

1 CHAPTER 6. OTHER ECONOMIC ACTIVITIES

2 A changing climate could potentially affect all sectors of Alaska's economy (Box 6-1 gives the
3 mission statement for the sector). Some of Alaska's major economic activities, such as tourism and

Box 6-1. Other Economic Activities Mission Statement

To identify adaptive actions and options that contribute to the ability of sectors of the Alaska economy not directly supported by living systems (e.g., fishing) to adapt to the effects of climate change and ensure the sustainability of a robust Alaskan economy based on the responsible development of its natural resources.

4 shipping, are highly dependent on weather conditions and/or the natural environment, both of
5 which can be significantly affected by climate change. Some activities, such as mining and oil and
6 gas exploration, rely on engineered infrastructure that is also potentially affected by climate,
7 weather, and underlying environmental conditions. For example, permafrost thaw could threaten
8 the stability of oil pipelines in Alaska and shorter winters would reduce the utility of seasonal ice
9 roads for off-road navigation.

10 At the same time, a changing climate could create economic development opportunities in existing
11 and new sectors. This chapter focuses on the impacts and vulnerabilities facing sectors of the
12 Alaska economy that are not dependent on living systems. The recommendations are designed to
13 assist these economic sectors in adjusting to a changing climate to ensure a continued healthy
14 economy for Alaska. Measures to adapt the economy to a changing climate may also contribute to
15 building resiliency in Alaska's economy to other external factors such as market prices.

Overview of Economic Activities Options		
	Option Name	Level of Support
EA-1	Assess Arctic Capability Needs	Unanimous
EA-2	Develop Alaskan Economic Scenarios	Unanimous
EA-3	Improve Availability of Data	Unanimous

16 Impacts, Vulnerabilities, and Opportunities

17 Climate change could have numerous effects on the Alaska economy. Potential vulnerabilities,
18 impacts, and opportunities within different sectors, as a result of climate change, include the
19 following.

20 **Oil & Gas:** Oil and gas is the leading sector in the Alaska economy, generating more than 85% of
21 State revenue to royalties and taxes providing for its residents as well as significant
22 employment. Alaska's economic future will depend largely on maintaining robust oil and gas

1 production. With thawing permafrost and changing weather patterns, oil and gas operations are
2 likely to see impacts both on- and off-shore. This includes potential impacts to infrastructure such
3 as pipelines, ice roads and waste pits. Already, shorter and warmer winters have resulted in
4 reduced operation windows for exploration and development, and warmer summers have resulted
5 in reduced efficiency of gas compression and reinjection. Engineering focused on proactively
6 addressing challenges of the changing climate is already essential. Decreased sea ice creates the
7 potential for impacts to North Slope oil fields. Increased local, national and global energy demands
8 may increase the need for and economic viability of oil and gas operations.

9 **Mining:** Mining is another important sector of Alaska's natural resource based economy (not
10 dependent on living systems), especially in remote rural areas of the state where employment
11 opportunities are rare. Mining is expected to face similar challenges and opportunities as the oil
12 and gas sector. Currently, exposed permafrost and warmer temperatures has resulted in increased
13 erosion and less stability in mining sites. Engineering challenges will arise as thawing permafrost
14 and other climatic conditions affect existing and planned infrastructure and transportation related to
15 mining. The same climate changes, however, may also highlight new mining opportunities and
16 allow expanded seasons for exploration, development and operations.

17 **Tourism and Recreation:** Tourism and recreation are also important industries in Alaska and are
18 tied closely to the diversity and condition of the natural environment. Climate change may impact
19 many of the natural resources that attract tourists to Alaska. Increased temperatures could lead to
20 changes in seasons that support various activities (e.g., skiing, hiking, camping). Some regions of
21 the state may experience increases in summer tourists due to a longer and warmer season. This
22 could create more seasonal job opportunities in areas and times where they do not currently exist.
23 Less ice in the Arctic Ocean may mean increased cruise and land-based tourism opportunities
24 throughout the region, with requirements for additional infrastructure to support the industry.

25 **Ocean Transportation:** Less ice in the Arctic Ocean will have significant impacts for trade and
26 ocean transportation for all countries in the Arctic region. New shipping lanes are likely to open and
27 be available for longer periods, and there would be increased access to the Ocean's natural
28 resources, such as fish, oil and gas and minerals. Increased ocean transportation and activity will
29 require increased vigilance for safety and environmental protection (e.g., oil spills) and may also
30 lead to more disputes around boundaries and ownership of natural resources.

31 **Boundaries and Ownership:** Changes in sea ice and glaciers, with potential concomitant erosion
32 and sedimentation, including river erosion and sedimentation, can result in changes in boundaries
33 and issues about ownership in the Arctic. Receding glaciers will likely result in post-glacial rebound
34 of lands previously submerged or covered by glaciers. Boundary and ownership disputes can affect
35 a number of sectors, such as mining, oil and gas, tourism and recreation, as well as fishing and
36 locations of boroughs, municipalities and villages.

37 **Energy Production and Demand:** Activities that address the needs of Alaskans for affordable
38 energy are likely to be significantly affected by climate change. Changes in weather will affect how
39 Alaskans generate energy and when they demand energy, with potential decreased demands in
40 winter and increased demands in summer (for cooling). In addition, global demands and Federal
41 and State regulations could affect oil, gas and coal operations. While global energy demand is
42 expected to increase, requirements to reduce greenhouse gas emissions may affect the sources

1 and costs of energy supplied, with increased interest in and opportunities for the use of alternative
2 and renewable sources of energy.

3 **Economic Activities Adaptation Strategy**

4 The recommendations in this sector focus on broad issues relevant to the Alaska economy as a
5 whole, rather than actions designed to address the individual concerns of a particular economic
6 group or industry. Box 6-2 summarizes the EA recommendations. These recommendations
7 represent high priority actions, based on a number of criteria, including:

- 8 • **Significance:** the importance of the option to the state's economy, including tangible and
9 intangible variables such as social justice and the viability of small communities.
- 10 • **Benefits and effectiveness:** consideration of the vulnerability of the economy if the option is
11 not carried out and whether those "benefits" are long or short term.
- 12 • **Costs:** expenses initially and over time.
- 13 • **Feasibility:** ease and possibilities of implementing the option, including speed of
14 implementation.
- 15 • **Timing of Impact:** assessment of when the option must be undertaken (e.g., in response to
16 immediate impacts or longer term). Shorter term needs were given higher priority.
- 17 • **Adaptive capacity:** ability of the system (e.g., economic sectors) to cope with the
18 consequences of climate change.

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Box 6-2. Overview of EA TWG Adaptation Options

EA-1: Evaluate Capability Needs for Potential Expansion of Arctic Economic Activities

This option recommends that the State recognize and address the potential for increased Arctic economic activities and identify gaps in infrastructure and the ability to provide an adequate presence in the Arctic coastal region to protect environmental resources, human health, and safety.

EA-2: Develop and Evaluate Scenarios for the Alaskan Economy

Components of the Alaska economy will experience varying impacts due to potential effects of climate change. An assessment of economic strengths, weaknesses, opportunities and threats by sector is needed to better understand current and potential future components of the economy. This understanding will aid state agencies and other stakeholders in identifying and acting on optimum adaptive strategies and policies to help address future conditions. This option recommends conducting and managing a project to develop and evaluate possible economic scenarios for the State, based on potential climate change effects.

EA-3: Improve Availability of Mapping, Surveying, Charting and Imagery Data

Accurate, timely information about the distribution and magnitude of changes is needed to better address economic challenges and opportunities. This option recommends improving the availability of data, specifically real-time mapping, digital elevation model, and imagery, to better track and understand the impacts of climate change. This option would build on the work of the Statewide Digital Mapping Initiative and aid in transitioning between locations at the water-land interface.

1 Assisting the Alaska economy to adapt to climate change requires meeting several broad needs:
 2 1) improved understanding of the current Alaskan economy and identification of opportunities and
 3 risks for the future, 2) better data and improved access to data for decision-making, and 3)
 4 enhanced capabilities to respond to climate change in specific environments that may experience
 5 significant changes in economic activities such as the Arctic. The following three options address
 6 these needs.

7 The three options are focused on state agency activities in conjunction with other parties, to gather
 8 and analyze additional information to better understand potential economic challenges and
 9 opportunities from climate change. The rationale is that climate change adaptation actions and
 10 options specific to individual sectors are best addressed by industries within those sectors (as they
 11 are currently doing). State and federal agencies can assist by improving available data about
 12 physical changes in the landscape (option EA-3) and developing a deeper understanding of how
 13 the potential impacts of climate change to the current economy and how to maintain a robust
 14 economy in future climatic conditions (option EA-2). Option EA-3 calls for significant investments in
 15 new data collection. Option EA-2 requires funding to conduct additional scenario development and
 16 analyses. Option EA-1 is an assessment of likely needed State and Federal support for safety and
 17 environmental protections as economic development occurs in the Arctic. Funding is needed to
 18 assess and evaluate these needs. Characteristics of the options are described in the table below.

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		Type of option										Implementation				
Option	Option name	Coordination				Data collection (research, monitoring, observation, etc.)	Regulatory / programmatic change or addition	Assessment, evaluation, or planning	Capacity building , education, outreach	Direct or indirect financial assistance (e.g., tax incentives)	Capital improvements	Requires new institutions / government agency	Requires new staffing	Requires funding	Requires new legislative authority	Lead role for state government
		State interagency coordination	Community response and assistance	Data management	Access to data and "knowledge" sharing											
EA-1	Assess Arctic Capability Needs	✓	✓	✓	✓	✓	✓	✓		✓			✓		✓	
EA-2	Develop Alaskan Economic Scenarios	✓	✓	✓	✓	✓		✓					✓		✓	
EA-3	Improve Availability of Data	✓		✓	✓	✓				✓			✓		✓	

20 In addition to the recommendations presented in this chapter, there is also a need for better
 21 coordination of knowledge-sharing relative to Arctic activities, including participation in meetings
 22 and development of policies. This option is presented in Chapter 8, "Common Themes," as
 23 Common Themes Option #1, establishment of an *Alaska Climate Change Knowledge Network*.

1 Research will also be a critical part of these recommendations, as described in Box 6-3. The
2 recommendations are also intended to build on existing public and private sector programs and
3 activities as described in Box 6-4. Both these boxes appear at the end of this chapter.

4 **Description of Other Economic Activities Recommendations**

5 This section describes the options recommended for the Other Economic Activities sector.

6 EA-1 Evaluate Capability Needs for Potential Expansion of Arctic Economic Activities

7 Many scientific models predict that Arctic sea ice will continue to retreat, creating longer ice-free
8 summers along the Alaska Arctic coast. This will result in growth of maritime economic activities in
9 the region such as shipping, mining, fishing, tourism, and oil & gas exploration. The oil & gas
10 industry is estimated to have the greatest potential for substantial economic growth in the Arctic. To
11 support increased economic activity, ports, infrastructure, and other facilities are expected to
12 develop as warming temperatures result in longer seasonal access. This will bring increased ship
13 traffic and a greater human presence, not only creating job and business opportunities, but also
14 requiring investments to ensure essential government functions such as safety, security, and
15 environmental protection are provided. Potential gaps may exist in emergency response and
16 regulatory oversight capabilities. This option recommends that the potential for increased Arctic
17 economic activities be recognized and that this creates a need to address potential gaps in
18 infrastructure and the ability to protect environmental resources, human health, and safety.

19 To implement this option, the EA TWG recommends that a Capital Improvement Project (CIP),
20 managed by the Alaska Department of Transportation (AK-DOT) and involving other stakeholders,
21 be undertaken to plan for and collaboratively identify the infrastructure and capabilities required to
22 address response and regulatory needs concerning the Arctic maritime industry. Implementing this
23 option will provide the state with needed information to plan for services and capabilities to support
24 future economic growth, including better positioning the state to compete for Federal funding.
25 Moreover, extending government programs into the Arctic is resource intensive. Tremendous
26 opportunities exist to share costs, facilities, equipment, and responsibilities, thus increasing
27 efficiency and strengthening interagency partnerships. An adequate understanding of the
28 capabilities available is needed before these opportunities can be fully explored.

29 EA-2 Develop and Evaluate Scenarios for the Alaskan Economy

30 Components of the Alaska economy could experience varying impacts due to potential effects of
31 climate change. Better understanding the potential range of economic impacts based on possible
32 climate changes, as well as other ancillary effects such as growth or loss of jobs, is needed to
33 anticipate challenges and opportunities. This understanding will aid state agencies and other
34 stakeholders in identifying and acting on optimum adaptive strategies and policies to help address
35 future conditions.

36 This option recommends that Alaska provide funding to conduct and manage a project that
37 develops and evaluates economic scenarios for Alaska, based on potential climate change effects.
38 Scenarios will be developed that take current variables and conditions (e.g., socio-economic-
39 demographic) as a starting point and examine the effects of various future conditions, such as

1 changes in climate, land use, energy use, water availability, regulations, demographics. Future
 2 economic scenarios will examine challenges in terms of economic variables such as possible job
 3 losses, economic investments staying or leaving Alaska, sustainability, etc. as components of the
 4 in current economy and opportunities that may result in both existing and new sectors. The
 5 scenarios developed would provide potential ways to maintain a robust economy based on
 6 responsible natural resource development. They will consider the future of the Alaskan economy
 7 and aid in planning and investment decisions in response to the needs and opportunities to adapt
 8 to climate change.

9 EA-3 Improve Availability of Mapping, Surveying, Charting and Imagery Data

10 Accurate, timely and high resolution information about the distribution and magnitude of
 11 topographic changes resulting from climate change is needed to better address economic
 12 challenges and opportunities. To assess change, a good baseline of existing conditions is needed,
 13 and from there, real-time updating of rapidly changing conditions, such as shorelines and coastal
 14 areas.

15 This option proposes that the State of Alaska and others invest in an accurate and high-resolution
 16 statewide digital base map that includes a digital elevation model and an acquisition system for
 17 imagery and ensure that the associated data are available to all users. This option would improve
 18 the availability of real-time mapping, surveying, charting, digital elevation models, and imagery data
 19 to provide means to better track changing conditions and understand economic impacts of and
 20 opportunities to address climate change. Additionally, this option would provide support for ongoing
 21 management and distribution of this spatial information through a geographic information system
 22 and open standards web services. This option recommends using the existing program that is
 23 creating a digital basemap, the Statewide Digital Mapping Initiative (SDMI), as a vehicle of
 24 implementation, as well as continued coordination with University of Alaska (UA) Research
 25 Centers, the U.S. Coast Guard, and the National Oceanic Atmospheric Administration (NOAA).

6-3. Economic Activities Recommended Research Needs (continued)

TRANSPORTATION AND RECREATION

EA/RN-25 Develop economic analysis of potential rise or decline of tourism and impact on state revenues.

EA/RN-26 Develop economic (scenario) analysis of potential national and international changes in patterns of people and freight movements.

EA/RN-27 Assess opportunities for development/enhancement of recreation due to climate change.

BOUNDARIES AND OWNERSHIP

EA/RN-28 Improve mapping and surveying to accurately and efficiently establish boundaries, address boundary disputes as needed and aid charting for safe navigation.

ENERGY DEMAND

EA/RN-29 Assess how climate change will impact application of federal, state, and local laws, regulations and policies on energy demand and use.

EVOLVING ALASKA'S JOBS AND ECONOMY

EA/RN-30 Assess how climate change will impact application of federal, state, and local laws, regulations and policies on economic development activities.

INFORMATION COLLECTION AND DISSEMINATION

EA/RN-31 Continue to refine the "Cost of Climate Change" study recently completed by the UAA ISER.

EA/RN-32 Identify climate trends and downscale models leading to establishing environmental information, analysis tools, and design criteria for use in adapting to climate change.

Box 6-4. Relevant Current Activities***EA-1: Evaluate Capability Needs for Potential Expansion of Arctic Economic Activities***

The U.S. Coast Guard, 17th District (Alaska), has conducted an Arctic capabilities analysis. In addition, the U.S. Arctic Research Commission has developed an Arctic Marine Shipping Assessment that explores some of the infrastructure and service needs with a more navigable Arctic Ocean. The Institute of the North is coordinating several programs relating to current and future Arctic industry. Finally, Alaska's FY10 funding proposal has \$0.5 million set aside for a long term harbor study, which may be matched by the Denali Commission.

EA-2: Develop and Evaluate Scenarios for the Alaskan Economy

The University of Alaska - Fairbanks Scenarios Network for Alaska Planning (SNAP) program is tasked with developing high quality predictions for Alaskan climate, but this program is not yet linked to predictions on economic implications.

EA-3: Improve Availability of Mapping, Surveying, Charting and Imagery Data

Currently, the Statewide Digital Mapping Initiative (SDMI) is underway and would be a vehicle of this option. A related effort for this option is NOAA's GRAV-D program is an airborne gravity survey to improve the accuracy of the vertical datum, by mapping the mean sea level elevation, which, for Alaska, can be several meters off with the current data. Alaska is the top priority to be mapped under this program, but it will need federal funding.

1