Practice and Needs Assessment Final Report

Bringing For-Profit Companies into the Boundary Chain Model

GLISA
A NOAA RISA TEAM

American Society of Adaptation Professionals

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Bringing For-Profit Companies into the Boundary Chain Model: Practice and Needs Assessment Report

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Recommended Citation:
American Society of Adaptation Professionals. "Brining For-Profit Companies into the Boundary Chain Model: Practice and Needs Assessment Report." November 2020.

Summary of Process & Key Findings

From November 2019 through November 2020, the American Society of Adaptation Professionals (ASAP) executed a small grant funded by Great Lakes Integrated Sciences and Assessments (GLISA) for the project, "Bringing For-Profit Companies into the Boundary Chain Model." The following report documents the background, methods, and outputs of "Stage 2: an assessment of the practices and needs of for-profit climate service providers in the Great Lakes region". It accounts for ASAP's execution of this project and informs future projects designed or supported by GLISA.

The purpose of the Practice and Needs Assessment (Assessment) was to enable ASAP and GLISA to:

- Learn about the state of the adaptation and resilience marketplace in the region.
- Better understand how for-profit companies want to engage with boundary organizations to co-create climate resources for the adaptation and resilience marketplace.
- Strengthen the cross-sectoral relationship between GLISA and for-profit climate service providers, increasing the market and reach of GLISA's products and services.

The goal of the Assessment was to describe how for-profit climate adaptation service providers in the Great Lakes obtain, manipulate, and apply climate data and information; assess vulnerability; engage stakeholders; and form and execute adaptation strategies. The Assessment was also designed to help the project team understand what knowledge and skills service providers most want to gain in these areas to inform a subsequent workshop.

The Assessment included two components: a survey and a set semi-structured interviews. The project team defined three assessment areas (see below) and designed guiding research questions for each area with feedback from the Advisory Group. The team used the guiding research questions as a base for a survey instrument and interview protocol, which the Advisory Group also reviewed. The interview protocol and survey instrument are available in the supplemental materials folder for this report.

The team collected data for both components between April and May of 2020, sourcing informants from Advisory Group members' professional networks and the extended ASAP network. The project team separately analyzed survey and interview results using summary tables and thematic analysis. The team then developed "Takeaways" for each assessment area to put those two analyses into dialogue with one another. Takeaways are available in the **Summary & Analysis by Assessment Area** secont, at the beginning of each assessment area subsection:

- **Current Climate Data and Information Practices**
- **Climate Data and Information Needs**
- **Perspectives on Publicly Available, Regional, Vetted Climate Data**

The team then analyzed the takeaways together to form major findings which are intended to inform future projects designed or supported by GLISA, especially those seeking to bring climate service providers in the region closer into the GLISA boundary chain. The major findings address fundamental

issues concerning how assessment participants navigate the marketplace, pursue service improvement, and perceive barriers to public climate data. The findings offer example strategies that GLISA might consider to address these issues.

FInding 1: It can be difficult for service providers to find new sources of public climate data without support: For-profit climate service providers use a wide variety of climate data and information resources. Federal and state resources are popular because they are relatively visible and often required by regulations for public works projects and funders for certain climate adaptation projects. Survey results suggest that awareness of other public climate data and information resources is comparatively low. Interview results suggest it may be difficult to discover new sources of publicly available climate data because there are few centralized resources or clearinghouses. To increase use of the highest quality publicly available climate data and information among for-profit providers, GLISA might consider continuing projects focused on strengthening information sharing networks in the Great Lakes region. GLISA might also consider supporting projects that seek to build centralized sources for public climate data, like clearinghouses, in order to make it easier for service providers to discover new data sources. Because key federal resources are a common touchpoint for service providers, these federal programs could be valuable partners for that work.

Finding 2: Supporting service providers in their development goals may help GLISA bring them into its boundary chain: Competitive for-profit climate service providers vigorously pursue new resources, partnerships, and skills to improve the quality of their products and better meet demand in the marketplace. They have strong, clear ideas of what makes their business successful and which of their performance areas need improvement. Survey participants readily identified areas for their company to improve and were interested in learning how new sources of publicly available data could help. They also identified tailored technical assistance as an incentive to using these new climate data products. Interview participants voiced strong commitment to the integrity of their products and practice and a similar interest in using new sources of publicly available data. However, neither had strong relationships with a RISA program. To increase use of the highest quality publicly available climate data and information among for-profit providers, GLISA might consider prioritizing technical assistance to providers on an individual basis. By further prioritizing individual support, GLISA might help more providers pursue their individual development goals using GLISA products and services, thus strengthening cross-sectoral relationships between GLISA and for-profit climate service providers and bringing them further into GLISA's boundary chain.

Finding 3: Service providers face technical and regulatory barriers that prevent them from diversifying their libraries of publicly available climate data: For-profit service providers demonstrated strong, consistent interest in making greater use of publicly available climate data to expand and improve their existing climate services. However, providers experience technical barriers, regulatory barriers, and market barriers to accessing new sources of public data. Survey participants identified lack of technical training among their staff and lack of client demand for projects requiring public available data in the Great Lakes region as significant barriers to using new public climate data resources. Interview participants identified regulatory mandates for public works projects and construction projects, which

often require the use of certain federal or state data sources, as a significant barrier limiting their ability and incentive to explore new sources of publicly available climate data. To increase use of the highest quality publicly available climate data and information among for-profit providers, GLISA might consider retooling its marketing, training, and growth strategies to more directly target these persistent barriers experienced by for-profit providers. For example, GLISA may increase the ability and willingness of service providers to try GLISA data by providing further training on the technical aspects of GLISA data and providing information on how GLISA data helps satisfy regulatory requirements for public works projects in the Great Lakes region. GLISA could also consider offering trainings to help service providers communicate the value of GLISA data to clients, who might otherwise demand other climate data resources for a project. GLISA could also consider examining regulation mandates, and the resources mandated to see if additional GLISA products could be developed to make the required data more usable to service providers. This could potentially be an opportunity to present both the mandated sources and higher-quality GLISA data.

This work was successfully in defining and testing a methodology for assessing service provider practices and needs and is ripe for replicating and scaling. However, the team achieved limited sample sizes in this first application of the methodology. Therefore, the information contained in this report is best suited for generating ideas and research questions rather than confidently describing practices and needs in a way that is representative of all for-profit service providers in the Great Lakes region.

Assessment Methodology

The practice and needs assessment included two components, a survey and a set semi-structured interviews. The project team defined three assessment areas (see below) and designed guiding research questions for each area with feedback from the Advisory Group. The team used the guiding research questions as a base for a survey instrument and interview protocol, which the Advisory Group also reviewed. The interview protocol and survey instrument are available in the supplemental materials folder for this report.

Survey Methodology

The project team used a survey to gather qualitative and quantitative data on a large scale that could provide a representative sample of climate service providers operating in the Great Lakes region. With a representative sample, the project team could confidently assess providers' needs and perspectives and design a workshop to effectively respond.

Through February, March, and April of 2020, the project team defined three assessment areas and designed guiding research questions for each area with feedback from the Advisory Group. The Advisory Group helped articulate questions about the marketplace, define the target participant base, clarify key terms that would resonate with participants, and address concerns about privacy over proprietary information. The team used the guiding research questions as a base for the survey instrument, which the Advisory Group also reviewed and tested (Supplement E).

The survey instrument gathers closed- and open-ended responses to sets of questions on providers' current climate data and information practices, climate data and information needs, perceptions of publicly available climate data and information, interest in a workshop, and demographic information.

The project team recruited survey participants through the Advisory Group, the entire ASAP membership, ASAP social media, and business and personal connections that comprise the extended ASAP network. The promotional strategy included separate form letters for potential participants who likely considered themselves adaptation or climate professionals, and those who likely did not. The strategy included mass mail merge solicitations and tailored direct outreach.

The team constructed and delivered the survey through a Google Form. The form was open for four weeks between April and May 2020.

An ASAP team member created summary tables for each survey question and conducted thematic analysis on open-ended questions. The content of open-ended responses were split and organized as needed into a set of categories representing unique concepts. The analyst tallied recurring responses and concepts so that the prevalence of responses could be compared, which may offer insight into how significant certain responses were from the participant perspective.

Participant Demographics

The survey sample consists of 14 participants. All participants represented organizations headquartered within the United States, with 64% headquartered in the Great Lakes region, including Minnesota, Wisconsin, Illinois, Indiana, Ohio, Michigan, Pennsylvania, and New York. Of the remainder, 14% were headquartered in the Southeast, 7% in the Southeast, and 7% in the Northeast.

Survey participants represented organizations of various sizes. 64% belonged to organizations with 200 or fewer employees, including 14% that were self-employed, and an additional 29% at organizations with 10 or fewer employees. 50% identified as a small business enterprise. 29% belonged to organizations with greater than 1,000 employees, including 14% under 5,000, 7% under 10,000, and 7% at an organization with more than 10,000 employees.

Most survey participants represented organizations with a private for-profit structure (57%), though 14% were in non-profit, and an additional 7% each identified with public for-profit, public private partnership, and public organizational structure.

All survey respondents provided climate adaptation service in at least one Great Lakes state or the province of Ontario, Canada. The minimum number of areas served was 1, the maximum was all 9, and the median was 4. All but one (a new company) provided services in other regions of the United States and/or internationally, with 64% providing services across the entire United States.

Most participants identified at least two primary functions that their organization fills: facilitator (71%); end user of climate data and information (64%); climate science provider (29%); climate data visualization and tool provider (29%); climate advocate (29%); funder (29%); and climate researcher (0%). See function descriptions below.

Most participants identified at least three types of climate services that their organization provides: communicate and engage (100%); plan (85%); shift management practices and recurring behavior (64%); change policy and law (43%); fund and invest (36%); develop and deploy technology (29%); build physical infrastructure (29%); and, measure and learn (21%). See service descriptions below.

Most participants identified at least three stages of the adaptation process that their services cover: awareness (79%); assessment (64%); planning (79%); implementation (50%); integration/mainstreaming (50%); evaluation (43%); and, sharing lessons (50%). See EcoAdapt's Adaptation Ladder of Engagement for stage descriptions.

- **Organization functions, descriptions**
    - Climate Researcher: Conducting basic scientific research on climate change, including collecting data and developing climate projections
    - Climate Science Provider: Providing climate science to decision makers

- Climate Data Visualization and Tool Provider: Producing climate data-driven tools and climate data visualizations
- Facilitator: Facilitating the effective use/application of climate data and information
- End User of Climate Data and Information: Making decisions for groups of people based on the application or interpretation of climate data and information
- Climate Advocate: Advocating for certain decisions to be made based on the application or interpretation of climate data and information
- Funder: Providing financial resources to enable other organizations to conduct one or more of the functions described in this list

- **Climate services, descriptions**
  - Measure and Learn: Monitoring changes in the climate system, gathering and analyzing data to build understanding of climate impacts and climate risk, and monitoring and evaluating actions taken to adapt to climate impacts
  - Plan: Considering climate science, climate impacts, and climate risk in institutional planning
  - Fund and Invest: Repurposing, leveraging, or obtaining public or private funds to finance or invest in adaptation actions
  - Develop and Deploy Technology: Developing and deploying climate-resilient technologies, and technologies that enable climate resilience
  - Communicate and Engage: Communicating with people and institutions the information they need to prepare for climate impacts, communicating information about adaptation actions being taken on their behalf, and engaging individuals and institutions in iterative processes, including through workforce development and trainings, to increase the effectiveness and equity of climate adaptation action
  - Build Physical Infrastructure: Building new or improved physical infrastructure aimed at providing direct or indirect protection from climate hazards
  - Shift Management Practices and Recurring Behavior: Incorporating climate adaptation considerations into land management, and day-to-day practice and behavior of professionals and laypeople
  - Change Policy and Law: Revising, or creating new, law, policy, or regulation that requires or incentivizes adaptation action and penalizes maladaptation

Challenges and Potential Biases in Sampling and Data Collection

The strength of the survey analysis is limited by its small sample size of 14 participants and incomplete sets of responses from some participants. It is possible that the timing of the survey, which was circulated April to May 2020 during the early phase of the COVID-19 pandemic in the United States, contributed to low response rates. It is possible that the length of the survey, at over 25 questions, discouraged participation. Members of the Advisory Group, reflecting on these shortcomings and that most respondents (86%) participated anonymously, suggested that participants may have been uncomfortable disclosing information on their business activities and challenges.

There may be some sampling bias in the results that makes them less representative of climate service providers in the Great Lakes region overall. For example, for the purposes of analyzing the number of unique mentions that participants made of specific climate information providers (Table 2), analyses should consider that participants may be more familiar with ASAP and its partner organizations than a representative sample because ASAP promoted the survey through personal and business connections of the Advisory Group and extended ASAP network. By the same token, individuals with stronger connections to ASAP may have been more motivated to participate in the survey.

As a result, the research findings are best suited for thematic analysis and exercises to generate ideas and research questions that do not depend on representative sampling, such as those used to inform the climate data and information workshop for this project. These findings should not be treated as representative of any population or community.

Interview Methodology

The project team used semi-structured interviews to gather qualitative data that could offer a deeper exploration of the guiding research questions, elucidate contextual factors that could be used to interpret analyses of the survey findings, and thus increase the assessment's value for workshop planning (Supplement A).

Through February, March, and April of 2020, the project team defined three assessment areas and designed guiding research questions for each area with feedback from the Advisory Group. The Advisory Group helped articulate questions about the marketplace, define the target participant base, clarify key terms that would resonate with participants, and address concerns about privacy over proprietary information. The team used the guiding research questions as a base for the interview protocol, which the Advisory Group also reviewed.

The interview protocol gathers background and contextual information about a participant's business and uses this to inform direct questions about vulnerability assessment, stakeholder engagement, adaptation strategies, climate data access and applications, barriers and incentives to using publicly available data, and quality assurance practices.

The project team recruited interview participants through the extended ASAP network by identifying specific individuals or companies who may be especially willing to participate because of their relationships with the ASAP staff and network.

An ASAP team member delivered each interview over a one-hour period on Zoom video calls. A GLISA team member participated in each interview as a co-interviewer and was invited to ask their own questions of the participant. Each interview was recorded through Zoom and later transcribed by an ASAP team member (Supplement B, Supplement C).

An ASAP team member conducted a joint, inductive thematic analysis of both transcripts. The analysis involved cataloging and organizing significant information from both transcripts under thematic headings in one notes document (Supplement D). The headings were based on the original guiding research questions. Other headings were created as needed to catalog other significant information. If a piece of information recurred, the transcript number and line numbers where it appeared were cataloged alongside the first entry. The number of times a piece of information was mentioned uniquely can provide some indication as to how significant it was to a participant. The next step applied notes compiled under each heading directly to the guiding research questions to develop takeaways for the workshop, which were in turn analyzed alongside the survey takeaways to produce major findings for the report.

Participant Profiles

Interview participant 1 belongs to a global consulting firm with over 10,000 employees. The company contains several groups that each provide services to a particular sector. Each group has a specialized climate adaptation team embedded in it that provides all climate adaptation services for project teams in the group. The participant was based at the company's New York City headquarters and helped lead the adaptation team for the environment and water group. They support many projects in New York State, New York City, other Mid-Atlantic cities, and occasionally in the greater Great Lakes region.

Interview participant 2 (see Supplement C) owns a small (<10 employee) consulting firm based in Colorado. The company provides specialized climate adaptation and resilience services, focused on climate analysis and vulnerability assessment for residential housing in small- to mid-sized municipalities. They also specialize in engaging residents and diverse groups of community members as project stakeholders.

Challenges and Potential Biases in Sampling and Data Collection

The strength of the interview analysis is limited by its small sample size of 2 participants. It is possible that the timing of the interview request, which was circulated April to May 2020 during the early phase of the COVID-19 pandemic in the United States, contributed to low response rates to the interview invitations.

One interview subject, participant 2, did not conduct any business in the Great Lakes region and was completely unfamiliar with GLISA. Analyses should consider some of participant 2's responses to be generally less applicable to the experiences of climate service providers in the Great Lakes region.

Therefore, these findings are best suited for thematic analysis and exercises to generate ideas and research questions that do not depend on representative sampling, such as those used to inform the climate data and information workshop for this project. These findings should not be treated as representative of any population or community.

Summary & Analysis by Assessment Area

As described above, the practice and needs assessment included two components, a survey and a set semi-structured interviews. The team collected data for both components between April and May of 2020, sourcing informants from Advisory Group members' professional networks and the extended ASAP network. The project team separately analyzed survey and interview results using summary tables and thematic analysis. The team then developed "Takeaways" for each assessment area to put those two analyses into dialogue with one another. Takeaways are available at the beginning of each assessment area subsection:

Current Climate Data and Information Practices

Description

This category of survey and interview questions asked participants to describe what sources of climate data and information they use, for what purposes they use each source, and how they integrate these data and information into their climate services.

Guiding Research Questions

- What climate data and information resources, services, and models to climate service providers in the Great Lakes region currently use?
- How comfortable are providers with accessing and using vetted, publicly available regional climate data and information?

Takeaways

- Federal, not-for-profit, academic, and regional sources were popular among survey participants. To demonstrate the credibility and market value of GLISA resources at a workshop, it may be helpful to illustrate how ASAP and GLISA fit within these climate data and information networks. It could be especially helpful to demonstrate how well ASAP and GLISA are networked with popular federal sources like NOAA, the National Climate Assessment, and the U.S. Climate Resilience Toolkit, as these were the most mentioned examples in the most mentioned category.

- Among survey participants, certain data sources were popular references for specific climate data and information activities. To improve the credibility of ASAP and GLISA resources in a workshop, consider positioning ASAP and GLISA to take advantage of these expectations, where helpful, and challenge them, where there is room to grow participant's perspectives. The most popular sources for each activity were:

    - for vulnerability assessments: local government (64%), state government (50%), federal government (50%), and academia (50%)
    - for stakeholder engagement: academia (79%), not-for-profit (71%), and local government (64%)
    - for formation and execution of adaptation strategies: not-for-profit (85%), academia (79%), and federal government (64%)

- Survey participants demonstrated low awareness for public sector climate service providers and GLISA products and services that may help meet their business needs. It is possible that survey participants did not see their regular business activities adequately represented in the options provided on the survey. To improve future iterations of the assessment survey, explore and consider expanding the provided lists of public sector climate service providers (Table 3) and GLISA products and services (Table 4). During workshops on GLISA products and services, consider highlighting those products and services that are the best fit for supporting areas of improvement that participants identified in Table 5.

- According to interview participants, regulatory requirements governing public contracts often require climate service providers to use specific types and sources of climate data and information even though providers desire to use higher quality data from sources that do not meet regulatory requirements. To help providers in the Great Lakes region make the most of GLISA's publicly available data, a workshop on GLISA products and services could include lessons to help providers evaluate GLISA data for how well it satisfies these requirements and to help them understand where GLISA data quality exceeds other common, mandated sources of public data.

- Interview participants demonstrate high familiarity with federal and state climate data and information providers, due to heavy reliance on these sources to meet regulatory requirements for contracts with local, state, and federal governments. Projects or collaborations that help network GLISA products and services into the activities and data sharing platforms associated with highly popular climate data and information sources, like high-traffic clearinghouses or websites for NOAA, FEMA, and USGS (see also, Table 2), may help climate service providers discover GLISA's website and resources and find them credible.

Data Summary

Survey participants indicated that they use relatively diverse sets of data and information sources. Federal governments, not-for-profits, and academia were the most popular sources, being the most frequently listed sources overall and for specific applications (i.e. vulnerability assessment, stakeholder engagement, formation and execution of adaptation strategies). This could suggest that respondents have overall positive or important associations betweens these sources and their own business practices.

Survey participants mentioned federal government sources, especially NOAA and NOAA products and services, the most often as sources for general climate data and information. Participants described

regional entities, including GLISA, as the next most significant category for general climate data and information. Participants most mentioned not-for-profit sources for specific applications, with ASAP and USDN tied for the number of most unique mentions in open-ended survey questions. Despite academic sources being common references, few specific exact sources were mentioned, perhaps suggesting low importance or recall.

Participants demonstrated low overall familiarity with public sector climate service providers and specific GLISA products and services. No more than 14% of participants described having greater-than-baseline familiarity with any public sector climate service provider from the list provided, with the exceptions of NOAA Regional Climate Centers (43%) and GLISA Programs (36%).

The proportion of participants who had heard of or used specific GLISA products and services ranged between 29% and 71%. Participants had greatest awareness of GLISA's Regional Data Products (71%), Localized Data Products (57%), and Scenario Planning Process (57%). Participants had least awareness of GLISA's service providing customized interpretation of climate information for individual organizations (29%) and Great Lakes Adaptation Data Suite (36%).

Both interview participants mentioned regulatory requirements and data requirements set by contracts with local, state, and federal governments as the primary factors while choosing climate data and information sources, and did so often. They also mentioned wanting to use sources that could provide higher quality data at a local scale compared to what they are typically required to use.

Both interview subjects cited federal and state climate data and information sources almost exclusively when asked and asked to elaborate on their company's data decisions. They also described heavy or exclusive reliance on certain federal and state climate data tools.

Supporting interview data:

- See "Observational notes for thematic analysis of key informant interviews"
    - "Preferred tools for climate adaptation projects"
    - "Preferred climate data and information sources, based on type of data needed"
    - "Perceived advantages to using publicly available climate data and information"
    - "Factors in choosing climate data and information sources"

Supporting survey data:

Table 1. Sources of climate data and information by category

From where does your organization access climate data and information? (% affirmative response) (n=14)	For-profit companies	Not-for-profit organizations	Local governments	State governments	Regional entities
1.1. All sources	36%	79%	43%	64%	64%
1.3. For vulnerability	36%	43%	64%	50%	43%

assessments					
1.4. For stakeholder engagement	57%	71%	64%	43%	43%
1.5. For formation and execution of adaptation strategies	50%	86%	43%	50%	43%
	Tribal governments	Federal governments	Academia	International entities	My organization doesn't use this
1.1. All sources	21%	86%	79%	36%	0%
1.3. For vulnerability assessments	29%	50%	50%	29%	14%
1.4. For stakeholder engagement	21%	57%	79%	21%	0%
1.5. For formation and execution of adaptation strategies	29%	64%	79%	21%	7%

Table 2. Sources of climate data and information, by specific mention		
Name specific climate data and information sources (unique mentions, # of mentions)	1.2. General climate data and information needs (# of mentions in response to open-ended survey question)	1.6. For vulnerability assessment, stakeholder engagement, and/or formation and execution of adaptation strategies (# of mentions in response to open-ended survey question)
	n=12	n=10
For-profit (1)	total # mentions	**1**
The Climate Service	1	0
Not-for-profit (9)	total # mentions	**15**
American Planning Association	0	1
ASAP	0	3
CAKE	1	2
Climate Central	1	0
EcoAdapt	0	1
Headwaters Economics	0	1
Huron River Watershed Council	1	0
Union of Concerned Scientists	0	1
USDN	0	3
Local governments (0)	total # mentions	**0**
-	-	-
State governments (1)	total # mentions	**1**
Minnesota Pollution Control Agency	0	1
Regional entities (6)	total # mentions	**9**
Great Lakes Climate Adaptation Network	0	1
Greenest Region Compact	0	1
GLISA	3	0
Midwest Regional Climate Center	2	0
SE FL Climate Compact	1	0
Wisconsin Initiative on Climate Change Impacts	1	0
Tribal governments (0)	total # mentions	**0**
-	-	-
Federal government (20)	total # mentions	**30**
CDC	1	0
Climate Explorer	1	0
climate.gov	1	0
DOE	1	0
EPA e-GRID data	1	0

FEMA	1	0
HUD	1	0
NASA	1	0
National Center for Atmospheric Research	1	0
National Climate Assessment	3	1
National Climate Data Center	1	0
NOAA	5	0
NOAA Climate at a Glance	1	0
NOAA Digital Coast	1	0
NOAA National Centers for Environmental Information	1	0
NOAA Sea Grant	0	1
State Climate Summaries	1	0
US Climate Resilience Toolkit	1	3
USDOT Sustainability	0	1
USGS	1	0
Academia (3)	total # mentions	**3**
Georgetown Climate Center	0	1
University of Illinois	1	0
University of Michigan	1	0
International entities (5)	total # mentions	**6**
Climate Access	1	0
Climate Bonds Initiative	0	1
IPCC	1	0
World Bank	1	0
World Resource Institute	1	1

Table 3. Interactions with public sector climate service providers					
1.7. Tell us about your interactions with the following public sector climate service providers (n=14)	**1 (No familiarity)**	**2**	**3**	**4**	**5 (frequent interaction)**
State Climatologist Offices	3	4	5	1	1
GLISA Programs	5	3	1	3	2
NOAA Regional Climate Centers	1	5	2	2	4
NOAA Regional Climate Service Directors	4	4	3	2	1
NWS Regional Offices	4	2	6	2	0
NWS River Forecast Centers	5	4	4	1	0
State Sea Grant Programs	5	2	4	2	1
National Estuarine Research Reserves	8	4	2	0	0
US Department of Agriculture Regional Climate Hubs	5	3	4	1	1
Department of the Interior Climate Science Centers	6	3	4	1	0

Table 4. Awareness of GLISA products and services			
1.8. We would like to understand your organization's awareness or use of specific climate data and information products and services offered by the Great Lakes Integrated Sciences and Assessments (GLISA), a NOAA RISA Team. Please indicate whether you have heard of and/or used each product or service. (n=13)	**Used or are using**	**Heard of it**	**No response**
Climate 101' presentations	1	6	7
Great Lakes Adaptation Data Suite (GLADS)	0	5	9
Great Lakes Ensemble (including Climate Model Buyer's Guide and Report Cards)	0	6	8
Localized Data Products (e.g., Station and Division Climatologies)	2	6	6
Regional Data Products (e.g., Annual Climate Summary, Climate Change in the Great Lakes 2-pager)	4	6	4
Scenario Planning Process (creation of climate and impact scenarios)	1	7	6
Municipal vulnerability Assessment Process (including template and workbook)	0	6	8
Tool Training (e.g., for EPA's National Stormwater Calculator)	1	5	8
Customized interpretation of climate information for individual organizations	0	4	10

Climate Data and Information Needs

Description

This category of survey and interview questions asked participants to describe climate data and information activities that are important to their business model, activities for which they would like to improve their business's performance, and factors that they expect would support such an improvement.

Guiding Research Questions

- What climate data and information resources, services, and models do climate service providers in the Great Lakes region think they need, or are missing in the marketplace?

Takeaways

- Survey participants shared that certain climate data and information activities were important to their business models and seen as areas for improvement. A workshop that targets the following activities may improve its market value and better meet the needs of a variety of participants:
    - using and understanding climate scenarios for adaptation planning
    - developing climate scenarios for adaptation planning
    - conducting climate vulnerability assessments
    - engaging stakeholders in climate adaptation projects
    - developing climate adaptation strategies
    - implementing climate adaptation strategies

- Interview participants emphasized that client-driven climate service providers are beholden to their client's specifications on data, value strong stakeholder engagement, and desire the most accurate data available to help give clients as complete an understanding of a project's cost and benefit as is possible. Providing climate service providers with information that can help them make GLISA data meaningful to clients, like how GLISA data can be used to meet and exceed certain federal and state regulatory requirements, may increase the ability and willingness of providers to try GLISA data.

Data Summary

Survey participants described an overall high diversity of climate data and information activities that are important to their business model (Table 5). Participants most frequently mentioned activities involving the application of climate data and/or information, including climate scenarios, vulnerability assessments, stakeholder engagement, developing climate adaptation strategies, and implementing adaptation strategies. Participants less frequently mentioned activities accessing specific types of Great Lakes regional climate data, accessing or applying downscaled projections, or climate model projections.

Survey participants did not necessarily consider activities important to their business models to also be areas for improvement. Overall, participants seem to have greatest interest in improving their activities

involving application of climate data and/or information, such as using climate scenarios in adaptation planning (93%) and developing adaptation strategies (86%).

The following activities emerged as both popular activities important to participant business models and popular areas for improvement (>40% in each category): using and understanding climate scenarios for adaptation planning; developing climate scenarios for adaptation planning; conducting climate vulnerability assessments; engaging stakeholders in climate adaptation projects; developing climate adaptation strategies; and implementing climate adaptation strategies.

Survey participants mentioned a number of ideas for how to improve their climate data and information services, but responses were low and no major themes emerged. Responses included greater access to data, information, training, and market opportunity.

Both interview participants emphasized the importance of client education, including education on data sources, strengths, and shortcomings. They also emphasized the weight that client's data specifications has in determining what data sources are used for a project.

Supporting interview data:

- See: "Observational notes for thematic analysis of key informant interviews"
    - "Factors in choosing climate data and information sources"
    - "Approach to developing adaptation projects: Stakeholder engagement

Supporting survey data:

Table 5. Climate Data and Information Activities

	2.1. Which of the following are important to your business model? (n=14) (% affirmative responses)	2.2. In which areas would you like to improve your company's performance? (n=13) (% affirmative responses)
Accessing or applying observational (historical) climate data and/or information for areas in the Great Lakes region	36%	-
Accessing observational (historical) climate data and/or information for areas in the Great Lakes region	-	15%
Applying observational (historical) climate data and/or information for areas in the Great Lakes region	-	15%
Using observational (historical) climate data and/or information to set the context for future climate projections	50%	-

Using observational (historical) climate data and/or information to set the context for future climate projections	-	23%
Accessing or applying climate model projections for areas in the Great Lakes region	29%	-
Accessing climate model projections for areas in the Great Lakes region	-	15%
Applying climate model projections for areas in the Great Lakes region	-	23%
Choosing credible climate model projections for the Great Lakes region	-	31%
Accessing or applying downscaled and/or bias corrected projections for areas in the Great Lakes region	29%	
Choosing downscaled and/or bias corrected projections for areas in the Great Lakes region		38%
Using climate scenarios for adaptation planning	93%	
Understanding climate scenarios for adaptation planning in the Great Lakes region		46%
Developing climate scenarios for adaptation planning	57%	46%
Conducting climate vulnerability assessments	71%	69%
Engaging stakeholders in climate adaptation projects	86%	69%
Developing climate adaptation strategies	86%	85%
Implementing climate adaptation strategies	64%	46%

Table 6. Participant ideas on improving climate data and information activities

What would enable improvement? (unique mentions from short answer)	Number of mentions (n=7)
Greater access to data and information	2
Workshops, trainings	2
Client project(s)	1
Greater access to studies, reports, case studies	1
More experience in the Great Lakes region	1
More opportunity in the Great Lakes region	1

Comparing best practices with others	1
Funded initiatives supporting improvement	1
Conferences	1

Perspectives on Publicly Available, Regional, Vetted Climate Data

Description

This category of survey and interview questions asked participants to describe their perspectives on publicly available, regional, vetted climate data and information, including perceived barriers and incentives to using these data and information.

Guiding Research Questions

- What are the opinions of climate service providers in the Great Lakes region on publicly available, regional, vetted climate data products and services?
- What would it take for providers to start using these products more?
- What are providers' awareness of the need and value for these products and services?

Takeaways

- Survey participants expressed an overall high perceived need, value, and interest in increasing use of these products and services, but lack of clients in the Great Lakes region and lack of client demand for these products and services are common barriers. To increase the value of a workshop on GLISA climate products and services, include lessons or panels of providers on finding or creating demand in the Great Lakes region through the use of publicly available products and services.

- Survey participants were interested in learning how to use these products and services but expressed that lack of awareness on how to use them was a common barrier. Customized and technical assistance are popular incentives. Participants may find greater value in the workshop if lessons, activities, or guidance is highly relevant to their individual business needs, and if some avenues for on-going custom technical assistance are made available.

- Interview participants described the marketplace for publicly available climate data and information as large but difficult-to-navigate. Participants were interested in taking greater advantage of these resources, believing that it would improve their company's data quality and thus their products and services. Participants shared that the climate data and information resource that they're required to use by regulatory mandates are not always of the best quality. In future workshops on GLISA climate data and products, GLISA may be able to offer training on navigating the breadth of the greater Great Lakes climate data and information marketplace--including but not exclusively focused on GLISA--to earn the attention of climate service providers and begin building partnerships with them.

Data Summary

Most survey participants were interested in learning more about publicly available, vetted, regional climate data and information products and services, using these more, and building relationships with entities that create these products. Participants saw a need for it in their business and some thought it would improve their competitive advantage or clients' perceptions, though most agreed it's not standard in their sector (Table 7).

The most common perceived barriers were lack of awareness of available products and services (74%); lack of understanding on how to use products and services (26%); and unclear benefits of these products and services (26%) (Table 8). Client and market demand emerged as important recurring barriers and incentives across multiple questions. Participants identified customized products and services (69%), and technical assistance with integrating products and services into their business models (38%) as the most popular incentives.

Both interview participants expressed great interest in broadening their libraries of public climate data. However, they also described the process of finding these resources as difficult or tricky. Both described that they were unaware of the breadth of resources available. One mentioned that there seemed to be insufficient diffusion and sharing of available data and called for an external data-sharing platform for experts to use. The other wished for climate data and information tools to be more user- and consumer-friendly, so that they could be accessible to more practitioners and communities. This participant also said it was difficult to find new trainings on public climate data and information resources in their region, the American Southwest.

Supporting interview data:

- See: "Observational notes for thematic analysis of key informant interviews"
    - "Perceived barriers to using publicly available climate data and information"
    - "Perceived advantages to using publicly available climate data and information"
    - "Service improvement measures"

Supporting survey data:

Table 7. Values, interests, and norms around publicly available data

3.1. To what extent do you agree with the following statements with respect to publicly available climate data and information products and services for the Great Lakes region? (n=14)

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
We are interested in learning more about these products and services	0	0	1	7	6
We are interested in using these products and services	0	0	3	8	3

We are interested in building relationships with the entities that have created these products and services	0	0	1	9	4
We see a need for these products and services in our business	0	1	1	5	7
We expect that our use of these products would have a positive effect on our competitive advantage	0	0	5	5	4
Use of these products is standard in our sector	1	5	4	2	2
Our clients would think favorably on our use of these products	0	0	4	7	3

Table 8. Barriers to using publicly available data, pre-selected options

3.2. Which of the following describe barriers your organization faces for using publicly available climate data and information products and services for the Great Lakes region? (Check all that apply) (n = 13)

We don't know what products/services are available	10
We are aware of these products/services but don't know how to use them	4
We do not see the benefit of using these products/services over other products/services we use currently	4
These products/services are not relevant to our work	3
These products/services require infrastructure (e.g. technological infrastructure) that we do not have	3
Other:	0

Table 9. Barriers to using publicly available data, open-ended

3.3. Please share more information about the barriers your organization faces for using publicly available climate data and information products and services for the Great Lakes region. (n = 10)

Clients	Number of unique mentions
Clients not asking us to use these data and information	1
Clients unaware of these products	1
My clients aren't in the Great Lakes region	1
We are beholden to the data that our clients want us to use	1

Sector demand and norms	-
Not much focus on these products and services among people who provide the services I provide	1
Lack of market demand in my sector	1
Training	-
Learning curve for products and resources in this region	1
Need help tying these products and services into adaptation planning and stakeholder engagement	1
Individual relevance	-
We already make and use similar products	1
We have no regular use for climate data	1
Other	-
Low awareness [no further detail]	1

Table 10. Incentives to using publicly available data, pre-selected options	
3.4. Which of the following describe incentives which would motivate your organization to use climate data and information products and services offered by public and not-for-profit entities for the Great Lakes region? (Check all that apply) (n=13)	
Technical assistance to integrate these products/services into our business model	9
Products/services that are more customized to our business needs	5
Money to transition our systems to be able to use these products/services	3
Other: Client demand	1
Other: Projects in Great Lakes region	1
Other: Regulatory changes that enable greater focus on demand-side resiliency	1

Table 11. Incentives to using publicly available data, open-ended	
3.5. Please share more information about the incentives that would motivate your organization to use publicly available climate data and information products and services for the Great Lakes region. (n=3)	Number of unique mentions
Market demand	1
Scalability to local areas	1
Certification or other recognition as vetted GLISA partner	1

Supplemental Materials

The following Supplemental Materials are available in this folder:

- Interview protocol
- Interview 1 Transcript
- Interview 2 Transcript
- Observational notes for thematic analysis of key informant interviews
- Survey instrument
- Summary tables of select survey data
- Survey Data and Summary Tables

Most items are publicly viewable. The raw data collected through the assessment (interview transcripts and survey data) are available only to project partners. If you would like to access the raw data, please send a request to Rachel Jacobson at rjacobson@adaptpros.org.

https://adaptationprofessionals.org/

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