Quality and Extent of Partnership Involvement in Climate Science Centers in the Northeast, South Central & Pacific Islands Regions

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EXECUTIVE SUMMARY

Background

A key component of the U.S. Geological Survey regional Climate Science Centers is to work with partners. Two major groupings of partners include: (1) science producers (many federal agencies, universities, scientific societies, and other NGOs), who contribute to the development of science information and tools; and (2) science users, which is a broad category covering those working to apply this science information and tools to conservation (e.g., state and federal natural resources agencies, tribes, conservation NGOs). A major indicator of success of each CSC is the degree to which partners are effectively engaged in and benefit from their work. One of the primary benefits expected from the CSCs is the development of "actionable science." In the climate science literature there is a great deal of discussion and consternation about climate information going unused (Lemos, 2015). Boundary organizations, which CSCs have evolved over the last three years to become (ACCNRS, 2015), can link varied social and organizational sectors, fostering innovation and two-way communications, aiming to align science production with user needs (Feldman & Ingram, 2009). Some refer to this involvement of stakeholders or practitioners as "co-production of knowledge" (e.g., Tribbia & Moser, 2008).

Research Objectives

We designed a partner survey to measure the quality and extent of partnership involvement at each of the CSCs. We focused on the following questions for three regional CSCs (Northeast, South Central, and Pacific Islands) for which site reviews were conducted in FY 2018:

- To what extent are science users and producers involved with the CSC?
- What are the benefits of this involvement? What limits involvement?
- To what extent do partners believe the CSC is producing actionable science?
- To what extent are CSC-affiliated science users and producers involved in co-production? What limits this involvement?
- To what extent does the CSC play a role as a boundary organization, facilitating actionable science and co-production? What characterizes that role?

Methods

A standardized, web-based survey of partners and potential partners of the three CSCs was conducted. An initial sample for the survey was compiled from science producers and science users identified by each CSC, Landscape Conservation Cooperative staff and steering committee members with regions that overlap with the two CSC's regions, and members of the Association of Fish and Wildlife Agencies Climate Science Committee. Nine hundred thirty-one individuals were included in the survey sample. The survey documented the ways in which partners were engaged with the CSCs and the factors affecting their engagement.

Summary of Results

While results were analyzed by region (NE, SC, and PI), key findings and patterns were similar across the CSCs. Respondents represented science users and science producers. Although a variety of types of partners were engaged with the CSCs, a large majority of them were from universities and federal agencies.

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That most common way for survey respondents to be involved with the CSCs was as participants in CSC trainings, webinars, workshops or conferences with between one-third and one-half having participated in these opportunities. Approximately one-fifth to one-third in each survey were grant recipients, applicants, or partners. No more than one-fifth were resource managers or decision makers who had used the science produced by the CSC.

For all three CSCs, the top two benefits of the CSC identified by survey respondents were being provided access to a network of people interested in climate adaptation science and receiving access to the science itself. The benefits of the CSC networks were discussed extensively in the focus groups. The most common limitations on partners' engagement with the CSC were the time they had available (given their other priorities).

Two-thirds to three-quarters of the survey respondents in each region felt that climate adaptation science in the regions was available to decision makers, and many also believed that decision makers use the climate adaptation science to inform management. Nevertheless, many believed that climate adaptation science did not *necessarily* influence management actions taken, although approximately half also believed that the CSCs had reduced the disconnect between scientists and decision makers. When asked specifically about the science produced through the CSCs, large majorities of the survey respondents agreed it can contribute to policy or management. Respondents were also generally positive about other characteristics of the CSC science, and the majority found it high quality, appropriate to the decisions being made, and able to integrate well with other information.

Science producers and science users had different perceptions about the use of climate science. The percentage of science producers who thought their science was used by decision makers was much higher than the percentage of decision makers who say they used CSC science. These perspectives were not necessarily inconsistent. It is possible that a small group of decision makers had access to and made use of the climate science that was produced, while others did not. In focus groups in both regions, participants argued that one of the factors contributing to the use of CSC science was translation of the science into a form that decision makers could use.

Co-production of climate adaptation science research was perceived as valuable by large majorities of producers and users. Users had less experience with co-production than producers. Coproduction tended to be more common in the early stages (setting priorities and identifying research questions) and late stages (interpreting and communicating results) of research than the middle stages. Science users who responded to the survey reported that their involvement in co-produced research projects is most limited by scientists not reaching out to them to collaborate and having different perspectives from scientists on what science is needed.

The majority of survey respondents noted a variety of contributions of the CSCs including contributions to collaboration between scientists, awareness of available science, interdisciplinary science, and communication between scientists and decision makers.

Conclusions

Although the CSCs produced a number of benefits, several possibilities exist for enhancing those benefits. More diverse types of partners could be engaged beyond the prevalent federal agencies and university scientists. Engaging new partners may require new ways to make it easier for potential partners to become involved and more outreach to invite them to participate. There is also more work to be done to facilitate actionable science and co-production in all of the regions. CSC efforts along these lines may be aided by defining more clearly those management issues that need attention, creating more opportunities

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for scientists and managers to work together or encouraging it through funding requirements, and improving the ways in which science is communicated.

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TABLE OF CONTENTS

EXECUTIVE SUMMARY i
Background i
Research Objectives i
Methods i
Summary of Results i
Conclusions ii
INTRODUCTION 1
Purpose of Report 1
METHODS 2
Focus Groups 2
Web-based Survey 3
Non-respondent Telephone Survey 4
RESULTS 5
Northeast CSC Results 5
Respondents 5
Extent of Involvement with the CSC 7
Benefits of Involvement 8
Limitations on Involvement 12
Is Climate Adaptation Science Actionable? 14
Science Users' and Producers' Use of Climate Adaptation Science 14
Science Users' and Producers' Engagement in Co-production of Knowledge 21
Perceptions of the Role of the CSC 24
Summary of Northeast CSC Results 24
South Central CSC Results 28
Respondents 28
Extent of Involvement with the CSC 29
Benefits of Involvement 30
Limitations on Involvement 34
Is Climate Adaptation Science Actionable? 36
Science Users' and Producers' Use of Climate Adaptation Science 39
Science Users' and Producers' Engagement in Co-production of Knowledge 43
Perceptions of the Role of the CSC 44
Summary of South Central Results 48

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Pacific Islands CSC Results 50
Respondents 50
Extent of Involvement with the CSC 51
Benefits of Involvement 52
Limitations on Involvement 57
Is Climate Adaptation Science Actionable? 60
Science Users' and Producers' Use of Climate Adaptation Science 63
Science Users' and Producers' Engagement in Co-production of Knowledge 68
Perceptions of the Role of the CSC 70
Summary of Pacific Islands Results 70
Summary of All CSC Results 75
BIBLIOGRAPHY 77
APPENDICES 78
Appendix A. Focus Group Scripts 79
Appendix B. Survey Instrument with Tables of Results – Northeast 83
Appendix C. Survey Instrument with Tables of Results – South Central 105
Appendix D. Survey Instrument with Tables of Results – Pacific Islands 124
Appendix E. Phone Survey Instrument 140
Appendix F. Comparison of Respondent (Web-based) and Nonrespondent (Phone) Surveys 142

INTRODUCTION

In 2008, Congress authorized the establishment of a National Climate Change and Wildlife Science Center (NCCWSC) within the U.S. Geological Survey (USGS) as part of its ongoing mission to meet the challenges of climate change and its effects on wildlife and aquatic resources. In response to Secretarial Order 3289, "Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources," on September 14, 2009 (amended February 22, 2010), the NCCWSC established eight regional Department of the Interior (DOI) Climate Science Centers (CSCs) from 2010 through 2012 to provide scientific information and tools to natural and cultural resource managers to conserve these resources in a changing world. The model developed by the NCCWSC for the regional CSCs employed a dual approach of a federal USGS-staffed component (CSC-federal) and a parallel host-university component (CSC-university), established competitively through a five-year cooperative agreement with NCCWSC.

As the CSCs complete their initial five-year project cycle, the university hosting agreements for these CSC regions are subject to a re-competition process by USGS. As part of this process, NCCWSC, with the engagement of the American Fisheries Society (AFS) and the Human Dimensions Research Unit of Cornell University (Cornell), coordinated an operational and programmatic review and evaluation of host universities to ensure established goals and obligations under the hosting agreements were met, as well as to identify obstacles and areas of improvement for future agreements. This report presents the results of research conducted at the Northeast, South Central, and Pacific Islands CSCs as part of these reviews. Two previous sister reports focused on the other five CSCs (Dayer et al. 2017; Lauber et al. 2018).

Purpose of Report

The NCCWSC has three basic goals: (1) work in close partnership with the natural resource management communities to understand their highest priority science needs regarding climate change impacts, and determine what is needed to fill those knowledge gaps; (2) work with the scientific community to develop the science information and tools in such a way that they can be readily used to generate management strategies for responding to climate change; and (3) deliver these relevant tools and information in a timely and useful way directly to resource managers.

Consequently, a key component of the CSCs is working with partners. Two major groupings of partners include: (1) science producers (many federal agencies, universities, scientific societies, and other NGOs), who contribute to the development of science information and tools and, (2) science users, which is a broad category covering those working to apply this science information and tools to conservation (e.g., state and federal natural resources agencies, tribes, conservation NGOs). Many agencies, particularly the large federal agencies, may represent both science users and producers. A major indicator of success of each CSC is the degree to which partners are effectively engaged in and benefit from their work.

One of the primary benefits expected from the CSCs is the development of "actionable science." In the climate science literature there is a great deal of discussion and consternation about climate information going unused (Lemos, 2015). The commonly held belief amongst scientists that "more and better information will improve decision-making" has been found to be a fallacy (Tribbia & Moser, 2008). Instead, more science often does not lead to better decision-making; there are barriers, other than lack of information, that inhibit science-based decisions. This issue is described as a knowledge-action gap (Cash et al., 2003), research-implementation gap (Knight et al., 2008), or a gap between production of science and use of science (Kirchhoff, Lemos, & Dessai, 2013). This gap may be due to a disconnect between "useful" (producers think it can be used) and "usable" (users apply to decision-making) science (Lemos, 2015).

Both effective boundary organizations and the co-production of knowledge are touted as solutions to this issue (Lemos, 2015).Boundary organizations, which CSCs have been evolving to become over the last three years (ACCNRS, 2015), link varied social and organizational sectors, fostering innovation and two-way communications, aiming to align science production with user needs (Feldman & Ingram, 2009). The role of boundary organizations may be thought of as "information brokers" and "participant advocates" (Feldman & Ingram, 2009). As such, their facilitation of communication may be one of their most essential functions, as poor or nonexistent communications are thought to inhibit science informing practice (Vogel, Moser, Kasperson, & Dabelko, 2007).

Likewise, the often-used approach of "loading dock" science (Feldman & Ingram, 2009) where scientists prepare models, products, forecasts for use without consulting users but with the expectation that users will use it is increasingly recognized to be ineffective (Feldman & Ingram, 2009). Research has shown that there is a greater uptake of climate science if there is two-way communications and long-term relationships between users and producers (Kirchhoff et al., 2013). Some refer to this involvement of stakeholders or practitioners as "co-production of knowledge" (e.g., Tribbia & Moser, 2008), while others term it "joint production of knowledge" (Hegger, Lamers, Van Zeijl-Rozema, & Dieperink, 2012) or "cooperative production of knowledge" (Podesta, Natenzon, Hildago, & Toranzo, 2013). Regardless of the term, there is wide-spread acknowledgement that interdisciplinary (defined more broadly than simply academic disciplines) engagement is essential for addressing 21st century global challenges such as climate change (Podesta et al., 2013). The ACCNRS report also recognizes the potential for co-production of knowledge by Climate Science Centers, calling for more of it in their recommendations.

We designed a study of CSC partners to measure the quality and extent of partnership involvement at each CSC. We focused on the following questions for the three regional CSCs for which site reviews were conducted in FY 2018:

- To what extent are science users and producers involved with the CSC?
- What are the benefits of this involvement? What limits involvement?
- To what extent do partners believe the CSC is producing actionable science?
- To what extent are CSC-affiliated science users and producers involved in co-production? What limits this involvement?
- To what extent does the CSC play a role as a boundary organization, facilitating actionable science and co-production? What characterizes that role?

METHODS

Our partnership evaluation consisted of two components: a series of focus groups and a standardized web-based survey. Similar methods were used in partnership evaluations conducted for five other CSCs (Dayer et al. 2017; Lauber et al. 2018).

Focus Groups

Two focus groups were conducted with partners of the CSCs during each of the three site visits. The purpose of the focus groups was to understand the range of perspectives and experiences of CSC partners in relation to their work with the CSC. One group at each CSC included science producers and the other included science users.

Focus group participants were recruited by each CSC's staff with guidance from Cornell. We attempted to include participants that represented a diversity of organizations and regions. Participants in the science

producers groups included researchers that had received research funding from the CSC. Participants in the science users groups included representatives of agencies intended to benefit from the science produced by the CSC: Landscape Conservation Cooperatives, federal natural resource agencies, state fish and wildlife agencies, tribal organizations, and nongovernmental conservation organizations. A total of 62 individuals participated in the six focus groups (Table 1).

Table 1. Number of focus group participants from each Climate Science Center.

Climate Science Center	Number of science producers	Number of science users
Northeast	12	9
South Central	16	11
Pacific Islands	8	6

Each focus group consisted of a semi-structured conversation guided by a series of open-ended questions (Appendix A) and lasted approximately two hours. The questions were designed to explore how partners contributed to the work of the CSCs and the factors that influenced the ability of the CSCs to work with their partners. The specific question topics focused on: how participants have worked with the CSC, reasons for becoming involved with the CSC, benefits of involvement with the CSC, challenges to involvement, and what the CSC could do to promote even more benefits from involvement. Additionally, we specifically explored how the CSCs contributed to the coproduction of science and the generation of actionable science, with questions about interactions between science producers and science users and the role of the CSC in connecting them.

The focus groups were audio-recorded and transcribed. We coded the transcripts by breaking them into segments of one sentence to one paragraph in length. Each segment was coded as pertaining to one of the following topics:

- Perceived benefits of involvement with the CSC
- Challenges to being involved with the CSCs
- Actionability of climate science produced by CSC
    - Factors contributing to actionability
    - Factors limiting actionability
- Coproduction of climate science produced by CSC
    - Factors contributing to coproduction
    - Factors limiting coproduction

After the transcripts were coded, we reviewed all segments coded with the same category. In our results, we present excerpts from the transcripts that reflect as much of the range of perspectives expressed as possible.

Web-based Survey

A standardized, web-based survey of partners and potential partners of the three CSCs was conducted. An initial sample for the survey was compiled from science producers and science users identified by each CSC, Landscape Conservation Cooperative staff and steering committee members with regions that overlap with the two CSC's regions, and members of the AFWA Climate Science Committee. A total of 501 individuals were included in the Northeast CSC survey sample, 272 were included in the South Central CSC sample, and 158 individuals were included in the Pacific Islands CSC sample.

The survey documented the ways in which partners were engaged with the CSC and the factors affecting their engagement. The survey questions (Appendices B-D) were developed based on insights from focus groups conducted during the reviews of three previous CSCs and a review of the scholarly literature. The question topics included:

- Nature of respondents' work
- Perspectives on the importance of addressing climate change
- Extent of involvement with the CSC
- Benefits of involvement with the CSC
- Limitations on involvement with the CSC
- Perceptions of climate adaption science
- For science users:
    - Use of climate adaptation science
    - Limitations on use of climate adaptation science
    - Importance of and engagement in co-production of science
    - Limitations on co-production of science
- For science producers:
    - Use of climate adaption science produced by others
    - Limitations on others' use of climate adaptation science
    - Importance of and engagement in co-production of science
- Perceptions of the role of the CSC

The survey instrument was reviewed by subject matter experts including staff from the NCCWSC, members of the review teams for the Climate Science Centers, and other researchers. The same survey instrument was used for all Climate Science Centers, with minor changes to reflect the region referenced. An identical survey instrument had been used in 2016 and earlier in 2017 with five other Climate Science Centers.

Individuals were e-mailed at the initiation of the survey and provided with a link to a web-based questionnaire. Individuals who did not respond to the first request received up to four additional requests to complete the questionnaire by e-mail. The web-based survey instrument was programmed and administered using Qualtrics, which provides a means of soliciting participation in a survey via email and recording responses. Qualtrics assigns each individual a unique web link to prevent individuals outside our study population from participating in the survey and prevent access to survey data by anyone other than the research team. Implementation of survey began on September 6, 2017 and concluded on October 4, 2017.

Non-respondent Telephone Survey

A short (5 minute) telephone survey of nonrespondents to the web-based survey was conducted by the Cornell University Survey Research Institute from October 11 to November 9, 2017. The survey questions (Appendix E) included a sample of questions from the web-based survey to determine whether and how nonrespondents differ from respondents on key criteria. Seventy-five nonrespondents (25 from each of the three CSCs) completed the questionnaire.

RESULTS

Response rates to the web-based survey were 53% (n=254) for the Northeast CSC, 53% (n=144) for the South Central CSC, and 67% (n=106) for the Pacific Islands CSC (not including undeliverable e-mails). The number of completed surveys differs due both to the different response rates and differences in the size of the partner databases provided by each CSC. We excluded respondents from our analyses if they reported that their work does not at all involve climate adaptation science, or management or policy related to climate change adaptation (11 respondents), reported that they had never heard of the CSC (13 respondents), or opened the survey but did not answer any survey questions (12 respondents). The analytical sample thus contained 468 individuals.

Results in this report are based on respondents to the web-based survey, but these respondents differed in some ways from the web survey nonrespondents who were reached subsequently through the phone survey (Appendix F). They placed less importance on the benefits the CSCs could provide. They were more likely than respondents to be affiliated with federal and state agencies, tribes, non-profits, and universities; in fact, they were more likely to have affiliations to multiple types of organization.

Respondents and nonrespondents did not differ in the degree to which they perceived climate change as a threat nor whether they thought that managers or policy makers should take action now to address climate change threats. Those respondents and nonrespondents who were involved with the CSCs had been involved for similar amounts of time.

Northeast CSC Results

Respondents

We sought to survey both partners and potential partners of the Northeast CSC. Specifically, we attempted to include people who were working to address climate change either as "science producers" (those who produce climate adaptation science) or "science users" (those who make decisions about natural resource policy, management, or programs). This population is not well defined. As described above, we compiled our sample from three sources, but this approach may have yielded different numbers and types of partners from region to region. We characterize our respondents in the Northeast region in this section.

Forty-seven percent (n = 101) of the respondents reported that they make decisions about natural resource policy, management, or programs as part of their jobs. We refer to these individuals as science users. Forty percent (n = 84) reported that they have produced climate adaptation science through an affiliation with the Northeast CSC, while 18% (n = 38) have produced climate adaptation science but never with such an affiliation. We refer to both of these groups as science producers (58%; n = 122). Forty of the respondents (19%) were both science users and producers.

Fifty-two respondents (22%) were neither users nor producers. These individuals were less engaged in work involving "climate adaptation science" or "management or policy related to climate change adaptation" (Table NE-1).

All of our respondents did work that involved climate adaptation science, management, or policy to at least some extent. More than half of our respondents (52%, n=123) were involved to a large or very large extent (Table NE-1). Thirteen percent (n=31) were involved only to a small extent. Producers were more involved than users. Seventy-four percent (n=61) of producers were involved to a large or very large extent. Seventy-one percent (n=41) of users were only involved to a small or moderate extent.

Table NE-1. Respondents' extent of involvement with climate adaptation science or management or policy related to climate change adaptation.

Extent of involvement	User	Producer	Both User and Producer	Neither User nor Producer	Total
To a small extent	15%	4%	10%	29%	13%
To a moderate extent	56%	22%	20%	40%	35%
To a large extent	21%	43%	40%	17%	31%
To a very large extent	8%	32%	30%	14%	21%

Most respondents (77%; n = 174) reported that they have had at least some interest in or involvement with the Northeast CSC (Table NE-2). Just 18% (n = 41) reported that they had no involvement but someone else in their agency or organization did, and another 5% (n = 12) had no interest or involvement at all.

Table NE-2. Respondents' relationships with the Northeast CSC.

Extent of involvement	User	Producer	Both User and Producer	Neither User nor Producer	Total
Heard of the Northeast CSC, but no interest or involvement	7%	2%	3%	11%	5%
No involvement with the Northeast CSC, but someone else in my organization involved	33%	7%	18%	18%	18%
At least some interest or involvement with the Northeast CSC	61%	90%	80%	71%	77%

Respondents worked in states throughout the Northeast region, but particularly in Massachusetts, New Hampshire, New York, Maine, and Wisconsin (Table NE-3). Relatively few worked in Kentucky and Iowa.

A majority of respondents worked at the regional/multi-state scale (70%; n=164) and the state scale (60%; n=140) for some or all of their work. Smaller percentages worked at the watershed (46%; n=109), local (43%; n=101), or national scale (32%; n=75). Only about one-quarter (23%; n=53) worked at the international scale.

The majority of respondents were affiliated with either federal agencies or universities (Table NE-4). Fewer were affiliated with state agencies or non-profit organizations. Very few were affiliated with private industry, tribal governments, or local governments.

Table NE-3. States in which respondents work.

State	Percentage of respondents	n
Massachusetts	35%	83
New Hampshire	21%	49
New York	21%	49
Maine	20%	48
Wisconsin	20%	48
Vermont	17%	39
Minnesota	17%	40
Connecticut	16%	37
Pennsylvania	16%	37
Virginia	16%	38
Maryland	15%	34
Michigan	15%	36
Rhode Island	13%	31
West Virginia	13%	30
New Jersey	12%	28
Indiana	11%	26
Illinois	11%	26
Delaware	10%	23
Ohio	10%	23
Missouri	10%	23
Kentucky	6%	15
Iowa	6%	15

Table NE-4. Respondents' affiliations.

Affiliation	Percentage of respondents	n
Federal agency	30%	70
University	28%	66
State agency	19%	44
Non-profit organization	15%	34
Tribal government	2%	5
Private industry	2%	4
Local government	1%	3

Nearly half of respondents held research positions (48%; n=112). More than one-quarter (29%; n=69) were in leadership/administration. Only a few were in operations (8%; n=19) or policy (8%; n=18).

Extent of Involvement with the CSC

On average respondents have been involved with the Northeast CSC for 3.4 years. Respondents reported a variety of types of involvement (Table NE-5). Most common was as a participant in a CSC training, webinar, workshop, or conference (37%; n=86). Nearly one-fifth were resource managers or decision makers who had used the science produced by the CSC (19%; n=44), and nearly as many (18%; n=43) were CSC grant recipients, applicants, or partners on a grant.

Table NE-5. Types of involvement with Northeast CSC in the last five years.

Affiliation	Percentage of respondents	N
Participant in a CSC training, webinar, workshop, or conference	37%	86
Resource managers or decision maker who has used the science produced by the CSC	19%	44
CSC grant recipient, applicant, or partner on a grant	18%	43
University member affiliated with the CSC	17%	39
CSC-funded graduate student or postdoctoral fellow	14%	33
LCC steering committee member	9%	21
CSC Stakeholder Advisory Committee member	6%	14
LCC staff member	6%	13
CSC USGS staff	2%	4

The respondents reported on their frequency of interaction with five types of CSC representatives and affiliates (Figure NE-1). At least two-thirds of respondents interacted with each of four of the types (US Geological Survey CSC staff; University leads/PIs for the CSC; CSC-affiliated researchers; and CSC graduate or post-doctoral fellows) at least a few times a year. For their interactions with CSC Stakeholder Advisory Committee members, the modal level of interaction was "not at all," although 44% interacted with these individuals at least some of the time.

Benefits of Involvement

One of the most frequently identified benefits attributed to the CSC (Figure NE-2) was "access to a broader network of people interested in climate adaptation science" (74% described as "important" or "very important"; n = 127). During the focus groups, both science producers and science users frequently referred to the benefits of broader networks:

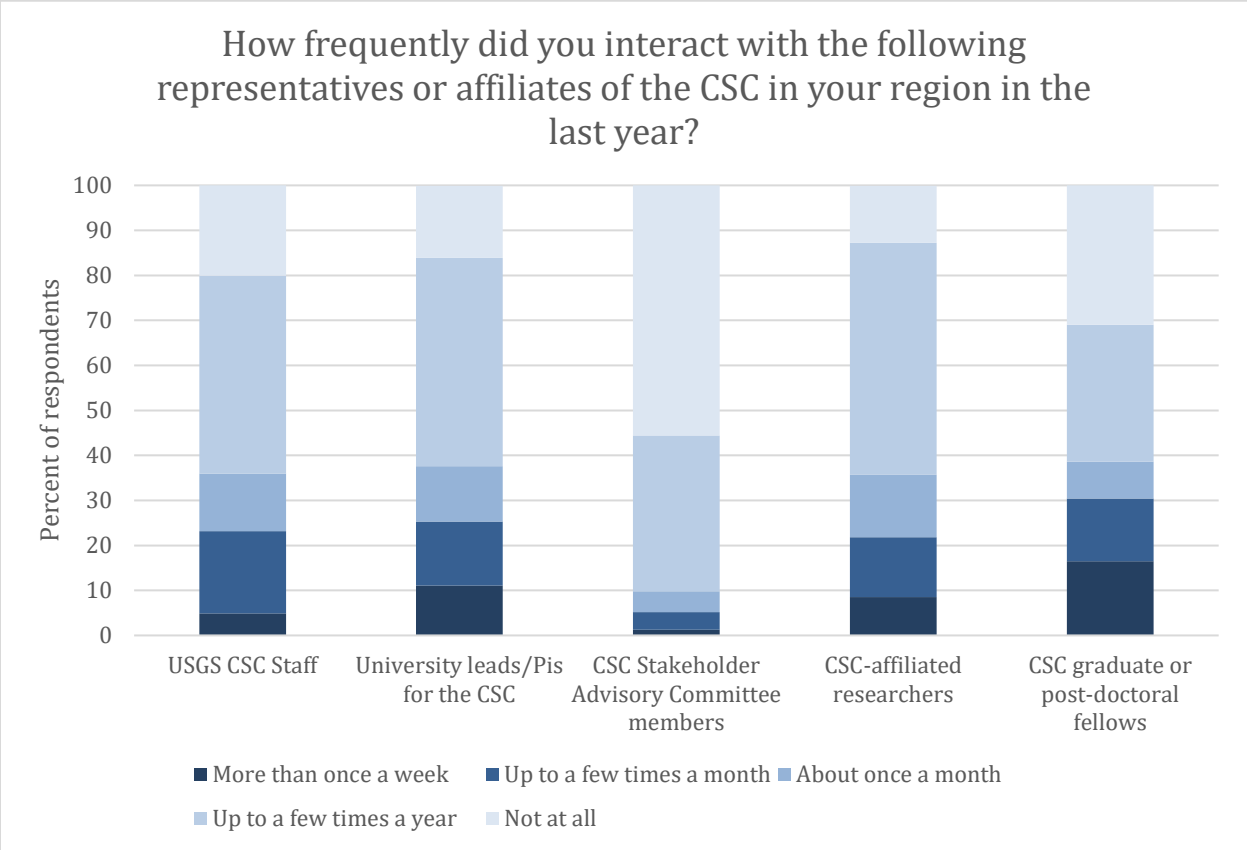
> *Really, really important to have this community that's been created.... Now there's a central place to go, and it's people you know you can talk to.* (NE Producer FG)

> *I think part of that is personal relationships. I know from my perspective working with Mary has been unbelievably productive. She's a fantastic point of contact and has really helped connect us to different folks and different resources.... So you know those sorts of relationships have just been huge in being able to sort of navigate that complex landscape. And we're tremendously thankful for that relationship.* (NE User FG)

Several participants observed that these networks often enable larger regional collaborations:

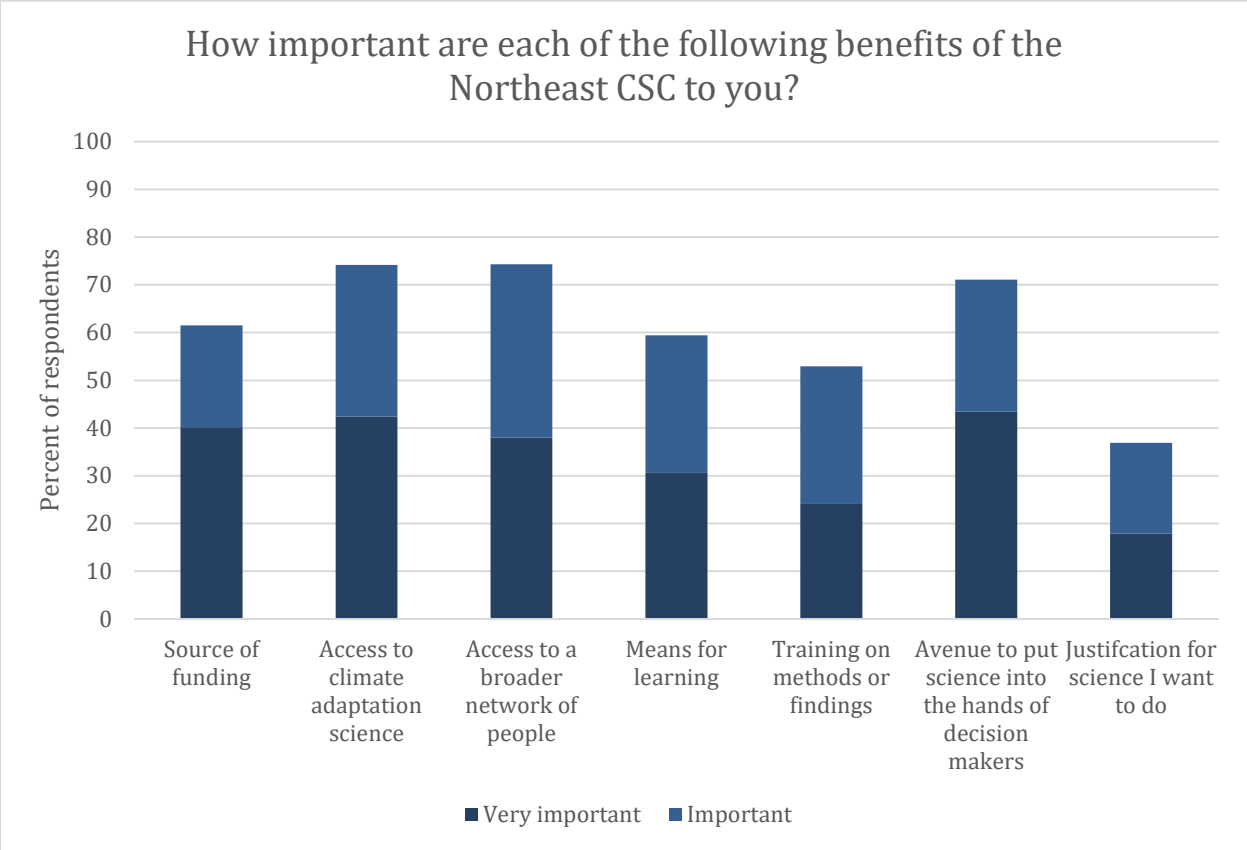
> *Being able to plug into and establish a regional network is really valuable.... We're over on the west end of the CSC range, thinking about lake and stream issues.... It's kind of a no-brainer to connect with all of the people doing great work on the eastern end of that range.... It really helps*

Figure NE-1



Note: Based on survey question 8.

Figure NE-2



Note: Based on survey question 9. Text in items shortened for presentation in graph, and only "important" or "very important" responses are shown. Full results in table in Appendix B.

solve the mechanism to get together to talk about shared interests and compare notes and collaborate so that has tremendous value to me. (NE Producer FG)

One of the great benefits for our project is that we were able to connect with other states within the Northeast Climate Science Center region. And this topic is really important not just within New York State, but the region interacts with other people across the Northeast who are dealing with the same questions. And also just really having that connection with climate scientists that I don't normally have in my day-to-day support. So that was really helpful. (NE User FG)

"Access to climate adaptation science" was a benefit attributed to the CSCs by just as many survey respondents (74%; n = 126). Focus group participants also considered this one of the values of the CSC:

I think that there have been some really tremendous gains made in this region with the science that's being developed by the CSC. And so it's being kind of a ... boundary-setting kind of translational science organization... It's been a pretty good and easy conduit for us to take the science that they're doing ... and be able to use that to speak to our audience and the people that we're working with as well. (NE User FG)

We're developing a landscape conservation design informed by future projections. A big part of that are climate projections, and to be able to lean on the CSC and the expertise that are found in the CSC was just completely important to that success of that project. (NE Producer FG)

Nearly as many people who responded to the survey thought that the CSC also was an effective "avenue to put climate adaptation science into the hands of decision makers" (71%; n = 121). Science producers in the focus group identified communication with science users as an important benefit:

Also, the CSC is an excellent avenue for facilitating communication and engagement with regional stakeholders facilitated through meetings and webinars. (NE Producer FG)

A majority of survey respondents also believed that important or very important benefits of the CSC included serving as "a source of funding for climate adaptation science" (62%; n = 104), "means for learning about climate adaptation" (59%; n = 101), and "training on climate adaptation science methods or findings" (53%; n = 90).

Funding was discussed more often in the producers focus group than the users focus group. Participants who talked about funding often argued that it filled needs that other funding sources could not:

Tthe project that I'm working on primarily funded a postdoc.... What that allowed me to do in my research program was to do a project that is very closely tied to stakeholders and to a network of kind of end users ... in a way that has science behind it.... That kind of project would be almost impossible to fund anywhere else. (NE Producer FG)

There are several other I think unique aspects about the funding from the center that are worth mentioning as benefits. So as one of the consortium PIs we benefit in that we get a relatively stable level of base funding for the duration of the original 5-year study.... So that lets you do something or things you can't do with more intermittent funds. (NE Producer FG)

During discussions of the value of learning and training opportunities, benefits to students and postdocs were frequently discussed:

There are some benefits of the Climate Science Center to me that are really kind of intangible.... There's this informal interaction ... just interactions, consultations, picking brains kind of thing that really is invaluable to an early career person.... Just the times of exposure to the staff here, the focus on stakeholders, to an early career person is very valuable and constantly learning to approach the discussion that we're addressing from stakeholders' perspectives ... has been really valuable. (NE Producer FG)

I think one of the things that has been happening that's really important is the training and capacity building by supporting students and postdocs. And so there's a lot of more capacity of people who not only have been studying, doing their research on the climate science, but have been working with stakeholders.... Some of them have been getting this other thing communication training and I think we are building a bigger capacity of really having people who are you know starting to fill this real need we have nationally. (NE Producer FG)

Limitations on Involvement

The most common limit on involvement with the CSC was not having enough time (41%; n = 97), followed by not having enough funds (26%; n = 60) (Figure NE-3). Being constrained by the amount of time that partners had available was a topic that came up in both the producers and users focus groups:

We all work for another institution, so that is one more organization we have to coordinate and interact with. But we all do it by choice because of the great work we think we're doing through it. So it's a challenge. (NE Producer FG)

The amount of time I'm able to devote to it has been challenging.... I've seen that the Climate Science Center has grown and has been very active and has an incredible staff. And I have worked with some of them, and they have sent emails to me directly. But I haven't taken the time to understand the roles or position staff members at the Climate Center and I think that would be helpful to me going forward.... I just haven't had time to do that. (NE User FG)

Even more frequently discussed was the closely related topic of the difficulties faced by some of the partners who worked in locations far from the University of Massachusetts:

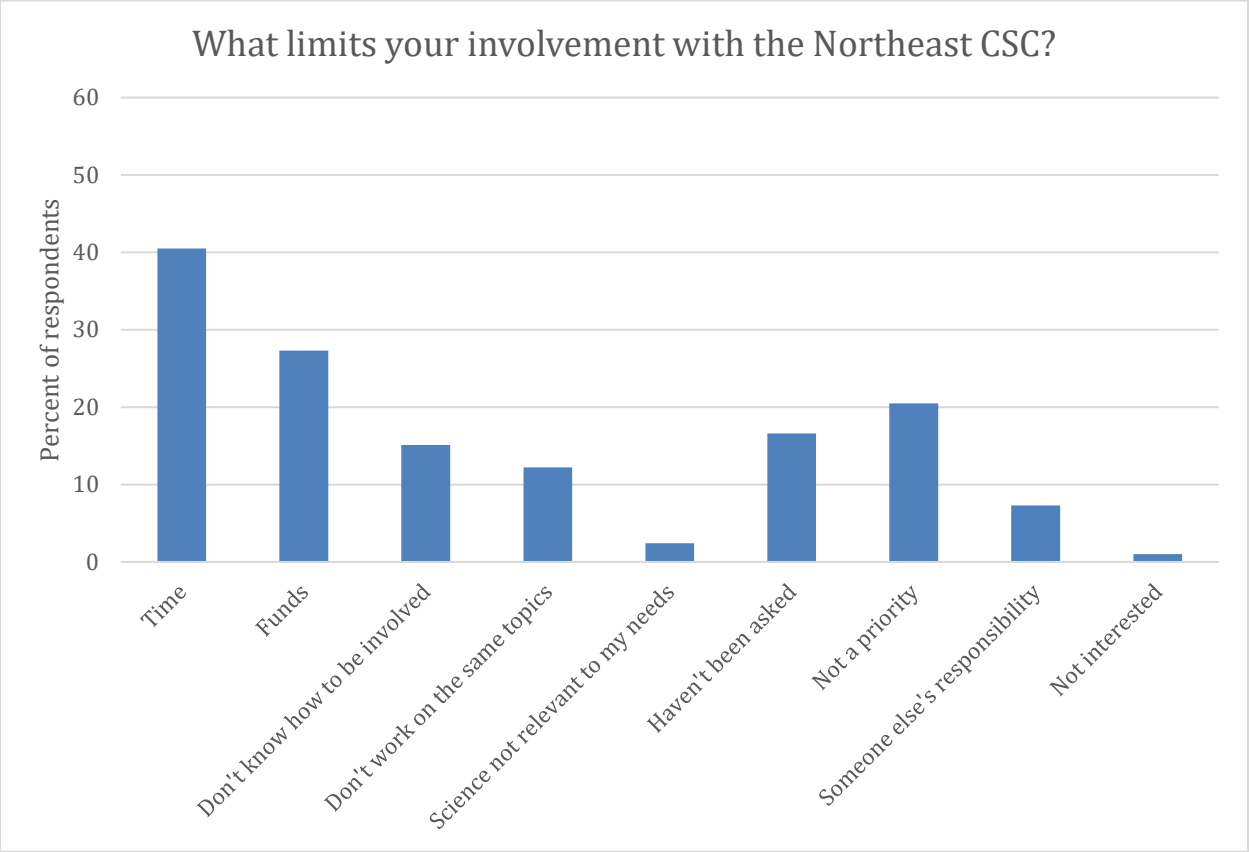
We're really, really lucky to be nearby, but, unfortunately, I think there are people who aren't right nearby. But there's a great advantage for local folks. (NE Producer FG)

A challenge in a distributed network like this where you got the hub at UMass ... is there's a lot of attenuation as you, as you go ever ... further from that hub.... When your mandate is to cover 22 states and ... directly have a presence in 9 of them ... it's a big challenge that's difficult to overcome.... It's ... never going to be like the UMass model on every one of these campuses within the network. (NE Producer FG)

From the science users' perspective, the distance led to many of the Northeast CSC projects being more relevant to the Northeast than other parts of the region:

It certainly seems that a lot of the projects are either national or ... focused a lot of times in the northeast corridor.... It's certainly something we've seen where even some of the scientists who are from University of Minnesota or Forest Service of Missouri are actually working on projects that are based in the Northeast. (NE User FG)

Figure NE-3



Note: Based on survey question 10. Text in items shortened for presentation in graph. Full text in table in Appendix B.

> *That's ... one of my top issues, a drum that I beat all the time, with the need for a Midwest focus.... Not that the Northeast Climate Science Center hasn't been great, but it is just a really key area and the issues that we have in the Great Lakes are very different or in the corn belt are very different from the Northeast.* (NE User FG)

One in five survey respondents said their involvement with the CSC was limited because working with the CSC was not as high of a priority as other work (20%; n = 48). Fewer than one-fifth of survey respondents reported that their involvement was limited because they had not been invited or asked to be involved (18%; n = 42) or did not how to be involved (17%; n = 40). Nevertheless, confusion about the functions that the CSC filled, which had implications for how partners would engage with it, was a topic that was discussed in the science users focus group.

> *I think that for some partners, at least for folk that we engage with, there may still be some confusion as to the roles of the LCC vs. the Climate Science Center in terms of science generation.* (NE User FG)

Is Climate Adaptation Science Actionable?

Respondents shared their perceptions both of climate adaptation science, in general, and of the climate adaptation science produced by the CSC. With regard to climate adaptation science in general, nearly three-quarters of respondents (73%; n = 155) agreed or strongly agreed that climate adaptation science in the Northeast region is available to decision makers (Figure NE-4), and more than half thought that fish and wildlife managers, (55%; n = 119) and land managers (51%; n = 110) used this science to inform management. Only about one-third (31%; n = 67) believed that policy makers used this science to inform policies. A majority (58%; n = 125) maintained that what is known about climate adaptation does not necessarily influence actions taken by decision makers in the region. Nearly half (47%; n = 102), however, agreed that the CSC has helped to reduce the disconnect between what is known about climate adaptation and the actions taken by decision makers in the region.

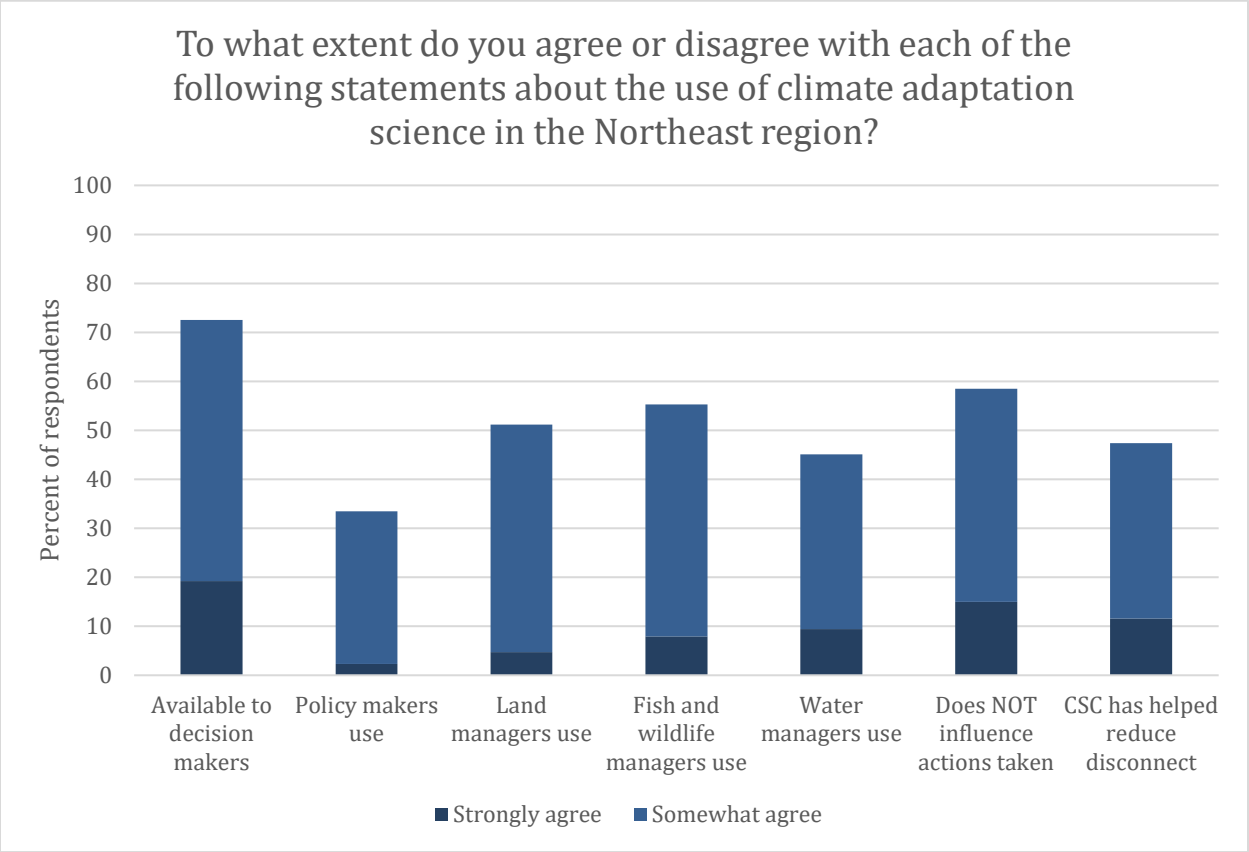
In terms of the Northeast CSC science specifically, respondents (89%; n = 191) strongly or somewhat agreed the CSC science can contribute to policy or management (Figure NE-5). Respondents were also positive about other characteristics of the CSC science, finding it high quality (79%; n = 168) and appropriate to inform the types of decisions being made (82%; n = 175). A majority also thought that it integrated well with other information (69%; n = 147). Fewer than 20% thought that the Northeast CSC's science was irrelevant to management (13%; n = 27), and almost none thought it was biased (2%; n = 4).

Science Users' and Producers' Use of Climate Adaptation Science

Among respondents who reported that they were science users, 61% (n = 61) reported that they or someone in their organization used climate adaptation science from sources affiliated with the Northeast CSC. (Twenty-eight percent did not know whether they had.) More than three-quarters (77%; n = 76) reported that they or someone in their organization used climate adaptation science from sources not affiliated with the CSC.

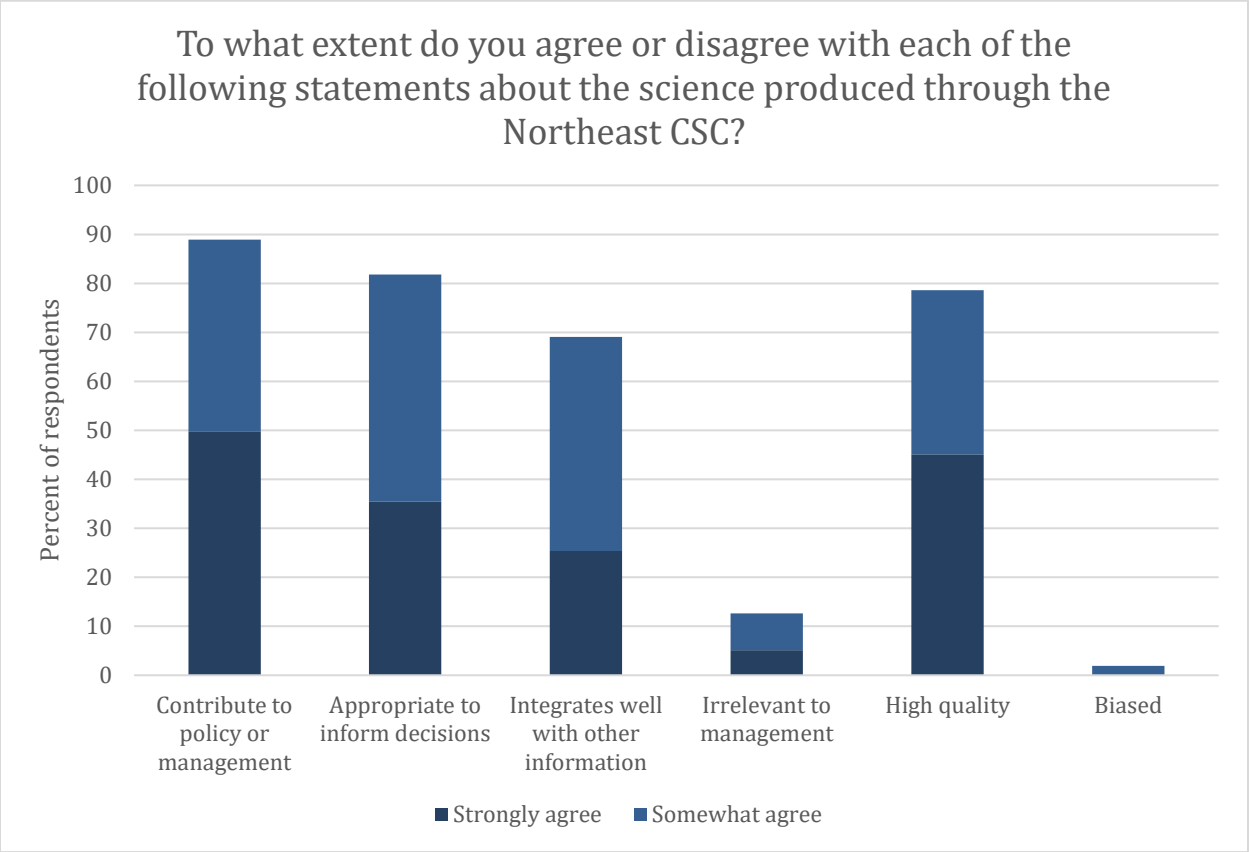
The most common way science users reported using the Northeast CSC science (Figure NE-6) was to inform management plans (46%; n = 46). More than one-third reported using it to inform management actions (36%; n = 36) and inform training of conservation professionals (34%; n = 34). More than one-quarter (29%; n = 17) used it to inform the public about climate change and its impacts. It was less frequently used to inform policy (17%; n = 17) and inform land acquisition priorities (13%; n = 13).

Figure NE-4



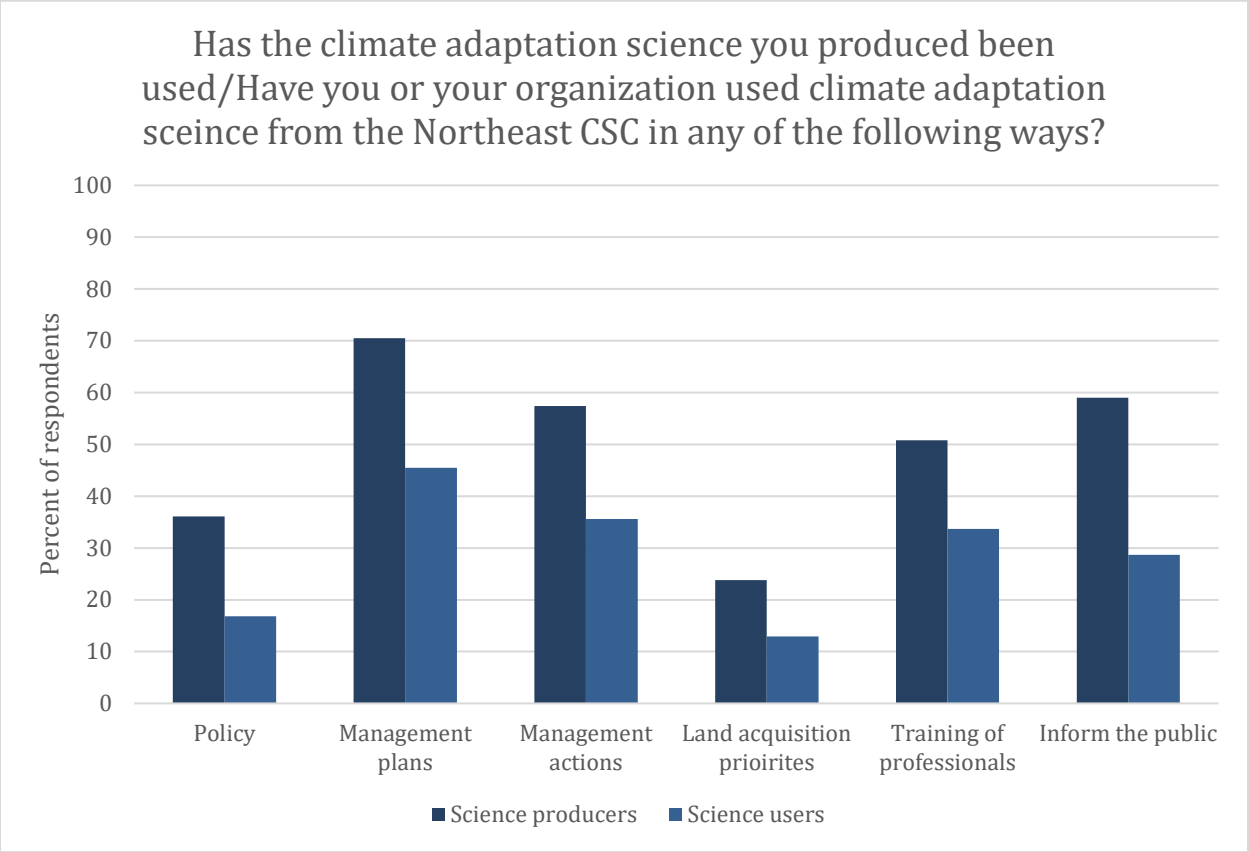
Note: Based on survey question 11. Text in items shortened for presentation in graph. Full text in table in Appendix B.

Figure NE-5



Note: Based on survey question 12. Text in items shortened for presentation in graph, and only "strongly agree", "somewhat agree", or "I'm unfamiliar with the science" responses are shown. Full results in table in Appendix B.

Figure NE-6



Note: Survey questions 15 & 21. Text in items shortened for presentation in graph. Full text in table in Appendix B.

When science producers were asked a parallel set of questions about how the science they had produced had been used, the relative frequency of different types of reported uses was similar, but the absolute frequency was greater. More than two-thirds (71%; n = 86) said their science had been used to inform management plans, and more than half said their science had been used to inform the public about climate change and its impacts (59%; n = 72), inform management actions (57%; n = 70), and inform training of conservational professionals (51%; n = 62). The differences between science users' and science producers' responses could reflect differences in perceptions about how frequently CSC science is used. It could also reflect that the use of CSC science is concentrated in a subset of potential CSC science users.

Different perceptions of the use of Northeast CSC science also were evident in the focus groups. Many science producers characterized their science as actionable, sometimes providing examples of their efforts to make it actionable:

> *We met with stakeholders once a month for two years and that slowed down the science. We knew it was going to be actionable as a landscape conservation design but when you're kind of exploring five or six different avenues every month to show the stakeholders that they can visualize what the outcome might be, that's not the typical academic research science schedule and so that kind of collaboration between a CSC and the LCC really allowed that process to take place which I think is pretty unique.* (NE Producer FG)

> *Working at the Northeast CSC has allowed me to the do the science I've always wanted to do, which is work with a decision maker initially to make sure we're actually answering the question that they want answered ... And then to figure out ways of best presenting that research to the stakeholders so it's immediately digestible and supportive of decision making.* (NE Producer FG)

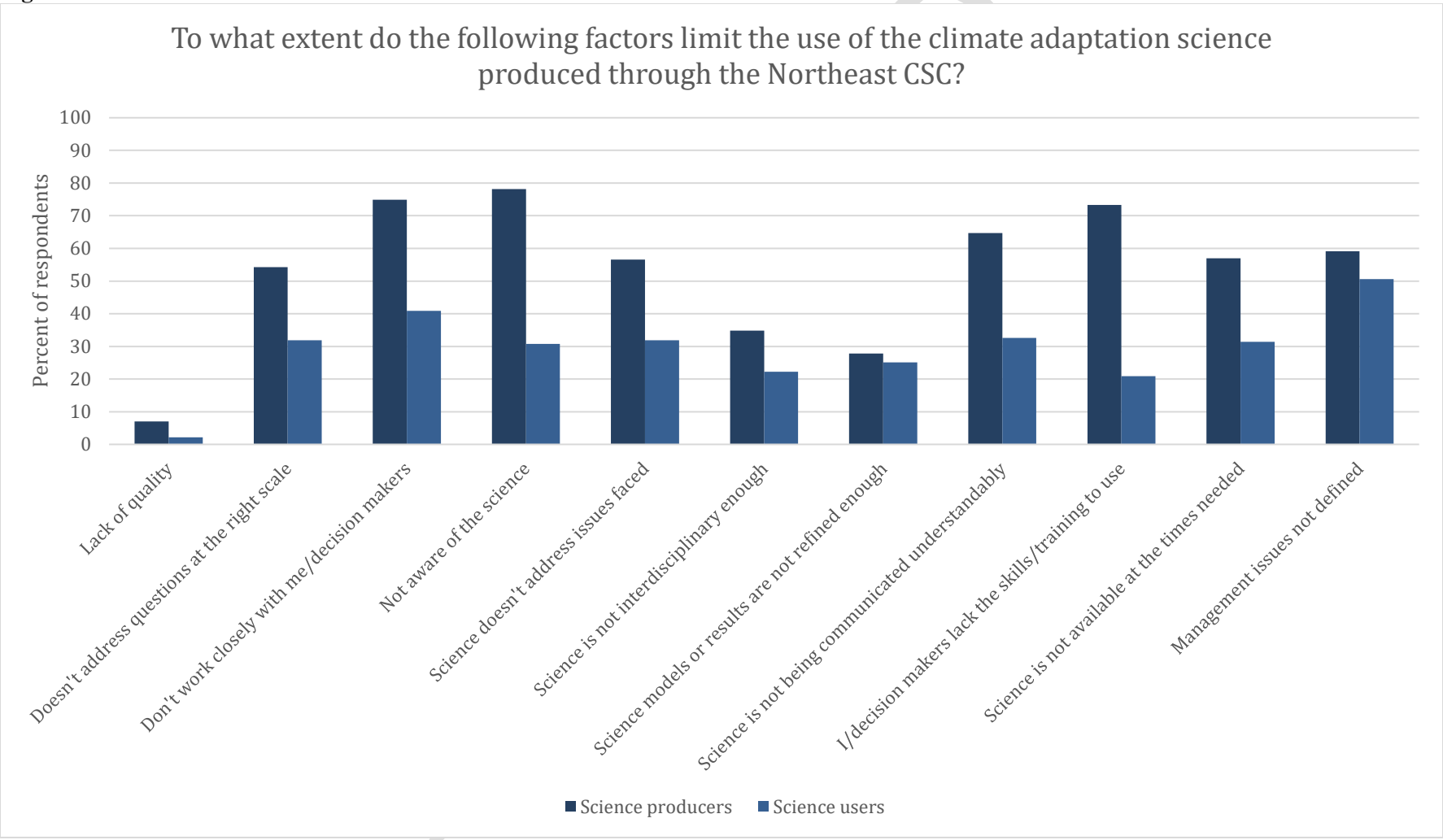
Science users, on the other hand, were more likely to question whether much of the CSC science was actionable:

> *To get climate science used, it's even beyond translation. You really have to have stakeholder-driven coproduction of science... My personal opinion is that many or even the majority of Northeast Climate Science Center projects are not really producing management-driven or actionable results, and it's really hard to do.... It takes a lot longer and it's more intense to bring the stakeholders and managers together to plan that out.... I've done a quick analysis of the Climate Science Center projects.... Of the 57 forest, wildlife, coastal projects that the center has focused on in our part of the geography, just kind of my rough cut, I mean you know this is my personal opinion, I'd say about 17 of those 57 look like, yes, they could have actual management implications and could be used right now for management.* (NE User FG)

Both science users and science producers recognized factors that could limit the use of CSC science. Science users and producers differed in their perceptions of what these factors were (Figure NE-7). In all cases, more science producers than science users perceived limits to the use (not necessarily their own use) of CSC science to a moderate, large, or very large extent. More than 60% of science producers thought that the use of CSC science was limited by lack of awareness of the science (78%), scientists not working closely enough with decision makers (75%), decision makers lacking the skills and training to use the science (73%), and the science not being communicated understandably (65%).

The only factor that a majority of science users thought was limiting the use of CSC science was management issues not being well defined (51%). Neither group considered a lack of quality of the science to be a problem (science users – 2%; science producers – 7%).

Figure NE-7



Note: Survey questions 16 & 22. Text in items shortened for presentation in graph, and only "to a moderate extent", "to a large extent", or "to a very large extent" responses are shown. Also, text varied slightly for science producers and users. Full results and text in tables in Appendix B.

The discussion of limitations on the use of CSC science in the focus groups surfaced a greater number of concerns. Both science producers and science users thought that making science accessible to users was a challenge:

> *I think the challenge then comes back to us ... how do we take the science ... is there some way, some framework we can put it in, some tool we can use, that makes it easier for them?* (NE Producer FG)

> *I just think that there's this inherent challenge to disseminating and translating that science and then perhaps to a lesser extent to make sure that the science is as user-friendly as possible.* (NE User FG)

> *I'm really an end user.... The challenge has always been to take those products and ... step it down a level that is applicable to us, and also having that background and time to understand it and interpret it.* (NE User FG)

They believed that one reason for this challenge was the technical limitations of potential science users:

> *The biggest challenge we've had is how to communicate uncertainty effectively... Lots of time they just don't like to deal with it because they haven't ... been able to understand it or figure out how to incorporate it into the decisions they're making.... If the Climate Science Center could come up with some kind of unified way of explaining variability that could be really, really powerful.* (NE User FG)

> *These are not uncommon problems. Right, I mean science literacy is a major issue in our center and country.... I mean it's really hard to have conversations about all of these aspects whether it's variability or just climate change without having an informed public. And so I think that that's always, that's always a challenge.* (NE User FG)

Consequently, producers and users made efforts to translate the science into forms that were usable to decision makers:

> *It's not enough to just create a model.... You have to take that model ... here's what the outcomes would be for those alternatives, being very explicit, prescriptive, is something that I think that was critical.* (NE Producer FG)

> *I think when we're talking about the products that would be useful to managers, managers don't generally think in terms of the climate impact that's going to impact them. They think more in terms of the problems that they have. So the syntheses are oriented around Wildlife Action Plans or how you set waterfowl regulations or the sort of problems that they're dealing with makes it easier for them to integrate climate into all of the other factors at work.* (NE User FG)

Some focus group participants believed that more efforts of this type were needed:

> *I would highly recommend some focus on data visualization at some level.... You could require that every project has a data vision component.... I was actually in this room a year ago talking about the visualization kind of approaches to the Climate Science Center and it hadn't really been thought about at all. And I was frankly shocked that ... they hadn't been taking it to that ... almost final step of how to communicate these very complicated things. So that's I'd say from my point of view the biggest deficiency in the Climate Science Center right now.* (NE Producer FG)

Outlets beyond peer review publications, they could be either provided, developed by the CSC or developed through the other partner.... You know there's like a whole slew of ways they can get out there, but some non-peer review publications and sort of thing, like they kind of talk like normal people. (NE User FG)

To some extent, the actionability of the CSC science was also limited by the diversity of ecoregions within the large geographic area:

I think the geography of this particular Climate Science Center is a very big issue.... I count something like 22 states in the Northeast Climate Science Center.... It is virtually impossible for this Climate Science Center to really address all of those ecoregions effectively.... I think that's probably the biggest issue, that almost none of the climate science that's being produced is effective in the agricultural working lands of the lower Midwest. (NE User FG)

Science Users' and Producers' Engagement in Co-production of Knowledge

Respondents reported on their beliefs about co-production of knowledge in general. An overwhelming proportion of both science users (94%; n = 91) and producers (95%; n = 114) expressed support for co-production, indicating it was important or very important for climate adaptation scientists and natural resources decision makers to work together on scientific research.

Many science producers indicated experience in co-production in various phases of research projects, much more so than did science users[1] (Figure NE-8). For all phases of research projects except for "analyzing data," at least half of the science producers had experience collaborating with decision makers to a moderate, large, or very large extent. (These results apply to all types of research, not just CSC-sponsored research.) In contrast, when science users were asked about their experience collaborating on research with CSC science, there were only 3 phases of research with which at least 30% of science users had experience: communicating results of a research project (44%), applying research results (41%), and identifying research questions (37%).

During the focus groups, a number of science producers described their experiences with coproduction:

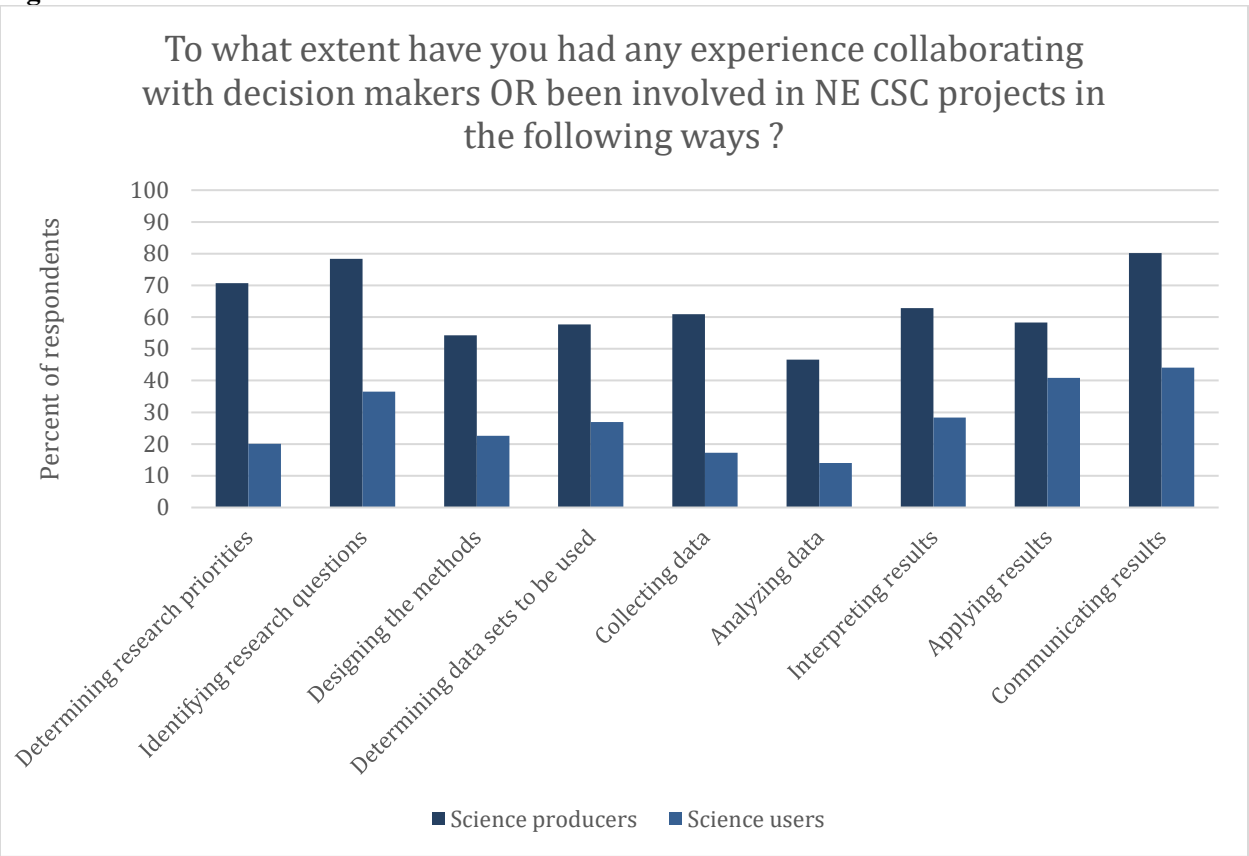
The work tapped into a whole stakeholder network of sugar maple producers who were then involved in data collection for sugar maple, sugar content ... phenolics and the timing of sap flow all across this broad geographical latitudinal gradient. (NE Producer FG)

I worked with eight resource managers from across the northeast where I got to really hear firsthand what their ... concerns were, what information they needed in order to make better informed decisions. (NE Producer FG)

One of our associates ... he's done a lot of these climate scenarios.... He's worked with the stakeholders ... to try to narrow them down to what it is they think they need.... So trying to get a complex climate science down to more digestible, that's the primary task of his. (NE Producer FG)

[1] As noted in a previous section, the science producers in our sample were also more extensively engaged with climate adaptation science, management, or policy – as well as with the CSC itself – than the science users in our sample.

Figure NE-8



Note: Survey questions 18 & 24. Text in items shortened for presentation in graph, and only "to a moderate extent", "to a large extent", or "to a very large extent" responses are shown. Additionally, the text of the question varied slightly for science producers and users (e.g., the users' version referencing "you or someone in your organization" and specifying a Northeast CSC project). Full results and text in tables in Appendix B.

Experiences with coproduction were also discussed in the science users focus group:

> *We've actually brought together the invasive species managers, the land managers to talk about ... what kind of information they need ... how they even use that information. And now we're going to the science and think, okay, okay what do we know? What do we don't know? And how can we get that information that we need to answer those questions?... We've been coming in from a different angle and that has been really useful because we've gotten the stakeholders, the people who are going to use the information, really engaged right up front.* (NE User FG)

Nevertheless, CSC partners also recognized many constraints on coproduction. In the survey, the factors that science users thought were most likely to limit their involvement in research projects were scientists not reaching out to them (41% agreed or strongly agreed; n = 38), followed by funders not supportive of collaboration between scientists and science users (32%; n = 30) and different perspectives on what science is needed (28%; n = 26).

Focus group participants also recognized that coproduction was sometimes limited by lack of a shared understanding of what science was needed by scientists and science users. One science producer argued that users do not always know what kind of information they need:

> *They don't always know what they need or want. So ... we're reaching out to the state.... They knew we're here. They knew we had lots of resources to bring to the table. But they weren't sure what they needed to help guide their state wildlife action plan. So they don't always know specifically what they need.* (NE Producer FG)

Other participants argued that scientists needed to make a proactive effort to learn about these needs if coproduction was to be successful:

> *The ... proactive outreach to identify what the science needs are ... a time-consuming and boots-on-the-ground intensive process, but I think one that's really important to make sure that the science that's being generated addresses the needs at the practitioner level. Sometimes it's not as fancy or flashy as perhaps some researchers like, but still needed. So I think that's a sort of a tension point that exists.* (NE User FG)

> *In terms of co-creation, I think it's not only being able to respond directly to the sort of demands or needs of stakeholders, but ... many people commented on the long, the ... relationship side of the partnerships that evolved.... And that leads to genuine co-creation of the ideas where you hear about an agency or an NGO's data, and then you bring some new ideas to the table, and then you inject a student or postdoc who has even better new ideas, and pretty soon you've gone beyond what any one partner could have done. So it's not only the sort of, "yeah, we're doing actionable stuff because we're responding to what an outside party said from day 1 they wanted...." We're helping them and they're helping us to evolve a new research goal that takes things to a higher level.* (NE Producer FG)

Some of the science users believed that scientists did not always make enough of this type of effort to learn about users' needs in their work:

As projects get started ... they really need to be specific about the users/stakeholders.... Like who is actually going to use this. 'Cause I think there may be a disconnect there.... I think some projects have done a great job and some really probably haven't, but I think you know the way to address that is to really have the researchers, the project leaders, to be thinking about who's going to use it. I don't think they are going to be trying to reach the general public, but they may be interfacing with organizations like the Park Service.... Who are actual people in organizations that could be using this information? And work with them throughout the process and not have it kind of be, well sometimes I've seen proposals, they list a whole bunch of stakeholders that could use it but there's not really you know a sharp connection there and it doesn't actually happen. (NE User FG)

Other factors were perceived to limit the involvement of smaller numbers of respondents: the science users not having enough time (25%; n = 23), scientists not interested in listening to them (14%; n =13), and different perspectives on how research projects should be conducted (13%; n = 12). The amount of time required for coproduction was also discussed in the focus groups:

To speak to the challenge ... from the perspective of an early career scientist, the coproduction of science is very time consuming. Not only the process of going through that coproduction but oftentimes for that science to be actionable. It's a map, it's a report, it's not a publication. And so we're constantly on that balancing act between ... we live in an academic world and our measure of success are publications, but yet we're also primarily funded by the CSC and the LCC and their currency is the coproduction actionable science, which are often tools. (NE Producer FG)

Perceptions of the Role of the CSC

The Northeast CSC has helped facilitate various connections (Figure NE-9). The most common connections reported were with climate adaptation science (57%; n = 117) and climate adaptation scientists (54%; n = 110). Nearly half also reported getting connected with resources needed to conduct science (47%; n = 94).

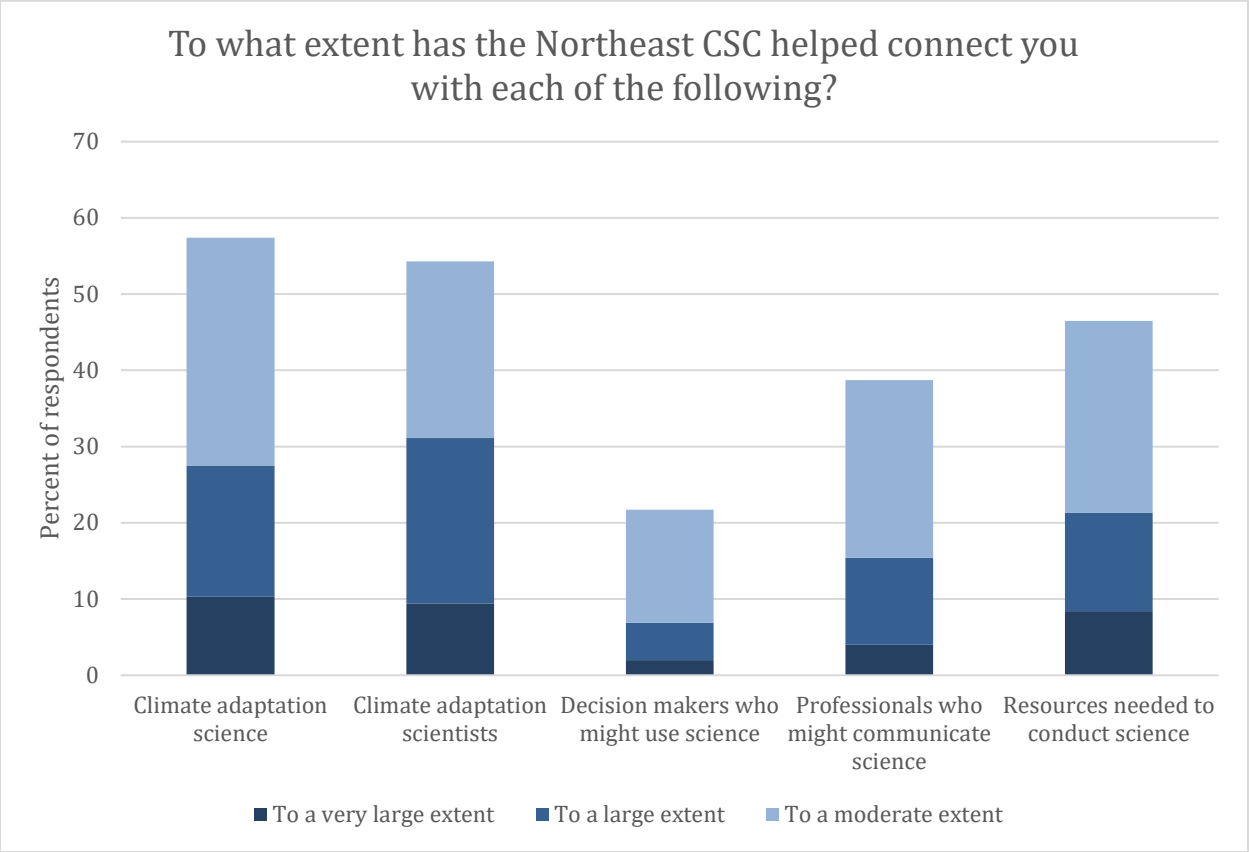
Most than half of respondents agreed that the Northeast CSC made a wide variety of contributions to the region (Figure NE-10). The contributions that were most widely perceived were awareness of available science (72%; n = 144), collaboration between scientists (68%; n = 135), communication between scientists and those who might use the science (66%; n = 132), and interdisciplinary science (62%; n = 126).

Summary of Northeast CSC Results

Survey respondents were comprised of nearly one-half science users, more than one-half science producers, and some individuals who fell into neither group. All were involved with climate work to some extent, but producers were more involved than users. All were aware of the Northeast CSC, and most were involved with it; producers were more likely to be involved than users. Respondents included employees of a variety of types of organizations and agencies, but federal agencies and universities were most prominent.

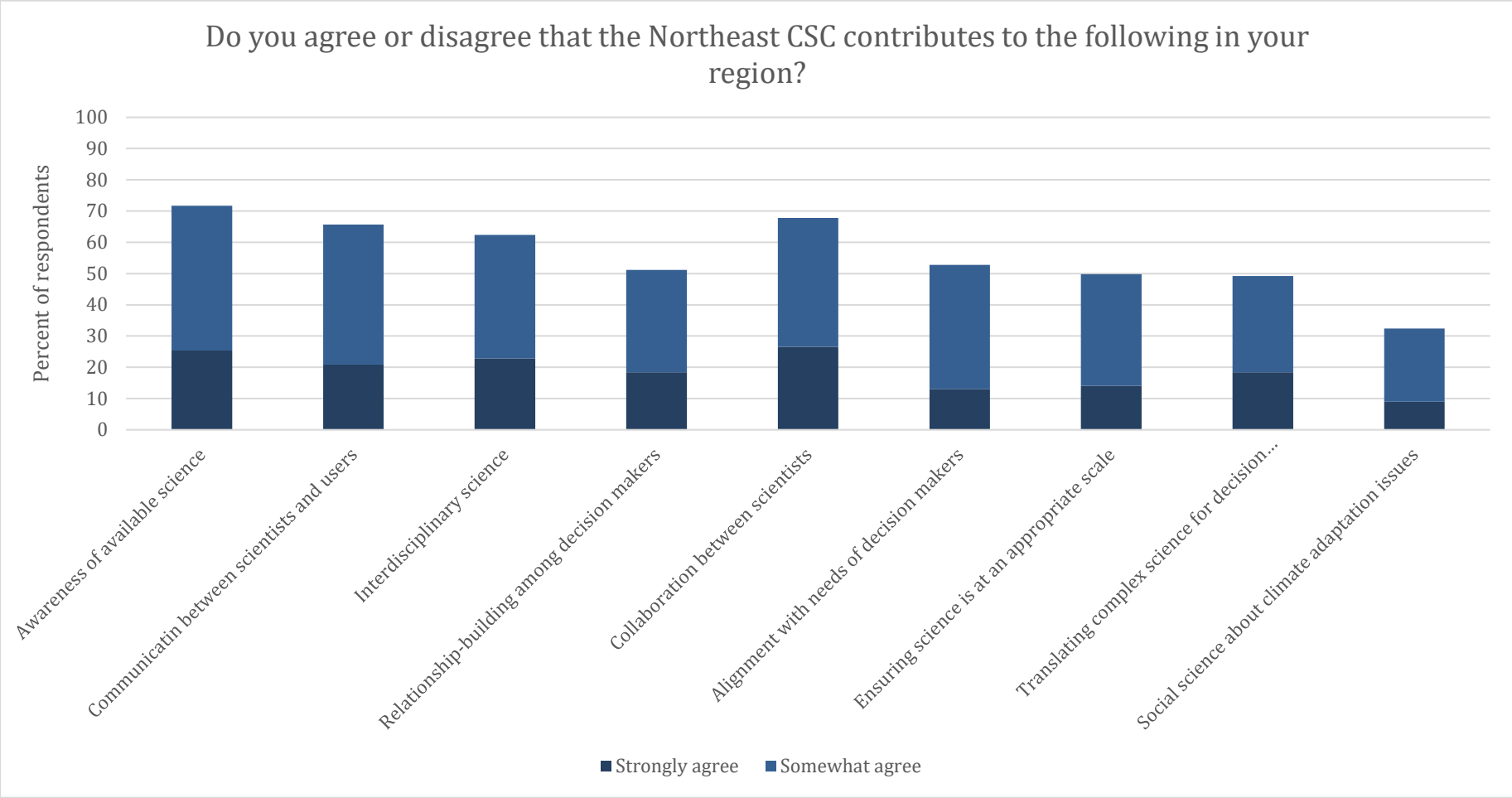
Survey respondents were involved with the Northeast CSC in a variety of ways, but the most common was as participants in CSC trainings, webinars, workshops, or conferences. Nearly one-fifth were resource managers or decision makers who had used the science produced by the CSC, and approximately

Figure NE-9



Note: text in items shortened for presentation in graph, and only "to a moderate extent", "to a large extent", or "to a very large extent" responses are shown. Full results and text in tables in Appendix B.

Figure NE-10



Note: text in items shortened for presentation in graph, and only "strongly agree" or "somewhat agree" responses are shown. Full results in table in Appendix B.

the same number were CSC grant recipients, applicants, or partners. Partners interacted most frequently with CSC-affiliated researchers, university PIs for the CSC, and USGS staff.

The CSC provided many important benefits to partners with the top ones identified by survey participants being providing access to climate adaptation science, providing access to a network of people interested in climate adaptation science, and serving as an avenue to put science in the hands of decision makers. Focus group participants spoke at length about the value of the networks to which the CSC gave them access and the value of the science produced. Survey respondents reported they were limited in their involvement with the CSC by a variety of factors with the most common ones being time and funds.

Nearly three-quarters of the survey respondents felt that climate adaptation science in the Northeast region[1] was available to decision makers, and many also believed that decision makers, particularly fish and wildlife managers and land managers, use the climate adaptation science to inform policies and management. Nevertheless, more than half believed that climate adaptation science did not *necessarily* influence management actions taken, although almost half also believed that the Northeast CSC had reduced the disconnect between scientists and decision makers. When asked specifically about the science produced through the Northeast CSC, the vast majority of the survey respondents agreed it can contribute to policy or management. Respondents were also generally positive about other characteristics of the CSC science, and a large majority found it appropriate to inform decisions, high quality, and able to integrate well with other information.

The most common way science users and producers reported that the Northeast CSC science was used was to inform management plans. Science users and producers differed in their perceptions of what limits the use of CSC science. Science producers perceived more limits than users on the use of CSC science. Nevertheless, focus participants elaborated on factors that could limit the use of CSC science. Most prominent among these factors were the difficulty in making science accessible to users and the technical limitations of the users. In response to these challenges, CSC partners made efforts to translate the science into forms accessible to decision makers.

An overwhelming proportion of both science users and producers expressed support for coproduction of knowledge. While many of the science producers indicated experience in coproduction in various phases of research projects, many fewer science users reported first-hand experience. Coproduction was more common in the early stages (identifying research questions) and late stages (interpreting and communicating results) of research than the middle stages. Science users who responded to the survey reported that their involvement in co-produced research projects is most limited by scientists not reaching out to them to collaborate, funders not supporting collaboration between scientists and science users, and users having different perspectives from scientists on what science is needed. In the focus groups, discussions of the limitations on coproduction centered on users not always knowing what type of science they needed and scientists having to make more of a proactive effort to learn about these science needs.

[1] All climate adaptation science in the region, not solely the science produced by the CSC.

South Central CSC Results

Respondents

We sought to survey both partners and potential partners of the South Central CSC. Specifically, we attempted to include people who were working to address climate change either as "science producers" (those who produce climate adaptation science) or "science users" (those who make decisions about natural resource policy, management, or programs). This population is not well defined. As described above, we compiled our sample from three sources, but this approach may have yielded different numbers and types of partners from region to region. Consequently, we characterize our respondents in this section.

Forty-six percent (n = 57) of the respondents reported that they make decisions about natural resource policy, management, or programs as part of their jobs. We refer to these individuals as science users. Thirty-three percent (n = 38) reported that they have produced climate adaptation science through an affiliation with the South Central CSC, while 20% (n = 23) have produced climate adaptation science but never with such an affiliation. We refer to both of these groups as science producers (52%; n = 61). Twenty-one of the respondents (18%) were both science users and producers.

Twenty-eight respondents (24%) were neither users nor producers. These individuals were less engaged in work involving "climate adaptation science" or "management or policy related to climate change adaptation" (Table SC-1).

Table SC-1. Respondents' extent of involvement with climate adaptation science or management or policy related to climate change adaptation.

Extent of involvement	User	Producer	Both User and Producer	Neither User nor Producer	Total
To a small extent	26%	20%	24%	29%	26%
To a moderate extent	28%	28%	14%	39%	32%
To a large extent	32%	34%	38%	25%	30%
To a very large extent	14%	18%	24%	7%	12%

All of our respondents did work that involved climate adaptation science, management, or policy to at least some extent. Fewer than half of our respondents (42%, n=56) were involved to a large or very large extent (Table SC-1). Twenty-six percent (n=34) were involved only to a small extent. Respondents who were both producers and users were more involved than other respondents.

Almost all respondents (84%; n = 106) reported that they have had at least some interest in or involvement with the South Central CSC (Table SC-2). Just 11% (n = 14) reported that they had no involvement but someone else in their agency or organization did, and another 6% (n = 7) had no interest or involvement at all.

Respondents worked in states throughout the South Central region, but they were more than twice as likely to work in Oklahoma or Texas than New Mexico or Louisiana (Table SC-3).

Table SC-2. Respondents' relationships with the South Central CSC.

Extent of involvement	User	Producer	Both User and Producer	Neither User nor Producer	Total
Heard of the South Central CSC, but no interest or involvement	7%	0%	0%	7%	6%
No involvement with the South Central CSC, but someone else in my organization involved	18%	8%	14%	7%	11%
At least some interest or involvement with the South Central CSC	75%	92%	86%	86%	84%

Table SC-3. States in which respondents work.

State	Percentage of respondents	N
Oklahoma	42%	56
Texas	41%	54
New Mexico	20%	27
Louisiana	16%	21

A majority of respondents worked at the regional/multi-state scale (66%; n=87), the state scale (54%; n=72), and the watershed scale (51%; n=68) for some or all of their work. Smaller percentages worked at local (43%; n=57), national (26%; n=35), or international scales (15%; n=20).

The majority of respondents were affiliated with either federal agencies or universities (Table SC-4). Fewer were affiliated with non-profit organizations or state agencies. Very few were affiliated with tribal governments, private industry, or local governments.

More than one-third of respondents held positions in leadership/administration (38%; n=51) and research positions (35%; n=47). Only a few were in operations (11%; n=14) or policy (6%; n=8).

Extent of Involvement with the CSC

On average respondents have been involved with the South Central CSC for 3.7 years. Respondents reported a variety of types of involvement (Table SC-5). Most common was as a participant in a CSC training, webinar, workshop, or conference (34%; n=45). One-quarter were CSC grant recipients, applicants, or partners on a grant (25%; n=33), and one-fifth were LCC steering committee members (20%; n=26).

The respondents reported on their frequency of interaction with five types of CSC representatives and affiliates (Figure SC-1). At least 70% of respondents interacted with each of three of the types (US Geological Survey CSC staff; University leads/PIs for the CSC; and CSC-affiliated researchers) at least a

Table SC-4. Respondents' affiliations.

Affiliation	Percentage of respondents	n
Federal agency	35%	46
University	26%	34
Non-profit organization	12%	16
State agency	11%	14
Tribal government	6%	8
Private industry	2%	2
Local government	2%	2

Table SC-5. Types of involvement with South Central CSC in the last five years.

Affiliation	Percentage of respondents	N
Participant in a CSC training, webinar, workshop, or conference	34%	45
CSC grant recipient, applicant, or partner on a grant	25%	33
LCC steering committee member	20%	26
CSC Stakeholder Advisory Committee member	15%	20
Resource managers or decision maker who has used the science produced by the CSC	14%	19
LCC staff member	14%	18
University member affiliated with the CSC	12%	16
CSC-funded graduate student or postdoctoral fellow	5%	6
CSC USGS staff	3%	4

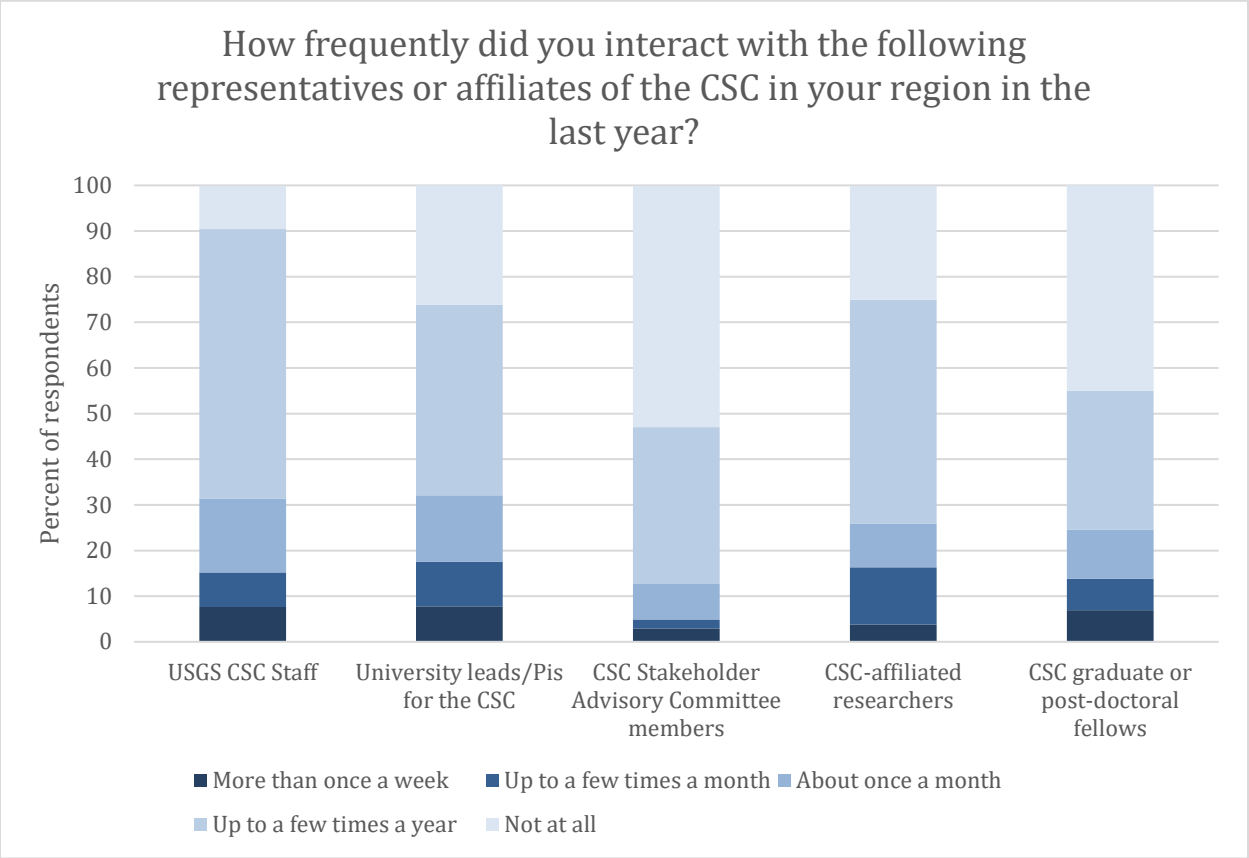
few times a year. For their interactions with CSC Stakeholder Advisory Committee members, the modal level of interaction was "not at all," although 47% interacted with these individuals at least some of the time.

Benefits of Involvement

The most frequently identified benefit attributed to the CSC (Figure SC-2) was "access to climate adaptation science" (73% described as "important" or "very important"; n = 76). Both science producers and science users in the focus groups described the value of the scientific expertise within the CSC:

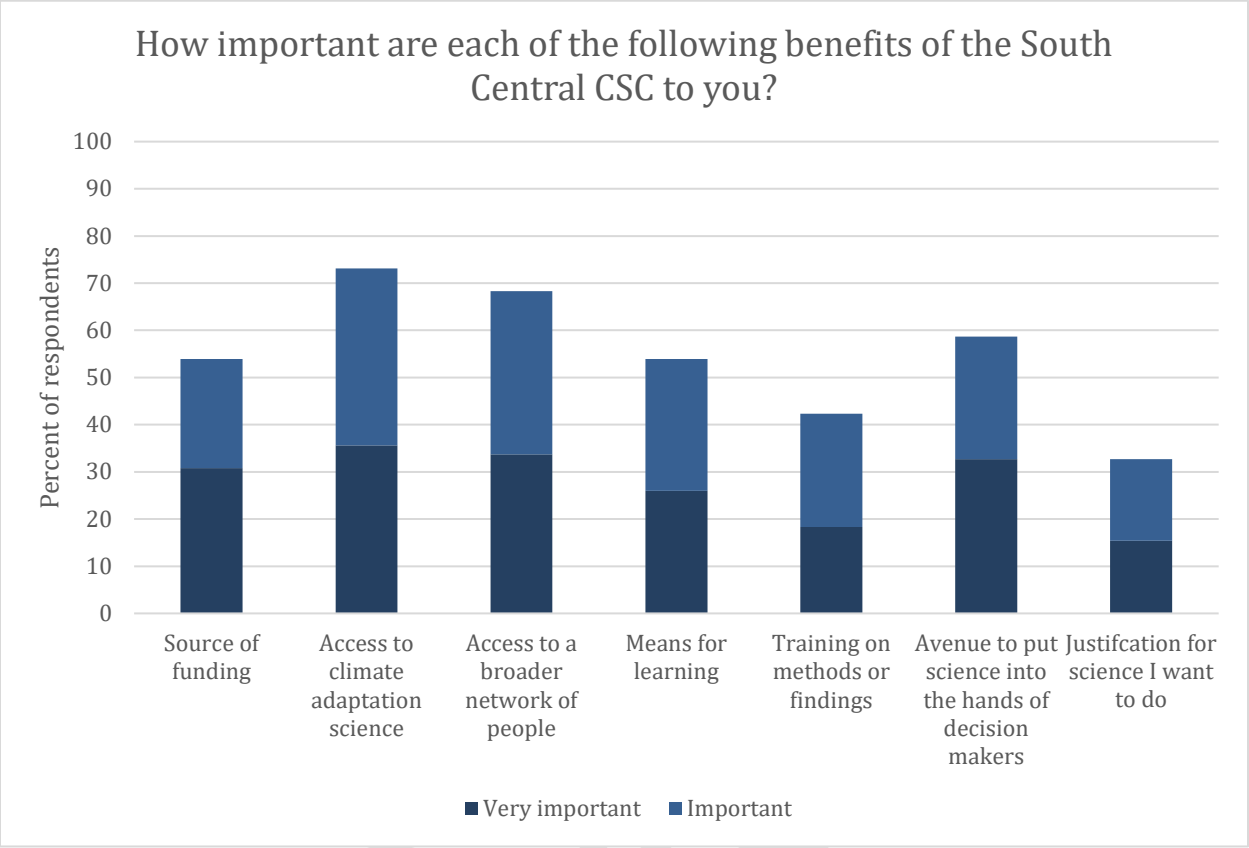
> *You know for the Choctaw and Chickasaw Nations I think it's great to have this partnership and for them to be able to access whenever they want the technical expertise and the data in order to be able to do their planning work, their water resources work, things like that, instead of bumping from project to project working different institutions. Now they've got a center of expertise ... that they can jump into.* (SC Producer FG)

Figure SC-1



Note: Based on survey question 8.

Figure SC-2



Note: Based on survey question 9. Text in items shortened for presentation in graph, and only "important" or "very important" responses are shown. Full results in table in appendix.

> *Water is one of the cornerstones of economic development.... That's one of the reasons that we got involved with the center, to help us understand climate change long term and then integrate that into our comprehensive water management strategy as well as a comprehensive economic development strategy.... We have been very pleased with the work that they have produced.* (SC User FG)

Nearly as many respondents identified "access to a broader network of people interested in climate adaptation science" (68%; n = 71) as being another important benefit. Participants in the focus groups spoke at length about this benefit. They maintained that the network provided by the CSC allowed them to get to know and communicate with other people interested in climate science:

> *We have the annual meetings, actually meeting people, that is really helpful when you are a new person who is coming into it that other people don't know.... Meeting in person is much easier to make a connection.* (SC Producer FG)

> *There's no organization to bring those tribes together. So you have tribes becoming more sovereign and less communicative amongst tribes.... There's really no real forum for tribes and tribal representatives to have these kind of discussions. So I think this really plays a very important role for that networking, and it's not just networking between and amongst tribes, it's also networking between tribes, government, and industry.* (SC User FG)

They also argued that the network provided an opportunity to combine and expand capacities:

> *Each of the consortium members has sort of a reputation in terms of what it's capable to.... So what that allows them to do is to go after and deal with larger issues. So that that trust is already established.... So now the network becomes the ... mechanism through which activities get accomplished.... We're dealing with issues that are multilevel and so we need that capacity.* (SC Producer FG)

> *I think for me that's one of the biggest benefits of working with the Climate Science Center is those new opportunities for collaboration.... As an ecologist, the ability to work with climate scientists and get the climate data that I need to combine with the ecological data that I have has been really advantageous for a lot of different projects.* (SC Producer FG)

> *Tribal capacity is job #1. And that's really a ... pretty heavy lift, and we can't do that alone. So we know that we're going to have to reach out.... So that's the reason why we're reaching out and trying to build ... a stronger relationship... you know, various internships and, you know, exporting and importing the ... scientists to come in and be within the community. Those kinds of things I think are more important as we continue to build our capacity. So really for us it's about capacity.* (SC User FG)

A majority of survey respondents also believed that important or very important benefits of the CSC included serving as an "avenue to put science into the hands of decision makers" (59%; n=61), "a source of funding for climate adaptation science" (54%; n = 56), and a "means for learning about climate adaptation" (54%; n = 56).

With regard to funding, participants in the focus groups maintained that the CSC funding played an important role in enabling their activities:

> *With that ... project, we received some funding to work with that sort of partners across the Gulf. And the LCCs provided input regarding which partners to work with. And so one LCC would say*

we'd like you to work with the Nature Conservancy, another would say we'd like you to work with this Fish and Wildlife Refuge, and so on and so forth. And the Climate Science Center involvement facilitated that. (SC Producer FG)

My engagement with the Climate Science Center started actually when I worked for NOAA.... We at that time looked to the CSC network as an opportunity to leverage investments that USGS and DOI were making in regional climate science.... I think it would be remiss not to say that many of us looked to the CSCs when they created as an opportunity for funding things. (SC User FG)

The CSCs also provided students with the opportunity to learn more about science and its application:

We come from the State of New Mexico where we're ranked 50th for education in terms of funding and performance and everything else.... In modern times, I think a lot of our youth grew up thinking we're not very good at math, we're not very good at science.... We come from really strong science and understanding of science and technology, but somehow we've learned we're not very good at math and science. And I think when you have the Science Center staff in the water with ... nets talking to the youth about science, the benefits from that ... you can't quantify it. (SC User FG)

Our program ... for a couple years we had a summer internship that we would fund to send a student somewhere to work with an organization.... So there were areas where climate expertise from the university here existed, and we want our students to get hands-on experience. And by putting a call out through their network we were able to identify some opportunities there. (SC Producer FG)

Limitations on Involvement

The most common limit on involvement with the CSC was not having enough time (36%; n = 48), followed by working with the CSC not being as high of a priority as other work (24%; n=32) (Figure SC-3). Eighteen percent (n=24) did not have enough funds, and 15% (n=20) hadn't been asked.

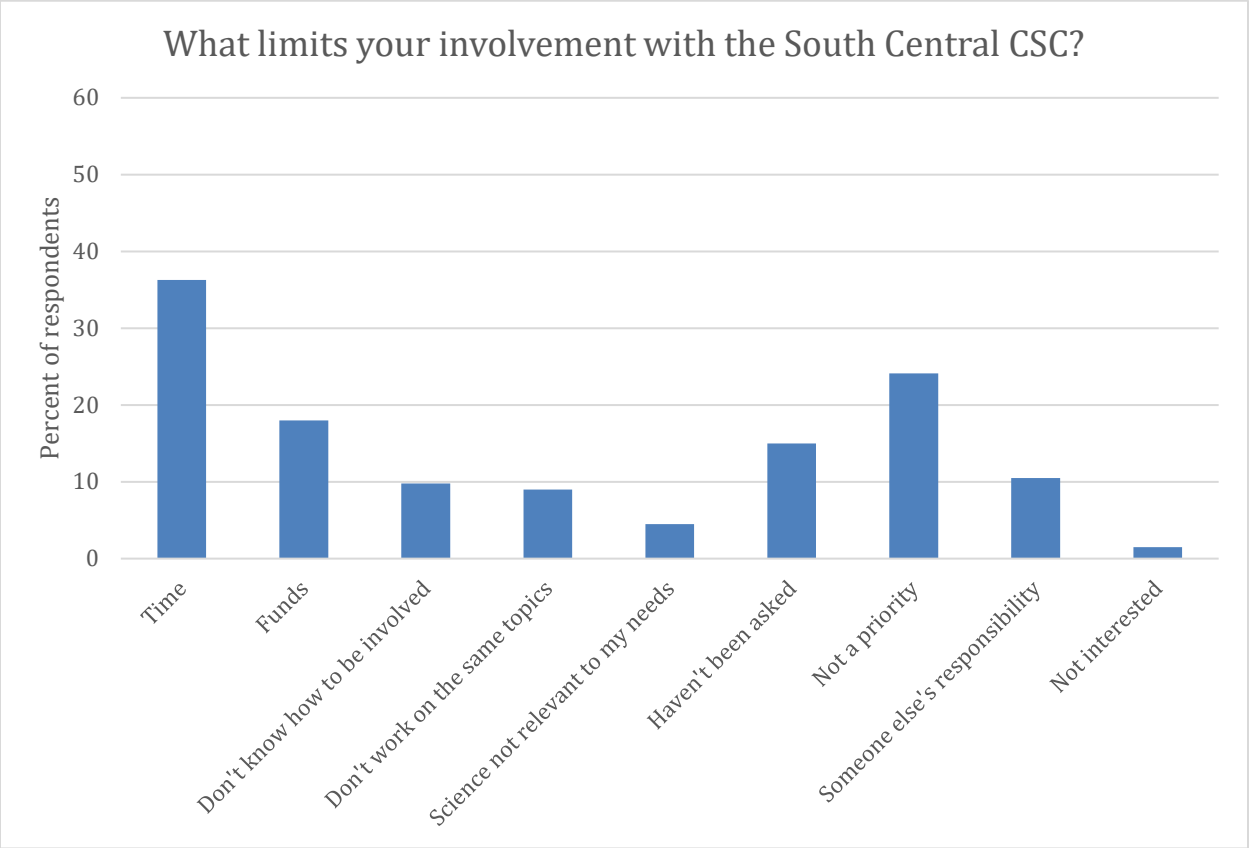
During the focus groups, there was considerable discussion of limitations on participation related to funding. Some commented on a lack of funding making it difficult to participate:

We're also beginning to see some of the diminishing dollars related to travel and that can make it difficult to come to all these different meetings. And put up a choice between coming to these meetings or going to a park, and I'd rather not have to do that because I find the meetings very important. (SC User FG)

Others spoke to the challenges of utilizing funds from the CSC. Some maintained that the requirements for obtaining this funding were onerous:

I think there's mechanically a couple of challenges related to the funding.... The ... core funding that comes into the CSC from USGS has to stay within the consortium, and there are some ways to kind of partner with consortium members on collaborations but if someone who's not a member of the consortium wanted to propose a project or an activity to the CSC there would be challenges in the CSC funding.... It is fantastically difficult to pool federal resources around a common project. I don't know how many times we have talked about the LCC, the Hub, NOAA and the ... folks in the CSC ... just trying to have a common pot to do something together we could all benefit from. It's so hard. (SC User FG)

Figure SC-3



Note: Based on survey question 10. Text in items shortened for presentation in graph. Full text in table in appendix.

> *With our Climate Science Center, we start our fiscal year March 1. That's ludicrous. We'll actually pay somebody from January 1 to August because the new money doesn't start until March 1.... So the question is how do you pay graduate students, how do you pay postdocs? And it just so happens that's the way USGS physically operates, so you have to know that and that can raise some tension.* (SC Producer FG)

Some participants thought that the funding that could be obtained through the CSC for projects was not enough to make those projects worthwhile:

> *You've got the level of funding.... We don't get enough direct research dollars out of it to make it worthwhile. And while it's a good idea, we can't only do the climate science which applies to stakeholder-driven. Because even though it's appreciated, that's not what give us tenure.... We can only do one thing, 'cause otherwise the science will suck.* (SC Producer FG)

One participant argued that for social scientists, it was difficult to engage with the CSC on their research:

> *There's been a great deal of enthusiasm in the CSC itself for integrating social scientific work into a lot of their other more traditional climate-focused work. But what's been interesting is to see ... what their priority is at the CSC level. I know sometimes run up against that their own reviewers and their own culture ... did not value sort of social science work. And so there's been a little bit of a tension there.... So there was kind of a culture that went beyond I think the people at our CSC that made it difficult for some of the social science initiatives to get kicked off and I think it's much improved now.* (SC Producer FG)

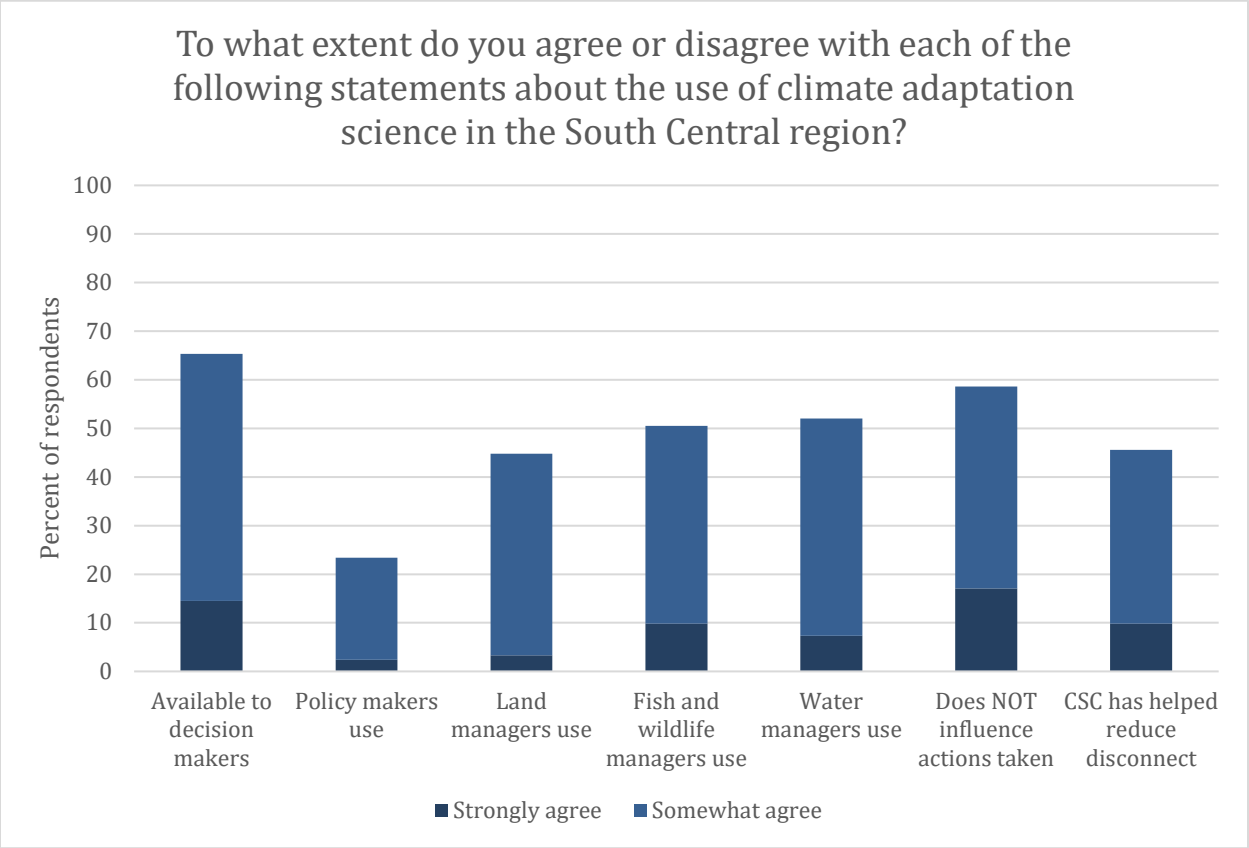
Is Climate Adaptation Science Actionable?

Respondents shared their perceptions both of climate adaptation science, in general, and of the climate adaptation science produced by the CSC. With regard to climate adaptation science in general, nearly two-thirds of respondents (65%; n = 81) agreed or strongly agreed that climate adaptation science in the South Central region is available to decision makers (Figure SC-4), and about half thought that water managers (52%; n = 64) and fish and wildlife managers (51%; n = 62) used this science to inform management. Only about one-quarter (23%; n = 29) believed that policy makers used this science to inform policies. A majority (59%; n = 72) maintained that what is known about climate adaptation does not necessarily influence actions taken by decision makers in the region. Nearly half (46%; n = 56), however, agreed that the CSC has helped to reduce the disconnect between what is known about climate adaptation and the actions taken by decision makers in the region.

One participant in the focus groups argued that the CSC helped to reduce this disconnect by filling gaps in the type of science produced:

> *A connection that our partnership saw in ... what really the Climate Science Centers would bring to the table [was] looking at these issues at a much larger scale than normally.... Most agencies, state agencies, federal agencies, or organizations have very specific geographic footprint, and they don't look to connect those dots on a larger landscape.... You've got to realize there's five states and multiple entities including tribes that have authority and responsibility in that watershed and never had there been an entire watershed-based evaluation from a conservation standpoint to develop consistency among all those efforts.... We were able to use climate data from the Climate Science Center customized for Oklahoma, Texas, Louisiana, and adjacent states to be consistent in how those action plans were put together. So very specific deliverables that were developed based on a larger-scale insight into conservation needs.* (SC User FG)

Figure SC-4



Note: Based on survey question 11. Text in items shortened for presentation in graph. Full text in table in appendix.

In terms of the South Central CSC science specifically, three-quarters of respondents (74%; n = 93) strongly or somewhat agreed the CSC science can contribute to policy or management (Figure SC-5). Respondents were also positive about other characteristics of the CSC science, with large majorities finding it high quality (65%; n = 81) and appropriate to inform the types of decisions being made (69%; n = 86). A majority also thought that it integrated well with other information (55%; n = 68). Only a minority thought that the South Central CSC's science was irrelevant to management (14%; n = 17) or biased (4%; n = 5).

Similar themes were discussed during the focus groups. Participants generally agreed that the science the CSC produced was of high quality and that quality was an important consideration in their use of it:

> *The vetting process is crucial. We went with the USGS instead of these company private firms, they were pounding to get in the door. And we went with USGS and their ties to the Science Center because we knew it would be a much deeper and much richer and more honest analysis of the actual science. (SC User FG)*

They noted several challenges, however, that sometimes could whether it was appropriate to inform decisions. One participant pointed out that some scientists were not interested in doing actionable science:

> *We also learned a lot, and there's value just getting experiences about what the challenges are in going through the translation and transfer of science, trying to maintain the high quality science along the way. And quite frankly the vast majority of people here ... have no interest in being and trained ... because they don't see it as helping their career.... It's not just limited to the South Central or the CSCs in general, but I think the organizations in the climate field in general have this bit of a no-man's land where some of the work that you need to do in order to really get that high quality science all the way to the stakeholders, there's aspects that ... may be too applied to be a top priority.* (SC Producer FG)

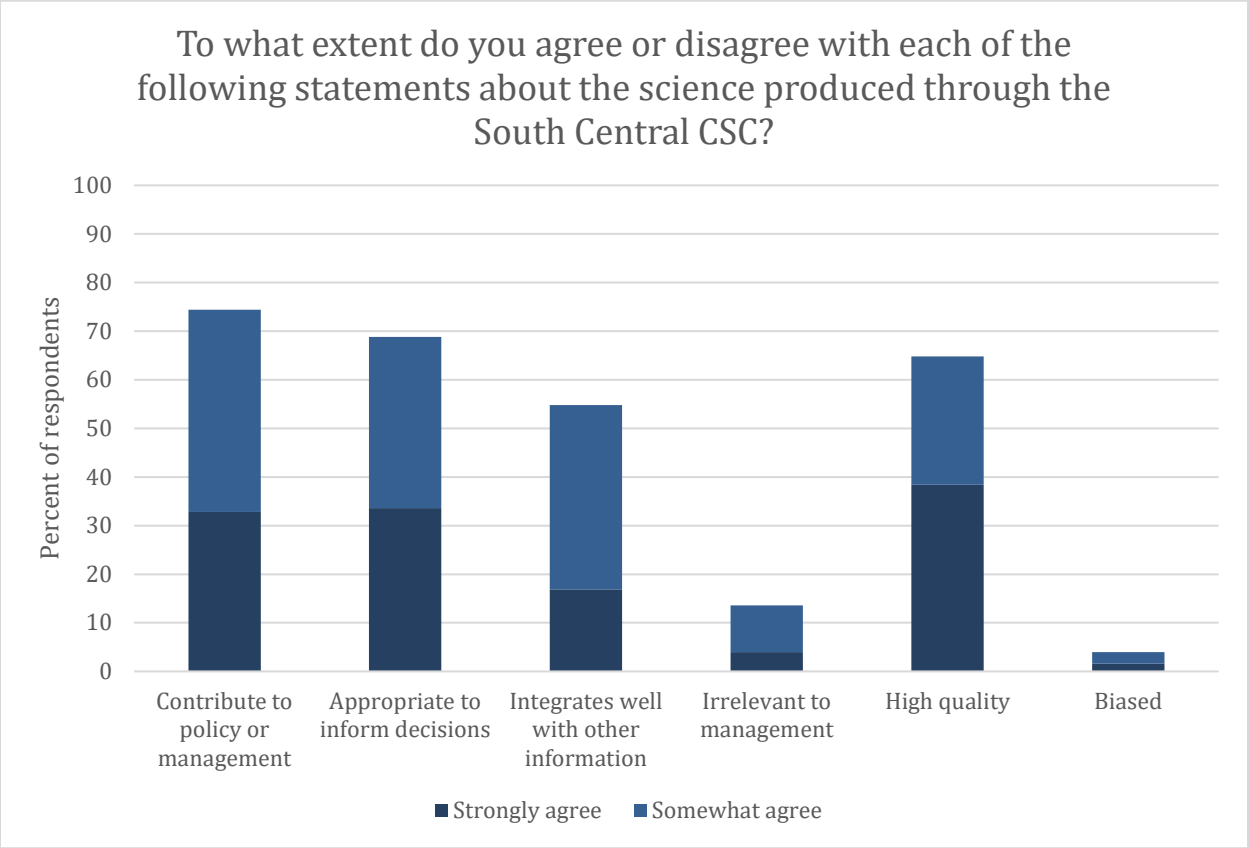
Even those scientists who were interested did not always understand what type of science was relevant to stakeholders:

> *When we had an early career workshop ... one of the places that we went to visit was one of the largest vineyards around. And of course the modelers are talking about ... projections, you know 20, 30, 40 years. And one of the producers ... turned and said, "I don't care. Right, I don't care. I want to know what's going to happen three months from now. Right, so why don't you provide me with that...." We don't understand how the rest of the world has to use some of the information.* (SC Producer FG)

Conversely, potential users of the science were perceived to sometimes have difficulty recognizing the usefulness of science that was relevant to meeting their needs:

> *I think we could get a strong Park Service response ... if I could find a way to get a project that's directly linked to one of the parks.... I think we have so many on-the-ground folks that just feel like they're overloaded, and they can't take on one more thing.... If you could show them a pilot or a benefit for participating ... the next thing you know you've got everybody wanting to jump onboard* (SC User FG)

Figure SC-5



Note: Based on survey question 12. Text in items shortened for presentation in graph, and only "strongly agree", "somewhat agree", or "I'm unfamiliar with the science" responses are shown. Full results in table in appendix.

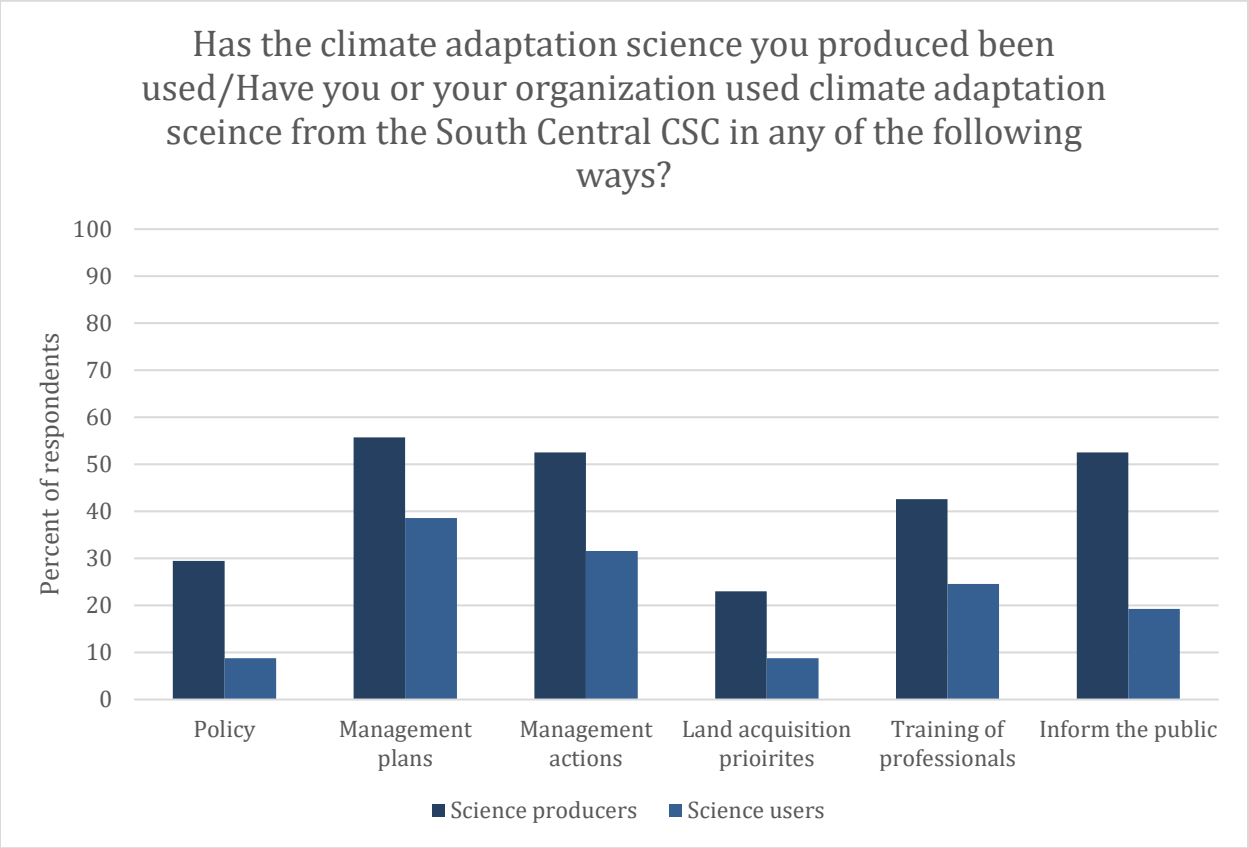
Science Users' and Producers' Use of Climate Adaptation Science

Among respondents who reported that they were science users, 40% (n = 20) reported that they or someone in their organization used climate adaptation science from sources affiliated with the South Central CSC. (Twenty-eight percent did not know whether they had.) More than two-thirds (68%; n = 34) reported that they or someone in their organization used climate adaptation science from sources not affiliated with the CSC.

The most common ways science users reported using the South Central CSC science (Figure SC-6) were to inform management plans (39%; n = 22) and inform management actions (32%; n = 18). One-quarter (25%; n = 14) used it to inform training of conservation professionals and about one-fifth (19%; n = 11) used it to inform the public about climate change and its impacts. It was less frequently used to inform policy (9%; n = 5) or inform land acquisition priorities (9%; n = 5).

When science producers were asked a parallel set of questions about how the science they had produced had been used, the relative frequency of different types of reported uses was similar, but the absolute frequency was greater. More than half said their science had been used to inform management plans (56%; n = 34), inform the public about climate change and its impacts (53%; n = 32), or inform management actions (53%; n = 32). The differences between science users' and science producers'

Figure SC-6



Note: Survey questions 15 & 21. Text in items shortened for presentation in graph. Full text in table in appendix.

responses could reflect differences in perceptions about how frequently CSC science is used. It could also reflect that the use of CSC science is concentrated in a subset of potential CSC science users.

Nevertheless, CSC partners recognized factors that limited the use of CSC science. Science users and producers differed in their perceptions of what these factors were (Figure SC-7). In all cases, more science producers than science users perceived limits to the use (not necessarily their own use) of CSC science to a moderate, large, or very large extent. More than 60% of science producers thought that the use of CSC science was limited by lack of awareness of the science (85%), scientists not working closely enough with decision makers (76%), the science not being communicated understandably (75%), decision makers lacking the skills and training to use the science (63%), and the management issues not being clearly defined (61%).

The only factor that more than 40% of science users thought limited the use of CSC science was scientists not working closely enough with decision makers (44%). Neither group considered a lack of quality of the science to be a problem (science users – 2%; science producers – 11%).

During the focus groups, discussions of the factors that could facilitate or limit the use of CSC science focused primarily on relationships and communication between scientists and decision makers. Several science users commented on how relationships could contribute to the use of science:

> *As more of a user directly of the science ... when I had questions about specific data that I needed ... to integrate into my overall analysis for the project that we talked about ... I can just contact the scientists directly here at the CSC. And then they can put me in contact with the appropriate person so if I needed some information, some idea of how to deal with something.... So having contacts with those scientists who ... were in it, producing the products that the Center was then sending out to other people.... They just directed me directly to those products for our purposes, and said that any time I had questions, if they couldn't ... do it here then they sent me to someone else.* (SC User FG)

> *You know, the science is terribly useful (chuckle). It's just making the connections of the on-the-ground resource manager so that they'll pick it up and run with it or use it to define further questions.* (SC User FG)

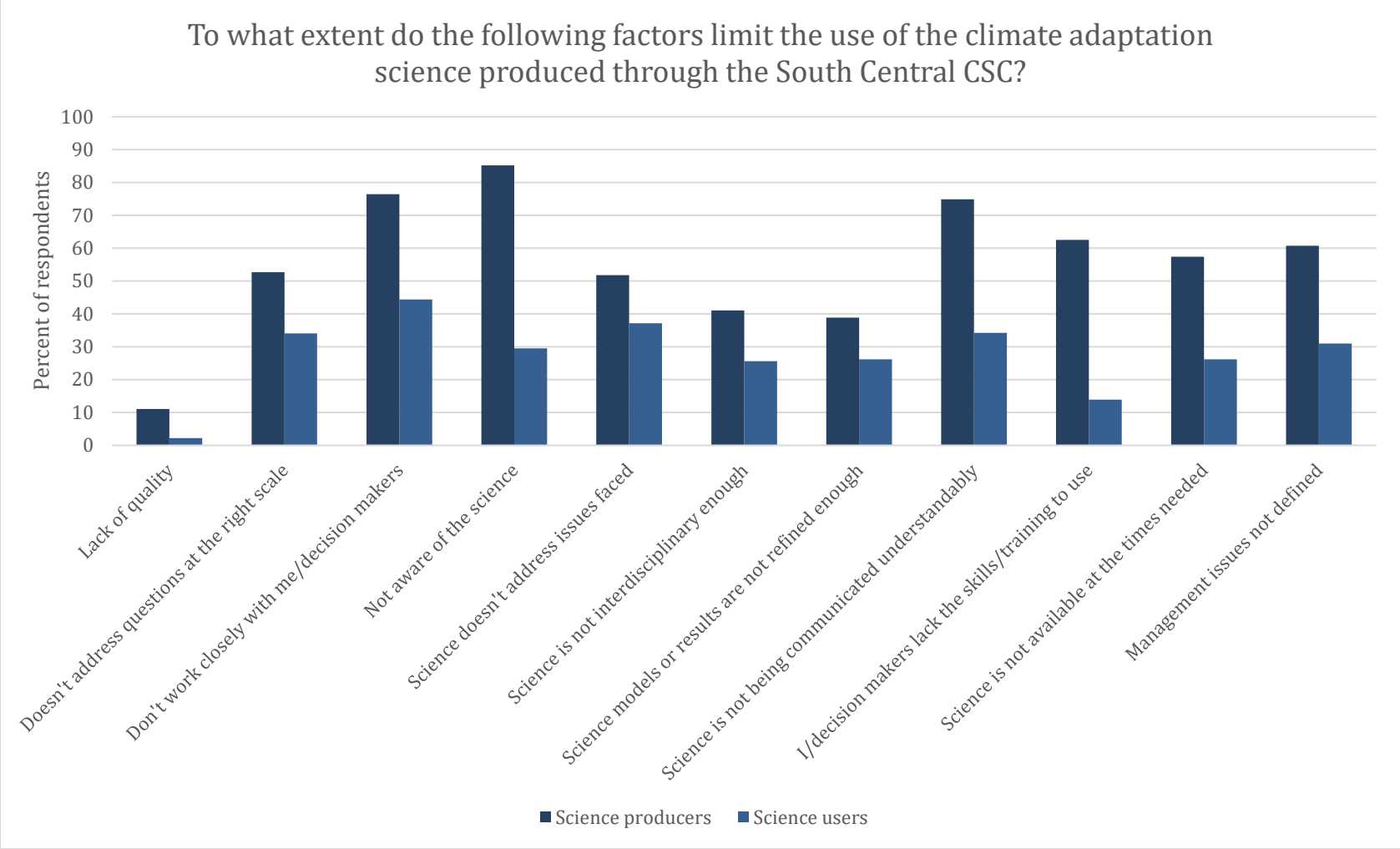
The science producers recognized that in their interactions with science users, they needed to translate the science into terms that the users could understand:

> *It's like stop talking, listen to what they're telling you ... as you're trying to translate your science to your audience.... That's something I never would have done on my own as an academic, but now that I've done it I... like it.* (SC Producer FG)

The science users described how the science could be made understandable to them:

> *For us I think it's when you think about science you think about white papers that are very scientific and academic, almost in a ... non-English language. How do we begin to understand and how do we be able to communicate with scientists you know as tribal leaders, as tribal community members? ... Then vice versa, the scientists... For some tribes, not all, but for some tribes, we start talking about fire and flood, you can't even really discuss it because you're calling that incident to happen... How do you even broach that subject culturally with science to a community who's almost culturally prohibited from maybe discussing that? ... I think it's really important, and I think the way to do that is to take that science and to be able to make it understandable for laypeople. And I think the Center has been really good ... Being there as a*

Figure SC-7



Note: Survey questions 16 & 22. Text in items shortened for presentation in graph, and only "to a moderate extent", "to a large extent", or "to a very large extent" responses are shown. Also, text varied slightly for science producers and users. Full results and text in tables in appendix.

teacher not just as a scientist with data ... You have to be able to take that information, that data and translate it into Indian and translate it into layman and translate it into community so we can understand it and then so we can have that conversation, so you can understand where it is we're coming from as well.... I think we're starting to get there. I don't, I wouldn't say with a big flag, "Hey, this is a great success." I think we're getting there. (SC User FG)

Developing a conservation vision, a common vision, requires the ability to surround something like a map that we can all share. And it's a communication that you can't put into words.... The science that's been developed through the Climate Science Center here ... when you see water ... that's projected in 50 years to be in somebody's front bedroom, that catches their attention.... The maps are a special way to communicate that people can gather around. (SC User FG)

One of the challenges that scientists faced when communicating the science was that potential users did not always have the capacity to understand the limitations of some of the science, particularly with regard to uncertainty:

Sometimes stakeholders are looking for certain types of answers with certain ... levels of certainty.... Sometimes I use a meta-analogy that a lot of what is produced is of a certain quality and certainty, that it should be out on the server. It's kind of the over-the-counter type medicine.... But other things that are produced are more experimental, the levels of certainty aren't that high and really take the more sophisticated user to make sense of. And in that case I'd say that's where the datasets ... should be by prescription.... There needs to be some interactions where they are used wisely and not misused or abused.... One of the challenges that ... I know we've gone through here is trying to see if that distinction is acknowledged and recognized. (SC Producer FG)

In some cases, they faced the challenge of audiences that did not even believe that climate change was taking place:

I appreciate this conversation about your audience and tailoring the information that you present to your audience, but I find it very, very difficult to uh to know in advance exactly the level of education, level of understanding and receptiveness of your audience on the topic that you're presenting ... and I guess just knowing how to present that material.... Last month doing that ... presentation ... it turns out [my audience was] very, very, very up to speed on climate change aspects ... not very many climate deniers in my audience, which was interesting. Here in the U.S., very often I'll get folks ... I'll get the eye roll.... It's really hard to stay upbeat in a presentation when guys are ... snickering.... Then obviously you've missed that target or missed the delivery to that person. You're not connecting with that person in that presentation and in that situation. (SC Producer FG)

Science Users' and Producers' Engagement in Co-production of Knowledge

Respondents reported on their beliefs about co-production of knowledge in general. A large majority of both science users (72%; n = 34) and producers (91%; n = 52) expressed support for co-production, indicating it was important or very important for climate adaptation scientists and natural resources decision makers to work together to produce science research. One of the science users participating in the focus group argued why co-production was important:

If we're being studied, if the Indian tribal communities are being studied, and the environment and the landscape, the air is being studied around tribes, then why aren't the tribes participating in that budgetary standpoint? And really as opposed to just being a subject that is being studied

as opposed to being a partner and partner in the study. And let us help ask questions. And what I told some anthropologists that came through, they're wanting to do an anthropological study, is ... let us be part of the study.... We may not be the scientists, I might not have a Ph.D. at the end of my business card, but I've got questions I want to know about myself. (SC User FG)

Participants in the focus groups also spoke to the steps that the Southwest CSC took to ensure that at least some level of co-production occurred:

I was able to participate in both the Southwest and South Central proposal review process.... Part of the ... scoring of the proposals was collaboration, and specifically collaboration with the LCCs.... Essentially the proposals were given extra points if they had a clear framework for collaboration laid out in advance. And because that was laid out in RFP, several of the science producers reached out to me and ... my coordinator directly to talk about forum for getting partner input on the products. (SC User FG)

Many science producers indicated experience in co-production in various phases of research projects, much more so than did science users[1] (Figure SC-8). For all phases of research projects, at least 40% of the science producers had experience collaborating with decision makers to a moderate, large, or very large extent. The only phases that fewer than half of science producers had experience collaborating with decision makers were designing the methods, determining the data sets to be used, and analyzing the data. (These results apply to all types of research, not just CSC-sponsored research.) In contrast, when science users were asked about their experience collaborating on research with CSC science, there were only 4 phases of research with which at least 30% of science users had experience: communicating results of a research project (38%), applying research results (38%), identifying research questions (34%), and determining research priorities for the CSC as a whole (33%).

The factors that science users thought were most likely to limit their involvement in research projects were scientists not reaching out to them (56% agreed or strongly agreed; n = 27), followed by different perspectives on what science is needed (40%; n = 19), and different perspectives on how research projects should be conducted (28%; n = 13). Other factors were perceived to limit the involvement of smaller numbers of respondents included funders not supportive of collaboration between scientists and science users (20%; n = 9), the science users not having enough time (17%; n = 8), and scientists not interested in listening to them (15%; n =7).

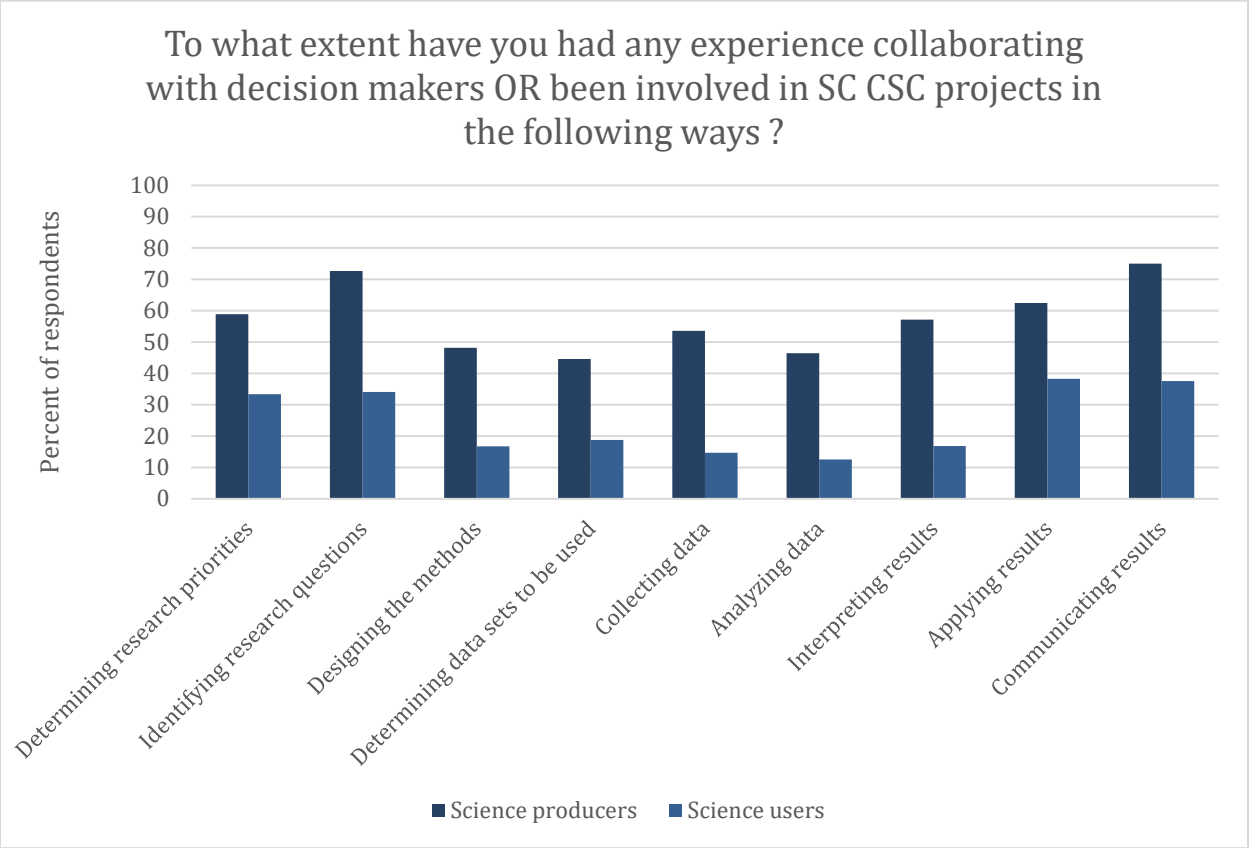
Perceptions of the Role of the CSC

The South Central CSC has helped facilitate various connections (Figure SC-9). Approximately half of respondents reported connections with climate adaptation science (55%; n = 61), climate adaptation scientists (55%; n = 61), professionals who might communicate science (50%; n = 55), and resources needed to conduct science (49%; n = 54).

Most than half of respondents agreed that the South Central CSC made a variety of contributions to the region (Figure SC-10). The contributions that were most widely perceived were communication between scientists and those who might use the science (68%; n = 73), awareness of available science (66%; n = 71), interdisciplinary science (64%; n = 69), and collaboration between scientists (62%; n = 67).

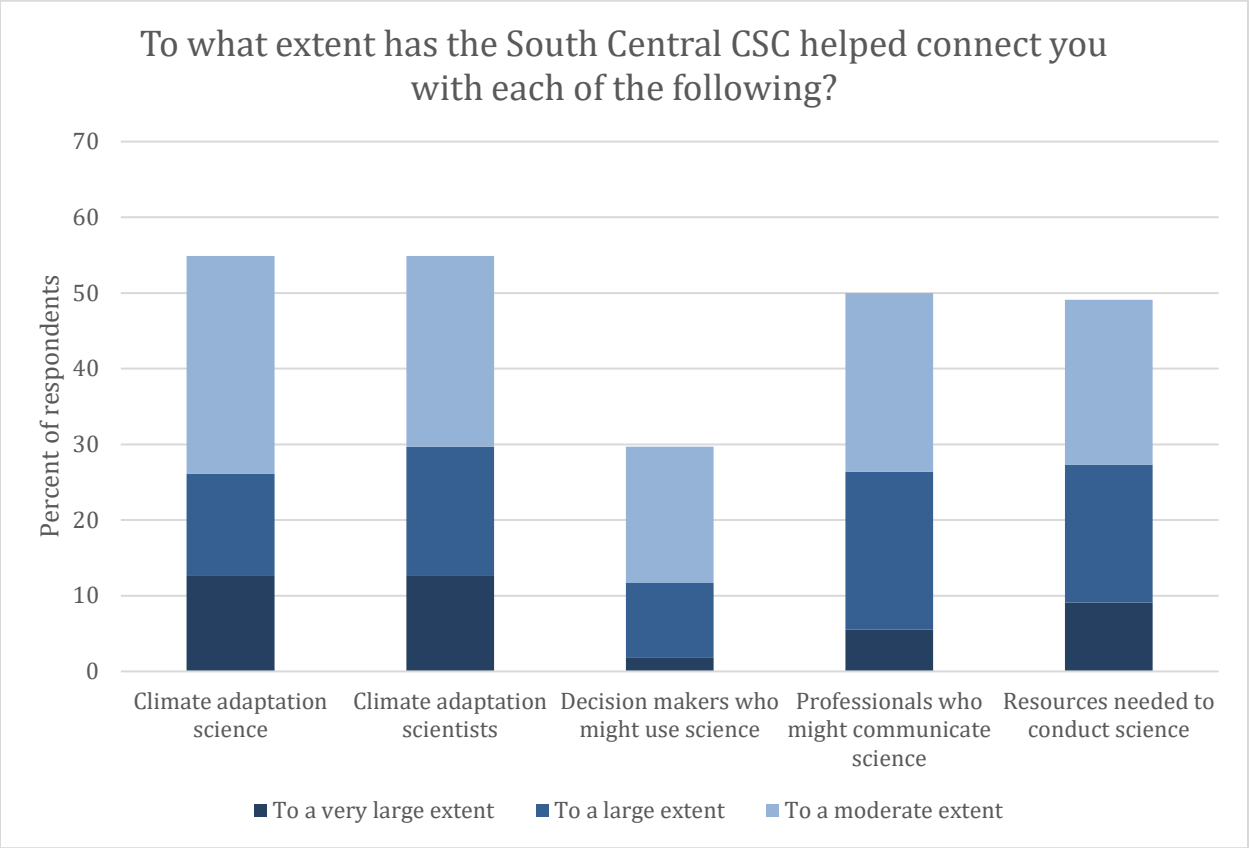
[1] As noted in a previous section, the science producers in our sample were also more extensively engaged with climate adaptation science, management, or policy – as well as with the CSC itself – than the science users in our sample.

Figure SC-8



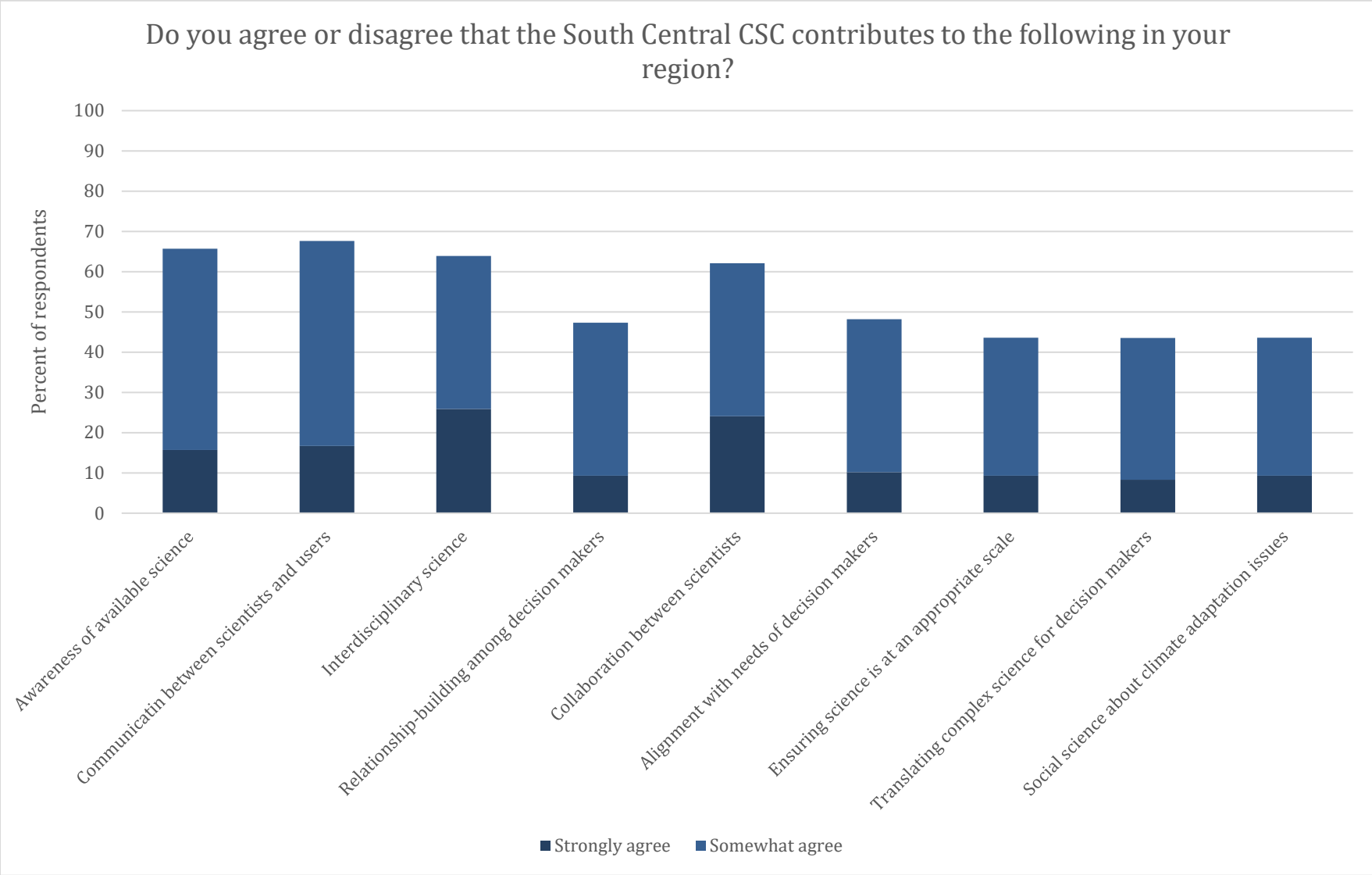
Note: Survey questions 18 & 24. Text in items shortened for presentation in graph, and only "to a moderate extent", "to a large extent", or "to a very large extent" responses are shown. Additionally, the text of the question varied slightly for science producers and users (e.g., the users' version referencing "you or someone in your organization" and specifying a South Central CSC project). Full results and text in tables in appendix.

Figure SC-9



Note: text in items shortened for presentation in graph, and only "to a moderate extent", "to a large extent", or "to a very large extent" responses are shown. Full results and text in tables in appendix.

Figure SC-10



Note: text in items shortened for presentation in graph, and only "strongly agree" or "somewhat agree" responses are shown. Full results in table in appendix.

Summary of South Central Results

Survey respondents were comprised of almost one-half science users, slightly more than one-half science producers, and some individuals who fell into neither group. All were involved with climate work to some extent, but producers were slightly more involved than users. All were aware of the South Central CSC to at least some extent, but producers were more likely to be involved with it. Respondents included employees of a variety of types of organizations and agencies, but federal agencies and universities were most prominent.

Survey respondents were involved with the South Central CSC in a variety of ways, but the most common was as participants in CSC trainings, webinars, workshops, or conferences. One-quarter were CSC grant recipients, applicants, or partners on a grant. Only 14% were resource managers or decision makers who had used the science produced by the CSC.

The CSC provided many important benefits to partners with the top ones identified by survey participants being providing access to climate adaptation science and providing access to a network of people interested in climate adaptation science. Focus group participants spoke about both of these benefits as well as the opportunities the CSC provided to students to learn about science and the needs that CSC funding could fill. Survey respondents reported they were limited in their involvement with the CSC by a variety of factors with the most common one being limits on their time.

About two-thirds of the survey respondents felt that climate adaptation science in the South Central region[1] was available to decision makers, and many also believed that decision makers (particularly water managers and fish and wildlife managers) use the climate adaptation science to inform management. Nevertheless, more than half believed that climate adaptation science did not influence *necessarily* management actions taken, although nearly half also believed that the South Central CSC had reduced the disconnect between scientists and decision makers. When asked specifically about the science produced through the South Central CSC, about three-quarters of the survey respondents agreed it can contribute to policy or management. Respondents were also generally positive about other characteristics of the CSC science, and the majority found it appropriate to the decisions being made, high quality, and able to integrate well with other information.

The most common ways science users and producers reported that the South Central CSC science was used were to inform management plans and inform management actions. Most science producers also thought it was used to inform the public. Focus participants thought that relationships between scientists and decision makers and efforts to translate science into forms that decision makers could use played important roles in promoting the use of climate adaptation science.

Science users and producers differed in their perceptions of what limits the use of CSC science. Science producers were more likely than science users to perceive a variety of factors as limiting the use of science. Focus group participants maintained that one of the limits on the use of the science was that science users did not always have the capacity to understand some of the limitations of the science

A large majority of both science users and producers expressed support for coproduction of knowledge, with producers more likely to support it. While many of the science producers indicated experience in coproduction in various phases of research projects, many fewer science users reported first-hand experience. Coproduction was more common in the early stages (setting priorities and identifying

[1] All climate adaptation science in the region, not solely the science produced by the CSC.

research questions) and late stages (applying and communicating results) of research than the middle stages. Science users who responded to the survey reported that their involvement in co-produced research projects is most limited by scientists not reaching out to them to collaborate, having different perspectives from scientists on what science is needed, and having different perspectives from scientists on how research projects should be conducted.

The majority of survey respondents noted a variety of contributions of the South Central CSC, including contributions to communication between scientists and science users, awareness of available science, interdisciplinary science, and collaboration between scientists.

Pacific Islands CSC Results

Respondents

We sought to survey both partners and potential partners of the Pacific Islands CSC. Specifically, we attempted to include people who were working to address climate change either as "science producers" (those who produce climate adaptation science) or "science users" (those who make decisions about natural resource policy, management, or programs). This population is not well defined. As described above, we compiled our sample from three sources, but this approach may have yielded different numbers and types of partners from region to region. Consequently, we characterize our respondents in this section.

Forty percent (n = 39) of the respondents reported that they make decisions about natural resource policy, management, or programs as part of their jobs. We refer to these individuals as science users. Fifty-two percent (n = 50) reported that they have produced climate adaptation science through an affiliation with the Pacific Islands CSC, while 13% (n = 13) have produced climate adaptation science but never with such an affiliation. We refer to both of these groups as science producers (65%; n = 63). Twenty of the respondents (21%) were both science users and producers.

Fifteen respondents (15%) were neither users nor producers. These individuals were less engaged in work involving "climate adaptation science" or "management or policy related to climate change adaptation" (Table PI-1).

Table PI-1. Respondents' extent of involvement with climate adaptation science or management or policy related to climate change adaptation.

Extent of involvement	User	Producer	Both User and Producer	Neither User nor Producer	Total
To a small extent	5%	7%	5%	20%	8%
To a moderate extent	63%	12%	16%	33%	26%
To a large extent	16%	30%	37%	13%	26%
To a very large extent	16%	51%	42%	33%	40%

All of our respondents did work that involved climate adaptation science, management, or policy to at least some extent. Nearly two-thirds of respondents (66%, n=65) were involved to a large or very large extent (Table PI-1). Eight percent (n=8) were involved only to a small extent. Respondents who were producers or both producers and users were more involved than other respondents.

Almost all respondents (85%; n = 82) reported that they have had at least some interest in or involvement with the Pacific Islands CSC (Table PI-2). Just 13% (n = 12) reported that they had no involvement but someone else in their agency or organization did, and another 2% (n = 2) had no interest or involvement at all.

Respondents worked in locations throughout the Pacific Islands region, but they were most likely to work in Hawai'i (Table PI-3). About two-thirds of respondents worked at the state (69%; n=69) or local (66%; n=66) scale for some or all of their work. More than half worked at the watershed scale (58%; n=58). Smaller percentages worked at the regional/multi-state scale (36%; n=36), national (23%; n=23), or international (23%; n=23) scale.

Table PI-2. Respondents' relationships with the Pacific Islands CSC.

Extent of involvement	User	Producer	Both User and Producer	Neither User nor Producer	Total
Heard of the Pacific Islands CSC, but no interest or involvement	11%	0%	0%	0%	2%
No involvement with the Pacific Islands CSC, but someone else in my organization involved	28%	0%	15%	27%	13%
At least some interest or involvement with the Pacific Islands CSC	61%	100%	85%	73%	85%

Table PI-3. Locations in which respondents work.

Location	Percentage of respondents	N
Hawai'i	78%	78
Guam	25%	25
Northern Marinara Islands	23%	23
American Samoa	21%	21
Federated States of Micronesia	18%	18
Republic of Marshall Islands	18%	18
Republic of Palau	14%	14

The majority of respondents were affiliated with either federal agencies or universities (Table PI-4). Fewer were affiliated with local government, non-profit organizations, or state agencies. None were affiliated with tribal governments or private industry.

More than half of respondents held research positions (53%; n=53). About one-quarter were in leadership/administration (25%; n=25). Only a few were in operations (13%; n=13) or policy (6%; n=6).

Extent of Involvement with the CSC

On average respondents have been involved with the Pacific Islands CSC for 2.8 years. Respondents reported a variety of types of involvement (Table PI-5). Most common was as a participant in a CSC training, webinar, workshop, or conference (47%; n=47) or CSC grant recipients, applicants, or partners on a grant (36%; n=36). One-fifth were resource managers or decisions makers who had used the CSC's science (20%; n=20 or CSC-funded graduate student or postdoctoral fellows (20%; n=20).

Table PI-4. Respondents' affiliations.

Affiliation	Percentage of respondents	n
University	42%	42
Federal agency	31%	31
Local government	13%	13
Non-profit organization	11%	11
State agency	5%	5
Tribal government	0%	0
Private industry	0%	0

Table PI-5. Types of involvement with Pacific Islands CSC in the last five years.

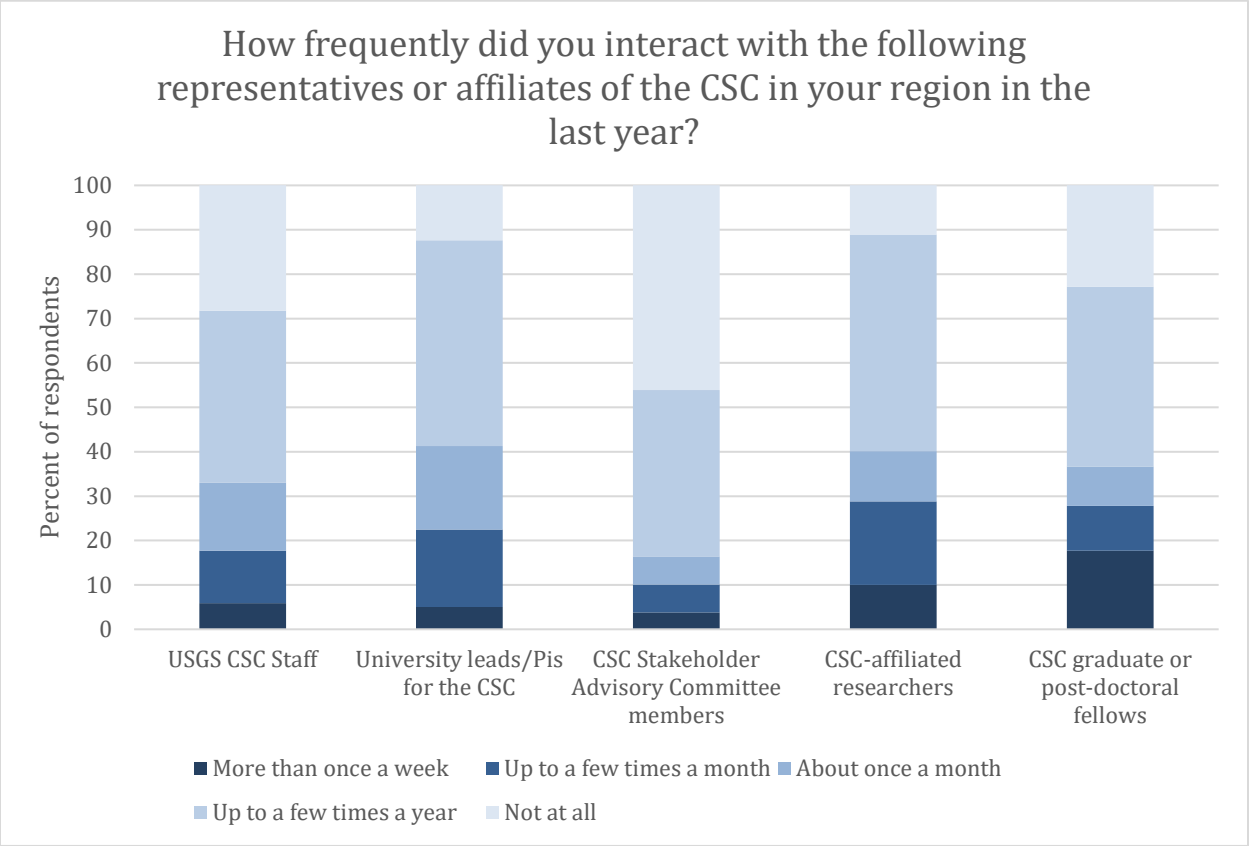
Affiliation	Percentage of respondents	N
Participant in a CSC training, webinar, workshop, or conference	47%	47
CSC grant recipient, applicant, or partner on a grant	36%	36
Resource managers or decision maker who has used the science produced by the CSC	20%	20
CSC-funded graduate student or postdoctoral fellow	20%	20
CSC Stakeholder Advisory Committee member	16%	16
University member affiliated with the CSC	14%	14
LCC staff member	7%	7
LCC steering committee member	5%	5
CSC USGS staff	4%	4

The respondents reported on their frequency of interaction with five types of CSC representatives and affiliates (Figure PI-1). At least 70% of respondents interacted with each of four of the types (CSC-affiliated researchers, University leads/PIs for the CSC; CSC graduate or postdoctoral fellows, and U.S. Geological Survey CSC staff) at least a few times a year. For their interactions with CSC Stakeholder Advisory Committee members, the modal level of interaction was "not at all," although 54% interacted with these individuals at least some of the time.

Benefits of Involvement

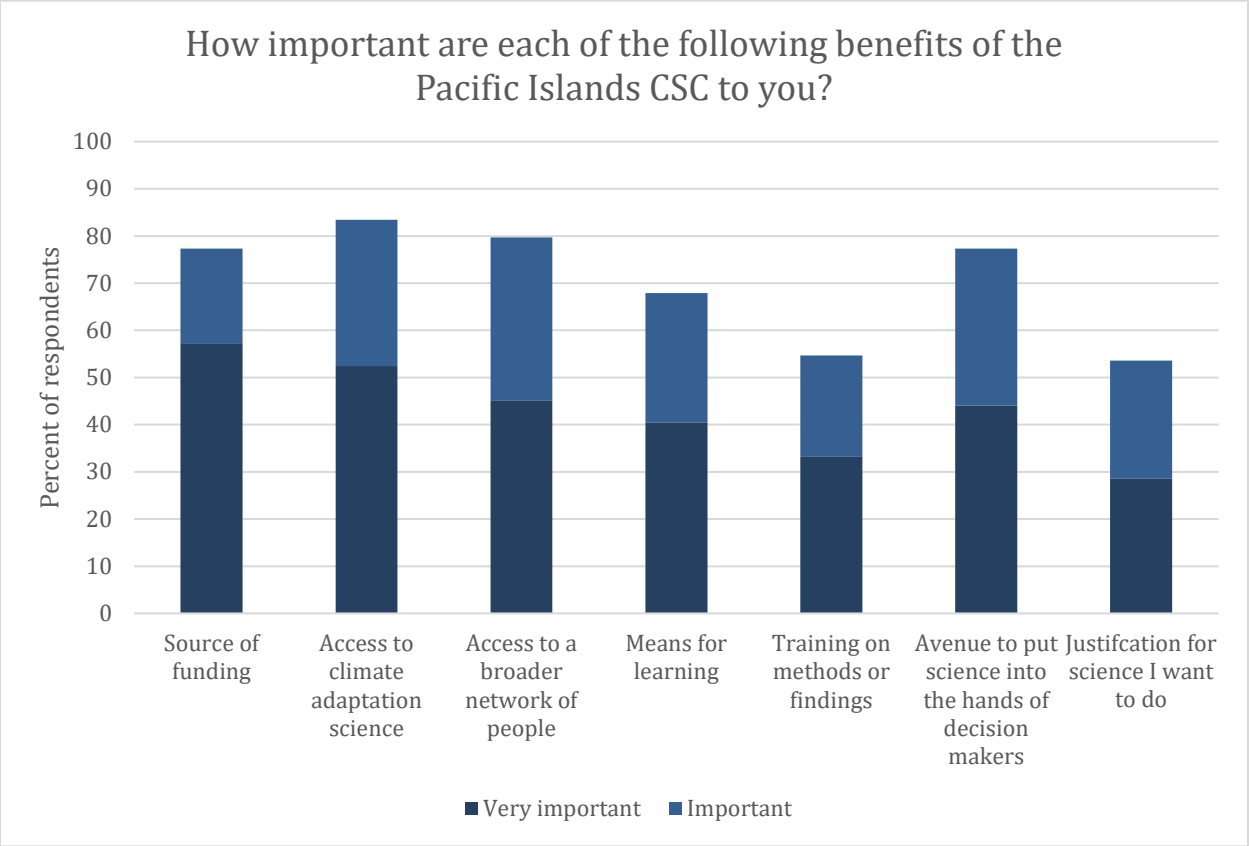
The most frequently identified benefits attributed to the CSC (Figure PI-2) were "access to climate adaptation science" (83% described as "important" or "very important"; n = 70), "access to a broader network of people interested in climate adaptation science" (80%; n = 67), "source of funding for climate adaptation science" (77%; n = 65), and "avenue to put climate adaptation science in the hands of decision makers" (73%; n = 65). Partners described all of these benefits during the focus groups.

Figure PI-1



Note: Based on survey question 8.

Figure PI-2



Note: Based on survey question 9. Text in items shortened for presentation in graph, and only "important" or "very important" responses are shown. Full results in table in appendix.

Focus group participants believed that the CSC's science was important for addressing existing regional problems:

> *One of the things that I think was very positive outcome of the introduction of the CSC to Hawai'i and development of the CSC structure is a very strong focus on this drought issue ... rallying of people around the issue as well as bringing significant funding to the topic. And so by collecting those different features into a large research portfolio for Hawai'i the CSC in a very short amount of time has been able to elevate the drought issue, do some really good synthetic work bringing together the really nice research that has happened in the past in different research groups, and then the value added work whether it's new research or packaging of the existing research, synthesis of existing research.... That's been really a positive outcome.* (PI Producer FG)

It also served to keep people up to date on relevant science:

> *I think one of the straight benefits is that it's a way for us to know when papers come out, when studies get published.... A lot of studies that I would not otherwise have known came out, I now have knowledge that I can share with my team. So that's great.* (PI User FG)

People who attended the focus groups also spoke frequently about the value of the opportunities the CSC provided to interact with others who were interested in climate adaptation science:

> *I'm a fish pond[1] manager.... What they offered was this opportunity to ... do a project that collaborates a lot of different entities. And that's kind of something that I was already doing as a manager and student, meeting with other fish pond practitioners, meeting with different scientific experts.* (PI Producer FG)

> *One of the things that I received as a collaborator, as a partner, was to be invited to the ... Climate Science Boot Camp in 2016.... I thought it was beneficial because you know sometimes we are working quite alone ... it doesn't necessarily allow you to connect that work that a person does to actually sitting down and meeting with various stakeholders, politicians, managers, Hawaiian culture practitioners.... So that is one thing that I felt was really a highlight of me being a part of this collaborative.* (PI User FG)

These network opportunities could contribute to improved science:

> *For me it enabled a whole new research direction to flourish.... I cannot emphasize enough how valuable it is ... to be able to access the Hawaiian language database because 97% of the database no one has ever read because there are so few native speakers now. And so it has been extremely cross cutting and bringing together fields that never talked to each other like Hawaiian language and climate scientists ... to do it in a very respectful and appropriate way.... The science ... was made possible through CSC.... This was a deep dive.... It was really special in that way. It really changed not only my paradigms of what I thought about how Hawaiians approached climatology. It enabled a collaboration.* (PI Producer FG)

[1] Hawaiian fish ponds are established in brackish water habitats along the coast. They provide a sustainable food source and are the focus of traditional cultural practices. They are, therefore, areas where environmental health and culture are closely interconnected.

The CSC also helped to connect scientists and decision makers, which contributed to the use of the science developed through the CSC:

> *One of the things I've gotten out of it was the way our most recent project on the fish pond work was put together with the Climate Science Center.... It was fantastic. It was like speed dating for actionable science because the managers presented their work and researchers were then able to kind of think ... what are their interests and how does it relate to the needs, the broader needs of these managers. And then have that conversation of can we work together and is it something that would be useful for you. Building those relationships ... can be difficult to meet the right people who are interested in doing the work and then take time ... to develop those relationships. I really felt like this process that they put together sped that up by months if not longer. And we were then able to pull together a project that has been very productive.* (PI Producer FG)

The funding the CSC provided was also an important benefits to focus group participants. They indicated that the PI CSC would fund work that was hard to fund through other sources:

> *The project I'm interested in pursuing ... [is] trying to understand the long-term impacts that have affected the ... indigenous built structures in the environment. And so we felt that the most direct way would be approach from a historical standpoint. Unfortunately, the kind of research ... it's hard to find funding. 'Cause it's kind of weird junk ... semi-qualitative, so there wasn't a good ... standard funding mechanism.... And then in kind of thinking with people, it seemed that the Climate Science Center was interested in potentially funding this research.... I would say the key thing to me is it funded a project that was hard to find a normal funder for.* (PI Producer FG)

> *There was no existing climate change funding available on campus or much in the state.... We saw this as another federal unit wanting to support climate research so we worked very hard on producing the initial proposal that went in.* (PI Producer FG)

CSC funding also provided opportunities to leverage other funding sources:

> *We ... looked at this Climate Science Center as a way to leverage, basically add more emphasis to the same issues that we were dealing with.... Initially there was more money for the same issues. There's no way in the Pacific Islands that we could spend enough money to answer the questions ... there's a big deficit in terms of the underlying science that you need to talk about impacts of climate change. So the ability to have more funding to leverage the university consortium's expertise and ... researcher base was really important for addressing the common questions that we all share.* (PI User FG)

A majority of survey respondents also believed that important or very important benefits of the CSC included serving as a "means for learning about climate adaptation" (57%; n = 68), "justification for climate adaptation science I want to do" (54%; n = 45), and "training on climate adaptation science methods or findings" (55%; n = 46). Focus group participants also described the learning and training that the CSC facilitated. In particular, they described the learning opportunities provided to students:

> *I've always been enthralled by paleoclimatology and so being able to have ... a focus on climate change at our camp was really an exciting concept. And the opportunities for funding for students, undergraduates, and graduate projects is what really steered me to the program.* (PI Producer FG)

> *The graduate student, he had never taken a science class at his high school. And so for him to learn about science through his own cultural lens ... and he was from a rural community.... He*

had never been off island before, and to think through the CSC he went to Guam. And so it ... totally expanded his world being able to interact with other students, other indigenous cultures. It was extremely enriching for him. (PI Producer FG)

The CSC helped to train local students to address local problems:

I've focused on funding graduate students that are from Hawai'i because prior to that I'd get tons of graduate students from the mainland. You train them and then they disappear to the mainland. And when it comes to climate change in any sort of resource management issue we need a workforce that's going to stay in Hawai'i. This was ... really the only source of funding focused on climate that because of my professional choices at that point I could link up with local students ... so augmenting the education of local students so that we can augment the management of local resources and local problems. (PI Producer FG)

Limitations on Involvement

The most common limit on involvement with the CSC was not having enough time (52%; n = 52), which more than half of the partners stated (Figure PI-3). More than one-fifth were also limited by funds (23%; n = 23) and not knowing how to be involved (22%; n = 22).

During the focus groups, discussions about funding limitations focused primarily on the concern that the funding the CSC provided was insufficient to motivate engagement. The University of Hawai'i was reluctant to commit substantial resources to the CSC given limits to the resources available through the CSC:

The original concept was for significant ... federal footprint here with actual offices.... One of the setbacks was the administration at UH was not interested in throwing much in the way or anything in the way of matching funds towards it. When you look at the budget that is provided the overhead that comes to the university is not large. I mean it's hundreds of thousands of dollars but it's not enough to make it worth the administration's dedication of a floor of a building or a bunch of offices considering that we are already very crowded in many places. So ... from the federal side it sort of morphed into smaller and smaller budget. From the UH side the reaction was that's not enough to get a high degree of interest from us in terms of throwing resources at anything. (PI Producer FG)

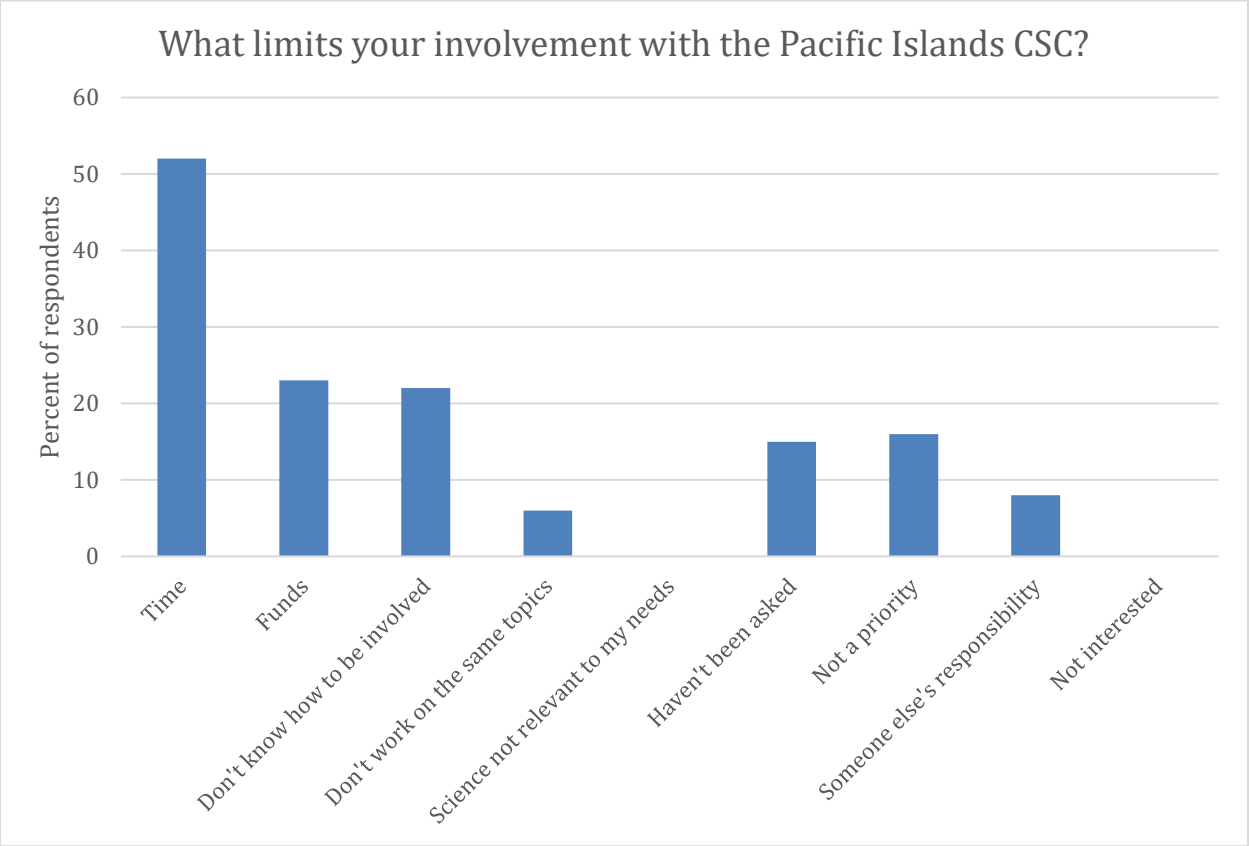
Some partners of the CSC had similar perceptions about funding limitations:

At the end of the day without money it's a little bit of a waste of time for most people.... They don't have, there's no money. I mean I went to a meeting recently and there were federal budget cuts.... At some point people just say have to ask themselves if it's worth my time any longer ... keep participating in something that doesn't really seem like it's going anywhere.... I sincerely had to ask myself whether I was interested in even going any further with this period or if I was even going to come to this. I know that there's just no resources out there to actually engage in meaningful research efforts. (PI User FG)

The funding limitations required prioritizing which partners to engage in the CSC:

Another challenge I observed is conflicts between ... entry vs. wanting ... to continue the research program already supported.... I think that balance is between bringing on new research groups with new ideas vs. wanting to see who's continuing on. I would just state that as a challenge of this. (PI Producer FG)

Figure PI-3



Note: Based on survey question 10. Text in items shortened for presentation in graph. Full text in table in appendix.

Another challenge that partners faced in working with the CSC was a lack of information about how to navigate various aspects of their relationship with it. Some researchers found it difficult to navigate the proposal development and review process:

> *There was so many different avenues of preparing proposals, I found it really difficult to navigate.... Reviewers didn't seem to be conversant with some of the language that I used.... I mean there were translational issues there.... Drafting a proposal that was satisfactory ... that seemed like it was happening with a blindfold on to some degree.... I do think that there would be better for more establishment supporting those who aren't as familiar with the processes. I think that would be helpful.* (PI Producer FG)

Some found it similarly confusing to determine what their obligations were once they had been funded:

> *We had to write quarterly reports and then a final report. We published. We had the papers; the CSC was listed in the acknowledgments, but that didn't seem to be what was being encouraged as the end product. The end product seemed to be these reports, at least in my case. And we were told at one point, "Oh, you won't need to do a final report." And then we did have to do a final report.... If peer-reviewed, published research and a statement from resource managers that the data has been used, [if] that's the ultimate end goal then that could be gotten to fairly easily, a paper and then some sort of interview or statement from the resource managers.* (PI Producer FG)

Potential science users found it hard to even figure out what scientific studies has been supported by the CSC:

> *The nature of the Climate Science Center is that it's a university consortium-based partnership. It's very difficult for anybody from the outside to really understand what the priorities or the actual studies underway on the university side are.... Last year I asked ... where's the list of the ... I didn't have a list of the university's funded CSC projects. He didn't know either.... There's no mechanism to find out what those studies are. Or there wasn't. I think ... that's improved.* (PI User FG)

Some partners also said that interpersonal relationships with some CSC staff members were sometimes difficult to navigate and impeded communication.

Some partners were limited in their interactions with the CSC because their priorities differed from the CSC. One science user argued that the CSC focused more on the impacts of climate change on ecology than the impacts of climate change on people:

> *The Climate Science Center seems to see its priorities in the ecological realm.... A lot of the efforts that are undertaken by them has to do with the ecological consequences of climate change, fauna, flora shifting ... shifting habitats, that kind of stuff. I dwell on kind of a little bit of a different realm where we're looking at sea level rise, and sea level rise you know one of the biggest problems with respect to climate change.... But the issue is really the impact on human beings, impact on coastal communities and infrastructure, that kind of stuff.... I was always ... can we get some more emphasis on... the implication for humans in society as a result of climate change?* (PI User FG)

Another argued that the geographic scale of the PI CSC region made it impossible to support research that was relevant to everyone:

This center services the Pacific basin basically.... How do you realistically say I represent the Pacific Basin without a budget? You know, you either you need to start cutting back on your expectations or people's expectations. And it's hard for us in Hawai'i to sit in meetings where they're talking about solving problems on Majuro.... I mean the research and the science isn't really that relevant to what's happening in Hawai'i because it's a completely different sort of island ecology (PI User FG)

Is Climate Adaptation Science Actionable?

Respondents shared their perceptions both of climate adaptation science, in general, and of the climate adaptation science produced by the CSC. With regard to climate adaptation science in general, more than three-quarters of respondents (76%; n = 74) agreed or strongly agreed that climate adaptation science in the Pacific Islands region is available to decision makers (Figure PI-4), and one-half to two-thirds thought that it was used to inform management by fish and wildlife managers (66%; n = 65), water managers (60%; n = 59), and land managers (59%; n = 57). Fewer than half (46%; n = 45) believed that policy makers used this science to inform policies. Nearly half (48%; n = 47) maintained that what is known about climate adaptation does not necessarily influence actions taken by decision makers in the region.

More than half (56%; n = 54), however, agreed that the CSC has helped to reduce the disconnect between what is known about climate adaptation and the actions taken by decision makers in the region.

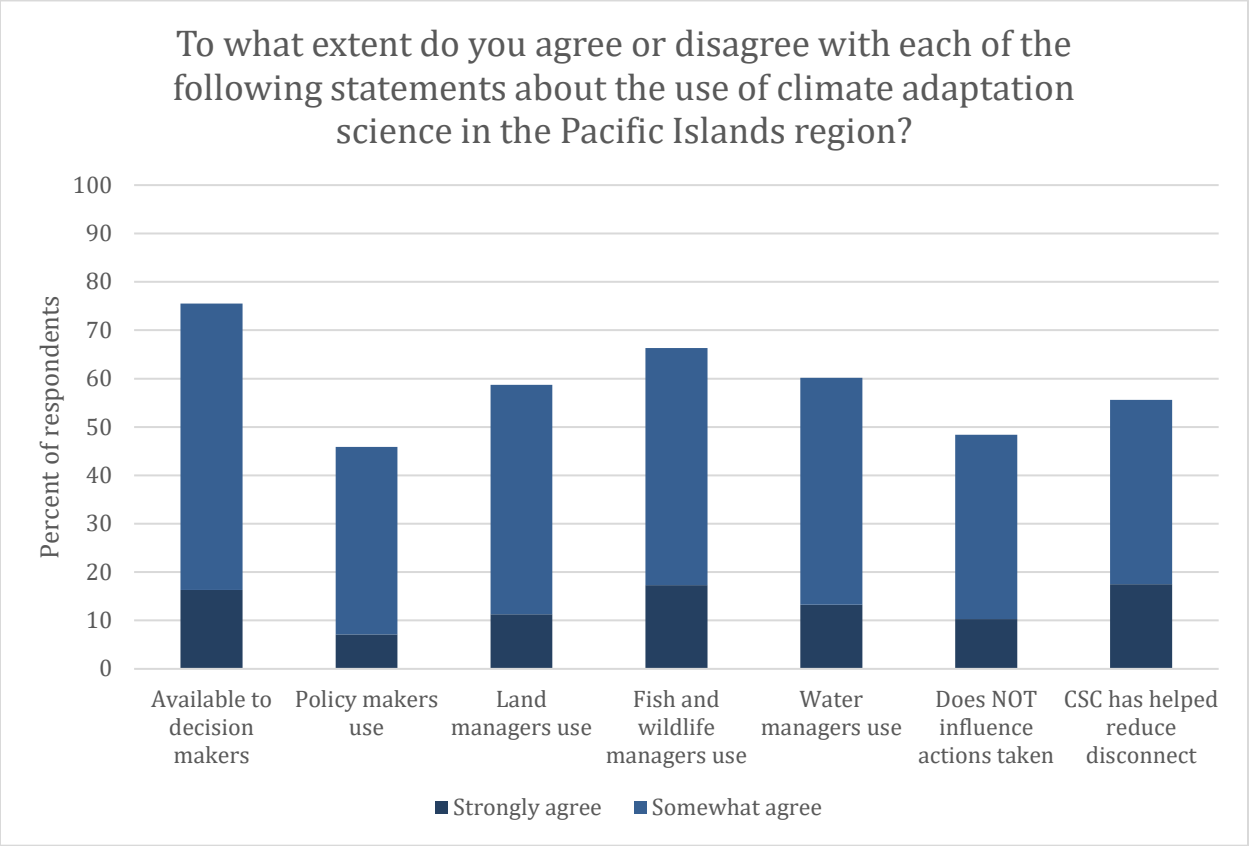
During the focus groups, one science user described an example of how the CSC had helped reduce this disconnect between science and management actions:

Our agency is entrusted with management of the public water resources.... And of course climate change has the potential to drastically affect what we know about the resource in terms of you know its current availability, quantities, and whatnot.... We became engaged with the Climate Science Center, that provided a forum to bring the different climate scientists that were doing things in the state together. And at the time initially when I got involved there were actually two models that had been done for climate change in Hawai'i ... and they were showing disparate results. And so we were wanting to know you know what we should make out of this. And so one of the first very productive initiatives that Dave took on was to bring the two sort of models together and try to come up with ... agreements, points for the models to agree on, and sort of give us managers something ... maybe results that we could have more high confidence in than others. And so it was very helpful for us to have one conduit for getting the climate scientists and researchers together and helping us understand and transforming for us what that science meant, so that we could turn it into a management policy or whatnot. (PI User FG)

In terms of the Pacific Islands CSC science specifically, nearly all respondents strongly or somewhat agreed the CSC science can contribute to policy or management (93%; n = 90) and that it was appropriate to inform decisions (92%; n = 89) (Figure PI-5). Similar comments were made in the focus groups:

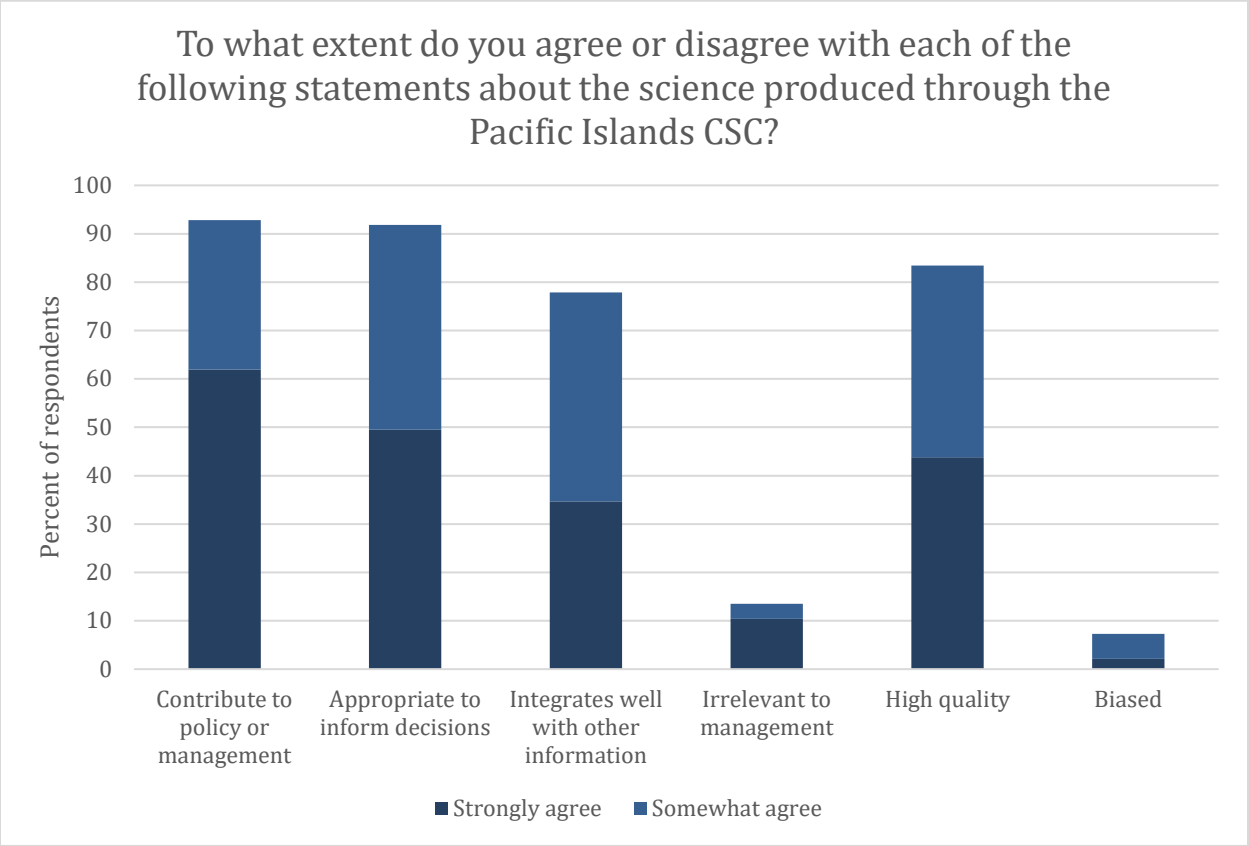
The work that the CSC has been doing that is on the ecological side is very beneficial for us to be able to manage those resources.... We're looking at these intensely managed special ecological areas. We haven't changed our management yet um but the work that the CSC has done has definitely started a dialogue about ... how viable those areas are going to be and what exactly we're managing for. You know we're managing these natural ecosystems but we're also managing for change as well.... We have limited resources as well and so where are you going to be directing those resources? And that takes first doing ... the downscaling and then having a translator you know translate that into the ecological information, and then translating it into management. (PI User FG)

Figure PI-4



Note: Based on survey question 11. Text in items shortened for presentation in graph. Full text in table in appendix.

Figure PI-5



Note: Based on survey question 12. Text in items shortened for presentation in graph, and only "strongly agree", "somewhat agree", or "I'm unfamiliar with the science" responses are shown. Full results in table in appendix.

Respondents were also positive about other characteristics of the CSC science, with large majorities finding it high quality (83%; n = 80) and able to integrate well with other information (78%; n = 74). Very few thought that the Pacific Islands CSC's science was irrelevant to management (14%; n = 13) or biased (7%; n = 7). Focus group participants also argued that the CSC science was relevant to their decision making:

> *I just wanted to point out that I think both PI CCC and the CSC have been working very hard to try to make their science more relevant..... Hats off to Dave and the stakeholder working group ... or the staff or whatever it was that ... have been trying to actually apply that to what people need.... I think both the CSC and PI CCC are examples of trying to focus the application more ... on livelihoods and how people relate to their surrounding ecological systems um as opposed to just birds and bees and bats.* (PI User FG)

Science Users' and Producers' Use of Climate Adaptation Science

Among respondents who reported that they were science users, 59% (n = 23) reported that they or someone in their organization used climate adaptation science from sources affiliated with the Pacific Islands CSC. (Eighteen percent did not know whether they had.) More than three-quarters (79%; n = 30) reported that they or someone in their organization used climate adaptation science from sources not affiliated with the CSC.

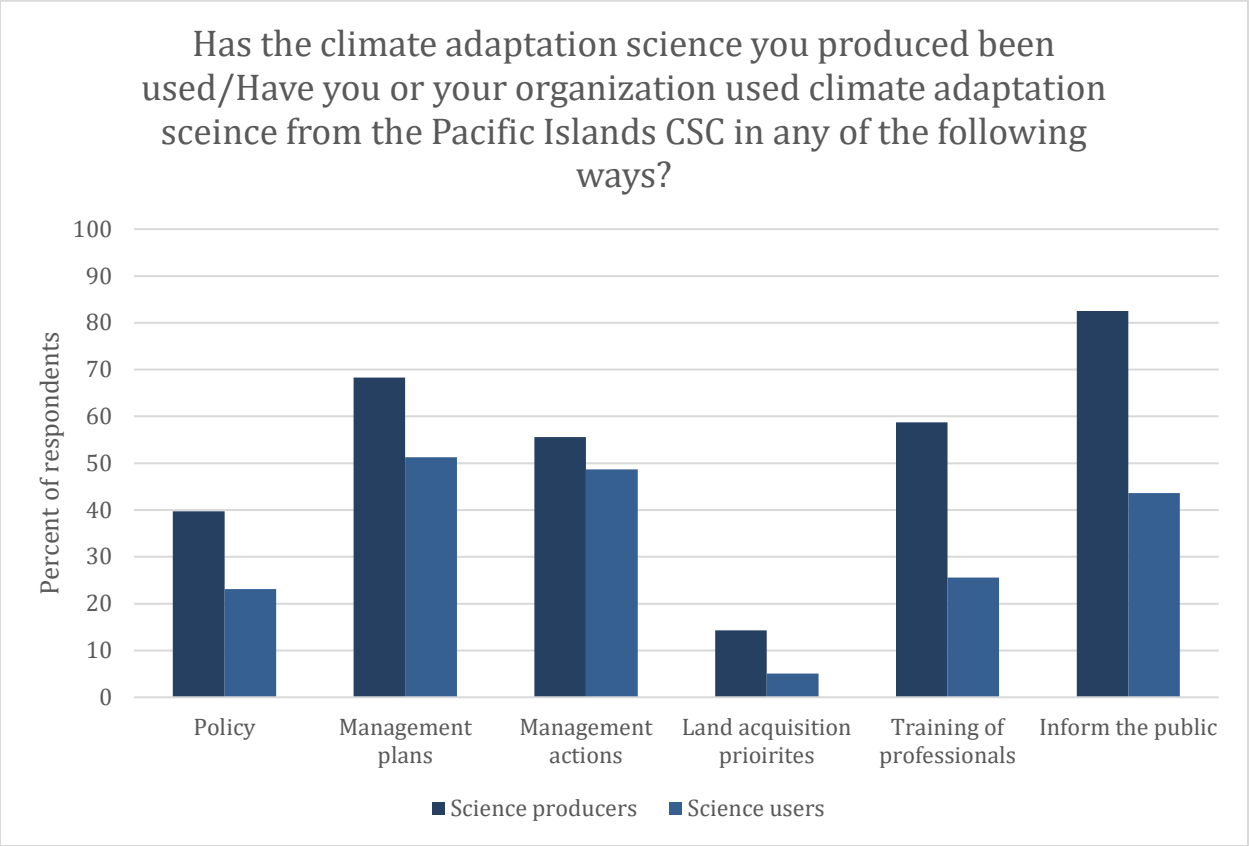
The most common ways science users reported using the Pacific Islands CSC science (Figure PI-6) were to inform management plans (51%; n = 20), inform management actions (49%; n = 19), and inform the public about climate change and its impacts (44%; n = 17).

When science producers were asked a parallel set of questions about how the science they had produced had been used, the frequency of all of the types of reported uses was greater. More than half said their science had been used to inform the public about climate change and its impacts (83%; n = 52), inform management plans (68%; n = 43), inform the training of conservation professionals (59%; n = 37), and inform management actions (56%; n = 35). The differences between science users' and science producers' responses could reflect differences in perceptions about how frequently CSC science is used. It could also reflect that the use of CSC science is concentrated in a subset of potential CSC science users.

Nevertheless, CSC partners recognized factors that limited the use of CSC science. Science users and producers differed in their perceptions of what these factors were (Figure PI-7). In almost all cases, more science producers than science users perceived limits to the use (not necessarily their own use) of CSC science to a moderate, large, or very large extent. The one exception was that 47% of science users said that the CSC science did not address questions at the right scale and 42% of science producers agreed. Focus group participants also discussed the importance of the scale at which science was done. Scientists found it hard to produce results at timescales that were relevant to science users:

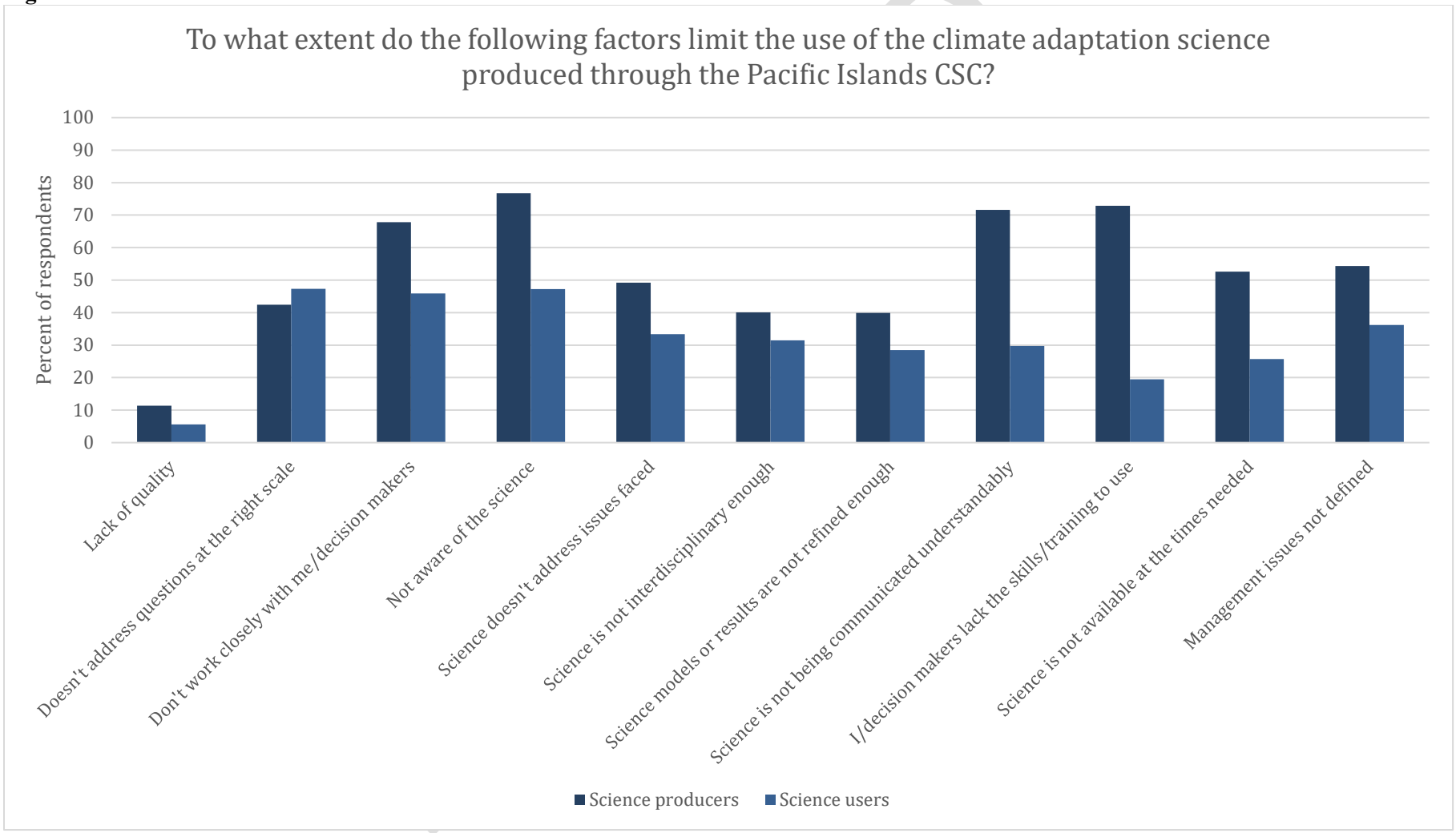
> *Climate change has this long-term scale perspective.... So we have these outlooks by 2100 or the middle of the 20th century. And one of the things that was so challenging is to make this kind of science that we can do ... timescales that are outside the range, the horizon in which managers can really operate and work.* (PI Producer FG)

Figure PI-6



Note: Survey questions 15 & 21. Text in items shortened for presentation in graph. Full text in table in appendix.

Figure PI-7



Note: Survey questions 16 & 22. Text in items shortened for presentation in graph, and only "to a moderate extent", "to a large extent", or "to a very large extent" responses are shown. Also, text varied slightly for science producers and users. Full results and text in tables in appendix.

Similarly, science users often needed results at a finer geographic resolution than scientists could provide:

> *I talked about the downscale climate models.... Although there was some general agreement, which was helpful for us to at least communicate to the decision makers ... it wasn't specific enough.... It was ... helpful to know what the general trends are at least. What we really wanted at the water commission was more finely downscale climate model.... The scale right now of the models is much too gross for us to use in our management but the trend that leads are helpful.* (PI User FG)

More than two-thirds of science producers thought that the use of CSC science was limited by lack of awareness of the science (77%), decision makers lacking the skills and training to use the science (73%), the science not being communicated understandably (72%), and scientists not working closely enough with decision makers (68%). From the science users' perspective, the top limits were that the CSC science did not address questions at the right scale (47%), lack of awareness of the science (47%), and scientists not working closely enough with decision makers (46%).

Some of these constraints were also discussed during the focus groups. During these groups, one scientist argued that the university side of the CSC was not that interested in doing actionable science initially.

> *From the university side, the whole thing began without actionable science being a key theme. And where the CSC was housed at the university ... actionable science was not a theme at all, very fundamental scientists. The actionable science from the USGS end caught us at the university side with the CSC being managed by people who were not interested in management aspects of it. It took two years. Now it's in the right place. It's in Sea Grant so I think the university took a little bit to catch up to the actionable science because originally that was not a big ... purpose.* (PI Producer FG)

One scientist in the focus group also argued that there was value in doing science that was not actionable:

> *Right now, there needs to be a clear line between the research that you propose and a partner manager.... Yet ... we have very interesting information that could be applied to climate models. We could extend back beyond the modern period of observation by using climate proxies, geologic proxies and yet that's not encouraged. Sea Grant doesn't encourage it.... Climate proxy research is valuable for the Hawaiian Islands.... But that was strongly discouraged and they were turned very strongly into more immediately actionable ... sciences.... Because the planner, the county planner on the big island, may not be interested in it.* (PI Producer FG)

Focus group participants recognized, however, that the CSC has provided valuable opportunities for researchers to connect with decision makers that are central to actionable science:

> *The opportunity of meeting managers and working with managers ... meeting the fish pond manager who we've been talking with, but also ... that opportunity to interact with those that are the superintendents of the National Park Services. We have 3 national parks on Hawaii Island. Having the opportunities to talk and work with them have been very useful.* (PI Producer FG)

Maintaining these connections between researchers and local decision makers, although important for producing actionable science, is challenging to do throughout the Pacific Islands region without more funding:

> *In the Pacific ... you need to really have credibility. And you get credibility by being consistent and doing what you say you're going to do and being there long term.... As a set of islands that have a long colonial history, people are very wary of folks that just fly in and say, "Oh, we have your best interest in mind. And we have some money for something. And here's what we're going to do for you. And you'll love it." And then they leave.... The last thing you want to do is, is parachute in, make a promise, not keep it, and be gone.... That's why the consortium actually is very powerful because ... you have kind of a local foothold, but it's very, very hard without a substantial increase in funding for the CSC to really be considered ... a presence that will be able to you know deliver and then deliver on the delivery.* (PI User FG)

Science users who participated in the focus groups also spoke frequently about the necessity for translating science into a form that decision makers could use:

> *I think one of the things that's actually been really important for ... the CSC is that as we've gone forward I think we've realized ... [it] started with kind of a deficit model of science delivery. Right? The problem is lack of science. The answer is create science, and it's originally kind of the loading dock approach. I mean you've dumped the study off and, and everybody just does good things with it. And as we move forward I think ... out here in the Pacific Islands especially, we've been very motivated by the failure of that model to really change anything.... I think the big benefit for everyone involved is the realization that it's the translation of the science into product and tools that people can actually use that's the main challenge.... When you look around, it's nobody's job to do it, but it's the critical part. It's kind of that last mile getting from the journal article to the actual decision point of a ... manager. To decide to do one thing or another.... You can generate a lot of climate data that does not inform people. You know they look at that and they don't know what to do with it because it doesn't translate into effects on their system.... It's more of ... knowing how to relate to the manager's needs that takes time, and it takes a lot of staff time, and it takes a commitment to do that.... That translation is the critical component.* (PI User FG)

> *I wouldn't be able to just take the downscale information and try to figure out exactly how it's going to impact plants. There has to be somebody in-between the climate modelers and then some ecologist that's going to really look at the impact on resources and then maybe collaboratively be able to talk with managers about ... our options.* (PI User FG)

Some of the scientists wanted more support in communicating science to users because they believed that they did not have the necessary expertise themselves:

> *Ideally I would have liked to have a contact person ... that way you can go to talk about it.... As a kind of hard core scientist, that first focus on science and that we're going to communicate and produce actionable products and over the years. I found it got better on my side. I learned a lot but ideally there would have been a little bit more ... permanent persons that don't change from one year to another and that know what the products are, where the databases are located, and how to transfer the knowledge.... Somehow there's one layer missing still in the process of communicating the actual science to the right end users.... There's one person to ask, "How do we do that? How do we produce our data best? And what are the best products?" I feel like that it would have helped if there would have been another person in some form responsible for this communication of the – maybe you want to call it the datasstream. (PI Producer FG)*

Other ideas about actionable science also emerged during the focus groups. In particular, one scientist argued that integrating more social science into the CSC's work would increase the actionability of the science:

I think we need more social scientists in the long haul.... Cultivating interdisciplinary relationships is really important.... I think engaging other departments ... is a big part of the suggestion as well as how we can make science more actionable. (PI Producer FG)

Science Users' and Producers' Engagement in Co-production of Knowledge

Respondents reported on their beliefs about co-production of knowledge in general. A large majority of the science producers (95%; n = 58) and all of the science users (100%; n = 38) expressed support for co-production, indicating it was important or very important for climate adaptation scientists and natural resources decision makers to work together to produce science research.

Many science producers indicated experience in co-production in various phases of research projects, much more so than did science users[1] (Figure PI-8). For all phases of research projects, at least 40% of the science producers had experience collaborating with decision makers to a moderate, large, or very large extent. The only phase that fewer than half of science producers had experience collaborating with decision makers was analyzing the data (43%; n = 9). (These results apply to all types of research, not just CSC-sponsored research.) In contrast, when science users were asked about their experience collaborating on research with CSC science, there were only 3 phases of research with which at least 40% of science users had experience: collecting data (40%), applying results (40%), and identifying research questions (40%).

The factors that science users thought were most likely to limit their involvement in research projects were scientists not reaching out to them (35%; n = 13), the science users not having enough time (32%; n = 12), different perspectives from scientists on what science is needed (29%; n = 11), and funders not supportive of collaboration between scientists and science users (26%; n = 10). Very few users thought that their involvement in research was limited by scientists not being interested in listening to them (8%; n =3).

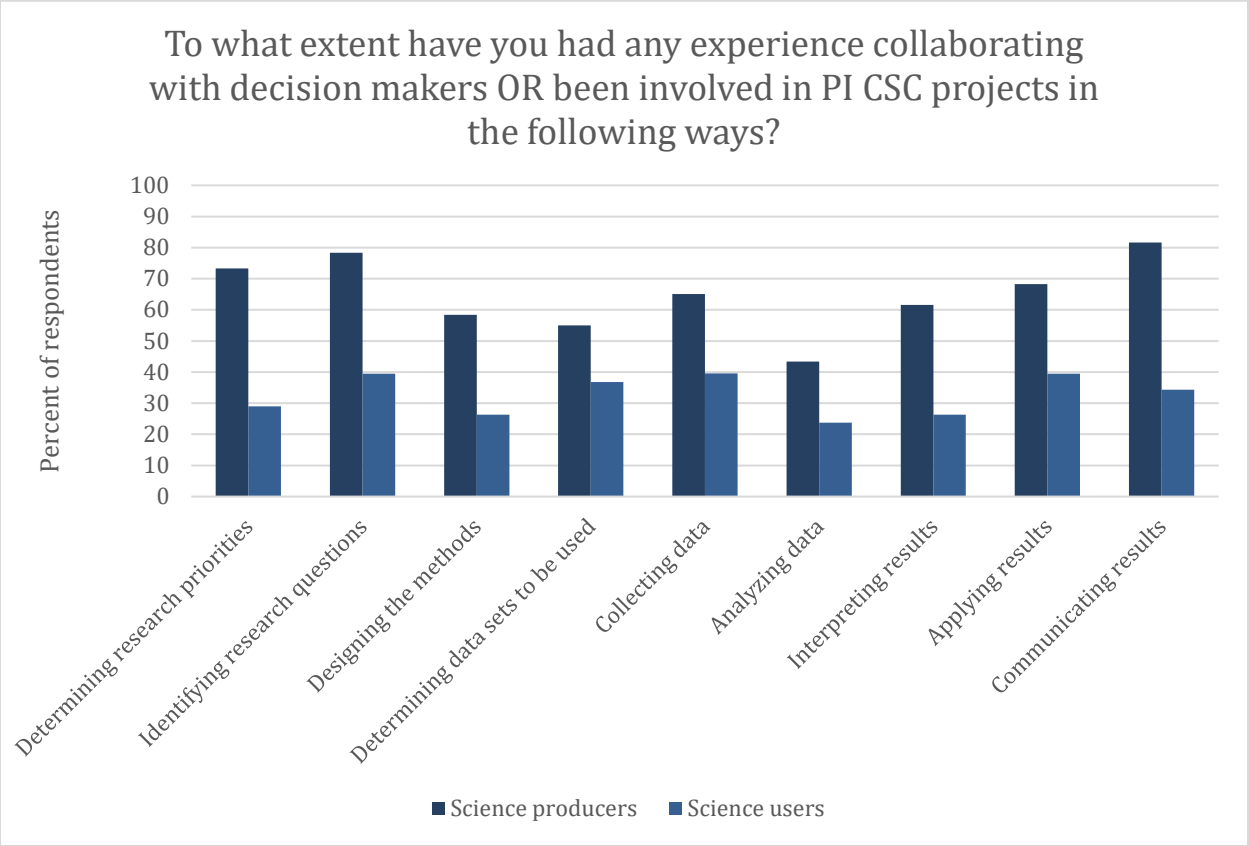
Science users who participated in the focus groups generally recognized and appreciated the CSC's efforts to have scientists reach out to them about their information needs:

To reach out to resource managers to find out what our applied science needs are. In the past a lot of research came out that was very academic, but we did not know what to do with that information. So the fact that researchers are asking us what specific research questions we have, and then trying to design a study around that, is just appreciated. (PI User FG)

With this one project that we're working on with special ecological areas, getting that translation of the information ... We sat down with the researchers you know before the projects kind of got initiated. What are your needs? And then there was kind of this process, iterative process, back and forth ... with us as managers and the scientists.... And that sort of project was really beneficial in just making those connections. (PI User FG)

[1] As noted in a previous section, the science producers in our sample were also more extensively engaged with climate adaptation science, management, or policy – as well as with the CSC itself – than the science users in our sample.

Figure PI-8



Note: Survey questions 18 & 24. Text in items shortened for presentation in graph, and only "to a moderate extent", "to a large extent", or "to a very large extent" responses are shown. Additionally, the text of the question varied slightly for science producers and users (e.g., the users' version referencing "you or someone in your organization" and specifying a Pacific Islands CSC project). Full results and text in tables in appendix.

The scientists also described how the CSC facilitated these interactions:

> *One thing that the Climate Science Center ... has done with this most recent round of funding ... about a year ago, one-and-a-half years ago, they helped to bring together the managers and the researchers to kind of develop the project.... And then about 9 months into the project they made sure, they organized another meeting with all of us on the proposal to have us sit down and talk about and see where things were.... They helped facilitate that.* (PI Producer FG)

Many of them saw these interactions as valuable and think that it would be useful to have more such opportunities:

> *Managers know what problems they have and what their goals are. And having researchers able to come in and help them identify those really interesting research questions that help them ... gain insight into their issues and allow the researchers to do quality science, having that type of forum that allows that to happen would be helpful.* (PI Producer FG)

Yet not every scientist believed that interacting directly with end users of science was feasible or valuable:

> *I have had limited discussions or communication directly with end users. But I think that's very likely also where the strength of the PI CSC is, that there is this ... middle that helps with the communication. And everybody has a full day and works hard, so a manager won't have much time to talk to each and every individual researcher.... As we have these good communication channels through the PI CSC and I think that worked quite well. What worked extremely well for me was connecting to the next level, that is the people who use my climate information to bring it down to their environmental ... impact layer here in Hawai'i. And that worked extremely well and that would have not been possible without the funding and the PI CSC.* (PI Producer FG)

Perceptions of the Role of the CSC

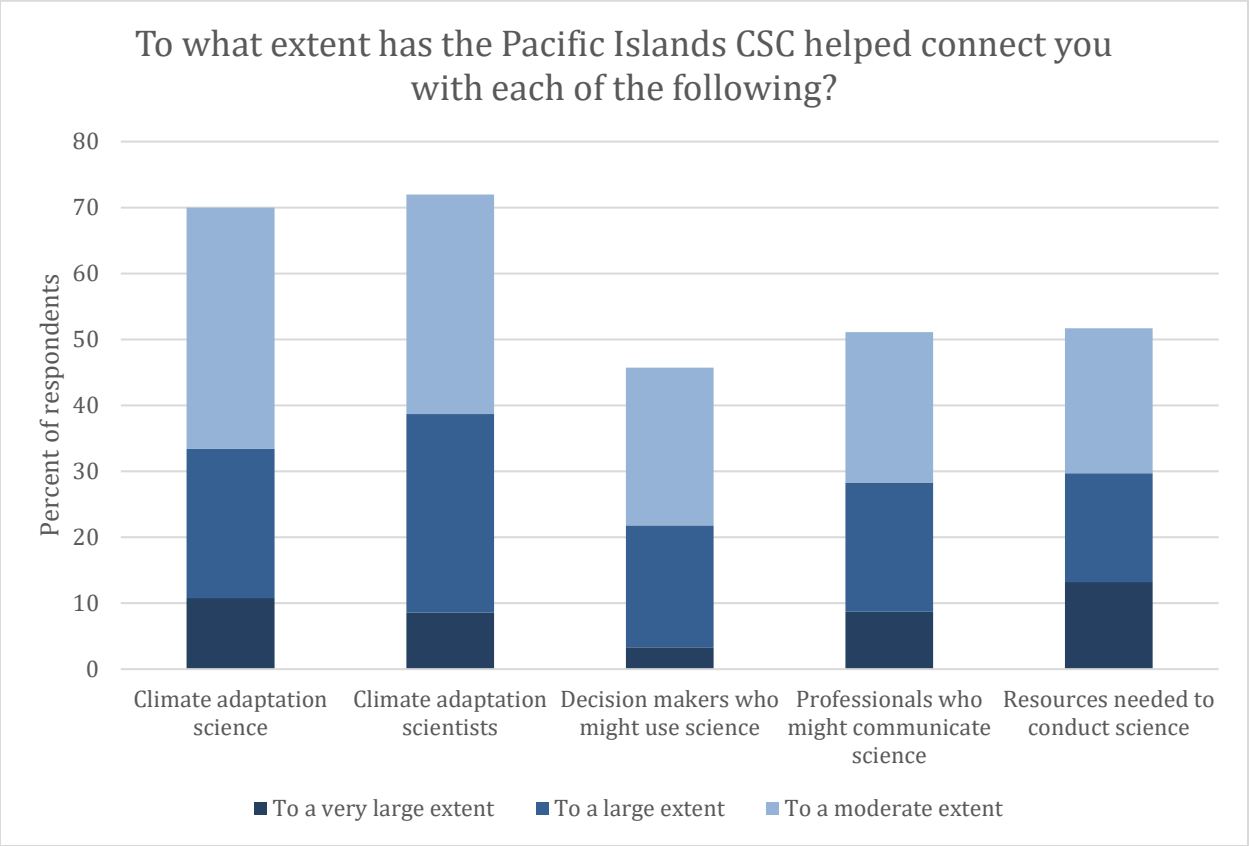
The Pacific Islands CSC has helped facilitate various connections (Figure PI-9). Nearly three-quarters of respondents reported connections with climate adaptation scientists (72%; n = 67) and climate adaptation science (70%; n = 65). About half thought the CSC had helped connect them with resources needed to conduct science (52%; n = 47), professionals who might communicate science (51%; n = 47), and decision makers who might use science (46%; n = 42).

Most than three-quarters of respondents agreed that the Pacific Islands CSC made a variety of contributions to the region (Figure PI-10). The contributions that were most widely perceived were awareness of available science (83%; n = 77), communication between scientists and those who might use the science (77%; n = 72), collaboration between scientists (75%; n = 70), and interdisciplinary science (74%; n = 69).

Summary of Pacific Islands Results

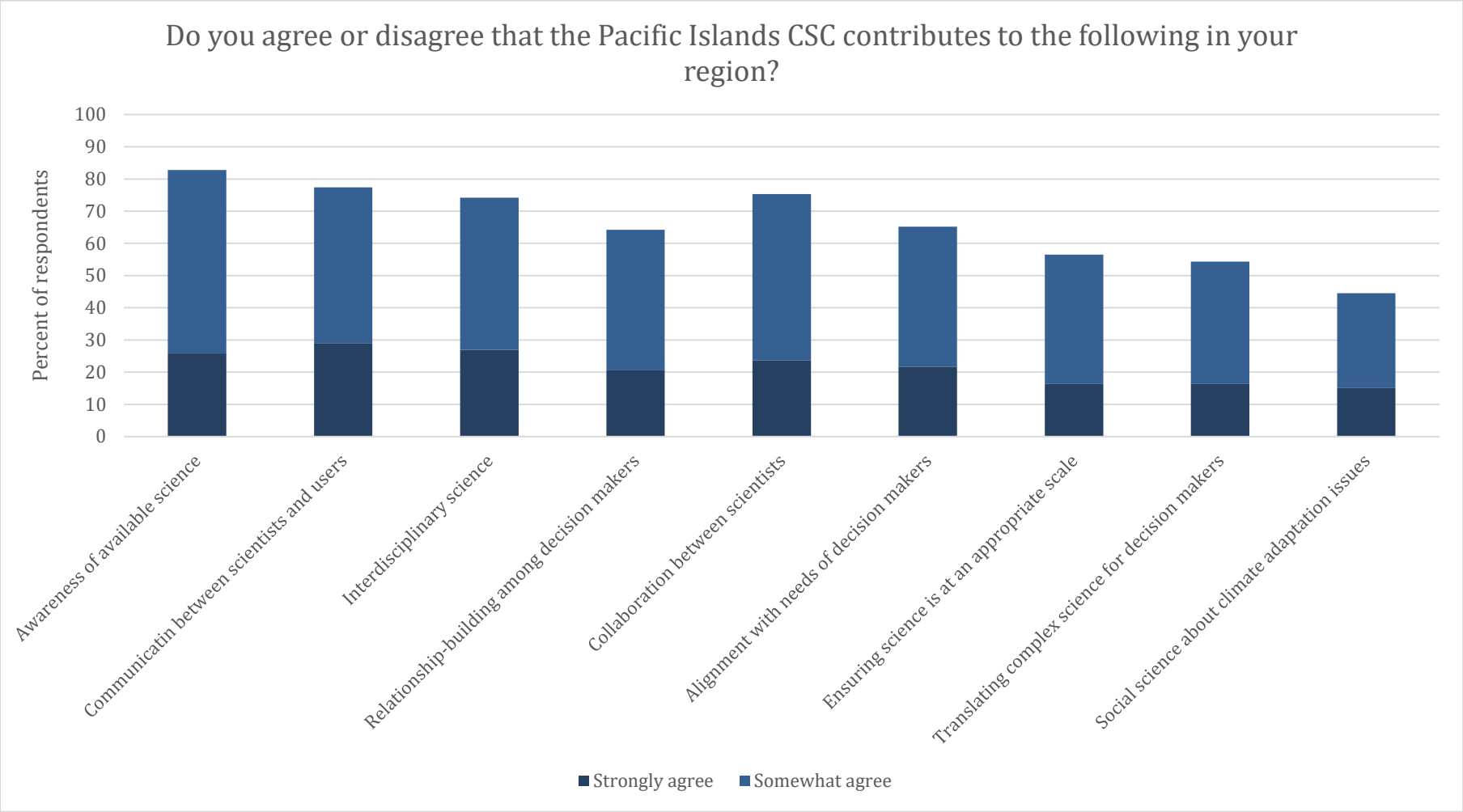
Survey respondents were comprised of more than one-third science users, nearly two-thirds science producers, and some individuals who fell into neither group. All were involved with climate work to some extent, but producers were more involved than users. All were aware of the Pacific Islands CSC to at least some extent, but producers were more involved with the CSC than users were. Respondents included employees of a variety of types of organizations and agencies, but universities and federal agencies were most prominent.

Figure PI-9



Note: text in items shortened for presentation in graph, and only "to a moderate extent", "to a large extent", or "to a very large extent" responses are shown. Full results and text in tables in appendix.

Figure PI-10



Note: text in items shortened for presentation in graph, and only "strongly agree" or "somewhat agree" responses are shown. Full results in table in appendix.

Survey respondents were involved with the Pacific Islands CSC in a variety of ways, but the most common was as participants in CSC trainings, webinars, workshops, or conferences with nearly half of respondents having taken advantage of one of these opportunities. More than one-third were CSC grant recipients, applicants, or partners on a grant. Only one-fifth were resource managers or decision makers who had used the science produced by the CSC.

The CSC provided many important benefits to partners with the top ones identified by survey participants being providing access to climate adaptation science, providing access to a network of people interested in climate adaptation science, serving as an avenue to put science into the hands of decision makers, and providing a source of funding. Focus group participants spoke about all of these benefits as well as the opportunities the CSC provided to educate local students. Survey respondents reported they were limited in their involvement with the CSC by a variety of factors with the most common one being limits on their time.

About three-quarters of the survey respondents felt that climate adaptation science in the Pacific Islands region[1] was available to decision makers, and many also believed that decision makers use the climate adaptation science to inform management. Nevertheless, nearly half believed that climate adaptation science did not influence *necessarily* management actions taken, although a majority also believed that the Pacific Islands CSC had reduced the disconnect between scientists and decision makers. When asked specifically about the science produced through the Pacific Islands CSC, the vast majority of the survey respondents agreed it can contribute to policy or management. Respondents were also positive about other characteristics of the CSC science, and the majority found it appropriate to inform decisions, high quality, and able to integrate well with other information.

The most common ways science users and producers reported that the Pacific Islands CSC science was used were to inform the public and inform management plans and actions. Focus group participants described translation of the science into a form that decision makers could use was a key factor in ensuring it was used.

Science users and producers differed in their perceptions of what limits the use of CSC science. Science producers perceived issues to be more limiting, than science users found them to be. Focus group participants maintained that one on the limits on the use of the science was that the scale at which scientists tended to work was often different from the scale of the information that decision makers needed.

An overwhelming proportion of both science users and producers expressed support for coproduction of knowledge. While many of the science producers indicated experience in coproduction in various phases of research projects, many fewer science users reported first-hand experience. Scientists were the most likely to have experience with coproduction in the early stages (setting priorities and identifying research questions) and late stages (interpreting, applying, and communicating results) of research, although many also had experience with coproduction during the data collection stage. Science users were most likely to have experience in coproduction by identifying research questions, collecting data, and applying results. Science users who responded to the survey reported that their involvement in co-produced research projects is most limited by scientists not reaching out to them to collaborate, not having enough time to work with scientists, having different perspectives from scientists on what science is needed, and funders not being willing to support collaboration between scientists and science users.

[1] All climate adaptation science in the region, not solely the science produced by the CSC.

The majority of survey respondents noted a variety of contributions of the Pacific Islands CSC, including contributions to awareness of available science, communication between scientists and decision makers, collaboration between scientists, and interdisciplinary science.

Summary of All CSC Results

While results were analyzed by region (NE, SC, and PI), key findings and patterns were similar across the CSCs. Respondents represented science users and science producers. Although a variety of types of partners were engaged with the CSCs, a large majority of them were from universities and federal agencies.

That most common way for survey respondents to be involved with the CSCs was as participants in CSC trainings, webinars, workshops or conferences with between one-third and one-half having participated in these opportunities. Approximately one-fifth to one-third in each survey were grant recipients, applicants, or partners. No more than one-fifth were resource managers or decision makers who had used the science produced by the CSC.

For all three CSCs, the top two benefits of the CSC identified by survey respondents were being provided access to a network of people interested in climate adaptation science and receiving access to the science itself. The benefits of the CSC networks were discussed extensively in the focus groups. The most common limitations on partners' engagement with the CSC were the time they had available (given their other priorities).

Two-thirds to three-quarters of the survey respondents in each region felt that climate adaptation science in the regions was available to decision makers, and many also believed that decision makers use the climate adaptation science to inform management. Nevertheless, many believed that climate adaptation science did not *necessarily* influence management actions taken, although approximately half also believed that the CSCs had reduced the disconnect between scientists and decision makers. When asked specifically about the science produced through the CSCs, large majorities of the survey respondents agreed it can contribute to policy or management. Respondents were also generally positive about other characteristics of the CSC science, and the majority found it high quality, appropriate to the decisions being made, and able to integrate well with other information.

Science producers and science users had different perceptions about the use of climate science. The percentage of science producers who thought their science was used by decision makers was much higher than the percentage of decision makers who say they used CSC science. These perspectives were not necessarily inconsistent. It is possible that a small group of decision makers had access to and made use of the climate science that was produced, while others did not. In focus groups in both regions, participants argued that one of the factors contributing to the use of CSC science was translation of the science into a form that decision makers could use.

Co-production of climate adaptation science research was perceived as valuable by large majorities of producers and users. Users had less experience with co-production than producers. Coproduction tended to be more common in the early stages (setting priorities and identifying research questions) and late stages (interpreting and communicating results) of research than the middle stages. Science users who responded to the survey reported that their involvement in co-produced research projects is most limited by scientists not reaching out to them to collaborate and having different perspectives from scientists on what science is needed.

The majority of survey respondents noted a variety of contributions of the CSCs including contributions to collaboration between scientists, awareness of available science, interdisciplinary science, and communication between scientists and decision makers.

Although the CSCs produced a number of benefits, several possibilities exist for enhancing those benefits. More diverse types of partners could be engaged beyond the prevalent federal agencies and

university scientists. Engaging new partners may require new ways to make it easier for potential partners to become involved and more outreach to invite them to participate. There is also more work to be done to facilitate actionable science and co-production in all of the regions. CSC efforts along these lines may be aided by defining more clearly those management issues that need attention, creating more opportunities for scientists and managers to work together or encouraging it through funding requirements, and improving the ways in which science is communicated.

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APPENDICES

A. Focus Group Scripts
B. Survey Instrument with Tables of Results – Northeast
C. Survey Instrument with Tables of Results – South Central
D. Survey Instrument with Tables of Results – Pacific Islands
E. Phone Survey Instrument
F. Comparison of Respondent (Web-based) and Nonrespondent (Phone) Surveys

Appendix A. Focus Group Scripts

Science Producers

(0-5 minutes) Introduction:

- Welcome.
- Introduction of focus group leaders
- Thanks for coming to our session today.
- Purpose: to develop an understanding of how partners have contributed to and benefitted from the work of the CSC and what has influenced the ability of the CSC to work with its partners.
- We are hosting two focus groups. One with those who tend to produce climate science and those who tend to use climate science. This focus group is focused on the former.
- We have included a diverse set of partners in the focus groups to try to get a range of perspectives.
- In the process of the interview we will ask some open-ended questions – both myself and members of the team that is conducting the CSC review. There are no right and wrong answers, and it is OK to disagree with what others have said.
- As you can see, the Science Review Team will also be listening in to this discussion. They will be learning about the CSC from this discussion and may use material anonymously as part of their report. We will also allow them to ask follow-up questions that elaborate on topics of interest.
- We will use an audio-recorder, so that we can listen to the discussion and transcribe the full details later.
- Your responses will be kept anonymous in any reporting of the focus groups.
- Your participation in this group is voluntary.
- Timing: The session today will last for two hours.

(5-15 minutes 1) We'd like to start with everyone introducing themselves. We will go around the room. Please tell us your name, your affiliation, and in what ways you interact with the Climate Science Center and with whom. And I'll also have the Review Team briefly introduce themselves.

(15-25 minutes) 2) What were the reasons you became involved with the Climate Science Center?

(25-40 minutes) 3) What are the benefits of your involvement with the Climate Science Center? (probe for benefits to them as individuals, to scientific knowledge, to people who are in need of scientific information, to professional development of others)

- What are some concrete examples of how you were able to leverage personnel or resources based on your involvement with the Climate Science Center?

(40-55 minutes) 4) What are the challenges you face in your involvement with the Climate Science Center?

(55-60 minutes) 5) To what degree have you worked with other people who are affiliated with the Climate Science Center – either those who want to make use of the science it produces or the climate scientists who produce the CSC science?

(60-75 minutes) 6) Tell us more about your efforts to work with these people. Why and how have you worked with them?

(75-90 minutes) 7) What challenges have you faced in working with or reaching out to people who might use your climate science?

(90-105 minutes) 8) How has the CSC helped to overcome barriers to working with or reaching out to science users? [or to ensuring that the science you produce is used]?

(105-120 minutes) 9) Generally speaking, how could your involvement with the CSC generate more benefits – whether to you individually, to scientific knowledge, to people who use currently or could use climate scientific information, etc?

- How would you like to be engaged with the Climate Science Center in ways that you currently are not?

Science Users

(0-5 minutes) Introduction:

- Welcome.
- Introduction of focus group leaders
- Thanks for coming to our session today.
- Purpose: to develop an understanding of how partners have contributed to and benefitted from the work of the CSC and what has influenced the ability of the CSC to work with its partners.
- We are hosting two focus groups. One with those who tend to produce climate science and those who tend to use climate science. This focus group is focused on the latter.
- We have included a diverse set of partners in the focus groups to try to get a range of perspectives.
- In the process of the interview we will ask some open-ended questions – both myself and members of the team that is conducting the CSC review. There are no right and wrong answers, and it is OK to disagree with what others have said.
- As you can see, the Science Review Team will also be listening in to this discussion. They will be learning about the CSC from this discussion and may use material anonymously as part of their report. We will also allow them to ask follow-up questions that elaborate on topics of interest.
- We will use an audio-recorder, so that we can listen to the discussion and transcribe the full details later.
- Your responses will be kept anonymous in any reporting of the focus groups.
- Your participation in this group is voluntary.
- Timing: The session today will last for two hours.

(5-15 minutes 1) We'd like to start with everyone introducing themselves. We will go around the room. Please tell us your name, your affiliation, and in what ways you interact with the Climate Science Center and with whom. And I'll also have the Review Team briefly introduce themselves.

(15-25 minutes) 2) What were the reasons you became involved with the Climate Science Center?

(25-40 minutes) 3) What are the benefits of your involvement with the Climate Science Center? (probe for benefits to them as individuals, to scientific knowledge, to people who are in need of scientific information, to professional development)

- What are some concrete examples of how you were able to leverage personnel or resources based on your involvement with the Climate Science Center?

(40-55 minutes) 4) What are the challenges you face in your involvement with the Climate Science Center?

(55-60 minutes) 5) To what degree have you worked with other people who are affiliated with the Climate Science Center – either those who want to make use of the science it produces or the climate scientists who produce the CSC science?

(60-75 minutes) 6) To what degree have you used the science produced through the Climate Science Center?

- Tell us more about your impressions of this climate science. Has it been useful? How have you used it?

(75-90 minutes) 7) What challenges have you faced in using the science as part of the CSC? (probe for challenges in working with scientists in using science)

(90-105 minutes) 8) How has the CSC helped to overcome barriers to using climate science?

- How has the CSC helped you to develop relationships with climate scientists?

(105-120 minutes) 9) Generally speaking, how could your involvement with the CSC generate more benefits – whether to you individually, to scientific knowledge, to people who use currently or could use climate scientific information, etc.?

- How would you like to be engaged with the Climate Science Center in ways that you currently are not?
- How can the CSC better meet the needs of your organization and constituencies?

Appendix B. Survey Instrument with Tables of Results – Northeast

1. To what extent does your work involve climate adaptation science, or management or policy related to climate change adaptation? (Select one option)

Answer Options	Response Percent	Response Count
Not at all	0.0%	0
To a small extent	13.2%	31
To a moderate extent	34.5%	81
To a large extent	31.1%	73
To a very large extent	21.3%	50
Answered question		**235**
Skipped question		**0**

2. How serious of a threat do you believe that climate change is to natural resources, relative to other stressors? (Select one option)

Answer Options	Response Percent	Response Count
Much lesser threat	0.0%	0
Lesser threat	4.0%	9
Similar threat	31.4%	71
Greater threat	47.8%	108
Much greater threat	16.8%	38
Answered question		**226**
Skipped question		**9**

3. How important do you believe it is that managers or policy makers take action now in the Northeast region to address climate change threats? (Select one option)

Answer Options	Response Percent	Response Count
Not at all important	0.0%	0
Slightly important	0.9%	2
Moderately important	8.8%	20
Important	30.1%	68
Very important	60.2%	136
Answered question		**226**
Skipped question		**9**

4. How important do you believe it is that climate adaptation science informs decisions about natural resource management in the Northeast region? (Select one option)

Answer Options	Response Percent	Response Count
Not at all important	0.0%	0
Slightly important	2.2%	5
Moderately important	4.0%	9
Important	21.1%	48
Very important	72.7%	165
Answered question		**227**
Skipped question		**8**

5. Which statement best characterizes your relationship with the Northeast Climate Science Center (CSC)? (Select one option)

Answer Options	Response Percent	Response Count
I have never heard of the Northeast CSC.	0.0%	0
I have heard of the Northeast CSC, but have no interest in or involvement with it.	5.3%	12
I have had no involvement with the Northeast CSC, but someone else in my agency or organization has.	18.1%	41
I have had at least some interest in or involvement with the Northeast CSC.	76.7%	174
Answered question		**227**
Skipped question		**8**

6. In what ways have you been involved with the Northeast Climate Science Center (CSC) in the last five years? (Select all that apply)

Answer Options	Response Percent	Response Count
CSC Stakeholder Advisory Committee member	6.0%	14
University member affiliated with the CSC	16.6%	39
CSC-funded graduate student or postdoctoral fellow	14.0%	33
CSC US Geological Survey staff	1.7%	4
Landscape Conservation Cooperative Steering Committee member	8.9%	21
Landscape Conservation Cooperative staff member	5.5%	13
CSC grant recipient, applicant, or partner on a grant	18.3%	43
Participant in a CSC training, webinar, workshop, or conference	36.6%	86
Resource manager or decision maker who has used the science produced by the CSC	18.7%	44
Other (please specify)	11.9%	28
None of the above	2.1%	5

Comments provided under "other":

- *Chair and member of LCC work group*
- *Collaborated with CSC staff on publications; co-hosted workshops*
- *Collaborator with CSC affiliated researchers/projects*
- *Collaborator, partner*
- *Contributor to research projects supported by NECSC*
- *Director of a government science organization that has had limited interaction with CSC*
- *Evaluator of grant proposals submitted to CSC*
- *Funder of CSC projects*
- *have contributed to our in-person trainings and we use their content to inform people of the tools and resources out there.*
- *Helped write the original grant for the NECSC*
- *I am currently collaborating with the NE CSC*
- *I work closely with wildlife diversity program managers who were the direct beneficiaries of a report produced by the CSC to help state integrate climate change in their State Wildlife Action Plans*
- *information consumer*
- *LCC science advisor panel*
- *NGO Partner and supporter*
- *Not a university member, but a non-profit sector partner with the CSC*
- *other federal agency*

- *Partner on CSC project*
- *Partner/presenter at the NE CSC Regional Science Meeting May 2017*
- *Peer reviewer*
- *Personal communications with the scientists at the Northeast CSC*
- *PhD work at UNH*
- *The agency I work fro has sent them money to work on two projects.*
- *US Geological Survey Headquarters staff working closely with the Land Resources Mission Area that governs the CSCs*
- *User of Climate Data from CSC*
- *USGS manager in footprint of NE CSC*
- *We are paying for NECSC to produce statewide climate change data for Massachusetts*

7. How long (in years) have you been involved with the CSC? (Fill in number of years, or zero, if none)

Answer Options	Average number of years involved with CSC	Response Count
	3.4	167

8. How frequently did you interact with following representatives or affiliates of the CSC in your region in the last year? (Select one option per row)

Answer Options	Not at all	Up to a few times a year	About once a month	Up to a few times a month	More than once a week	Response Count
US Geological Survey CSC Staff	20.1%	43.9%	12.8%	18.3%	4.9%	164
University leads/PIs for the CSC	16.0%	46.3%	12.3%	14.2%	11.1%	162
CSC Stakeholder Advisory Committee members	55.6%	34.6%	4.6%	3.9%	1.3%	153
CSC-affiliated researchers	12.7%	51.5%	13.9%	13.3%	8.5%	165
CSC graduate or post-doctoral fellows	31.0%	30.4%	8.2%	13.9%	16.5%	158

9. How important are each of the following benefits of the Northeast CSC to you? (Select one option per row)

Answer Options	Not at all important	Slightly important	Moderately important	Important	Very important	Response Count
Source of funding for climate adaptation science	14.8%	11.2%	12.4%	21.3%	40.2%	169
Access to climate adaptation science	1.8%	8.2%	15.9%	31.8%	42.4%	170
Access to a broader network of people interested in climate adaptation science	2.3%	9.4%	14.0%	36.3%	38.0%	171
Means for learning about climate adaptation	2.4%	14.1%	24.1%	28.8%	30.6%	170
Training on climate adaptation science methods or findings	8.8%	17.6%	20.6%	28.8%	24.1%	170
Avenue to put climate adaptation science into the hands of decision makers	2.4%	12.4%	14.1%	27.6%	43.5%	170
Justification for climate adaptation science I want to do	25.0%	21.4%	16.7%	19.0%	17.9%	168
Other (please specify)						9

Comments provided under "other":

- *Bringing together multiple LCCs*
- *From my experience, there is an occasional gap between practitioner needs and the science and tools that are developed. Need to extensively ask practitioners about what is needed before investing $ in models/tools that offer limited benefit to on-the-ground conservation.*
- *I oversee regional science for USGS, so I am not dependent on CSC for funding. However, other staff in our centers are dependent on CSC funding.*
- *I'm not sure what 'Justification for climate adaptation ...' means. The CSC is a very productive and relevant avenue for me to conduct research in collaboration with an agency that shares my mission. In that sense, it is 'Very important'.*
- *Means for sharing useful information on climate adaptation with colleagues.*
- *PR/outreach around emphasizing the vital importance of climate adaption science and adaptive management*
- *Provides insight into the science communication needs of researchers, practitioners and stakeholders.*
- *The CSC is a highly-regarded source for climate science data (includes research affiliates). Their interest in research needs associated with State Wildlife Action Plans is a great benefit to this natural resource community and on-the-ground management activities.*
- *While these questions and the projects/information that they would provide are important to me, I must state that I have seen very little productivity from this Center, especially when compared to the SECSC. I feel that the organizational structure of the NE Center is flawed, and that little*

or no focus has been provided to the southern-most states in the region.

10. What limits your involvement with the Northeast CSC? (Select all that apply)

Answer Options	Response Percent	Response Count
I don't have enough time	41.3%	97
I don't have the funds	25.5%	60
I don't know how to be involved	17.0%	40
I don't work on the same topics as the CSC	10.6%	25
The CSC's science is not relevant to my needs	3.0%	7
I haven't been invited or asked to be involved	17.9%	42
It's not as high a priority as my other work	20.4%	48
It's someone else's responsibility in my organization	10.6%	25
I'm not interested in this work	0.0%	0
I don't have any limits on the extent to which I am involved	17.4%	41
Other (please specify)	17.4%	41

Comments provided under "other":

- *Agency limits our direct participation in climate science.*
- *Although relationships with state resource agencies and CSCs have improved, there still needs to be more interactions. The majority of energy and work of CSCs seems to be at the federal and university levels. More interaction with state agencies needs to be formally and expressly cultivated.*
- *As a Tribal organization, we often do not have as direct access to the same level of students as the other consortium members (undergraduate vs. graduate and post-doc level). This creates some difficulty in trying to match up in terms of collaborations across consortium members. Although we have worked on those issues over the years.*
- *Climate change, though a priority, involves only a part of my role. So, like most people, the issue of involvement is primarily a matter of time, funds, and task prioritization.*
- *Current funding is directed for SE region.*
- *Current strength is largely to support thesis work and develop nextgen of climate/environmental scientists. The larger USGS research community is currently not a strategic partner in the CSC. In my view our involvement starts and ceases with any given RFP and we aren't delivering at a scale and with impact we could if a more strategic partnership was formed.*
- *Currently part of a funding organization, but can see connections with CSC that I should foster.*
- *Due to the extremely large geography covered by the NE CSC and it's location at an eastern university (Amherst), it was very difficult for them to adequately address issues relevant to the western and lower Midwest areas of their geography. They chose to focus largely on the species, habitats and conditions of the North Atlantic and Great Lakes. These areas are very different in climate and land use from the Midwest. This is not a fault of the staff, who made*

some attempt to address the Midwest issues within the severe limits of their funding.

- *Geography doesn't work in our favor, as my research group is in Missouri on the far western fringe of the Ne CSC.*
- *Geograpy*
- *Government travel restrictions*
- *I am already deeply involved with NECSC, but could probably be even more involved if I had more time...*
- *I am not as active with the LCCs now, due in part to my job responsibilities and also to the temporary shut-down of them. However, as someone who has followed the development of both LCCs and CSCs, I would have to say that the two agencies never really worked collaboratively to make sure that there were strong connections. Both agencies were too concerned about their own authorities as compared to really trying to connect and advance landscape conservation and climate science.*
- *I am not clear on what the CSC has or is working on, what products have been created, data available, etc.*
- *I am typically a consumer of CSC products rather than working directly with them.*
- *I design and implement adaptation strategies in natural systems. CSC research is generally not applicable*
- *I now work in a very different geographical region - Great Lakes.*
- *I retired from the University of Wisconsin in 2016, and ceased to represent the NECSC at that time.*
- *I was much more involved in my previous position and worked with the CSC during that time on a number of temperature related topics.*
- *I was previously involved as a CSC-funded graduate student and have since graduated and am no longer in academia.*
- *I work with the NECSC a lot, which translates to the appropriate amount of involvement.*
- *I've heard of CSCs and I think there are some in the agency who are involved but not clear how. I wouldn't say that is a "fault" for a lack of better term of the CSC. The state has significant budget issues right now and that would intuitively seem like a valid explanation (albeit discouraging) for any progress on climate change.*
- *In Florida, so work is mostly with the SECSC.*
- *It appears CSC hasn't been focusing on climate change impact on water supply directly. However, I am now aware that regional climate change data are available through CSC and can be used for climate change impact assessment on water resources.*
- *It is extremely difficult to figure out how to be involved. Feels like a close-knit circle that if you are not a part of, you are not welcome. Also seems they do not have much of an interest in interacting with individuals that do not address the wildlife or ecology.*
- *l am the Deputy Director of another CSC.*
- *Lack of institutional support for climate adaptation science.*
- *Lack of relevance of CSC activities to my work.*

- *Location outside the Northeast region*
- *Mainly, I'm a user of the information produced by the CSC. I'm not a climate researcher myself.*
- *My organizations involvement in Wisconsin has more been through the Northern Institute of Applied Climate Science.*
- *My work includes PA, MD, WV, VA, KY and TN so much of it is presumably outside your range.*
- *My work is focused on adjoining geography and I interact with the Southeast CSC much more frequently.*
- *Not a clear role other than receiving information. Plus I am more interested in communities and land use than in managing fish and wildlife.*
- *Of course there are some time and funding limits. Currently I have partial funding to work with the NE CSC and it is the most interesting work that I am involved in.*
- *Over the past several years, my responsibilities have focused on issues in the Southeastern U.S. It is only very recently that I have been asked to work on issues in the Northeastern U.S.*
- *The geographic extent of the NE CSC minimally extends to the GCPO LCC geography. Thus, our involvement in the CSC is limited by geographic interest.*
- *The majority of my work falls within the Southeast CSC geography.*
- *There are topics of joint interest but it has been difficult to find the time and funding to pursue.*
- *With less time, I have to focus more on state-level involvement, even though regional networking is essential to inform my work. If funds were associated with time commitments, myself or other staff would be more involved.*
- *Would love to become more involved but don't fully know how to do so from here at USGS headquarters.*

11. To what extent do you agree or disagree with each of the following statements about the use of climate adaptation science in the Northeast region? (Select one option per row)

Answer Options	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree	Missing/I don't know
Climate adaptation science is available to decision makers.	19.2%	53.3%	11.7%	8.9%	1.9%	32
Policy makers use climate adaptation science to inform policies.	2.3%	28.8%	16.3%	27.0%	13.5%	46
Land managers use climate adaptation science to inform management.	4.7%	46.5%	15.3%	18.1%	4.7%	43
Fish and wildlife managers use climate adaptation science to inform management.	7.9%	47.4%	16.7%	13.0%	4.7%	42
Water managers use climate adaptation science to inform management.	9.4%	35.7%	15.5%	14.6%	3.3%	68
What is known about climate adaptation does not necessarily influence actions taken by decision makers in the region.	15.0%	43.5%	15.9%	13.1%	2.3%	43
The CSC has helped reduce the disconnect between what is known about climate adaptation and the actions taken by decision makers in the region.	11.6%	35.8%	24.7%	3.7%	0.9%	70

12. To what extent do you agree or disagree with each of the following statements about the science produced through the Northeast CSC (their staff, university affiliates, those funded by the CSC)? (Select one option for each row)

Answer Options	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree	I'm unfamiliar with the science
It can contribute to policy or management.	49.8%	39.1%	3.7%	1.4%	0.0%	6.0%
It is appropriate to inform the type of decisions being made.	35.5%	46.3%	10.3%	0.9%	0.5%	6.5%
It integrates well with other information.	25.4%	43.7%	16.9%	3.8%	0.5%	9.9%
It is irrelevant to management.	5.1%	7.5%	8.9%	20.6%	51.9%	6.1%
It is high quality.	45.1%	33.5%	12.1%	0.5%	0.0%	8.8%
It is biased.	0.0%	1.9%	15.0%	13.6%	60.6%	8.9%

13. Is making decisions about natural resource policy, management, or programs part of your job?

Answer Options	Response Percent	Response Count
Yes	46.8%	101
No. I do NOT make decisions about natural resource policy, management, or programs.	53.2%	115
Answered question		**216**
Skipped question		**19**

14. Have you or your organization used climate adaptation science produced by the following sources to inform decisions about natural resource policy, management, or programs? (Select one option per row)

Answer Options	Yes	No	I don't know	Response Count
Northeast CSC (e.g., from CSC staff; university faculty, staff or students funded by or affiliated with the CSC; others funded by the CSC)	61.2%	11.2%	27.6%	98
Organizations or scientists who are NOT affiliated with the Northeast CSC	77.3%	4.1%	18.6%	97

15. How have you used the climate adaptation science produced by the Northeast CSC, if at all? (Select all that apply)

Answer Options	Response Percent	Response Count
To inform policy	16.8%	17
To inform management plans	45.5%	46
To inform management actions	35.6%	36
To inform land acquisition priorities	12.9%	13
To inform training of conservation professionals about climate change and its impacts	33.7%	34
To inform the public about climate change and its impacts	28.7%	29
None of the above	10.9%	11
I don't know	16.8%	17
Other (please specify)	8.9%	9

Comments provided under "other":

- *All of my usage of CSC products has been assisting states in their use of the State Wildlife Action Plan report. This report was used extensively in many SWAPs to inform the plan, propose and design the actions, and secondarily to inform the public about climate change*

through the many outreach efforts associated with SWAPs. In the question below (factors limiting the use of tools produced by the NE CSC) I believe that the NECSC is a top leader in the field of science delivery - they absolutely couldn't do better on any of the points you are inquiring about. In time, we will all get better at delivering climate science, but given the state of the science right now the NE CSC is setting the mark for performance in this area.

- *But not in large measure*
- *In our Wildlife Action plan*
- *Incorporate into scenarios and models of related or impacted systems*
- *It's quite possible and likely the information from the CSC has been used by this organization, I am just unfamiliar with who all is in CSC.*
- *Off the top of my head, I can't recall which products that we use are derived from the work of the CSC.*
- *The Northeast CSC was instrumental in providing crucial climate science information that could be integrated into State Wildlife Action Plans. The analysis and interpretation provided by this CSC was essential and offered much more than simply reams of data. The information was specifically focused on the needs of the Wildlife Action Plans and thus relevant to needs of on-the-ground resource managers.*
- *To inform decision support tools.*

16. To what extent do the following factors limit your use of the climate adaptation science and tools produced through the Northeast CSC? (Select one option per row)

Answer Options	Not at all	To a small extent	To a moderate extent	To a large extent	To a very large extent	Missing
Lack of quality of the science	90.2%	7.6%	2.2%	0.0%	0.0%	9
The science doesn't address questions at the right scale	36.3%	31.9%	24.2%	5.5%	2.2%	10
The scientists don't work closely enough with me	37.6%	21.5%	19.4%	17.2%	4.3%	8
I'm not aware of the science	42.9%	26.4%	13.2%	6.6%	11.0%	10
The science does not address issues I face	38.5%	29.7%	22.0%	7.7%	2.2%	10
The science is not interdisciplinary enough	53.3%	24.4%	16.7%	3.3%	2.2%	11
The science models or results are not refined enough	39.8%	35.2%	20.5%	2.3%	2.3%	13
The science is not being communicated in ways that are understandable	40.2%	27.2%	19.6%	8.7%	4.3%	9
I lack the skills or training to make use of the science	58.2%	20.9%	15.4%	4.4%	1.1%	10
The science is not available at the times at which it is needed for decision making	37.1%	31.5%	21.3%	7.9%	2.2%	12
The management issues for which science is needed have not been clearly defined	27.5%	22.0%	27.5%	16.5%	6.6%	10

17. In your opinion as a natural resource decision maker, how important is it that climate adaptation scientists and natural resource decision makers work together to produce science? (Select one option)

Answer Options	Response Percent	Response Count
Not at all important	0.0%	0
Slightly important	0.0%	0
Moderately important	6.2%	6
Important	25.8%	25
Very important	68.0%	66
Answered question		**97**
Skipped question		**4**

18. Some climate adaptation scientists collaborate with the end-users of their science in various stages of the research process. We are interested in whether you, as a natural resource decision maker, have any experience collaborating with climate adaptation scientists. To what extent have you or someone in your organization been involved in the following stages of research in one or more Northeast CSC projects (led by others)? (Select one option per row)

Answer Options	Not at all	To a small extent	To a moderate extent	To a large extent	To a very large extent	Missing
Determining research priorities for the CSC as a whole	48.4%	31.6%	9.5%	5.3%	5.3%	6
Identifying the research questions for a research project	38.7%	24.7%	20.4%	7.5	8.6%	8
Designing a research project's methods	51.6%	25.8%	10.8%	8.6%	3.2%	8
Determining data sets to be used for a research project	49.5%	23.7%	15.1%	8.6%	3.2%	8
Collecting data for a research project	58.1%	24.7%	10.8%	5.4%	1.1%	8
Analyzing data for a research project	63.4%	22.6%	9.7%	4.3%	0.0%	8
Interpreting results of a research project	50.0%	21.7%	12.0%	10.9%	5.4%	9
Applying results of a research project	35.5%	23.7%	18.3%	9.7%	12.9%	8
Communicating results of a research project	31.2%	24.7%	20.4%	12.9%	10.8%	8

19. To what extent do you, as a natural resource decision maker, agree or disagree that the following items limit your involvement in research projects? (Select one option per row)

Answer Options	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree	Missing
Scientists have different perspectives than me on what science is needed.	5.3%	22.3%	35.1%	20.2%	17.0%	7
Scientists have different perspectives from me on how research projects should be conducted.	2.1%	10.6%	40.4%	26.6%	20.2%	7
Scientists don't reach out to me to collaborate.	14.0%	26.9%	31.2%	17.2%	10.8%	8
Scientists aren't interested in listening to me.	1.1%	12.8%	34.0%	24.5%	27.7%	7
I don't have time to collaborate with scientists.	6.5%	18.3%	22.6%	22.6%	30.1%	8
Funders don't support collaboration between scientists and science users.	4.3%	27.7%	38.3%	19.1%	10.6%	7

20. Have you produced climate adaptation science through an affiliation with the Northeast CSC (e.g., as CSC staff; university faculty, staff or students funded by or affiliated with the CSC; others funded by the CSC) or otherwise? (Select one option) As a reminder, by "climate adaptation science," we mean "science that helps fish, wildlife, ecosystems, and the communities they support adapt to climate change."

Answer Options	Response Percent	Response Count
I have produced climate adaptation science through an affiliation with the Northeast CSC	39.8%	84
I have produced climate adaptation science but never through an affiliation with the Northeast CSC	18.0%	38
No, I have not produced climate adaptation science	42.2%	89
Answered question		**211**
Skipped question		**24**

21. Has the climate adaptation science you produced been used in any of the following ways? (Select all that apply)

Answer Options	Response Percent	Response Count
To inform policy	36.1%	44
To inform management plans	70.5%	86
To inform management actions	57.4%	70
To inform land acquisition priorities	23.8%	29
To inform training of conservation professionals about climate change and its impacts	50.8%	62
To inform the public about climate change and its impacts	59.0%	72
None of the above	3.3%	4
I don't know	8.2%	10

22. In other settings, various factors have been found to limit decision makers' use of science. From your perspective as a scientist, to what extent do the following factors limit the use of the climate adaptation science produced (not specifically by you) through the Northeast CSC? (Select one option per row)

Answer Options	Not at all	To a small extent	To a moderate extent	To a large extent	To a very large extent	Missing
Lack of quality of the science	66.1%	27.0%	6.1%	0.9%	0.0%	7
The science doesn't address questions at the right scale	13.8%	31.9%	29.3%	19.0%	6.0%	6
The scientists don't work closely enough with decision makers	6.9%	18.1%	31.0%	26.7%	17.2%	6
Decision makers are not aware of the science	6.1%	15.7%	33.9%	31.3%	13.0%	7
The science does not address issues decision makers face	14.8%	28.7%	29.6%	20.0%	7.0%	7
The science is not interdisciplinary enough	28.7%	36.5%	20.0%	8.7%	6.1%	7
The science models or results are not refined enough	30.4%	41.7%	20.0%	7.8%	0.0%	7
The science is not being communicated in ways that is understandable to decision makers	8.6%	26.7%	23.3%	30.2%	11.2%	6
Decision makers lack the skills or training to make use of the science	9.5%	17.2%	33.6%	25.9%	13.8%	6
The science is not available at the times at which it is needed for decision making	12.1%	31.0%	25.9%	23.3%	7.8%	6
The management issues for which science is needed have not been clearly defined	12.2%	28.7%	27.8%	23.5%	7.8%	7

23. In your opinion as a scientist, how important is it that climate adaptation scientists and natural resource decision makers work together to produce science research? (Select one option)

Answer Options	Response Percent	Response Count
Not at all important	0.8%	1
Slightly important	0.8%	1
Moderately important	3.3%	4
Important	24.2%	29
Very important	70.8%	85
Answered question		**122**
Skipped question		**2**

24. Some climate adaptation scientists collaborate with the end-users of their science in various stages of the research process. To what extent have you, as a climate adaptation scientist, had any experience collaborating with natural resource decision makers in the following ways? (Select one option per row)

Answer Options	Not at all	To a small extent	To a moderate extent	To a large extent	To a very large extent	Missing
Determining research priorities	7.8%	21.6%	28.4%	23.3%	19.0%	6
Identifying the research questions for a research project	6.0%	15.5%	32.8%	28.4%	17.2%	6
Designing a research project's methods	17.2%	28.4%	23.3%	20.7%	10.3%	6
Determining data sets to be used for a research project	15.5%	26.7%	19.8%	28.4%	9.5%	6
Collecting data for a research project	15.7%	23.5%	27.8%	26.1%	7.0%	7
Analyzing data for a research project	22.4%	31.0%	23.3%	14.7%	8.6%	6
Interpreting results of a research project	12.9%	24.1%	28.4%	24.1%	10.3%	6
Applying results of a research project	16.5%	25.2%	20.9%	21.7%	15.7%	7
Communicating results of a research project	5.2%	14.7%	23.3%	36.2%	20.7%	6

25. To what extent has the Northeast CSC helped connect you with each of the following? (Select one option per row)

Answer Options	Not at all	To a small extent	To a moderate extent	To a large extent	To a very large extent	Missing
Climate adaptation science	21.1%	21.6%	29.9%	17.2%	10.3%	31
Climate adaptation scientists	23.2%	22.7%	23.2%	21.7%	9.4%	32
Decision makers who might use climate adaptation science	44.3%	34.0%	14.8%	4.9%	2.0%	32
Professionals who might communicate climate adaptation science	27.7%	33.7%	23.3%	11.4%	4.0%	33
Resources needed to conduct climate adaptation science	32.7%	20.8%	25.2%	12.9%	8.4%	33

26. Do you agree or disagree that the Northeast CSC contributes to the following in your region? (Select one option per row)

Answer Options	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree	Missing
Awareness of available science	25.4%	46.3%	20.9%	5.5%	2.0%	34
Communication between scientists and those who might use science	20.9%	44.8%	24.4%	7.5%	2.5%	34
Interdisciplinary science	22.8%	39.6%	32.2%	3.5%	2.0%	33
Relationship-building among decision makers who might be interested in science	18.4%	32.8%	37.8%	7.5%	3.5%	34
Collaboration between scientists	26.6%	41.2%	25.6%	5.0%	1.5%	36
Alignment of science with needs of decision makers	13.1%	39.7%	34.2%	10.1%	3.0%	36
Ensuring science is at an appropriate scale	14.1%	35.7%	40.7%	6.0%	3.5%	36
Translating complex science for decision makers	18.4%	30.8%	35.8%	11.9%	3.0%	34
Social science about climate adaptation issues	9.0%	23.4%	47.8%	16.4%	3.5%	34

Comments provided under "Other":

- *As a NECSC graduate fellow I was able to connect with a number of other early career scientists. These connection have been very helpful for forming my view of the world as it relates to the multiple dimensions of climate science and resource management. This will continue to influence me and the stakeholders with whom I interact throughout my career as a resource manager and scientist.*
- *Basically, the NECSC has not really been active in my state*
- *Building widely available tools, large workshops*
- *By bringing federal agency and academic researchers/trainees together frequently and in multiple settings, NECSC serves a role that would not otherwise exist. It is an expandable model; more people and more projects would mean even more interaction between these sectors, and further engagement with decision makers. Conversely, without NECSC, I think that these connections simply would not happen at nearly the rate that they have been for the last five years. I think that NECSC is influential in the locations and on the topics that it can support with very limited resources. It cannot do everything, but has made efficient use of leveraging opportunities to accomplish a great deal, making connections across branches of USGS, with other DOI agencies, with state and local resource managers, and harnessing the capacities of academic researchers and trainees to expand the knowledge frontier on climate adaptation science.*
- *I said above that I've never worked with the CSC - so I don't know the answers to many of these questions relative to others in my organization. I think climate science is important but I*

haven't worked with these people!

- *I see the CSC as a bridge organization between scientists and decision-makers, with an emphasis on the scientist part. NIACS is similar with a more decision-maker focus. Unlike many of my colleagues, I am willing to tolerate some confusion arising from redundancy in bridges if it lends overall resilience to adaptation in a time of budget cuts.*
- *none*
- *Synthesized science from other networks, universities, etc. for state wildlife agencies. New science that is crafted around specific management decisions is important, but that reflects one single study. Personally, I feel managers and policy makers should be making decisions off of a *whole host* of studies that agree about a specific outcome. This is part of the flaw in the CSC concept design that should be addressed: The CSCs need to be tasked with doing more synthesis of existing research, in addition to new research (secondarily).*
- *The Northeast CSC has been building toward the "strongly agree" column in most all of these questions.*
- *There are areas of joint interest but these have not been pursued because of time and funding constraints.*
- *Trained many of graduate students that have contributed to climate adaptation science and will hopefully continue to do so.*
- *Training students and fellows in collaborating with decision makers. Communicating broader climate adaptation science resources among scientists and decision makers.*

27. What state(s) do you work in? (Select all that apply)

Answer Options	Response Percent	Response Count
Connecticut	15.7%	37
Delaware	9.8%	23
Illinois	11.5%	27
Indiana	11.1%	26
Iowa	6.4%	15
Kentucky	6.4%	15
Maine	20.4%	48
Maryland	14.5%	34
Massachusetts	35.3%	83
Michigan	15.3%	36
Minnesota	17.0%	40
Missouri	9.8%	23
New Hampshire	20.9%	49
New Jersey	11.9%	28
New York	20.9%	49
Ohio	9.8%	23
Pennsylvania	15.7%	37
Rhode Island	13.2%	31
Vermont	16.6%	39
Virginia	16.2%	38
West Virginia	12.8%	30
Wisconsin	20.4%	48
Other state(s)	5.1%	12
Other (please specify)	10.2%	24

Comments provided under "Other":

- *Alaska*
- *all other regions nationally.*
- *Arkansas, Oklahoma, Alabama, Mississippi, Louisiana, Tennessee, Texas*
- *CA, CO, Canada (Ontario)*
- *Colorado, Utah, Wyoming, Montana, N. and S. Dakota, Nebraska and Kansas*
- *District of Columbia*
- *Florida - Due to this - I was unable to answer many of the questions specifically about the NECSC*
- *FWS R5 northeast region*
- *Kansas, Nebraska, Oklahoma*
- *Kansas, South Dakota, North Dakota, Montana, Arkansas*
- *NC, SC, GA, FL*
- *North Carolina*

- *North Dakota - on detail to USDA in DC for 120 days.*
- *Northeast Region*
- *OK, TX, NM, and LA*
- *Oklahoma*
- *Ontario and Quebec*
- *Ontario and Quebec Canada*
- *South Atlantic region*
- *Texas*
- *United States; British Columbia, CAN*
- *Washington, DC - Northeast USFWS Region 5.*

28. What scale(s) do you address in your work? (Select all that apply)

Answer Options	Response Percent	Response Count
International	22.6%	53
National	31.9%	75
Regional/multi-state	69.8%	164
State	59.6%	140
Watershed	46.4%	109
Local	43.0%	101

29. What is your affiliation? (Select all that apply)

Answer Options	Response Percent	Response Count
Federal agency	29.8%	70
Tribal government	2.1%	5
State agency	18.7%	44
Local government	1.3%	3
University	28.1%	66
Non-profit organization	14.5%	34
Private Industry	1.7%	4
Other (please specify)	3.8%	9

Comments provided under "Other":

- *Bi-national commission*
- *consultant*
- *Consultant to NGOs and agency partnerships.*
- *Cooperative partnership*
- *housed at a university but almost all grant funded.*

- *I am a private consultant working primarily with states at this time. Other contracts will likely be at the regional-state scale, or possibly at the scale of large management units.*
- *Independent research and education laboratory (MBL, Woods Hole)*
- *International organization*
- *Tribal College*

30. What type of position do you hold in your agency, university, or organization? (Select one option that best describes your type of work)

Answer Options	Response Percent	Response Count
Leadership/administration	29.4%	69
Policy	7.7%	18
Research	47.7%	112
Operations	8.1%	19
Other (please specify)	10.6%	25
Checked at least one		**177**
Checked none		**28**

Comments provided under "Other":

- *Applied Science*
- *Consultant: conservation scientist and capacity builder*
- *Distinguished Scientist*
- *Engineering*
- *Experimental forest forest manager and research coordinator*
- *Extension*
- *faculty*
- *Forest Management Planning and monitoring.*
- *Graduate student*
- *I advise the decision-makers.*
- *land management and restoration*
- *NR Program Management*
- *Outreach*
- *Project Development*
- *Project Management*
- *research and leadership*
- *Resource Management and Conservation*
- *resource management. planning.*
- *Resource manager & administrator*
- *Spatial Data support*

- *Strategic Planning and performance measurement.*
- *Teaching*
- *Technical assistance*
- *Visitor services*

Appendix C. Survey Instrument with Tables of Results – South Central

1. To what extent does your work involve climate adaptation science, or management or policy related to climate change adaptation? (Select one option)

Answer Options	Response Percent	Response Count
Not at all	0.0%	0
To a small extent	25.6%	34
To a moderate extent	32.3%	43
To a large extent	30.1%	40
To a very large extent	12.0%	16
Answered question		**133**
Skipped question		**0**

2. How serious of a threat do you believe that climate change is to natural resources, relative to other stressors? (Select one option)

Answer Options	Response Percent	Response Count
Much lesser threat	3.1%	4
Lesser threat	8.7%	11
Similar threat	40.9%	52
Greater threat	36.2%	46
Much greater threat	11.0%	14
Answered question		**127**
Skipped question		**6**

3. How important do you believe it is that managers or policy makers take action now in the South Central region to address climate change threats? (Select one option)

Answer Options	Response Percent	Response Count
Not at all important	1.6%	2
Slightly important	6.3%	8
Moderately important	15.7%	20
Important	33.9%	43
Very important	42.5%	54
Answered question		**127**
Skipped question		**6**

4. How important do you believe it is that climate adaptation science informs decisions about natural resource management in the South Central region? (Select one option)

Answer Options	Response Percent	Response Count
Not at all important	0.0%	0
Slightly important	10.2%	13
Moderately important	11.0%	14
Important	31.5%	40
Very important	47.2%	60
Answered question		**127**
Skipped question		**6**

5. Which statement best characterizes your relationship with the South Central Climate Science Center (CSC)? (Select one option)

Answer Options	Response Percent	Response Count
I have never heard of the South Central CSC.	0.0%	0
I have heard of the South Central CSC, but have no interest in or involvement with it.	5.5%	7
I have had no involvement with the South Central CSC, but someone else in my agency or organization has.	11.0%	14
I have had at least some interest in or involvement with the South Central CSC.	83.5%	106
Answered question		**127**
Skipped question		**6**

6. In what ways have you been involved with the South Central Climate Science Center (CSC) in the last five years? (Select all that apply)

Answer Options	Response Percent	Response Count
CSC Stakeholder Advisory Committee member	15.0%	20
University member affiliated with the CSC	12.0%	16
CSC-funded graduate student or postdoctoral fellow	4.5%	6
CSC US Geological Survey staff	3.0%	4
Landscape Conservation Cooperative Steering Committee member	19.5%	26
Landscape Conservation Cooperative staff member	13.5%	18
CSC grant recipient, applicant, or partner on a grant	24.8%	33
Participant in a CSC training, webinar, workshop, or conference	33.8%	45
Resource manager or decision maker who has used the science produced by the CSC	14.3%	19
Other (please specify)	16.5%	22
None of the above	1.5%	2

Comments provided under "other":

- *Chair of home department*
- *Collaborator*
- *CSC REU participant*
- *Current working relationship with climate scenarions and out grant*
- *Dr. Mike Langston has graciously provided inportant inputs linking researchers and suggesting potential ways to improve upon ongoing research.*
- *Federal agency program*
- *Have collaborated on two joint, day long conferences, have collaborated on research, have collaborated on a seminar series*
- *I am a close LCC partner*
- *I am a PI so I am not sure how useful my response will be to you*
- *I was acting director during year 1. I also participated on the selection panel for the SC CSC*
- *I was an intern in the very first South Central CSC Undergraduate Internship (2014).*
- *I've used information from the SC CSC in a previous job*
- *Informal Collaborator with SCCSC scientists*
- *Intern*
- *Met with CSC staff*
- *NRCS*
- *One of my staff had received a grant to examine species climate vulnerability before coming to the Department.*
- *reviewer for CSC grant competition*

- *subcontractor for communications planning*
- *Supporting Tribal Involvement*
- *Tribal Engagement Workgroup*
- *USGS non-CSC employee*

7. How long (in years) have you been involved with the CSC? (Fill in number of years, or zero, if none)

Answer Options	Average number of years involved with CSC	Response Count
	3.7	103

8. How frequently did you interact with following representatives or affiliates of the CSC in your region in the last year? (Select one option per row)

Answer Options	Not at all	Up to a few times a year	About once a month	Up to a few times a month	More than once a week	Response Count
US Geological Survey CSC Staff	9.5%	59.0%	16.2%	7.6%	7.6%	105
University leads/PIs for the CSC	26.2%	41.7%	14.6%	9.7%	7.8%	103
CSC Stakeholder Advisory Committee members	52.9%	34.3%	7.8%	2.0%	2.9%	102
CSC-affiliated researchers	25.0%	49.0%	9.6%	12.5%	3.8%	104
CSC graduate or post-doctoral fellows	45.1%	30.4%	10.8%	6.9%	6.9%	102

9. How important are each of the following benefits of the South Central CSC to you? (Select one option per row)

Answer Options	Not at all important	Slightly important	Moderately important	Important	Very important	Response Count
Source of funding for climate adaptation science	19.2%	11.5%	15.4%	23.1%	30.8%	104
Access to climate adaptation science	4.8%	12.5%	9.6%	37.5%	35.6%	104
Access to a broader network of people interested in climate adaptation science	3.8%	10.6%	17.3%	34.6%	33.7%	104
Means for learning about climate adaptation	8.7%	14.4%	23.1%	27.9%	26.0%	104
Training on climate adaptation science methods or findings	10.6%	22.1%	25.0%	24.0%	18.3%	104
Avenue to put climate adaptation science into the hands of decision makers	8.7%	11.5%	21.2%	26.0%	32.7%	104
Justification for climate adaptation science I want to do	30.8%	18.3%	18.3%	17.3%	15.4%	104
Other (please specify)						10

Comments provided under "other":

- *All of the above are extremely important to me but in practice, the opportunities are not realized.*
- *All topics are important for me in general but they are rated low as I don't have much interaction with CAC.*
- *Need more info on what's available.*
- *NOTE that I don't "do" climate science*
- *support for selection and processing of climate data*
- *The CSC provides user oriented climate change science -*
- *The CSC was extremely helpful, with Dr. Winton's guidance, as well as several others, in developing climate science information to support an important and very sensitive scientific document for our office. We could not have achieved the level of scientific rigor without your expertise. Very valuable.*
- *They also host climate change training specifics to Tribal nations which is a big plus.*
- *Translation of sophisticated climate science for natural resource/wildlife managers.*
- *Tribal Communities are the greatest and longest impacted groups with the least control and input on resources to meet their needs*

10. What limits your involvement with the South Central CSC? (Select all that apply)

Answer Options	Response Percent	Response Count
I don't have enough time	36.1%	48
I don't have the funds	18.0%	24
I don't know how to be involved	9.8%	13
I don't work on the same topics as the CSC	9.0%	12
The CSC's science is not relevant to my needs	4.5%	6
I haven't been invited or asked to be involved	15.0%	20
It's not as high a priority as my other work	24.1%	32
It's someone else's responsibility in my organization	10.5%	14
I'm not interested in this work	1.5%	2
I don’t have any limits on the extent to which I am involved	13.5%	18
Other (please specify)	24.8%	33

Comments provided under “other”:

- *Although I work in an area (topic) which deals directly with impacts of climate change, I do not feel my research area is prioritized by the CSC.*
- *As a CSC Postdoctoral fellow, I am essentially absorbed within the organization, and so get to participate on a daily basis. However, the broader quandary is how my interests have evolved. As a Postdoc, a major aim is to publish, preferably on basic science questions. However, as I move further into my career, my interests have shifted toward adaptation, communication, and training. I have yet to carve out opportunities to become more involved in these areas as I must balance the requirements of Postdoctoral work with some of the other CSC priorities I'd like to tap more in to.*
- *CSC has yet to hit the scale for which they were intended to step down climate models when they were originally proposed. The climate work is at the wrong scale and the wrong subjects to inform our conservation efforts. If you only ask climate scientists what climate science need to be done you'll get really cool climate models that don't necessarily relate to any actions on the ground.*
- *Department Chair Duties*
- *For the GCPO LCC, not all the science that comes out of the SC CSC is relevant to our geography.*
- *Geographic focus*
- *I also work in other SC regions.*
- *I am located in a different region*
- *I believe that NGO's, for which I work for, are not allowed to receive funding or participate in the CSCs in any meaningful way.*
- *I have changed jobs/roles, still involved as ETPBR LCC steering committee member but haven't figured out what that means yet in terms of my relationship with SC CSC.*

- *I primarily interface as a co-worker with the communications staff.*
- *I try to work closely with the SC CSC. My only limitation has been the DOI 2017 restrictions implemented under FACA Committee reviews.*
- *I was not aware of South Central CSC until by accident was made aware of a grant opportunity and then applied and received funding. It was never clear to me what is the role of institutional representation and individual researchers. My perception that all these activities were limited or passed through each institution.*
- *I work in an interior, Midwestern state that does not involve any coastlines. Climate adaptation strategies here involve providing landscapes that are of the best quality of natural communities and as well-connected as possible so that species can adapt and move as needed on their own. This also is our strategy for addressing the more urgent and critical threats of habitat loss, invasive species, etc. that threatens many species from surviving to the point that climate change becomes their primary threat. In many cases here, we are working with predicted climate models so our management is enhanced by the changes (e.g., glade and woodland restoration during periods of hotter & drier conditions are complementary with climatic conditions and restoration of shortleaf pine is congruent with models predicting expansion of shortleaf pine range).*
- *I work on important large scale land conservation projects that provide for multiple species to move inland (in the case of TX coastal projects) and adjust to change in an incremental way.*
- *I'm never too sure what it is that you do..., exactly.*
- *It would be great to be involved in collaborative research assessing potential changes to water resources, land cover, and species' habitats from climate change.*
- *Living in Texas while the CSC is located in Oklahoma.*
- *Many things have bigger immediate impacts to the items I am working on. I am glad someone is working on climate science.*
- *no limits. We are very involved with the SC CSC.*
- *RELEVANT ON-THE-GROUND MANAGEMENT PRACTICES*
- *SCCSC is outside of my geographic area of responsibility.*
- *See prior question on not realized.*
- *The models can be hard to understand. Climate change models are difficult to downscale to local conditions and decision makers.*
- *The science developed at the SCCSC is of great interest to me, as some of it applies to the SW region. However, technically, the SCCSC is out of my region, which limits my interactions with them.*
- *The South Central CSC does not encompass my area of jurisdiction. My area involves other CSCs.*
- *The technical nature of the GCMs we want to use. It's too much time commitment to translate the data on our own.*
- *They did not seem interested in California.*
- *Time and priority demands vary month to month. With the possible future realignment in USGS*

and Regional plans for DOI I'm not sure what my role will be.

- *Time is of the essence - we have determined better integration between CSC, LCC, state and fed agencies would allow more collaborative synergy to reduce duplication and stretch conservation dollars. We are finding our collaborative strength- we are not yet at perfection, maybe never will be, but it is better than 10 years ago !*
- *Tribal Capacity is our greatest challenge. Getting $upport from the Center would help us greatly*
- *We have worked extensively with the North Central CSC, and due to our geography have not worked much with SCCSC, but our key partners work closely with SCCSC.*
- *Whereas climate change is relevant to aquaticl resource management in the South Central Region, I believe that it is a greater threat to other parts of the country, i.e., trout fisheries. Population growth and the demand that it puts on our aquatic resources is a much more significant stressor.*

11. To what extent do you agree or disagree with each of the following statements about the use of climate adaptation science in the South Central region? (Select one option per row)

Answer Options	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree	Missing/I don't know
Climate adaptation science is available to decision makers.	14.5%	50.8%	15.3%	8.1%	1.6%	21
Policy makers use climate adaptation science to inform policies.	2.4%	21.0%	16.1%	29.8%	17.7%	25
Land managers use climate adaptation science to inform management.	3.3%	41.5%	21.1%	22.8%	1.6%	22
Fish and wildlife managers use climate adaptation science to inform management.	9.8%	40.7%	17.9%	15.4%	1.6%	28
Water managers use climate adaptation science to inform management.	7.3%	44.7%	17.9%	11.4%	1.6%	31
What is known about climate adaptation does not necessarily influence actions taken by decision makers in the region.	17.1%	41.5%	18.7%	10.6%	1.6%	23
The CSC has helped reduce the disconnect between what is known about climate adaptation and the actions taken by decision makers in the region.	9.8%	35.8%	22.8%	10.6%	1.6%	34

12. To what extent do you agree or disagree with each of the following statements about the science produced through the South Central CSC (their staff, university affiliates, those funded by the CSC)? (Select one option for each row)

Answer Options	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree	I'm unfamiliar with the science
It can contribute to policy or management.	32.8%	41.6%	8.0%	1.6%	0.0%	16.0%
It is appropriate to inform the type of decisions being made.	33.6%	35.2%	11.2%	3.2%	0.8%	16.0%
It integrates well with other information.	16.9%	37.9%	23.4%	3.2%	0.8%	17.7%
It is irrelevant to management.	4.0%	9.6%	8.0%	19.2%	43.2%	16.0%
It is high quality.	38.4%	26.4%	12.8%	0.8%	1.6%	20.0%
It is biased.	1.6%	2.4%	8.9%	13.7%	56.5%	16.0%

13. Is making decisions about natural resource policy, management, or programs part of your job?

Answer Options	Response Percent	Response Count
Yes	45.6%	57
No. I do NOT make decisions about natural resource policy, management, or programs.	54.4%	68
Answered question		**125**
Skipped question		**8**

14. Have you or your organization used climate adaptation science produced by the following sources to inform decisions about natural resource policy, management, or programs? (Select one option per row)

Answer Options	Yes	No	I don't know	Response Count
South Central CSC (e.g., from CSC staff; university faculty, staff or students funded by or affiliated with the CSC; others funded by the CSC)	40.0%	32.0%	28.0%	50
Organizations or scientists who are NOT affiliated with the South Central CSC	68.0%	10.0%	22.0%	50

15. How have you used the climate adaptation science produced by the South Central CSC, if at all? (Select all that apply)

Answer Options	Response Percent	Response Count
To inform policy	8.8%	5
To inform management plans	38.6%	22
To inform management actions	31.6%	18
To inform land acquisition priorities	8.8%	5
To inform training of conservation professionals about climate change and its impacts	24.6%	14
To inform the public about climate change and its impacts	19.3%	11
None of the above	15.8%	9
I don't know	10.5%	6
Other (please specify)	5.3%	3

Comments provided under "other":

- *Currently working with South Central CSC to obtain data on climate scenarios, projections and downscaling for our grant in the Southwest, along the Middle Rio Grande.*
- *The evolving knowledge and collaborative communication is indeed significant. In 2010, you could not make this same statement. Going forward, continued communication will be a necessary avenue to educate and make information & attitudes translate to behavior in. Observation science.*
- *To inform potential impacts to resources.*

16. To what extent do the following factors limit your use of the climate adaptation science and tools produced through the South Central CSC? (Select one option per row)

Answer Options	Not at all	To a small extent	To a moderate extent	To a large extent	To a very large extent	Missing
Lack of quality of the science	91.1%	6.7%	0.0%	2.2%	0.0%	12
The science doesn't address questions at the right scale	40.9%	25.0%	18.2%	9.1%	6.8%	13
The scientists don't work closely enough with me	31.1%	24.4%	20.0%	13.3%	11.1%	12
I'm not aware of the science	43.2%	27.3%	22.7%	2.3%	4.5%	13
The science does not address issues I face	39.5%	23.3%	18.6%	16.3%	2.3%	14
The science is not interdisciplinary enough	51.2%	23.3%	23.3%	2.3%	0.0%	14
The science models or results are not refined enough	47.6%	26.2%	14.3%	9.5%	2.4%	15
The science is not being communicated in ways that are understandable	36.6%	29.3%	17.1%	12.2%	4.9%	16
I lack the skills or training to make use of the science	44.2%	41.9%	11.6%	2.3%	0.0%	14
The science is not available at the times at which it is needed for decision making	47.6%	26.2%	21.4%	4.8%	0.0%	15
The management issues for which science is needed have not been clearly defined	23.8%	45.2%	16.7%	11.9%	2.4%	15

17. In your opinion as a natural resource decision maker, how important is it that climate adaptation scientists and natural resource decision makers work together to produce science? (Select one option)

Answer Options	Response Percent	Response Count
Not at all important	0.0%	0
Slightly important	17.0%	8
Moderately important	10.6%	5
Important	23.4%	11
Very important	48.9%	23
Answered question		**47**
Skipped question		**10**

18. Some climate adaptation scientists collaborate with the end-users of their science in various stages of the research process. We are interested in whether you, as a natural resource decision maker, have any experience collaborating with climate adaptation scientists. To what extent have you or someone in your organization been involved in the following stages of research in one or more South Central CSC projects (led by others)? (Select one option per row)

Answer Options	Not at all	To a small extent	To a moderate extent	To a large extent	To a very large extent	Missing
Determining research priorities for the CSC as a whole	39.6%	27.1%	16.7%	10.4%	6.3%	9
Identifying the research questions for a research project	38.3%	27.7%	12.8%	17.0%	4.3%	10
Designing a research project's methods	62.5%	20.8%	8.3%	6.3%	2.1%	9
Determining data sets to be used for a research project	56.3%	25.0%	10.4%	6.3%	2.1%	9
Collecting data for a research project	62.5%	22.9%	6.3%	6.3%	2.1%	9
Analyzing data for a research project	72.9%	14.6%	6.3%	2.1%	4.2%	9
Interpreting results of a research project	60.4%	22.9%	4.2%	6.3%	6.3%	9
Applying results of a research project	44.7%	17.0%	19.1%	14.9%	4.3%	10
Communicating results of a research project	43.8%	18.8%	14.6%	16.7%	6.3%	9

19. To what extent do you, as a natural resource decision maker, agree or disagree that the following items limit your involvement in research projects? (Select one option per row)

Answer Options	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree	Missing
Scientists have different perspectives than me on what science is needed.	6.4%	34.0%	23.4%	21.3%	14.9%	10
Scientists have different perspectives from me on how research projects should be conducted.	2.1%	25.5%	34.0%	23.4%	14.9%	10
Scientists don't reach out to me to collaborate.	18.8%	37.5%	22.9%	14.6%	6.3%	9
Scientists aren't interested in listening to me.	6.5%	8.7%	43.5%	21.7%	19.6%	11
I don't have time to collaborate with scientists.	2.1%	14.9%	21.3%	40.4%	21.3%	10
Funders don't support collaboration between scientists and science users.	6.5%	13.0%	39.1%	21.7%	19.6%	11

20. Have you produced climate adaptation science through an affiliation with the South Central CSC (e.g., as CSC staff; university faculty, staff or students funded by or affiliated with the CSC; others funded by the CSC) or otherwise? (Select one option) As a reminder, by "climate adaptation science," we mean "science that helps fish, wildlife, ecosystems, and the communities they support adapt to climate change."

Answer Options	Response Percent	Response Count
I have produced climate adaptation science through an affiliation with the South Central CSC	32.5%	38
I have produced climate adaptation science but never through an affiliation with the South Central CSC	19.7%	23
No, I have not produced climate adaptation science	47.9%	56
Answered question		**117**
Skipped question		**16**

21. Has the climate adaptation science you produced been used in any of the following ways? (Select all that apply)

Answer Options	Response Percent	Response Count
To inform policy	29.5%	18
To inform management plans	55.7%	34
To inform management actions	52.5%	32
To inform land acquisition priorities	23.0%	14
To inform training of conservation professionals about climate change and its impacts	42.6%	26
To inform the public about climate change and its impacts	52.5%	32
None of the above	4.9%	3
I don't know	11.5%	7

22. In other settings, various factors have been found to limit decision makers' use of science. From your perspective as a scientist, to what extent do the following factors limit the use of the climate adaptation science produced (not specifically by you) through the South Central CSC? (Select one option per row)

Answer Options	Not at all	To a small extent	To a moderate extent	To a large extent	To a very large extent	Missing
Lack of quality of the science	64.8%	24.4%	7.4%	3.7%	0.0%	7
The science doesn't address questions at the right scale	5.5%	41.8%	36.4%	14.5%	1.8%	6
The scientists don't work closely enough with decision makers	1.8%	21.8%	36.4%	29.1%	10.9%	6
Decision makers are not aware of the science	1.9%	13.0%	37.0%	42.6%	5.6%	7
The science does not address issues decision makers face	8.9%	39.3%	28.6%	19.6%	3.6%	5
The science is not interdisciplinary enough	26.8%	32.1%	32.1%	5.4%	3.6%	5
The science models or results are not refined enough	13.0%	48.1%	22.2%	14.8%	1.9%	7
The science is not being communicated in ways that is understandable to decision makers	1.8%	23.2%	35.7%	32.1%	7.1%	5
Decision makers lack the skills or training to make use of the science	0.0%	37.5%	19.6%	28.6%	14.3%	5
The science is not available at the times at which it is needed for decision making	16.7%	25.9%	38.9%	14.8%	3.7%	7
The management issues for which science is needed have not been clearly defined	7.1%	32.1%	33.9%	21.4%	5.4%	5

23. In your opinion as a scientist, how important is it that climate adaptation scientists and natural resource decision makers work together to produce science research? (Select one option)

Answer Options	Response Percent	Response Count
Not at all important	0.0%	0
Slightly important	1.8%	1
Moderately important	7.0%	4
Important	15.8%	9
Very important	75.4%	43
Answered question		**57**
Skipped question		**4**

24. Some climate adaptation scientists collaborate with the end-users of their science in various stages of the research process. To what extent have you, as a climate adaptation scientist, had any experience collaborating with natural resource decision makers in the following ways? (Select one option per row)

Answer Options	Not at all	To a small extent	To a moderate extent	To a large extent	To a very large extent	Missing
Determining research priorities	3.6%	37.5%	33.9%	17.9%	7.1%	5
Identifying the research questions for a research project	5.5%	21.8%	32.7%	27.3%	12.7%	6
Designing a research project's methods	16.1%	35.7%	25.0%	14.3%	8.9%	5
Determining data sets to be used for a research project	25.0%	30.4%	23.2%	14.3%	7.1%	5
Collecting data for a research project	25.0%	21.4%	32.1%	16.1%	5.4%	5
Analyzing data for a research project	19.6%	33.9%	25.0%	16.1%	5.4%	5
Interpreting results of a research project	16.1%	26.8%	30.4%	14.3%	12.5%	5
Applying results of a research project	12.5%	25.0%	32.1%	17.9%	12.5%	5
Communicating results of a research project	3.6%	21.4%	32.1%	25.0%	17.9%	5

25. To what extent has the South Central CSC helped connect you with each of the following? (Select one option per row)

Answer Options	Not at all	To a small extent	To a moderate extent	To a large extent	To a very large extent	Missing
Climate adaptation science	18.9%	26.1%	28.8%	13.5%	12.6%	22
Climate adaptation scientists	22.5%	22.5%	25.2%	17.1%	12.6%	22
Decision makers who might use climate adaptation science	34.2%	36.0%	18.0%	9.9%	1.8%	22
Professionals who might communicate climate adaptation science	23.6%	26.4%	23.6%	20.9%	5.5%	23
Resources needed to conduct climate adaptation science	30.9%	20.0%	21.8%	18.2%	9.1%	23

26. Do you agree or disagree that the South Central CSC contributes to the following in your region? (Select one option per row)

Answer Options	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree	Missing
Awareness of available science	15.7%	50.0%	23.1%	8.3%	2.8%	25
Communication between scientists and those who might use science	16.7%	50.9%	15.7%	11.1%	5.6%	25
Interdisciplinary science	25.9%	38.0%	22.2%	8.3%	5.6%	25
Relationship-building among decision makers who might be interested in science	9.3%	38.0%	37.0%	11.1%	4.6%	25
Collaboration between scientists	24.1%	38.0%	24.1%	6.5%	7.4%	25
Alignment of science with needs of decision makers	10.2%	38.0%	38.9%	9.3%	3.7%	25
Ensuring science is at an appropriate scale	9.3%	34.3%	38.0%	13.0%	5.6%	25
Translating complex science for decision makers	8.3%	35.2%	35.2%	15.7%	5.6%	25
Social science about climate adaptation issues	9.3%	34.3%	40.7%	13.0%	2.8%	25

Comments provided under "Other":

- *Building trust. I believe they have strong relationships with partners. If there were more resources - funding and Staff - I think they could do even more by being able to travel to the land managers more and target their needs rather than trying to conduct projects that meet a blended need. The loss of the LCCs will require even more Staff time and travel to facilitate communication.*
- *Collaborative communication*
- *I am in CA working for a state agency and as CA is out of the geographic focus, not much contribution has been made by CAC.*
- *I really don't have much interaction with South Central CSC. I do work with universities heavily on relevant research on various topics including some climate related topics but never with the CSC so I'm uncertain whether my answers on some of these questions were interpreted as desired.*
- *Informing the general public on the extent of adaptation issues and the impacts on urban and rural economies.*
- *Providing cross-disciplinary approaches to natural resources management beyond the "traditional" sectors to include agriculture, water supply, rural development, economics, public health, transportation and other organizations. The SC CSC has done an outstanding job of reaching out to tribes and all LCCs that overlap their region--even with LCCs that have limited geographic extent but significant overlapping resource issues. Of the four CSCs that we interact with, the South Central has been the best at participating in processes across very large*

geographies with multiple LCCs, connecting partners, communicating their science production, involving stakeholders and addressing key concerns across the mid-continent..

- *South Central has been a true committed partner of Indian Country*
- *Supported production of video "Listening for the Rain"*
- *Training about climate adaptation for specialists who need it, such as ecologists working with tribes.*
- *Valuable trainings and workshops, networking opportunities to interact with people in similar fields*
- *Working with Tribal Nations and our Climate Adaptation planning needs.*
- *Your survey is WAY too long...*

27. What state(s) do you work in? (Select all that apply)

Answer Options	Response Percent	Response Count
Louisiana	15.8%	21
New Mexico	20.3%	27
Oklahoma	42.1%	56
Texas	40.6%	54
Other state(s)	18.0%	24
Other (please specify)	21.8%	29

Comments provided under "Other":

- *Arizona*
- *Arizona Idaho Oregon California Nevada*
- *Arizona, Utah, CO, CA, NV*
- *Arizona, Utah, Nevada*
- *Arkansas*
- *Arkansas, Missouri*
- *AZ, CO, UT, WY*
- *California, Arizona, Nevada and Utah*
- *California, Arizona, New Mexico, and northern Mexico*
- *Colorado*
- *Colorado, Arizona, Utah, Wyoming, Montana*
- *Colorado,Utah, Arizona*
- *Florida*
- *Full CSC domain normally, and the broader U.S. where applicable*
- *I used to work in LA too. Now I have CO AZ UT as well. In October this may change as well*
- *I work will all 39 Oklahoma Tribes. State Tribal Liaison*

- *Indiana*
- *Kansas*
- *Kansas, Colorado, Nebraska*
- *Mexico*
- *Mexico and entire Gulf coast*
- *Missouri*
- *Missouri, Kentucky, Tennessee, Arkansas, Alabama, Mississippi, Florida, Georgia*
- *MN, IA, IL, SD, NE, KS, MO, IN, WI, OH*
- *MS, AR, AL, TN, KY, FL, GA, MO*
- *SW*
- *Utah*

28. What scale(s) do you address in your work? (Select all that apply)

Answer Options	Response Percent	Response Count
International	15.0%	20
National	26.3%	35
Regional/multi-state	65.4%	87
State	54.1%	72
Watershed	51.1%	68
Local	42.9%	57

29. What is your affiliation? (Select all that apply)

Answer Options	Response Percent	Response Count
Federal agency	34.6%	46
Tribal government	6.0%	8
State agency	10.5%	14
Local government	1.5%	2
University	25.6%	34
Non-profit organization	12.0%	16
Private Industry	1.5%	2
Other (please specify)	4.5%	6

Comments provided under "Other":

- *Colorado Natural Heritage Program*
- *Conservation cooperative*
- *consultant working for the LCCs*
- *Coordinator for the Reservoir Fisheries Habitat Partnership (affiliated with the National Fish*

Habitat Partnership)

- *Desert Landscape Conservation Cooperative*
- *Gulf Coastal Plains and Ozarks Landscape Conservation Cooperative*

30. What type of position do you hold in your agency, university, or organization? (Select one option that best describes your type of work)

Answer Options	Response Percent	Response Count
Leadership/administration	38.3%	51
Policy	6.0%	8
Research	35.3%	47
Operations	10.5%	14
Other (please specify)	8.3%	11

Comments provided under "Other":

- *Center management*
- *Deputy RD*
- *educational*
- *Environmental Planning*
- *Natural Resource Management*
- *President of a small consulting firm*
- *Program management and administration, teaching*
- *Research, science communication, and coordination across the region and between organizations.*
- *Resource/Environmental Policy Specialist*
- *Teaching research and extension*
- *Technical leadership*

Appendix D. Survey Instrument with Tables of Results – Pacific Islands

1. To what extent does your work involve climate adaptation science, or management or policy related to climate change adaptation? (Select one option)

Answer Options	Response Percent	Response Count
Not at all	0.0%	0
To a small extent	8.1%	8
To a moderate extent	26.3%	26
To a large extent	26.3%	26
To a very large extent	39.4%	39
Answered question		**99**
Skipped question		**1**

2. How serious of a threat do you believe that climate change is to natural resources, relative to other stressors? (Select one option)

Answer Options	Response Percent	Response Count
Much lesser threat	1.0%	1
Lesser threat	2.0%	2
Similar threat	23.0%	23
Greater threat	48.0%	48
Much greater threat	26.0%	26
Answered question		**100**
Skipped question		**0**

3. How important do you believe it is that managers or policy makers take action now in the Pacific Islands region to address climate change threats? (Select one option)

Answer Options	Response Percent	Response Count
Not at all important	0.0%	0
Slightly important	1.0%	1
Moderately important	4.0%	4
Important	22.0%	22
Very important	73.0%	73
Answered question		**100**
Skipped question		**0**

4. How important do you believe it is that climate adaptation science informs decisions about natural resource management in the Pacific Islands region? (Select one option)

Answer Options	Response Percent	Response Count
Not at all important	0.0%	0
Slightly important	0.0%	0
Moderately important	3.0%	3
Important	18.0%	18
Very important	79.0%	79
Answered question		**100**
Skipped question		**0**

5. Which statement best characterizes your relationship with the Pacific Islands Climate Science Center (CSC)? (Select one option)

Answer Options	Response Percent	Response Count
I have never heard of the Pacific Islands CSC.	0.0%	0
I have heard of the Pacific Islands CSC, but have no interest in or involvement with it.	2.0%	2
I have had no involvement with the Pacific Islands CSC, but someone else in my agency or organization has.	12.1%	12
I have had at least some interest in or involvement with the Pacific Islands CSC.	85.9%	85
Answered question		**99**
Skipped question		**1**

6. In what ways have you been involved with the Pacific Islands Climate Science Center (CSC) in the last five years? (Select all that apply)

Answer Options	Response Percent	Response Count
CSC Stakeholder Advisory Committee member	16.0%	16
University member affiliated with the CSC	14.0%	14
CSC-funded graduate student or postdoctoral fellow	20.0%	20
CSC US Geological Survey staff	4.0%	4
Landscape Conservation Cooperative Steering Committee member	5.0%	5
Landscape Conservation Cooperative staff member	7.0%	7
CSC grant recipient, applicant, or partner on a grant	36.0%	36
Participant in a CSC training, webinar, workshop, or conference	47.0%	47
Resource manager or decision maker who has used the science produced by the CSC	20.0%	20
Other (please specify)	7.0%	7
None of the above	1.0%	1

Comments provided under "other":

- *Acting CSC Director during a 3 month detail*
- *Co-funded project in Majuro, RMI between CSC and USGS CoNED*
- *Co-host, invited speaker, and co-organizer for workshops*
- *Federal Partner*
- *Grad student/post doc associated with PICSC, but not directly funded by them*
- *PI on 2 grants, have given webinar, on original author team of proposal to create the PICSC*
- *USFS Project*

7. How long (in years) have you been involved with the CSC? (Fill in number of years, or zero, if none)

Answer Options	Average number of years involved with CSC	Response Count
	2.8	85

8. How frequently did you interact with following representatives or affiliates of the CSC in your region in the last year? (Select one option per row)

Answer Options	Not at all	Up to a few times a year	About once a month	Up to a few times a month	More than once a week	Response Count
US Geological Survey CSC Staff	28.2%	38.8%	15.3%	11.8%	5.9%	85
University leads/PIs for the CSC	12.5%	46.3%	18.8%	17.5%	5.0%	80
CSC Stakeholder Advisory Committee members	46.3%	37.5%	6.3%	6.3%	3.8%	80
CSC-affiliated researchers	11.3%	48.8%	11.3%	18.8%	10.0%	80
CSC graduate or post-doctoral fellows	22.8%	40.5%	8.9%	10.1%	17.7%	79

9. How important are each of the following benefits of the Pacific Islands CSC to you? (Select one option per row)

Answer Options	Not at all important	Slightly important	Moderately important	Important	Very important	Response Count
Source of funding for climate adaptation science	4.8%	9.5%	8.3%	20.2%	57.1%	84
Access to climate adaptation science	1.2%	4.8%	10.7%	31.0%	52.4%	84
Access to a broader network of people interested in climate adaptation science	2.4%	2.4%	15.5%	34.5%	45.2%	84
Means for learning about climate adaptation	2.4%	9.5%	20.2%	27.4%	40.5%	84
Training on climate adaptation science methods or findings	3.6%	21.4%	20.2%	21.4%	33.3%	84
Avenue to put climate adaptation science into the hands of decision makers	2.4%	4.8%	15.5%	33.3%	44.0%	84
Justification for climate adaptation science I want to do	13.1%	17.9%	15.5%	25.0%	28.6%	84
Other (please specify)						5

Comments provided under "other":

- *avenue to strengthen relationships among students, scientists, managers, policy makers, and community.*
- *Seem to miss PISCS attention and assistance to our important Climate Science needs*
- *The PICSC is a valuable resource as it offers various technical assessments on the western Pacific region.*

- *This question is about how I use the CSC. It is very important in many of these ways to others, just not so much to myself as I am also a climate adaptation science provider.*
- *utilizing climate science data (predictions) to help guide management actions for rare plant species*

10. What limits your involvement with the Pacific Islands CSC? (Select all that apply)

Answer Options	Response Percent	Response Count
I don't have enough time	52.0%	52
I don't have the funds	23.0%	23
I don't know how to be involved	22.0%	22
I don't work on the same topics as the CSC	6.0%	6
The CSC's science is not relevant to my needs	0.0%	0
I haven't been invited or asked to be involved	15.0%	15
It's not as high a priority as my other work	16.0%	16
It's someone else's responsibility in my organization	8.0%	8
I'm not interested in this work	0.0%	0
I don't have any limits on the extent to which I am involved	18.0%	18
Other (please specify)	16.0%	16

Comments provided under "other":

- *Although I am a PICSC grant recipient, and much of my research involves ecological effects of climate change, I have never been invited to participate in any PICSC event or working group. As a result, I have not met anyone in that community or even know what they do. I don't know why this is, although it has been my strong impression that they favor modeling work over ecological/field studies.*
- *Although the above selected item reflects my experience, the support coming from our statement of need consultations has been progressing slowly.*
- *As a manager I have been involved in one of the CSC projects as requested and a workshop. I don't have a lot of extra time but would be interested in learning about more opportunities to be involved.*
- *Climate change issues related to sources and timing of supply are the main concerns.*
- *CSC needs to establish a point of contact on island in order maximize that type of services they provide.*
- *Early in the scoping of the establishment of the CSC, I strongly recommended close coordination with the state agencies and land managers so that we could provide information on our resource management concerns and science needs. It does not appear that any outreach to my agency was ever done. I have no idea what the CSC is doing relevant to my agency's area of resource management, which includes responsibility for all of the state's forest, natural area*

reserve, and wildlife resources. If there was interaction with my agency, it never made it over to me.

- *I am neither an on-the-ground manager nor a climate science researcher or higher-level policy maker. So I try to be a conduit to & from resource managers (mostly) and policymakers (secondarily). I have not yet seen much opportunity for the CSC to help me perform better at this intermediate level, tho perhaps the forthcoming Science Strategy will be useful or will encourage work relevant to middle-management.*
- *I don't have any limitations to working with PICSC.*
- *I was only recently invited to a meeting but wasn't able to attend.*
- *I would like to consult more on specific species action plans to involve climate change predictions but it is difficult to make time and I haven't asked if PICSC staff would be interested to help.*
- *I would love to work more, and sometimes need to defer to my staff because of other obligations of my agency, but consider it a great partnership! Mahalo!*
- *ill be as involved as the grant opportunities it provides overlap my research interests.*
- *Isolated by time and distance from interactions with PISCS based in Hawai'i.*
- *My position is funded through an NSF grant and a NOAA grant, so while the objectives of these two sets of responsibilities are significantly influenced by climate change-related issues my direct involvement in CSC-supported research is necessarily very limited. With that said, I I am very much interested in learning more about how CSC products can benefit my projects and have been (and will continue) to offer input on CSC-related products and services during workshops and in conversation with CSC-affiliated faculty and staff at the U. of Guam.*
- *My project is not directly involved in your program but I want to align it climate change adaptation.*
- *Other projects are also a high priority, but in general I do prioritize projects that I'm working on with the CSC.*

11. To what extent do you agree or disagree with each of the following statements about the use of climate adaptation science in the Pacific Islands region? (Select one option per row)

Answer Options	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree	Missing/I don't know
Climate adaptation science is available to decision makers.	16.3%	59.2%	6.1%	11.2%	0.0%	7
Policy makers use climate adaptation science to inform policies.	7.1%	38.8%	19.4%	20.4%	8.2%	6
Land managers use climate adaptation science to inform management.	11.3%	47.4%	12.4%	14.4%	1.0%	13
Fish and wildlife managers use climate adaptation science to inform management.	17.3%	49.0%	13.3%	3.1%	2.0%	15
Water managers use climate adaptation science to inform management.	13.3%	46.9%	15.3%	5.1%	0.0%	19
What is known about climate adaptation does not necessarily influence actions taken by decision makers in the region.	10.3%	38.1%	24.7%	19.6%	2.1%	5
The CSC has helped reduce the disconnect between what is known about climate adaptation and the actions taken by decision makers in the region.	17.5%	38.1%	24.7%	2.1%	2.1%	15

12. To what extent do you agree or disagree with each of the following statements about the science produced through the Pacific Islands CSC (their staff, university affiliates, those funded by the CSC)? (Select one option for each row)

Answer Options	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree	I'm unfamiliar with the science
It can contribute to policy or management.	61.9%	30.9%	2.1%	2.1%	0.0%	3.1%
It is appropriate to inform the type of decisions being made.	49.5%	42.3%	1.0%	2.1%	0.0%	5.2%
It integrates well with other information.	34.7%	43.2%	13.7%	2.1%	1.1%	5.3%
It is irrelevant to management.	10.4%	3.1%	9.4%	16.7%	56.3%	4.2%
It is high quality.	43.8%	39.6%	5.2%	1.0%	1.0%	9.4%
It is biased.	2.1%	5.2%	8.3%	19.8%	54.2%	10.4%

13. Is making decisions about natural resource policy, management, or programs part of your job?

Answer Options	Response Percent	Response Count
Yes	40.2%	39
No. I do NOT make decisions about natural resource policy, management, or programs.	59.8%	58
Answered question		**97**
Skipped question		**3**

14. Have you or your organization used climate adaptation science produced by the following sources to inform decisions about natural resource policy, management, or programs? (Select one option per row)

Answer Options	Yes	No	I don't know	Response Count
Pacific Islands CSC (e.g., from CSC staff; university faculty, staff or students funded by or affiliated with the CSC; others funded by the CSC)	59.0%	23.1%	17.9%	39
Organizations or scientists who are NOT affiliated with the Pacific Islands CSC	78.9%	13.2%	7.9%	38

15. How have you used the climate adaptation science produced by the Pacific Islands CSC, if at all? (Select all that apply)

Answer Options	Response Percent	Response Count
To inform policy	23.1%	9
To inform management plans	51.3%	20
To inform management actions	48.7%	19
To inform land acquisition priorities	5.1%	2
To inform training of conservation professionals about climate change and its impacts	25.6%	10
To inform the public about climate change and its impacts	43.6%	17
None of the above	7.7%	3
I don't know	30.8%	12
Other (please specify)	5.1%	2

Comments provided under "other":

- *It would be appropriate consider the science for a number of the items listed above, but I have not used it to date for those purposes. This is probably due accessibility of information and time needed to reach out to find the information, read and understands the documents, and then*

incorporate it into decisions. It could benefit from dissemination of material through a variety of platforms - webinars, short factsheets on findings and relevant information for resource managers, collaboration on needed research.

- *To inform family members and friends about climate change and its impacts.*

16. To what extent do the following factors limit your use of the climate adaptation science and tools produced through the Pacific Islands CSC? (Select one option per row)

Answer Options	Not at all	To a small extent	To a moderate extent	To a large extent	To a very large extent	Missing
Lack of quality of the science	83.3%	11.1%	2.8%	2.8%	0.0%	3
The science doesn't address questions at the right scale	38.9%	13.9%	30.6%	16.7%	0.0%	3
The scientists don't work closely enough with me	27.0%	27.0%	21.6%	16.2%	8.1%	2
I'm not aware of the science	27.8%	25.0%	25.0%	11.1%	11.1%	3
The science does not address issues I face	50.0%	16.7%	16.7%	11.1%	5.6%	3
The science is not interdisciplinary enough	48.6%	20.0%	22.9%	8.6%	0.0%	4
The science models or results are not refined enough	40.0%	31.4%	17.1%	5.7%	5.7%	4
The science is not being communicated in ways that are understandable	27.0%	43.2%	10.8%	10.8%	8.1%	2
I lack the skills or training to make use of the science	38.9%	41.7%	8.3%	5.6%	5.6%	3
The science is not available at the times at which it is needed for decision making	34.3%	40.0%	11.4%	11.4%	2.9%	4
The management issues for which science is needed have not been clearly defined	27.8%	36.1%	25.0%	5.6%	5.6%	3

17. In your opinion as a natural resource decision maker, how important is it that climate adaptation scientists and natural resource decision makers work together to produce science? (Select one option)

Answer Options	Response Percent	Response Count
Not at all important	0.0%	0
Slightly important	0.0%	0
Moderately important	0.0%	0
Important	15.8%	6
Very important	84.2%	32
Answered question		**38**
Skipped question		**1**

18. Some climate adaptation scientists collaborate with the end-users of their science in various stages of the research process. We are interested in whether you, as a natural resource decision maker, have any experience collaborating with climate adaptation scientists. To what extent have you or someone in your organization been involved in the following stages of research in one or more Pacific Islands CSC projects (led by others)? (Select one option per row)

Answer Options	Not at all	To a small extent	To a moderate extent	To a large extent	To a very large extent	Missing
Determining research priorities for the CSC as a whole	39.5%	31.6%	18.4%	5.3%	5.3%	1
Identifying the research questions for a research project	31.6%	28.9%	23.7%	7.9%	7.9%	1
Designing a research project's methods	47.4%	26.3%	10.5%	5.3%	10.5%	1
Determining data sets to be used for a research project	39.5%	23.7%	18.4%	7.9%	10.5%	1
Collecting data for a research project	42.1%	18.4%	13.2%	13.2%	13.2%	1
Analyzing data for a research project	57.9%	18.4%	5.3%	7.9%	10.5%	1
Interpreting results of a research project	60.5%	13.2%	7.9%	7.9%	10.5%	1
Applying results of a research project	44.7%	15.8%	15.8%	13.2%	10.5%	1
Communicating results of a research project	39.5%	26.3%	13.2%	7.9%	13.2%	1

19. To what extent do you, as a natural resource decision maker, agree or disagree that the following items limit your involvement in research projects? (Select one option per row)

Answer Options	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree	Missing
Scientists have different perspectives than me on what science is needed.	2.6%	26.3%	39.5%	23.7%	7.9%	1
Scientists have different perspectives from me on how research projects should be conducted.	0.0%	21.1%	39.5%	31.6%	7.9%	1
Scientists don't reach out to me to collaborate.	10.8%	24.3%	27.0%	24.3%	13.5%	2
Scientists aren't interested in listening to me.	2.7%	5.4%	37.8%	35.1%	18.9%	2
I don't have time to collaborate with scientists.	2.6%	28.9%	21.1%	26.3%	21.1%	1
Funders don't support collaboration between scientists and science users.	10.5%	15.8%	39.5%	21.1%	13.2%	1

20. Have you produced climate adaptation science through an affiliation with the Pacific Islands CSC (e.g., as CSC staff; university faculty, staff or students funded by or affiliated with the CSC; others funded by the CSC) or otherwise? (Select one option) As a reminder, by "climate adaptation science," we mean "science that helps fish, wildlife, ecosystems, and the communities they support adapt to climate change."

Answer Options	Response Percent	Response Count
I have produced climate adaptation science through an affiliation with the Pacific Islands CSC	51.5%	50
I have produced climate adaptation science but never through an affiliation with the Pacific Islands CSC	13.4%	13
No, I have not produced climate adaptation science	35.1%	34
Answered question		**97**
Skipped question		**3**

21. Has the climate adaptation science you produced been used in any of the following ways? (Select all that apply)

Answer Options	Response Percent	Response Count
To inform policy	39.7%	25
To inform management plans	68.3%	43
To inform management actions	55.6%	35
To inform land acquisition priorities	14.3%	9
To inform training of conservation professionals about climate change and its impacts	58.7%	37
To inform the public about climate change and its impacts	82.5%	52
None of the above	1.6%	1
I don't know	7.9%	5

22. In other settings, various factors have been found to limit decision makers' use of science. From your perspective as a scientist, to what extent do the following factors limit the use of the climate adaptation science produced (not specifically by you) through the Pacific Islands CSC? (Select one option per row)

Answer Options	Not at all	To a small extent	To a moderate extent	To a large extent	To a very large extent	Missing
Lack of quality of the science	59.0%	29.5%	9.8%	1.6%	0.0%	2
The science doesn't address questions at the right scale	18.6%	39.0%	28.8%	13.6%	0.0%	4
The scientists don't work closely enough with decision makers	5.1%	27.1%	32.2%	25.4%	10.2%	4
Decision makers are not aware of the science	5.0%	18.3%	36.7%	31.7%	8.3%	3
The science does not address issues decision makers face	15.3%	35.6%	33.9%	10.2%	5.1%	4
The science is not interdisciplinary enough	25.0%	35.0%	31.7%	6.7%	1.7%	3
The science models or results are not refined enough	21.7%	38.3%	23.3%	13.3%	3.3%	3
The science is not being communicated in ways that is understandable to decision makers	6.7%	21.7%	40.0%	18.3%	13.3%	3
Decision makers lack the skills or training to make use of the science	6.8%	20.3%	39.0%	23.7%	10.2%	4
The science is not available at the times at which it is needed for decision making	11.9%	35.6%	33.9%	15.3%	3.4%	4
The management issues for which science is needed have not been clearly defined	13.6%	32.2%	37.3%	13.6%	3.4%	4

23. In your opinion as a scientist, how important is it that climate adaptation scientists and natural resource decision makers work together to produce science research? (Select one option)

Answer Options	Response Percent	Response Count
Not at all important	0.0%	0
Slightly important	0.0%	0
Moderately important	4.9%	3
Important	16.4%	10
Very important	78.7%	48
Answered question		**61**
Skipped question		**2**

24. Some climate adaptation scientists collaborate with the end-users of their science in various stages of the research process. To what extent have you, as a climate adaptation scientist, had any experience collaborating with natural resource decision makers in the following ways? (Select one option per row)

Answer Options	Not at all	To a small extent	To a moderate extent	To a large extent	To a very large extent	Missing
Determining research priorities	5.0%	21.7%	20.0%	33.3%	20.0%	3
Identifying the research questions for a research project	8.3%	13.3%	30.0%	26.7%	21.7%	3
Designing a research project's methods	13.3%	28.3%	35.0%	16.7%	6.7%	3
Determining data sets to be used for a research project	13.3%	31.7%	25.0%	21.7%	8.3%	3
Collecting data for a research project	15.0%	20.0%	26.7%	26.7%	11.7%	3
Analyzing data for a research project	28.3%	28.3%	21.7%	16.7%	5.0%	3
Interpreting results of a research project	11.7%	26.7%	23.3%	25.0%	13.3%	3
Applying results of a research project	13.3%	18.3%	23.3%	26.7%	18.3%	3
Communicating results of a research project	1.7%	16.7%	23.3%	33.3%	25.0%	3

25. To what extent has the Pacific Islands CSC helped connect you with each of the following? (Select one option per row)

Answer Options	Not at all	To a small extent	To a moderate extent	To a large extent	To a very large extent	Missing
Climate adaptation science	9.7%	20.4%	36.6%	22.6%	10.8%	7
Climate adaptation scientists	10.8%	17.2%	33.3%	30.1%	8.6%	7
Decision makers who might use climate adaptation science	25.0%	29.3%	23.9%	18.5%	3.3%	8
Professionals who might communicate climate adaptation science	21.7%	27.2%	22.8%	19.6%	8.7%	8
Resources needed to conduct climate adaptation science	20.9%	27.5%	22.0%	16.5%	13.2%	9

26. Do you agree or disagree that the Pacific Islands CSC contributes to the following in your region? (Select one option per row)

Answer Options	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree	Missing
Awareness of available science	25.8%	57.0%	14.0%	2.2%	1.1%	7
Communication between scientists and those who might use science	29.0%	48.4%	20.4%	1.1%	1.1%	7
Interdisciplinary science	26.9%	47.3%	22.6%	2.2%	1.1%	7
Relationship-building among decision makers who might be interested in science	20.7%	43.5%	30.4%	4.3%	1.1%	8
Collaboration between scientists	23.7%	51.6%	21.5%	2.2%	1.1%	7
Alignment of science with needs of decision makers	21.7%	43.5%	31.5%	2.2%	1.1%	8
Ensuring science is at an appropriate scale	16.3%	40.2%	38.0%	4.3%	1.1%	8
Translating complex science for decision makers	16.3%	38.0%	38.0%	6.5%	1.1%	8
Social science about climate adaptation issues	15.2%	29.3%	43.5%	10.9%	1.1%	8

Comments provided under "Other":

- *A beacon of objective science, which compliments other work in the LCCs, Hubs, and organizations. Mahalo for the great work!*

27. What state(s) do you work in? (Select all that apply)

Answer Options	Response Percent	Response Count
American Samoa	21.0%	21
Commonwealth of the Northern Mariana Islands	23.0%	23
Federated States of Micronesia	18.0%	18
Guam	25.0%	25
Hawai'i	78.0%	78
Republic of Marshall Islands	18.0%	18
Republic of Palau	14.0%	14
Other (please specify)	5.0%	5

Comments provided under "Other":

- *Africa, Latin America*
- *California*
- *China, India*

- *I live in Hawai'i, but PICCC works in the above USAPI but I personally haven't*
- *Majuro Atoll*

28. What scale(s) do you address in your work? (Select all that apply)

Answer Options	Response Percent	Response Count
International	23.0%	23
National	23.0%	23
Regional/multi-state	36.0%	36
State	69.0%	69
Watershed	58.0%	58
Local	66.0%	66

29. What is your affiliation? (Select all that apply)

Answer Options	Response Percent	Response Count
Federal agency	31.0%	31
Tribal government	0.0%	0
State agency	5.0%	5
Local government	13.0%	13
University	42.0%	42
Non-profit organization	11.0%	11
Private Industry	0.0%	0
Other (please specify)	4.0%	4

Comments provided under "Other":

- *Collaborative Initiative*
- *Community College*
- *County Environmental Coordinator*
- *PICCC*

30. What type of position do you hold in your agency, university, or organization? (Select one option that best describes your type of work)

Answer Options	Response Percent	Response Count
Leadership/administration	25.0%	25
Policy	6.0%	6
Research	53.0%	53
Operations	13.0%	13
Other (please specify)	13.0%	13

Comments provided under "Other":

- *Agriculture*
- *and lecturer*
- *Biologist/Program Manager*
- *College instructor*
- *Communications*
- *Coordination*
- *Extension*
- *National coordination*
- *rare plant program manager*
- *Research and Management*
- *State Forester/Agroforestry*
- *Teacher*
- *Wildlife Biologist*

Appendix E. Phone Survey Instrument

The purpose of this survey is to learn more about the experiences of scientists, managers, and decision makers who may have interacted with the [INSERT REGION] Climate Science Center. Even if you haven't had much interaction with the Climate Science Center, your responses are important. Information about the needs and perspectives of scientists and potential users of science that is relevant to climate change adaptation will help the U.S. Geological Survey and the [INSERT REGION] Climate Science Center better serve their partners.

This survey is a cooperative effort of the Cornell University Department of Natural Resources, the U.S. Geological Survey, and the American Fisheries Society.

Your participation in this survey is voluntary, but we encourage you to respond. We estimate that it will take less than 5 minutes to complete the survey. Hearing back from as many people as possible will help ensure that the results of the survey are valid and adequately represent the perspectives of scientists and potential users of science in the region. Please be assured that your identity will be kept strictly confidential, and your responses will never be associated with your name.

Throughout the survey, we will be asking you questions about climate change and climate adaptation science. By "climate adaptation science", we mean "science that helps fish, wildlife, ecosystems, and the communities they support adapt to climate change."

1. To what extent does your work involve climate adaptation science, or management or policy related to climate change adaptation? (Select one option)
Not at all (If selected, respond: Thanks for your participation in the survey. We have no further questions.)
To a small extent
To a moderate extent
To a large extent
To a very large extent

Even among professionals who work on climate adaptation science, management, or policy, perspectives differ on the importance of climate change relative to other environmental problems.

2. How serious of a threat do you believe that climate change is to natural resources, relative to other stressors? (Select one option)
Much lesser threat
Lesser threat
Similar threat
Greater threat
Much greater threat

3. How important do you believe it is that managers or policy makers take action now in the [INSERT REGION] to address climate change threats? (Select one option)
Not at all important
Slightly important
Moderately important
Important
Very important

4. Which statement best characterizes your relationship with the [INSERT REGION] Climate Science Center (CSC)? (Select one option)
I have never heard of the [INSERT REGION] CSC. (If selected, skip to question 8)
I have heard of the [INSERT REGION] CSC, but have no interest in or involvement with it. (If selected, skip to question 8)
I have had no involvement with the [INSERT REGION] CSC, but someone else in my agency or organization has. (If selected, skip to question 8)
I have had at least some interest in or involvement with the [INSERT REGION] CSC.

5. How long (in years) have you been involved with the CSC? (Fill in number of years, or zero, if none)

6. How frequently did you interact with following representatives of the CSC in your region in the last year?
(Select one option for each – Not at all; Up to a few times a year; About once a month; Up to a few times a month, More than once a week).

US Geological Survey CSC staff
University leads or PIs for the CSC

7. How important are each of the following benefits of the [INSERT REGION] CSC to you? (Select one option for each – Not at all important, Slightly important, Moderately important, Important, Very important)
Source of funding for climate adaptation science
Access to climate adaptation science
Means for learning about climate adaptation

8. Is making decisions about natural resource policy, management, or programs part of your job?
Yes
No. I do NOT make decisions about natural resource policy, management, or programs.

9. Have you produced climate adaptation science through an affiliation with the [INSERT REGION] CSC (e.g., as CSC staff; university faculty, staff or students funded by or affiliated with the CSC; others funded by the CSC) or otherwise? As a reminder, by "climate adaptation science," we mean "science that helps fish, wildlife, ecosystems, and the communities they support adapt to climate change." (Select one option)

I have produced climate adaptation science through an affiliation with the [INSERT REGION] CSC
I have produced climate adaptation science but never through an affiliation with the [INSERT REGION] CSC
No, I have not produced climate adaptation science

10. What is your affiliation? (Select all that apply)
Federal agency
Tribal government
State agency
University
Non-profit organization
Other

Appendix F. Comparison of Respondent (Web-based) and Nonrespondent (Phone) Surveys

1. To what extent does your work involve climate adaptation science, or management or policy related to climate change adaptation? (Select one option)

Answer Options	Not at all	To a small extent	To a moderate extent	To a large extent	To a very large extent
Phone respondents	0.0%	25.3%	24.0%	33.3%	17.3%
Northeast web-based respondents	0.0%	13.2%	34.5%	31.1%	21.3%
South Central web-based respondents	0.0%	25.6%	32.3%	30.1%	12.0%
Pacific Islands web-based respondents	0.0%	8.1%	26.3%	26.3%	39.4%
All web-based respondents	0.0%	15.6%	32.1%	29.8%	22.5%

2. How serious of a threat do you believe that climate change is to natural resources, relative to other stressors? (Select one option)

Answer Options	Much lesser threat	Lesser threat	Similar threat	Greater threat	Much greater threat
Phone respondents	1.3%	5.3%	37.3%	28.0%	28.0%
Northeast web-based respondents	0.0%	4.0%	31.4%	47.8%	16.8%
South Central web-based respondents	3.1%	8.7%	40.9%	36.2%	11.0%
Pacific Islands web-based respondents	1.0%	2.0%	23.0%	48.0%	26.0%
All web-based respondents	1.1%	4.9%	32.2%	44.6%	17.2%

3. How important do you believe it is that managers or policy makers take action now in the [INSERT REGION] to address climate change threats? (Select one option)

Answer Options	Not at all important	Slightly important	Moderately important	Important	Very important
Phone respondents	1.4%	4.1%	9.5%	21.6%	63.5%
Northeast web-based respondents	0.0%	0.9%	8.8%	30.1%	60.2%
South Central web-based respondents	1.6%	6.3%	15.7%	33.9%	42.5%
Pacific Islands web-based respondents	0.0%	1.0%	4.0%	22.0%	73.0%
All web-based respondents	0.4%	2.4%	9.7%	29.4%	58.1%

4. Which statement best characterizes your relationship with the [INSERT REGION] Climate Science Center (CSC)? (Select one option)
   I have never heard of the [INSERT REGION] CSC. (If selected, skip to question 8)
   I have heard of the [INSERT REGION] CSC, but have no interest in or involvement with it. (If selected, skip to question 8)
   I have had no involvement with the [INSERT REGION] CSC, but someone else in my agency or organization has. (If selected, skip to question 8)
   I have had at least some interest in or involvement with the [INSERT REGION] CSC.

Answer Options	Haven't heard	No interest/ involvement	Someone else involved	Some involvement/ interest
Phone respondents	0.0%	5.7%	10.0%	84.3%
Northeast web-based respondents	0.0%	5.3%	18.1%	76.7%
South Central web-based respondents	0.0%	5.5%	11.0%	83.5%
Pacific Islands web-based respondents	0.0%	2.0%	12.1%	85.9%
All web-based respondents	0.0%	4.6%	14.8%	80.6%

5. How long (in years) have you been involved with the CSC? (Fill in number of years, or zero, if none)

Answer Options	Years
Phone respondents	3.6
Northeast web-based respondents	3.4
South Central web-based respondents	3.8
Pacific Islands web-based respondents	2.8
All web-based respondents	3.3

6. How frequently did you interact with following representatives of the CSC in your region in the last year?
   6a. US Geological Survey CSC staff

Answer Options	Not at all	Up to a few times a year	About once a month	Up to a few times a month	More than once a week
Phone respondents	18.6%	49.2%	15.3%	10.2%	6.8%
Northeast web-based respondents	20.1%	43.9%	12.8%	18.3%	4.9%
South Central web-based respondents	9.5%	59.0%	16.2%	7.6%	7.6%
Pacific Islands web-based respondents	28.2%	38.8%	15.3%	11.8%	5.9%
All web-based respondents	18.9%	47.2%	14.4%	13.6%	5.9%

6b. How frequently did you interact with following representatives of the CSC in your region in the last year? University leads or PIs for the CSC

Answer Options	Not at all	Up to a few times a year	About once a month	Up to a few times a month	More than once a week
Phone respondents	23.7%	39.0%	16.9%	11.9%	8.5%
Northeast web-based respondents	16.0%	46.3%	12.3%	14.2%	11.1%
South Central web-based respondents	26.2%	41.7%	14.6%	9.7%	7.8%
Pacific Islands web-based respondents	12.5%	46.3%	18.8%	17.5%	5.0%
All web-based respondents	18.3%	44.9%	14.5%	13.6%	8.7%

7. How important are each of the following benefits of the [INSERT REGION] CSC to you?

7a. Source of funding for climate adaptation science. (Select one option for each – Not at all important, Slightly important, Moderately important, Important, Very important)

Answer Options	Not at all important	Slightly important	Moderately important	Important	Very important
Phone respondents	30.5%	11.9%	25.4%	5.1%	27.1%
Northeast web-based respondents	14.8%	11.2%	12.4%	21.3%	40.2%
South Central web-based respondents	19.2%	11.5%	15.4%	23.1%	30.8%
Pacific Islands web-based respondents	4.8%	9.5%	8.3%	20.2%	57.1%
All web-based respondents	13.7%	10.9%	12.3%	21.6%	41.5%

7b. How important are each of the following benefits of the [INSERT REGION] CSC to you? Access to climate adaptation science. (Select one option for each – Not at all important, Slightly important, Moderately important, Important, Very important)

Answer Options	Not at all important	Slightly important	Moderately important	Important	Very important
Phone respondents	5.1%	8.5%	20.3%	25.4%	40.7%
Northeast web-based respondents	1.8%	8.2%	15.9%	31.8%	42.4%
South Central web-based respondents	4.8%	12.5%	9.6%	37.5%	35.6%
Pacific Islands web-based respondents	1.2%	4.8%	10.7%	31.0%	52.4%
All web-based respondents	2.5%	8.7%	12.8%	33.2%	42.7%

7c. How important are each of the following benefits of the [INSERT REGION] CSC to you? Means for learning about climate adaptation
(Select one option for each – Not at all important, Slightly important, Moderately important, Important, Very important)

Answer Options	Not at all important	Slightly important	Moderately important	Important	Very important
Phone respondents	5.1%	11.9%	33.9%	20.3%	28.8%
Northeast web-based respondents	2.4%	14.1%	24.1%	28.8%	30.6%
South Central web-based respondents	8.7%	14.4%	23.1%	27.9%	26.0%
Pacific Islands web-based respondents	2.4%	9.5%	20.2%	27.4%	40.5%
All web-based respondents	4.2%	13.1%	22.9%	28.2%	31.6%

8. Is making decisions about natural resource policy, management, or programs part of your job?
   Yes
   No. I do NOT make decisions about natural resource policy, management, or programs.

Answer Options	Yes	No
Phone respondents	60.0%	40.0%
Northeast web-based respondents	46.8%	53.2%
South Central web-based respondents	45.6%	54.4%
Pacific Islands web-based respondents	40.2%	59.8%
All web-based respondents	35.9%	64.1%

9. Have you produced climate adaptation science through an affiliation with the [INSERT REGION] CSC (e.g., as CSC staff; university faculty, staff or students funded by or affiliated with the CSC; others funded by the CSC) or otherwise? As a reminder, by "climate adaptation science," we mean "science that helps fish, wildlife, ecosystems, and the communities they support adapt to climate change." (Select one option)

   I have produced climate adaptation science through an affiliation with the [INSERT REGION] CSC
   I have produced climate adaptation science but never through an affiliation with the [INSERT REGION] CSC
   No, I have not produced climate adaptation science

Answer Options	Yes through CSC	Yes, not through CSC	No
Phone respondents	44.0%	20.0%	36.0%
Northeast web-based respondents	39.8%	18.0%	42.2%
South Central web-based respondents	32.5%	19.7%	47.9%
Pacific Islands web-based respondents	51.5%	13.4%	35.1%
All web-based respondents	36.8%	23.7%	39.5%

10. What is your affiliation?

10a. Federal agency (Select all that apply)

Answer Options	Yes, Federal agency
Phone respondents	41.3%
Northeast web-based respondents	29.8%
South Central web-based respondents	31.0%
Pacific Islands web-based respondents	34.6%
All web-based respondents	31.4%

10b. What is your affiliation? Tribal government (Select all that apply)

Answer Options	Yes, Tribal government
Phone respondents	8.0%
Northeast web-based respondents	2.1%
South Central web-based respondents	6.0%
Pacific Islands web-based respondents	0.0%
All web-based respondents	2.8%

10c. What is your affiliation? State agency (Select all that apply)

Answer Options	Yes, State agency
Phone respondents	25.3%
Northeast web-based respondents	18.7%
South Central web-based respondents	10.5%
Pacific Islands web-based respondents	5.0%
All web-based respondents	13.5%

10d. What is your affiliation? University (Select all that apply)

Answer Options	Yes, University
Phone respondents	38.7%
Northeast web-based respondents	28.1%
South Central web-based respondents	25.6%
Pacific Islands web-based respondents	42.0%
All web-based respondents	30.3%

10e. What is your affiliation? Non-profit organization (Select all that apply)

Answer Options	Yes, Non-profit organization
Phone respondents	29.3%
Northeast web-based respondents	14.5%
South Central web-based respondents	12.0%
Pacific Islands web-based respondents	11.0%
All web-based respondents	13.0%