



**Catalog of Adaptation Actions and Policy Options**  
**Other Economic Activities (EA) Technical Working Group (TWG)**  
**Preliminary Tiers of Options - Ranked: October 23, 2008**

**DRAFT**

Based on initial input from TWG members, the EA TWG has developed a preliminary categorization of adaptation options.

- **High Priority Options** have a high level of support from TWG members and will be analyzed first
- **Medium Priority Options** have mixed support from TWG members and will warrant additional discussion to prioritize for analysis
- **Not Considered Options** are options that either have low support from TWG members and will only be analyzed as time permits or have been recommended to other working groups for consideration.

EA TWG members rated each option as “High”, “Medium” or “Low” for further analysis, considering the adaptation criteria. These ratings were used to create a weighted average – “highs” were give 5 points, “mediums” were given 3 points, and “lows” were given 1 point, and the sum of ratings was divided by the number of responses for a particular option.

**Option Category Key (first digit of option numbers outlined below)**

- 1: Oil and Gas
- 2: Mining
- 3: Ocean Transportation
- 4: Rural Non-Road Transportation
- 5: Other Economic Sectors
- 6: Tourism and Recreation
- 7: Boundaries and Ownership
- 8: Energy Demand
- 9: Evolving Alaska’s Jobs and Economy
- 10: Information Collection and Dissemination

**Preliminary High Tier Options**

Option No.	Adaptation Action/Policy Option (includes regulatory and management options)	Notes	Priority for Analysis	Weighted Average	RANK (H or L and WHY)
3.1	Increase Coast Guard search and rescue, navigation safety, inspection and prevention, enforcement and icebreaking capabilities in the Arctic		High: 6 Medium: 2 Low: 0	4.5	
9.3	Make Alaska a world leader in the climate adaptation field: engineering and design services, climate-sensitive infrastructure systems, etc.		High: 4 Medium: 4 Low: 0	4	
3.5	Ensure oil spill response and clean up capabilities. Use R & D funds to develop new techniques to clean up oil spills in icy waters. (moved from option 1.5)	<ul style="list-style-type: none"> <li>- Is this covered under existing regulation (non-tank vessel plans)?</li> <li>- This option could potentially be combined with recommendations from the Oil and Gas TWG.</li> <li>- Combine with 1.5</li> </ul>	High: 3 Medium: 5 Low: 0	3.75	
7.3	Improve mapping and surveying to accurately and efficiently establish boundaries, address boundary disputes as needed and aid charting for safe navigation		High: 4 Medium: 3 Low: 1	3.75	
10.2	Allocate a portion of major public works investments toward monitoring, data dissemination, and analysis of climate and other environmental data	- Combine with 10.1	High: 3 Medium: 5 Low: 0	3.75	
10.4	Identify climate trends and downscale models leading to establishing environmental information, analysis tools, and design criteria for use in adapting to climate change.	- This option could include updating the environmental atlas of AK with chapter on adapting to climate change.	High: 4 Medium: 3 Low: 1	3.75	

Option No.	Adaptation Action/Policy Option (includes regulatory and management options)	Notes	Priority for Analysis	Weighted Average	RANK (H or L and WHY)
10.5	Provide resources for good Digital Elevation Model (DEM) and GIS data, and current and high resolution imagery to establish a more robust information infrastructure to plan and adapt	<ul style="list-style-type: none"> <li>- Link to UAF and their imagery data.</li> <li>- Need as close to real time as possible need permafrost, temp, sea level trends</li> <li>- This is an overarching option that applies to many sectors</li> <li>- The State is leading an effort to create a digital basemap of Alaska – the Statewide Digital Mapping Initiative</li> </ul>	High: 4 Medium: 3 Low: 1	3.75	
1.3	Model coastal vulnerability to establish criteria for pipeline coastal transition set-backs and burial depths and develop shoreline change adaptation public policy, guidance for preventive and mitigative measures, and knowledge of who pays for what	<ul style="list-style-type: none"> <li>- Currently there are funding streams to respond to spills/hazmat releases due to coastal erosion, but unless there is an “imminent threat” these funding mechanisms cannot be tapped.</li> <li>- This section should explore options to change such policies at the fed/state level to expend funds for more preventive measures.</li> <li>- There are not a lot of projects like this</li> </ul>	High: 4 Medium: 4 Low: 1	3.66	

Option No.	Adaptation Action/Policy Option (includes regulatory and management options)	Notes	Priority for Analysis	Weighted Average	RANK (H or L and WHY)
2.3	Research cost effective methods to monitor changes and develop flexible strategies to address the conditions reasonably expected to occur with climate change	- ADRN and LMPT should work with miners on best, cost effective methods to monitor changes and develop flexible strategies to address the conditions reasonably expected to occur with climate change - Provide sufficient/increased trained technical staff (e.g., ADNR) to monitor active placer and large hardrock mines and reclamation and closure progress	High: 3 Medium: 4 Low: 1	3.5	
5.13	Develop economic analysis of potential rise or decline of commercial fishing	- Couple with 2.8	High: 2 Medium: 6 Low: 0	3.5	
6.5	Address road, airport, bridge maintenance and other public infrastructure needs to support tourism		High: 3 Medium: 4 Low: 1	3.5	
10.1	Invest in monitoring and data dissemination programs to enhance information available for safe and efficient resource development		High: 3 Medium: 4 Low: 1	3.5	
1.5	Use R&D funds to model sea ice and develop new techniques to clean up oil spills in icy waters (moved to 3.5)	- The state should leverage already existing efforts in this area - Add second half to 1.5	High: 2 Medium: 7 Low: 0	3.44	
7.7	Participate in international forums dealing with Arctic issues (e.g. resource management, boundaries, shipping, etc.) to better inform U.S. delegations on the desires/needs/interests of the State and its native populations		High: 3 Medium: 3 Low: 2	3.25	

Option No.	Adaptation Action/Policy Option (includes regulatory and management options)	Notes	Priority for Analysis	Weighted Average	RANK (H or L and WHY)
10.3	Continue to refine the “Cost of Climate Change” study recently completed by the UAA Institute for Social and Economic Research		High: 3 Medium: 3 Low: 2	3.25	
3.4	Monitor impacts of shipping on environment, hunting, fishing and communities	- This could include impacts of increased invasive species	High: 1 Medium: 4 Low: 2	3.2	
1.1	Expand research on ice road and pad construction techniques and in-season monitoring to maximize seasonal use and minimize impacts.	- For example, this research could focus on insulating ice pads for extended use - Could be high priority for consideration if it was focused on scientific criteria for establishing tundra seasons, insulation is fairly well understood	High: 1 Medium: 7 Low: 1	3	
1.2	Develop long range infrastructure development and maintenance plan for oil and gas	- Roads, man-made shorelines, and other infrastructure maintenance needs may increase. - Low priority for oil and gas, perhaps high for public assets, could also be combined with 1.8	High: 3 Medium: 3 Low: 3	3	
1.7	Expand research on climate change impacts on permafrost engineering design.	- For example, research and consider use of thermosyphons or other technologies to maintain permafrost	High: 2 Medium: 5 Low: 2	3	
1.8	Prioritize coastal remediation in places that pose the greatest threat to humans.	- Low priority for oil and gas, perhaps high for public assets, could also be combined with 1.8	High: 3 Medium: 3 Low: 3	3	

Option No.	Adaptation Action/Policy Option (includes regulatory and management options)	Notes	Priority for Analysis	Weighted Average	RANK (H or L and WHY)
2.1	Examine and research cost-effective techniques for construction, operation, and reclamation that will be responsive and useful in changed environmental conditions	<ul style="list-style-type: none"> <li>- Consider longer growing season to establish revegetation to stabilize reclaimed areas.</li> <li>- Operators and regulators will need to consider future environmental conditions.</li> <li>- The State’s Large Mine Permitting Team (LMPT) under ADNR direction should work with mine operators.</li> <li>- This option includes both available techniques and potential development of new techniques</li> <li>- Applicable to other aspects of construction in Alaska.</li> <li>- Encourage research for design and application of new liner materials and other technologies</li> <li>- Consider costs and types of energy for mining in remote areas (state energy plan consideration).</li> </ul>	High: 1 Medium: 6 Low: 1	3	
2.8	Develop economic analysis of potential rise or decline of mining and impact on state revenues		High: 2 Medium: 4 Low: 2	3	
5.14	Develop long range infrastructure development and maintenance plan for commercial fishing	- Couple with 1.2	High: 1 Medium: 6 Low: 1	3	

**Preliminary Medium Tier Options**

<b>Option No.</b>	<b>Adaptation Action/Policy Option (includes regulatory and management options)</b>	<b>Notes</b>	<b>Priority for Analysis</b>	<b>Weighted Average</b>	<b>SHOULD BE HIGH BECAUSE...</b>
2.4	Encourage research and engineering applications for tailings storage in Arctic/Subarctic climates at UAF school of Mines & Engineering	- Opportunity for cooperative efforts by industry, government and university to address these challenges	High: 0 Medium: 7 Low: 1	2.75	
2.5	Review current regulations and compliance criteria for managing tailing dams and disposal sites and determine if changes are necessary	- LMPT and industry could review. - Each project will have unique challenges based on the site conditions - Regulations should address compliance criteria, but not how to comply; cooperative efforts between mine operators and LMPT regulators should be encouraged to find cost effective solutions. - Compliance criteria could include monitoring of permafrost or related ground conditions at specific sites	High: 2 Medium: 3 Low: 3	2.75	
2.7	Develop long range infrastructure development and maintenance plan for mining	- Consider river barging as an access option for increased mining infrastructure development - Couple with 1.2	High: 0 Medium: 7 Low: 1	2.75	
3.6	Develop economic analysis of potential rise or decline of shipping and impact on state revenues	- Couple with 2.8	High: 0 Medium: 7 Low: 1	2.75	
4.2	Consider expansion of river barging due to expanded open season		High: 1 Medium: 5 Low: 2	2.75	

Option No.	Adaptation Action/Policy Option (includes regulatory and management options)	Notes	Priority for Analysis	Weighted Average	SHOULD BE HIGH BECAUSE...
5.8	Assess permit needs for safe drinking water and sanitation in villages		High: 2 Medium: 3 Low: 3	2.75	
6.4	Explore alternative winter tourism options, considering the benefits of warmer, but sub-freezing temperatures, for selected locations		High: 1 Medium: 3 Low: 4	2.75	
6.11	Develop long range infrastructure development and maintenance plan for tourism and recreation	- Couple with 1.2	High: 0 Medium: 7 Low: 1	2.75	
7.1	Advocate for Law of Sea Convention Treaty provisions	- The Law of the Sea Convention provides nations a basis to extend their sea floor resource rights beyond the foot of the continental slope if they meet certain geological criteria backed up by scientific data. The U.S. has not yet ratified this treaty.	High: 1 Medium: 5 Low: 2	2.75	
7.4	Establish new boundaries to manage river erosion and property impacts		High: 1 Medium: 5 Low: 2	2.75	
5.7	Consider future income for selling carbon credits and offsets	- Recommend to Mitigation Advisory Group - NA, recommendation for MAG	High: 1 Medium: 4 Low: 2	2.7	
1.4	Explore use of modeling to project new species ranges and consider stresses on species; confirm with on-the-ground knowledge	- May be option for Natural Resources TWG	High: 1 Medium: 3 Low: 3	2.5	
6.10	Expand cruise tourism infrastructure into Arctic Ocean		High: 1 Medium: 4 Low: 3	2.5	

Option No.	Adaptation Action/Policy Option (includes regulatory and management options)	Notes	Priority for Analysis	Weighted Average	SHOULD BE HIGH BECAUSE...
9.4	Promote activities that will promote climate change adaptation and the responsible use of state resources through education and outreach	- State's ability to conduct adaptive activities will be dependent on continued responsible use of state's resources, including training additional resources - these capabilities may be promoted through universities	High: 0 Medium: 6 Low: 2	2.5	
1.6	Consider how potential rise or decline of oil and gas operation and maintenance may affect state revenues	- How does cost of operating pipeline affect revenue to state? AK pays 25% of cost of operating pipeline through tariffs. - Within this option, consider management of potential disruptions to oil and gas exploration and examine policies to continue oil and gas flows	High: 1 Medium: 4 Low: 4	2.33	
2.9	Consider changes in baseline conditions that may result from climate change and how this will affect standards that are floating based on that baseline.	- Baseline conditions may change over the life of a project, which should be taken into account as the project is monitored - Consider sedimentation and other environmental conditions	High: 0 Medium: 5 Low: 3	2.25	
4.1	Consider issues of traditional transportation between villages (e.g., more drowning, losing machines)		High: 1 Medium: 3 Low: 4	2.25	
5.3	Encourage private insurers, as investors, and the state pension funds to consider climate impact prevention in the prudent investment of portfolios and to invest in climate science as a 'present value of avoided costs' strategy		High: 1 Medium: 3 Low: 4	2.25	

Option No.	Adaptation Action/Policy Option (includes regulatory and management options)	Notes	Priority for Analysis	Weighted Average	SHOULD BE HIGH BECAUSE...
5.6	Anticipate and address increased insurance costs		High: 1 Medium: 3 Low: 4	2.25	
6.1	Develop economic analysis of potential rise or decline of tourism and impact on state revenues	- Couple with 2.8	High: 0 Medium: 5 Low: 3	2.25	
7.5	Reinstate a fully effective Alaska Coastal Zone Management program to reduce unwise investments along the coast	- Possible linkage to EA-1.3	High: 1 Medium: 3 Low: 4	2.25	
2.2	Conduct education for operators on new methods identified from research	- ADNR place mine permitting staff and LMPT should be involved in facilitating these training opportunities.	High: 0 Medium: 4 Low: 4	2	
5.12	Consider how climate change will impact the application of federal laws on specific economic development efforts	E.g. Endangered Species Act	High: 2 Medium: 0 Low: 6	2	

**Not Considered for Further Analysis by EA TWG**

Option No.	Adaptation Action/Policy Option (includes regulatory and management options)	Reason Not Considered
2.6	Examine opportunities for mining in newly exposed areas	Considered Low Priority for Analysis by TWG
4.3	Consider expanded use of rural air strips	Considered Low Priority for Analysis by TWG
5.1	Establish federal “all perils” insurance guarantee program	Considered Low Priority for Analysis by TWG
5.2	Reward climate protection at residential and commercial properties	Considered Low Priority for Analysis by TWG

Option No.	Adaptation Action/Policy Option (includes regulatory and management options)	Reason Not Considered
5.4	Explore potential of insurance industry to contribute to funding as beneficiaries of reduced risk	Considered Low Priority for Analysis by TWG
5.5	Identify incentives for private investment in creating 'climate safe' development	Considered Low Priority for Analysis by TWG
6.2	Consider allowing use of higher elevation lands for skiing based on changes to snow	Considered Low Priority for Analysis by TWG
6.3	Study cost of snow production	Considered Low Priority for Analysis by TWG
6.6	Consider extension of services and marketing for a longer summer season	Considered Low Priority for Analysis by TWG
6.7	Consider need to change or develop permit and changed itinerary requirements due to changing climate conditions	Considered Low Priority for Analysis by TWG
6.8	Address tourist issues from wildfire smoke and increased risks of drowning	Considered Low Priority for Analysis by TWG
6.9	Locate/re-locate visitor centers	Considered Low Priority for Analysis by TWG
7.2	Conduct field research re: boundaries and use of Outer Continental Shelf	Considered Low Priority for Analysis by TWG
7.6	Review the state policy on boundary change, with a focus on fixed versus migratory boundaries	Considered Low Priority for Analysis by TWG
9.1	Conduct long and short term jobs analysis to identify which sectors/occupations will be positively/negatively impacted, with an eye towards job creation opportunities at all levels, including community	Considered Low Priority for Analysis by TWG
9.2	Re-tool education and job training programs for new workforce to take advantage of green economy growth	Considered Low Priority for Analysis by TWG
3.3	Develop an understanding of inventories of fish stocks that may be related to shipping changes and implement reliable regulations and limitations on harvests as needed	Recommend to Natural Systems TWG (Considered Medium Priority by EA TWG – 2.4)
5.9	Consider prescribed fire as an approach for wildfire control	Recommend to Natural Systems TWG (Considered Medium Priority by EA TWG – 2.5)
3.2	Plan, finance, and build basic shipping infrastructure, including port planning and design, to support increased shipping, fishing, mining, offshore drilling, tourism	Recommend to Public Infrastructure TWG (Considered Medium Priority by EA TWG – 2.0)

<b>Option No.</b>	<b>Adaptation Action/Policy Option (includes regulatory and management options)</b>	<b>Reason Not Considered</b>
<b>5.10</b>	Explore, install, permit new wind, geothermal, solar, and other renewable energy projects	Recommend to MAG (Considered High Priority by EA TWG – 3.2)
<b>5.11</b>	Explore possibilities for new hydroelectricity sources	Recommend to MAG (Considered High Priority by EA TWG – 3.0)
<b>8.1</b>	Examine options for alternative energy sources (e.g., wind)	Recommend to MAG (Considered High Priority by EA TWG – 4.0)