
- Improve efficiencies in science activities by supporting partner coordination and collaboration;
- Identify research and share data to support land and resource management;
- Enable synthesis of information at landscape and larger spatial scales; and
- Enhance resource management in western Alaska through applied science and technology transfer.

To further its mission, the WALCC hosted a Science Workshop in Anchorage, Alaska, on 26-27 April, 2011. The workshop aimed to identify common science needs in its geographic region, with a focus on current and anticipated changes in climate and their effects, ultimately, on biological resources. The workshop was co-sponsored by the U.S. Geological Survey's Alaska Climate Science Center (CSC), the Bureau of Land Management (BLM), and the WALCC. It brought together 150 managers, field specialists, researchers, and local knowledge experts to identify climate change-related science needs for land and resource management in western Alaska. It was immediately followed by a small workshop sponsored by the CSC and the University of Alaska Fairbanks, focused on downscaling climate model projections (http://ine.uaf.edu/accap/research/downscaling_ws.htm).

The main goal of the Science Workshop was to ***identify the priority science and information needs for meeting shared management objectives in light of projected climate change impacts***, where 'shared management objectives' refers to those common to multiple resource management agencies (see Chapter 2). The workshop also aimed to:

- Increase understanding of projected climate change effects on Western Alaskan ecosystems,
- Provide a forum for communication across organizations, disciplines, and perspectives (scientist, managers, decision makers, and resource users),
- Increase awareness of linkages between physical processes and ecological systems, and
- Share information with those unable to participate, via this workshop report.

Before the Science Workshop, the WALCC held a Framing Workshop in February 2011, where participants identified climate-relevant resource management decisions commonly made by WALCC partner agencies and outcomes of common interest. These were used to organize the



Science Workshop discussions. The Science Workshop began with plenary presentations that summarized predictions about climate change effects in Western Alaska ecosystems. Participants were then split into breakout groups to discuss expected changes in physical processes and their impacts on taxa. The structure of the Science Workshop discussions is detailed in Chapter 2.

Most Important Changes in Geophysical Processes

The breakout discussions in the Science Workshop resulted in assessments of the most important changes in geophysical processes (summarized in chapter 4). Overall, the most important process change identified was change in aspects of the hydrologic cycle, which included changes in water budget and seasonality; base flows; flood timing, frequency, and magnitude; and timing of snow melt. The next most important process changes were vegetation changes (plant succession and distribution) and changes in coastal processes (inundation, erosion, salinization [increased saltiness], and shore-fast ice dynamics).

Common Science Needs

The breakout groups identified key science needs (summarized in chapter 5). All breakout groups were unanimous in identifying three broad needs:

- developing linkages among physical processes, ecological processes, and important species;
- conducting data synthesis;
- improving data management, long-term curation, access and sharing.

Two additional needs were raised by five of the six groups:

- maintaining and expanding hydrological data collection stations; and
- conducting gap analyses to identify key data on important species and/or physical/climate parameters that is currently unavailable.

Most of the identified needs reflect problems common to long-term knowledge management in organizations that mainly support short-term projects to address near-term objectives. Resources are allocated to the pressing needs of current data collection and analysis sufficient to generate the necessary information for the immediate objectives, but are not allocated for long-term data management, sharing and curation in order to support future analysis needs. That all breakout groups unanimously identified needs for science integration and support services also indicates problems common in multi-disciplinary studies.

Many groups also recommended specific science strategies and approaches (detailed in chapter 5). The majority of these reflect specific facets of the underlying need for more effective communication between scientists, managers, decision makers, and resource users. This becomes a central concern when focusing on planning decision-relevant science.

Next Steps in WALCC Science Planning

The Science Workshop was a forum for communication across agencies and organizations, disciplines and cultures, in alignment with the mission of the Western Alaska LCC. As expected in any cross-disciplinary, integrative effort, the dominant workshop challenges related to communication. Many groups recommended improving collaboration. This was raised in terms of integrative, multidisciplinary studies; involving local residents; and incorporating local and



traditional ecological knowledge. A summary of ‘Lessons Learned’ regarding the design of the workshop is in appendix 6.

Both the Framing and Science Workshop results have identified information gaps and science needs that limit the ability of resource management agencies to predict the outcomes that are of interest to them. These results provide a foundation for the science planning activities of both the Western Alaska LCC and the Alaska Climate Science Center.

The next steps in developing the Western Alaska LCC’s long term science plan include defining criteria for deciding which projects and portfolios of activities to pursue. Such criteria will provide a consistent approach for strategic decision making and allow for transparent process. More information about the Western Alaska LCC planning process is briefly outlined in chapter 6.



11 Appendix D: LCC Network Vision, Mission, and Goals

Vision

Landscapes capable of sustaining natural and cultural resources for current and future generations.

Mission

A network of cooperatives depends on LCCs to:

- Develop and provide integrated science-based information about the implications of climate change and other stressors for the sustainability of natural and cultural resources;
- Develop shared, landscape-level, conservation objectives and inform conservation strategies that are based on a shared scientific understanding about the landscape, including the implications of current and future environmental stressors;
- Facilitate the exchange of applied science in the implementation of conservation strategies and products developed by the Cooperative or their partners;
- Monitor and evaluate the effectiveness of LCC conservation strategies in meeting shared objectives;
- Develop appropriate linkages that connect LCCs to ensure an effective network.

Guiding Principles

- Consider and respect each participating organization's unique mandates and jurisdictions.
- Add value to landscape-scale conservation by integrating across LCCs and other partnerships and organizations to identify and fill gaps and avoid redundancies.
- Conduct open and frequent communications within the LCC network and among vested stakeholders and be transparent in deliberations and decision-making.
- Focus on developing shared landscape-level priorities that lead to strategies that can be implemented.
- Develop and rely upon best available science.
- Develop explicit linkages and approaches to ensure products are available in a form that is usable by partners delivering conservation.
- Use a scientifically objective adaptive management approach in fulfilling the mission.



12 Appendix E: Crosswalk identifying linkages between the Western Alaska LCC Strategic Science Plan and the National Fish, Wildlife and Plant Climate Adaptation Strategy

The National Fish, Wildlife and Plant Climate Adaptation Strategy (2012) identified seven goals and, for each, one or more strategies in support of achieving that goal. Additionally, the authors identified one or more example actions under each strategy.

The following table provides a cross-walk between those strategies and example actions and the LCC's Strategic Science Plan. Relevant sections of the science plan are identified for each relevant strategy element. Further, example actions that are appropriate for the LCC to contribute to through its actions are identified. Note that an example action may be appropriate for a partner of the LCC but not for the LCC itself. Strategies and example actions that are not currently appropriate for the LCC have been deleted for readability.

References

National Fish, Wildlife and Plants Climate Adaptation Partnership. 2012. *National Fish, Wildlife and Plant Climate Adaptation Strategy*. Association of Fish and Wildlife Agencies, Council on Environmental Quality, Great Lakes Indian Fish and Wildlife Commission, National Oceanic and Atmospheric Administration, and U.S. Fish and Wildlife Service. Washington, DC. <http://www.wildlifeadaptationstrategy.gov/> (accessed July 2012).



National Fish, wildlife and Plants Climate adaptation Strategy goals, strategies and example actions (2012). Only those relevant to the LCC are included in this table, for the full table see <http://www.wildlifeadaptationstrategy.gov/>.

Goal 1. Conserve habitat to support healthy fish and wildlife populations and ecosystem functions in a changing climate.		
Strategy 1.1: Identify areas for an ecologically-connected network of terrestrial, freshwater, coastal, and marine conservation areas that are likely to be resilient to climate change and to support a broad range of fish, wildlife, and plants under changed conditions.		
Example Actions		LCC Ref.
1.1.1: Identify and map high priority areas for conservation using information such as species distributions (current and projected), habitat classification, land cover, and geophysical settings (including areas of rapid change and slow change).		Strategic Science Plan; Sections 3.3, 3.4
1.1.2: Identify and prioritize areas currently experiencing rapid climate impacts (e.g., low-lying areas, Florida keys).		
1.1.3: Assess the potential of species to shift ranges, and prioritize conservation efforts taking into account range shifts and accounting for ecosystem functions and existing and future physical barriers.		
Strategy 1.4: Conserve, restore, and as appropriate and practicable, establish new ecological connections among conservation areas to facilitate fish, wildlife, and plant migration, range shifts, and other transitions caused by climate change.		
Example Actions		LCC Ref.
1.4.4: Assess and take steps to reduce risks of facilitating movement of undesirable non-native species, pests, and pathogens.		Sections 3.3, 3.4
Goal 2. Manage species and habitats to protect ecosystem functions and provide sustainable cultural, subsistence, recreational and commercial use in a changing climate.		
Strategy 2.1: Update current or develop new species, habitat, and land and water management plans, programs and practices to consider climate change and support adaptation.		
Example Actions		LCC Ref.
2.1.1: Incorporate climate change considerations into new and future revisions of species and area management plans (e.g., State Wildlife Action Plans, agency-specific climate change adaptation plans) using the best available science regarding projected climate changes and trends, vulnerability and risk assessments, scenario planning, and other appropriate tools as necessary.		Strategic Science Plan; Sections 3.3, 3.4
2.1.2: Develop and implement best management practices to support habitat resilience in a changing climate.		
2.1.3: Identify species and habitats particularly vulnerable to transition under climate change (e.g., wetlands, cool-water to warm-water fisheries) and develop management strategies and approaches for adaptation.		



	<p>2.1.5: Review and revise as necessary existing species and habitat impact avoidance, minimization, mitigation, and compensation standards and develop new standards as necessary to address impacts in a manner that incorporates climate change considerations.</p> <p>2.1.7: Review existing management frame-works and identify ways to increase the ability of stakeholders to adapt their actions to climate variability and change while preserving the integrity and sustainability of natural resources, habitats, and ecosystems.</p> <p>2.1.8: Utilize the principles of ecosystem-based management and green infrastructure.</p> <p>2.1.9: Develop strategic protection, retreat, and abandonment plans for areas currently experiencing rapid climate change impacts (e.g., coastline of Alaska and low-lying islands).</p>	
Strategy 2.2: Develop and apply species-specific management approaches to address critical climate change impacts where necessary.		
	<p>Example Actions</p> <p>2.2.1: Use vulnerability and risk assessments to design and implement management actions at species to ecosystem scales.</p> <p>2.2.2: Develop criteria and guidelines that foster the appropriate use, and discourage inappropriate use of translocation, assisted relocation, and captive breeding as climate adaptation strategies.</p> <p>2.2.3: Where appropriate, actively manage populations (e.g., using harvest limits, seasons, translocation, captive breeding, and supplementation) of vulnerable species to ensure sustainability and maintain biodiversity, human use, and other ecological functions.</p>	<p>LCC Ref.</p> <p>LCC information products can inform partners doing this; 3, 3.3, 3.4, 3.5</p>
Strategy 2.3: Conserve genetic diversity by protecting diverse populations and genetic material across the full range of species occurrences.		
	<p>Example Actions</p> <p>2.3.1: Develop and implement approaches for assessing and maximizing the potential for maintaining genetic diversity of plant and animal species.</p>	<p>LCC Ref.</p> <p>Strategic Science Plan; Sections 3, 3.3, 3.4</p>
Goal 3. Enhance capacity for effective management in a changing climate.		
Strategy 3.1: Increase the climate change awareness and capacity of natural resource managers and other decision makers and enhance their professional abilities to design, implement, and evaluate fish, wildlife, and plant adaptation programs.		
	<p>Example Actions</p> <p>3.1.1: Build on existing needs assessments to identify gaps in climate change knowledge and technical capacity among natural resource professionals.</p>	<p>LCC Ref.</p> <p>Strategic Science</p>



<p>3.1.2: Build on existing training courses and work with professional societies, academicians, technical experts, and natural resource agency training professionals to address key needs, augment adaptation training opportunities, and develop curricula, a common lexicon, and delivery systems for natural resource professionals and decision makers.</p> <p>3.1.3: Develop training on the use of existing and emerging tools for managing under uncertainty (e.g., vulnerability and risk assessments, scenario planning, decision support tools, and adaptive management).</p> <p>3.1.4: Develop a web-based clearinghouse of training opportunities and materials addressing climate change impacts on natural resource management.</p> <p>3.1.5: Encourage use of interagency personnel agreements and interagency (state, federal, and tribal) joint training programs as a way to disperse knowledge, share experience and develop interagency communities of practice about climate change adaptation.</p> <p>3.1.6: Support and enhance web-based clearinghouses of information (e.g., www. CAKEX.org, etc.) on climate change adaptation strategies and actions targeted towards the needs of resource managers and decision makers.</p> <p>3.1.7: Increase scientific and management capacity (e.g., botanical expertise) to develop management strategies to address impacts and changes to species.</p> <p>3.1.8: Develop training materials to help managers and decision makers apply climate knowledge to the administration of existing natural resource and environmental laws and policies.</p>	<p>Plan; Sections 3, 3.1, 3.3, 3.5, 3.7, 3.8, 6.2</p>
<p>Strategy 3.2: Facilitate a coordinated response to climate change at landscape, regional, national, and international scales across state, federal, and tribal natural resource agencies and private conservation organizations.</p>	
<p>Example Actions</p> <p>3.2.1: Use regional venues, such as LCCs, to collaborate across jurisdictions and develop conservation goals and landscape/ seascape scale plans capable of sustaining fish, wildlife, and plants.</p> <p>3.2.3: Integrate individual agency and state climate change adaptation programs and State Wildlife Action Plans with other regional conservation efforts, such as LCCs, to foster collaboration.</p> <p>3.2.4: Collaborate with tribal governments and native peoples to integrate traditional ecological knowledge and principles into climate adaptation plans and decision-making.</p> <p>3.2.5: Engage with international neighbors, including Canada, Mexico, and nations in the Caribbean Basin, and Atlantic ocean to help adapt to and mitigate climate change impacts in shared trans-boundary areas and for common migratory species.</p> <p>3.2.6: Foster interaction among land-owners, local experts, and specialists to identify opportunities for adaptation and to share resources and expertise that otherwise would not be available to many small landowners.</p>	<p>LCC Ref.</p> <p>Strategic Science Plan; Sections 3.1, 3.3, 3.5, 3.8, 6.2</p>



Goal 4. Support adaptive management in a changing climate through integrated observation and monitoring and use of decision support tools.

Strategy 4.1: Support, coordinate, and where necessary develop distributed but integrated inventory, monitoring, observation, and information systems at multiple scales to detect and describe climate impacts on fish, wildlife, plants, and ecosystems.

Example Actions	LCC Ref.
<p>4.1.1: Synthesize existing observations, monitoring, assessment, and decision support tools as summarized by the U.S. Global Change Research Program Ecosystem Working Group. Conduct a knowledge-gap analysis of existing observation networks, indicators, monitoring programs, remote sensing capabilities, and geospatial data necessary to define priorities.</p> <p>4.1.2: Use available long-term monitoring programs at appropriate scales (local to international) as baselines for population and migration changes that could be affected by climate change (e.g., International Waterfowl Surveys).</p> <p>4.1.3: Work through existing distributed efforts (e.g., NCA, National Estuarine Research Reserve System’s system-wide monitoring program, State Natural Heritage Programs, National Wildlife Refuge System and National Park Service inventory and Monitoring Programs) to support integrated national observation and information systems that inform climate adaptation.</p> <p>4.1.4: Expand and develop as necessary a network of sentinel sites (e.g., tribal lands, National Estuarine Research Reserves, National Wildlife Refuges, state lands) for integrated climate change inventory, monitoring, research, and education.</p> <p>4.1.5: Develop consensus standards and protocols that enable multi-partner use and data discovery, as well as interoperability of databases and analysis tools related to fish, wildlife, and plant observation, inventory, and monitoring.</p> <p>4.1.6: Develop, refine, and implement monitoring protocols that provide key information needed for managing and conserving species and ecosystems in a changing climate.</p> <p>4.1.7: Use existing or define new indicators at appropriate scales that can be used to monitor the response of fish, wildlife, plants, and ecosystems to climate change.</p> <p>4.1.8: Promote a collaborative approach to acquire, process, archive, and disseminate essential geospatial and satellite-based remote sensing data products (e.g., green-up, surface water, wetlands) needed for regional-scale monitoring and land management.</p> <p>4.1.9: Collaborate with the National Phenology Network to facilitate monitoring of phenology; create an analogous National Population Network to catalog changes in distribution and abundance of fish, wildlife, and plants that have been identified as most vulnerable to climate change.</p> <p>4.1.10: Identify and develop a lessons learned/success stories list of multi-partner data development, analysis, and dissemination efforts.</p>	<p>Strategic Science Plan; Sections 3.3, 3.4, 3.6, 3.7</p>



Strategy 4.2: Identify, develop, and employ decision support tools for managing under uncertainty (e.g., vulnerability and risk assessments, scenario planning, strategic habitat conservation approaches, forecasting, and adaptive management evaluation systems) via dialogue with scientists, managers (of natural resources and other sectors), economists, and stakeholders.

Example Actions	LCC Ref.
<p>4.2.1: Develop regional downscaling of Global Climate models to conduct vulnerability assessments of living resources.</p> <p>4.2.2: Develop, disseminate, and utilize geophysical and biological modeling (such as Species Distribution Models).</p> <p>4.2.3: Conduct vulnerability and risk assessments for habitats and priority species (threatened and endangered species, species of greatest conservation need, and species of socioeconomic and cultural significance).</p> <p>4.2.4: Define (national) standards and criteria to identify fish, wildlife, plants, and ecosystems most vulnerable to climate change impacts.</p> <p>4.2.5: Synthesize vulnerability assessments across jurisdictions to provide regional assessments.</p> <p>4.2.6: Engage scientists, resource managers, economists, and stakeholders in climate change scenario planning processes, including identification of a set of plausible future scenarios associated with climate phenomena and socio-economics likely to significantly impact fish, wildlife, and plants.</p> <p>4.2.7: Ensure the availability of and provide guidance for decision support tools (e.g., NOAA's Digital Coast, Sea Level Affecting Marshes Model (SLAMM), etc.) that assist federal, state, local, and tribal resource managers and planners in effectively managing fish, wildlife, and plants in a changing climate.</p> <p>4.2.8: Use observation and monitoring systems in an adaptive management framework to evaluate the effectiveness of specific management actions and adapt management approaches appropriately.</p> <p>4.2.9: Develop a central repository for sharing experiences and reporting progress in implementing the Strategy in order to share information across implementing agencies and partners and to inform future iterations of the Strategy.</p>	<p>Strategic Science Plan; Sections 3.2, 3.3, 3.5, 3.9</p>

Goal 5. Increase knowledge and information on impacts and responses of fish and wildlife to a changing climate.

Strategy 5.1: Identify knowledge gaps and define research priorities via a collaborative process among federal, state, tribal, private conservation organization, and academic resource managers and research scientists.

Example Actions	LCC Ref.
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<p>5.1.1: Increase coordination and communication between resource managers and natural and social scientists through existing forums (e.g., National Science Foundation (NSF), USGCRP, NCA, USDA, Cooperative Ecosystem Studies Units, CSCs, LCCs, JVs, RISAs, Associations of Fish and Wildlife Agencies, State Wetlands Managers, State Floodplain Managers, Coastal States Organization, National Estuarine Research Reserve Association, and others) to ensure research is connected to management needs.</p> <p>5.1.2: Bring managers and scientists together at the appropriate scales to prioritize research needs that address resource management objectives considering a changing climate.</p> <p>5.1.3: Encourage agencies with scientific assets and expertise to participate in and contribute to regional dialogues about actions needed to meet management-driven science needs.</p> <p>5.1.4: Participate in research planning for relevant programs of agencies (e.g., NSF, NOAA, state agencies, and local governments), and intergovernmental forums to ensure inclusion of research relevant to missions of agencies and resource managers.</p> <p>5.1.5: Based on priority conservation needs identified by resource managers, (develop national, and as appropriate,) regional research agendas identifying key high level questions for which more fundamental research is needed to enable development of management applications or decision support tools; and facilitate consultation among major science funding agencies to maximize incorporation of these needs into funding opportunities and work plans.</p> <p>5.1.6: Prioritize research on questions relevant to managers of near-term risk environments (e.g., low-lying islands, coral reefs) or highly vulnerable species.</p> <p>5.1.7: Prioritize research and methods development for the valuation of ecosystem services and the role these services play in ameliorating climate change impacts on people and communities.</p>	<p>Strategic Science Plan; Sections 3.2, 3.3, 3.5, 3.8, 4.1, 6.2</p>
<p>Strategy 5.2: Conduct research into ecological aspects of climate change, including likely impacts and the adaptive capacity of species, communities and ecosystems, and their associated ecosystem services, working through existing partnerships or new collaborations as needed (e.g., USGCRP, NCA, CSCs, RISAs, and others).</p>	
<p>Example Actions</p> <p>5.2.1: Produce regional to subregional projections of future climate change impacts on physical, chemical, and biological conditions for U.S. ecosystems.</p> <p>5.2.2: Support basic research on life histories and food web dynamics of fish, wildlife, and plants to increase understanding of how species are likely to respond to changing climate conditions and identify survival thresholds.</p> <p>5.2.3: Identify and address priority climate change knowledge gaps and needs (e.g., species adaptive capacity, risk and rewards of assisted relocation, climate change synergy with existing stressors).</p>	<p>LCC Ref.</p> <p>Strategic Science Plan; Sections 3.2, 3.3, 3.4, 3.5, 3.6, 6.2</p>



	<p>5.2.4: Conduct research on the propagation and production of native plant materials to identify species or genotypes that may be resilient to climate change.</p> <p>5.2.5: Accelerate research on establishing the value of ecosystem services and potential impacts to communities from climate change (e.g., loss of pollution abatement or flood attenuation; climate regulation by forests and wetlands through carbon sequestration, oxygen production, and Co2 consumption; and pollination by insects, birds, and mammals).</p> <p>5.2.6: Identify pollutants likely to be affected by climate change and accelerate research on their effects on fish, wildlife, and their habitats, including contaminant effects that will likely increase vulnerability to climate change.</p>	
Strategy 5.3: Advance understanding of climate change impacts and species and ecosystem responses through modeling.		
	<p>Example Actions</p> <p>5.3.1: Define the suite of physical and biological variables and ecological processes for which predictive models are needed via a collaborative process among state, federal, and tribal resource managers, scientists, and model developers.</p> <p>5.3.2: Improve modeling of climate change impacts on vulnerable species, including projected future distributions and the probability of persistence.</p> <p>5.3.3: Develop models that integrate the potential effects of climate and non-climate stressors on vulnerable species.</p> <p>5.3.4: Develop and use models of climate-impacted physical and biological variables and ecological processes at temporal and spatial scales relevant for conservation.</p> <p>5.3.5: Provide access to current climate data and ensure alignment with data management and decision support tools at agency and departmental levels.</p>	<p>LCC Ref.</p> <p>Strategic Science Plan; Sections 3, 3.3, 3.4, 3.5</p>
Goal 6. Increase awareness and motivate action to safeguard fish and wildlife in a changing climate.		
Strategy 6.1: Increase public awareness and understanding of climate impacts to natural resources and ecosystem services and the principles of climate adaptation at regionally- and culturally-appropriate scales.		
	<p>Example Actions</p> <p>6.1.1: Develop focused outreach efforts and materials aimed at local, state, tribal, and federal government authorities; land and water managers; economic policy decision makers; zoning and transportation officials; etc. on ecosystem services, climate impacts to fish, wildlife, plants, and ecosystems, the impacts of other local stressors, and the importance of adaptation planning.</p> <p>6.1.2: Develop outreach efforts and materials to other key audiences, such as the private sector (e.g., agriculture, forestry, etc.), cultural leaders, and private land managers that provide information on existing conservation incentive programs.</p>	<p>LCC Ref.</p> <p>Strategic Science Plan; Sections 3.1, 3.9, 4.1, 5</p>



<p>6.1.3: Identify and partner with key stakeholder groups (e.g., conservation and environmental organizations, hunting and angling groups, trade associations, outdoor manufacturers and retailers) to help develop and distribute key climate change and adaptation messages tailored for their interest groups as well as the broader public.</p> <p>6.1.4: Incorporate information about potential climate change impacts to ecosystem services in education and outreach activities.</p> <p>6.1.5: Increase public awareness of existing habitat conditions and the benefits of building resiliency of those habitats.</p>	
Strategy 6.2: Engage the public through targeted education and outreach efforts and stewardship opportunities.	
<p>Example Actions</p> <p>6.2.1: Identify and make opportunities available for public involvement to aid in the development of focused outreach materials.</p> <p>6.2.2: Use public access points, nature centers, and hunting and fishing regulation guides to inform tourists, visitors, and recreational users of climate change impacts to and adaptation strategies for fish, wildlife, and plants.</p> <p>6.2.3: Develop specific programs and/or modify existing programs (e.g., bird and amphibian surveys) to motivate action and engage citizens in monitoring impacts of climate change on the landscape (e.g., citizen science monitoring for detection of invasive species, nature center programs, etc.).</p> <p>6.2.4: Make research and monitoring information regarding climate impacts to species and natural systems accessible and easily understood to the public and other partners (e.g., commercial fisheries, etc.).</p> <p>6.2.5: Develop educational materials and teacher trainings for k-12 classrooms linked to state education standards on impacts and responses to climate change.</p> <p>6.2.6: Develop collaborations with zoos, museums, aquariums, botanic gardens, arboreta, and other organizations and universities to increase communication and awareness of impacts and responses to climate change.</p> <p>6.2.7: Develop core messaging and recommended strategies to communicate the <i>Strategy</i> within participating organizations, local associations and clubs (e.g., garden clubs), and with the public.</p> <p>6.2.8: Develop strategy to assess effectiveness of communication efforts and modify as appropriate.</p>	<p>LCC Ref.</p> <p>Strategic Science Plan; Sections 3.1, 3.6, 4.1, 5</p>
Strategy 6.3: Coordinate climate change communication efforts across jurisdictions.	
<p>Example Actions</p> <p>6.3.1: Develop, implement, and strengthen existing communication efforts between federal and state agencies and tribes to increase awareness of the impacts and responses to climate change.</p> <p>6.3.2: Engage employees from multiple agencies in key climate change issues by expanding existing forums for information sharing and idea exchange, and create new forums and channels as needed.</p>	<p>LCC Ref.</p> <p>Strategic Science Plan; Sections 3.1, 4.1, 5, 6.2</p>



	<p>6.3.3: Provide access to tools (web-based and others) that promote improved collaboration, interactive dialog, and resource sharing to minimize duplication of effort across jurisdictions.</p>	
	<p>Strategy 7.2: Slow, mitigate, and reverse where feasible ecosystem degradation from anthropogenic sources through land/ocean- use planning, water resource planning, pollution abatement, and the implementation of best management practices.</p>	
	<p>Example Actions</p> <p>7.2.3: Reduce existing pollution and contaminants and increase monitoring of air and water pollution as necessary.</p>	<p>LCC Ref. Strategic Science Plan; Sections 3.3, 3.4</p>
	<p>Strategy 7.3: Use, evaluate, and as necessary, improve existing programs to prevent, control, and eradicate invasive species and manage pathogens.</p>	
	<p>Example Actions</p> <p>7.3.3: Develop (national) standards for collecting and reporting invasive species data to facilitate information sharing and management response.</p> <p>7.3.4: Apply risk assessment and scenario planning to identify actions and prioritize responses to invasive species that pose the greatest threats to natural ecosystems.</p> <p>7.3.5: Implement existing national, state and local strategies and programs for rapid response to contain, control, or eradicate invasive species, and develop new strategies as needed.</p> <p>7.3.6: Assess risks and vulnerability to identify high priority areas and/or species for monitoring of invasive species and success of control methods.</p> <p>7.3.7: Monitor invasive species and pathogens associated with fish, wildlife, and plant species for increased understanding of distributions and to minimize introductions.</p> <p>7.3.8: Apply integrated management practices, share innovative control methodologies, and take corrective actions when necessary to manage fish, wildlife, and plant diseases and invasives.</p> <p>7.3.9: Work with federal, state, regional, and county agricultural interests to identify potentially conflicting needs and opportunities to minimize ecosystem degradation resulting from pests, pathogens, and invasive species eradication, suppression, and control efforts.</p>	<p>LCC Ref.</p> <p>Strategic Science Plan; Sections 3.3, 3.4, 3.5, 3.6</p>



13 Appendix F: Conflict of Interest Guidelines

Reviewer Confidentiality Agreement

WALCC Review process

The WALCC project selection process includes two stages of review: independent evaluation of each proposal with respect to seven criteria, followed by the full Steering Committee selecting the best integrative suite of proposals to fund. Any Steering Committee members with conflicts of interest with respect to a specific proposal are recused from sharing their evaluation of that proposal. Since all Steering Committee members are expected to participate in selecting the best integrative suite, those with conflicts of interest are expected to still share their views on the specific proposal with respect to the overall suite of proposals, but must refrain from blocking Steering Committee consensus with respect to that specific proposal's inclusion or exclusion in the final suite of proposals.

1. Your Potential Conflicts of Interests

Your designation as a member of the Peer Review Team (PRT) convened to review proposals submitted to the Western Alaska LCC (WALCC) in response to the Request for Proposals (RFP) released in Fiscal Year 2013, requires that you be aware of potential conflict situations that may arise. Read the examples of potentially biasing affiliations or relationships given below. As a PRT member, you will be asked to review applicant proposals. You might have a conflict with one or more of them. Should any conflict arise during your service, you must bring the matter to the attention of the LCC Coordinator. The LCC Coordinator will determine how the matter should be handled and will tell you what further steps, if any, to take. If the LCC Coordinator agrees there is a conflict, you should note the existence of a conflict in the LCC Funding Opportunity System and explain the nature of the conflict in the text field associated with the proposal.

2. Your Obligation to Maintain the Confidentiality of Proposals and Applicants

The WALCC receives proposals in confidence and protects the confidentiality of their contents. For this reason, you must not copy, quote, or otherwise use or disclose to anyone, including your staff, graduate students or post-doctoral or research associates or other colleagues, any material from any proposal you are asked to review. If you believe a colleague can make a substantial contribution to the review, please obtain permission from the LCC Coordinator before disclosing either the contents of the proposal or the name of any applicant or principal investigator. The duty of confidentiality prohibits you from purposefully disclosing proprietary or confidential information and requires you to act with due care in order to avoid the inadvertent disclosure of proprietary or confidential information. This duty extends beyond the period of time during which you serve as a reviewer for the WALCC proposal selection process.



3. Confidentiality of the Review Process and Reviewer Names

The WALCC keeps reviews and your identity as a reviewer of specific proposals confidential to the maximum extent possible. Your name, affiliation, or other identifying information will not be released. Please respect the confidentiality of all principal investigators and of other reviewers. Do not disclose their identities, the relative assessments or rankings of proposals by the PRT, or other details or documentation about the peer review of proposals.

Your Potential Conflicts

I have read the list of affiliations and relationships (below) that could prevent my participation in matters involving such individuals or institutions. To the best of my knowledge, I have no affiliation or relationship that would prevent me from performing my PRT duties. I understand that I must contact the LCC Coordinator if a conflict exists or arises during my service.

Maintaining the Confidentiality of Others

I will not divulge or use any confidential information, described above, that I may become aware of during my service.

Your Identity as a Reviewer will be Kept Confidential

I understand my identity as a reviewer of specific proposals will be kept confidential to the maximum extent possible.

Examples of possible conflicts

1. Your Affiliations with an applicant organization

In the context of a large agency or organization, these considerations are applied at the station or program level. For example, an employee of the US FWS's Migratory Bird Management program would not be viewed to have a conflict reviewing a proposal from the US FWS's Ecological Services program, nor would an employee of one National Park Unit be viewed as having a conflict reviewing proposals from a different National Park Unit (unless obviously involved in the proposal, etc.).

You may have a conflict if you have/hold/are:

- Current employment at the organization.
- Other current employment with the organization (such as consulting or an advisory arrangement).
- Previous employment with the organization within the last 12 months.
- Being considered for employment at the organization.



- Formal or informal reemployment arrangement with the organization.
- Ownership of securities of firms involved in the proposal or application.
- Current membership on a committee or similar body at the organization. (This is a conflict only for proposals or applications that originate from the station, program, department, school, or facility that the committee or similar body advises.)
- Any office, governing board membership, or relevant committee chairpersonship in the organization. (Ordinary membership in a professional society or association is not considered an office.)
- Current enrollment as a student, intern, or similar position with the organization. (Only a conflict for proposals or applications that originate from the station, program, department, school or facility in which one is a student, intern, or similar position.)
- Received and retained an honorarium or award from the organization within the last 12 months.

2. Your relationship with an investigator, project director, or other person who has a personal interest in the proposal or other application

- Known family relationship as spouse, child, sibling, or parent.
- Business or professional partnership.
- Past or present association as thesis advisor or thesis student.
- Collaboration on a project or on a book, article, report, or paper within the last 48 months.
- Co-editing of a journal, compendium, or conference proceedings within the last 24 months.

3. Your other affiliations or relationships

Interests of the following persons are to be treated as if they were yours: Any affiliation or relationship of your spouse, of your minor child, of a relative living in your immediate household or of anyone who is legally your partner that you are aware of, that would be covered by any items above.

Other relationship, such as close personal friendship, that you think might tend to affect your judgment or be seen as doing so by a reasonable person familiar with the relationship.



14 Appendix G: Project Evaluation Guidelines

Review and Selection Process:

Proposals will be evaluated by the Western Alaska LCC Steering Committee, Staff and outside experts using a tiered evaluation approach. Criterion 1, Soundness of Design/Technical Feasibility, and Criterion 2, Applicant Capability to Satisfactorily Complete Project, are “Go/No Go” criteria; proposals that warrant a score of Low on either criterion will not be reviewed further. Proposals receiving further review will be scored with respect to all criteria listed below, with scores summed across criteria. Proposals with total scores in the moderate to high range will then be evaluated with respect to additional criteria, including: potential impact of the expected products on the topics(s) addressed and overall contribution to the goals of establishing a volunteer water temperature monitoring network.

The Steering Committee will select a proposal for funding in consideration of both the individual project evaluation and the ability of the final suite of selections to provide the best foundation for the Western Alaska LCC to meet its conservation goals. Proposals targeting multiple LCCs will have a process for joint review by Steering Committees.

Unless otherwise noted, these criteria are applicable to proposals submitted under any Topic.

Criteria:

1. Soundness of Design / Technical Feasibility (“Go/No Go” criterion)

Is there a clear statement of project objectives, explanation of what the project will accomplish and why it is important for the Western Alaska LCC or sub-region of the LCC? Have the applicants demonstrated a clear understanding of the problem being addressed, the present state of knowledge in the field, and the project’s relation to other work? Is there sufficient information to evaluate the project technically? What are the strengths and/or weaknesses of the technical design relative to securing productive results? Is there an assessment of project uncertainties and how they could impact the success of the project?

2. Applicant Capability to Satisfactorily Complete Project (“Go/No Go” criterion) -

Does the proposal demonstrate that the technical capability of the applicant is sufficient to successfully complete the project, taking into account such factors as the applicant’s 1) past performance in successfully completing projects similar in size, scope and relevance to the proposed project; 2) organizational experience and plan for timely and successfully achieving the objectives of the project; 3) staff expertise/qualifications, staff knowledge, and resources or the ability to obtain them, to successfully achieve the objectives of the project (Was the proposal accompanied by CVs, resumes or letters defining their relevant experience, for each lead PI?); and 4) experience/familiarity working with land and resource management entities, and/or hydrological data.

3. Useability/Applicability –

Have the applicants demonstrated a clear understanding of the information needs the work will address and the logistical challenges presented by working in Alaska? Have they demonstrated a



clear understanding of what those information needs are, the measurable benefits to decision making by LCC partners and stakeholders that will result from the work, and the form or manner in which the work's products should be made available so as to be most readily used by these decision makers? The LCC will contact up to three decision makers from among those whose contact information is provided in the proposal or from others in similar positions within the recommended agency/entity

4. Leveraging / Partnerships -

To what extent will the proposed work strengthen existing partnerships and/or initiate new partnerships and collaborations? To what extent does the proposed work take advantage of existing resources such as matching funding (including in-kind) or build on previous efforts? The scoring guidelines below will be supplemented such that proposals with less than 25% leveraging will be scored Low; 25-49% scored Medium, and >50% scored as High.

5. Timeline and Costs -

Is there a clear table detailing appropriate timelines and associated measurable milestones, objectives, accomplishments, and deliverables that can be used to track and evaluate project performance through the entire award period? Is the justification and allocation of the budget, in terms of the work to be performed, unreasonably high or low? Are leveraged funds adequately described?

6. Education / Outreach -

Is an education and outreach plan clearly defined? Are there planned education and outreach activities/materials aimed at audiences including local communities, general public, stakeholders, and the scientific community? Are there activities/materials aimed at decision makers? Are the education/outreach costs itemized in the budget realistic for the proposed activities?

7. Data Management

Does the proposal include a clear **summary** of the project's draft data management plan? Does the summary identify any limitations on access or reuse, articulate quality assurance and quality control procedures, and identify a long-term data management & curation strategy, such as an existing publically-accessible repository and data server?

SCORING GUIDELINES – applies to each criterion.

High - The proposal responds to the criterion in a manner that leaves no questions from the reviewer that the applicant will successfully fulfill the criterion.

Medium –The proposal responds to most of the components of the criterion in a manner that results in only minor, non-scientific, easily addressed concerns that the proposed work will satisfy the criterion.

Low – The response to the criterion was insufficient to allow the reviewers to believe that the proposed action, as written, would address the criterion's intent.



Landscapes capable of sustaining natural and cultural resources for current and future generations.



Western Alaska LCC



The Western Alaska Landscape Conservation Cooperative promotes coordination, dissemination, and development of applied science to inform landscape level conservation, including terrestrial-marine linkages, in the face of landscape scale stressors, focusing on climate change.