

Some Research Perspective on the *Regional Framework for Climate Adaptation* Project

Joe Cone, Monty Johnson, Miriah Kelly, Colin Duncan, Kirsten Winters, and John Stevenson



Oregon Sea Grant



Research Team

Oregon Sea Grant members of the research team, and their roles:

Joe Cone (research project leader and framework project co-leader*)

Monty Johnson (research coordinator)

John Stevenson** (research associate)

Kirsten Winters (research associate)

Miriah Kelly (research associate)

Pat Corcoran (research associate)

Colin Duncan (research assistant)

*Framework project co-leader Jeff Weber advised the research team but did not participate directly in its activities. We appreciate his review of a draft of this report.

**John Stevenson is Regional Extension Climate Specialist, PNW Climate Impacts Research Consortium (CIRC) and Oregon State University Extension/Oregon Sea Grant.

Editing, design, and layout by Rick Cooper, Oregon Sea Grant.

Cover and inside photographs by Joe Cone.

Reference citation

Cone, J., M. Johnson, M. Kelly, C. Duncan, K. Winters, and J. Stevenson. 2015. Some Research Perspective on the *Regional Framework for Climate Adaptation* Project. Corvallis, OR: Oregon Sea Grant. URL: <http://seagrant.oregon-state.edu/sgps/some-research-perspective>

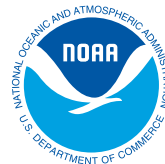
Development of *Regional Framework for Climate Adaptation for Clatsop and Tillamook Counties* was supported in part with funding to the Oregon Coastal Management Program from the National Oceanic and Atmospheric Administration, Office for Coastal Management, under the Coastal Zone Management Act of 1972, as amended, administered by NOAA's Office for Coastal Management.

The participation of Oregon Sea Grant was enabled under award number NA10OAR4170059 (project number A/CC-18) from the National Oceanic and Atmospheric Administration's National Sea Grant College Program, U.S. Department of Commerce, and by appropriations made by the Oregon State Legislature.

The participation of the Climate Impacts Research Consortium was enabled under award number NA10OAR4310218 from the National Oceanic and Atmospheric Administration's Climate Program Office, Regional Integrated Sciences and Assessments program, U.S. Department of Commerce, and Oregon State University Extension Service. The statements, findings, conclusions, and recommendations herein do not necessarily reflect the views of these funders.

Contents

1. Foreword: This research in context of the overall project....	3
2. Background: Research on Oregon coast professionals, climate change, and adaptation processes	5
3. Objectives of project research	8
4. Methods and results.....	9
5. Discussion	13
Works Cited	15
Appendices.....	17
Appendix 1: <i>Regional Framework for Climate Adaptation: Clatsop and Tillamook Counties</i> —Executive Summary.....	18
Appendix 2: Pre-workshop survey questions.....	20
Appendix 3: Pre-workshop (initial) interview questions	27
Appendix 4: Post-workshop survey questions.....	30
Appendix 5: Post-workshop interview questions	33



1. Foreword: This research in context of the overall project

This research report is a companion to the report of the project process and outcomes, *Regional Framework for Climate Adaptation: Clatsop and Tillamook Counties* [<http://seagrant.oregonstate.edu/sgpubs/regional-framework-for-climate-adaptation>].¹ The Regional Framework project, conducted from 2013 to early 2015, built on the foundation of Oregon’s state-level Climate Change Adaptation Framework, produced in 2010 (Oregon Department of Land Conservation and Development, 2010). With that foundation, and with an apparent interest on the part of state, federal, and local officials in exploring how the state frame-

work might be applicable at a regional scale, the Regional Framework project captured the attention of 123 participants, 84 of whom participated in one or more of the project’s three workshops, described in detail in the companion report. The project also claimed the attention of a cadre of staff and affiliates of Oregon Sea Grant, whose research report this is. All but one² of the authors of this report were directly involved in project activities, so readers should recognize this report as a perspective on the project rather than an independent evaluation of it.

1 The Executive Summary from that report is attached here as Appendix 1.

2 Colin Duncan is the exception.

Our motivation for producing this report lies in the fact that developing appropriate responses to the effects of climate change is arguably one of humanity’s biggest challenges for the foreseeable future. While what constitutes an “appropriate response” will vary among locations and participant responsibilities, the Regional Framework project was designed as a proof-of-concept of one particular strategy. That particular strategy is based on the observation, supported by research by members of this team, among others, that the amount, nature, and organization of information designed to foster appropriate

The essential difference of the framework approach from the vulnerability assessment approach is the viewing of adaptation as a systemic problem rather than as a particular response to a specific anticipated disturbance.

actions that respond to risks resulting from climate change *do not provide prospective actors—particularly local governments—a reliable and coherent foundation* for action. The key element in the strategy to address climate change based on these observations is the organization of information relevant to these actors. We wanted to understand whether and how well this strategy worked, primarily from the perspective of its primary participants, the coastal governance stakeholders.

Currently, the need to respond to the effects of a changing climate—cli-

mate “adaptation”—is attracting a great deal of attention from scholars and practitioners. Some of the professional literature is focused on understanding the criteria for successful adaptation, asking such questions as *What are the criteria? How can they best be applied? How will we know if we’re successful?* (Susanne C. Moser, 2009; Preston, Westaway, and Yuen, 2010). This defining of “outcome” success is an important, even critical, issue in adaptation, but it’s not what the Regional Framework project focused on.

Instead, as principal author and project co-leader Jeffrey A. Weber presents in the companion report, in bringing together a range of governmental and non-governmental leaders, the Regional

Framework project concentrated on identifying: (1) priority climate risks for the region; (2) management objectives to address those risks; and (3) mechanisms and actions to implement the management objectives. These three efforts can be seen as elements in the “understanding” and “planning” phases in a standard decision cycle (Figure 1) described for adaptation processes (S. C. Moser and Ekstrom, 2010).

Furthermore, the project was designed to test a model for organizing adaptation efforts that departs from the “vulnerability assessment”-based

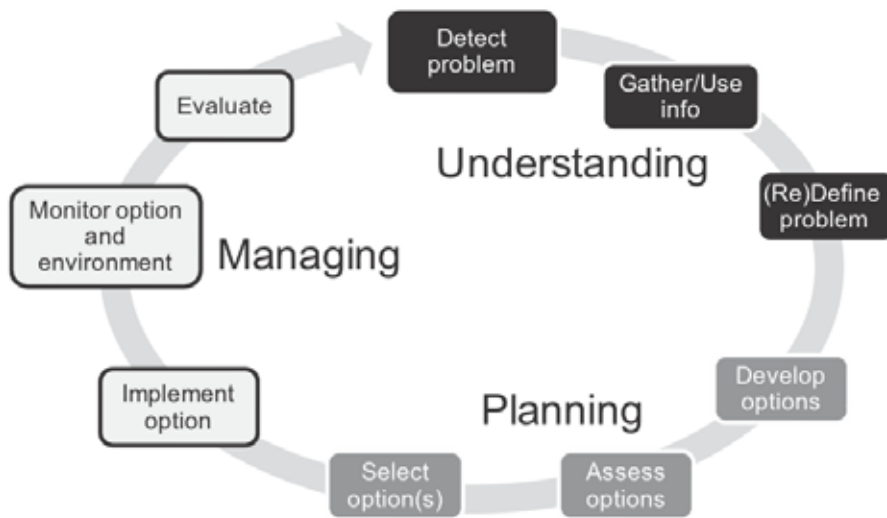


Figure 1. The Regional Framework proceeded generally through the Understanding and Planning phases of this normative model of adaptation decision-making.

model that appears to dominate much of the encouragement and support for adaptation planning (e.g., Glick, 2011). It undertook a risk-based and landscape-scale approach to adaptation. That is, the first orga-

nizing principle was *climate risk*—as opposed to, say, societal “sector,” such as agriculture or transportation. The second principle was to address adaptation at the scale of a “manageable landscape”—a watershed, ecoregion, or geographically distinct

region that shared more or less the same climate, geology, and so on. In this case, the landscape selected was two counties in northwest Oregon. The essential difference from the vulnerability assessment approach is the viewing of adaptation as a *systemic* problem rather than as a *particular* response to a specific anticipated disturbance.

However, the Regional Framework that resulted from the project is not a complete “adaptation plan,” for, as Weber notes, “a plan would contain detailed commitments and clear mechanisms for their implementation. The Regional Framework is a starting point” [p. 6]. The framework document concludes with consideration of next steps toward implementation, as of March 2015. Adaptation plans may arise out of future work based on this project.

2. Background: Research on Oregon coast professionals, climate change, and adaptation processes

To understand the views of Oregon coastal professionals regarding the effects of climate change, Oregon Sea Grant had conducted large (440 respondents total) opinion surveys in 2008 and again in 2012. The surveys were conducted as part of a larger strategy for communicating with and engaging coastal stakeholders in preparing for the effects of a changing climate. The approach derived from the discipline of communicating about risks (Morgan, Fischhoff, Bostrom, and Atman, 2002) such that understanding the risk perceptions, needs, and constraints of those facing the risks comes first. From that understanding, strategies to engage stakeholders can be implemented more effectively. This approach has been used by the Sea Grant team in both Oregon (Joe Cone and Goodwin, 2011; Joseph Cone, Rowe, Borberg, and Goodwin, 2012) and other states (J. Cone, Corcoran, Russo Kelly, and Winters, 2013; J. Cone, Rowe, et al., 2013).

The number of survey respondents (300 in 2008; 140 in 2012) together represents, we believe, the largest body of information collected to date in Oregon about the views of this broad category of “coastal professionals.” The professionals were targeted somewhat differently in the two surveys. In 2008 we solicited both private- and public-sector professionals; in 2012 our focus was on public-sector professionals and coastal elected officials (although we also received a minority of responses from those claiming “other primary

work affiliation”). Highlighted here are the responses from only public-sector professionals and elected officials; details of the respective surveys can be found in the 17-page 2008 analysis (Borberg, Cone, Jodice, Harte, and Corcoran, 2009)³ and the 12-page 2012 analysis (Winters, 2013).⁴

Relevant findings from the 2009 report:

- *Risks:* The most frequently cited risks associated with effects of climate change on the Oregon coast involved physical processes (for example, sea-level rise and erosion), followed by ecosystem effects and specific social and economic impacts.
- *Responses:* Few survey participants were ready to respond to climate change, with less than half stating that they were prepared, at the time of their 2008 response, to devote time and resources to climate change, and only one-third ready to be a leader on this issue.
- *Barriers:* People would be willing to take action in work if there were compelling information, new funding, and a sense of local urgency.
- *Information:* Coastal professionals had low amounts of information on climate change topics that they consider important for the performance of their work, with the

³ <http://seagrant.oregonstate.edu/sgpubs/analysis-survey-coast-decision-makers>

⁴ <http://seagrant.oregonstate.edu/sgpubs/coastal-climate-change-survey-results>

top information needs (in terms of importance versus amount) including climate change effects on community infrastructure, and effects of sea-level rise on shoreline protective structures.

Four years later, the overall picture had changed little.⁵ To summarize the relevant findings from the 2013 report:

- *Risks:* Most coastal professionals believed and were mostly sure that their communities will experience the local effects of climate change, but fewer than half (46%) reported involvement in adaptation planning (44% were not currently involved, and 11% skipped the question).
- *Responses:* Climate change planning ranked low on the list of priorities for coastal professionals, and most believed that while their professional efforts toward addressing climate change would benefit the community, a combination of governments and other organizations should initiate a local response to the likely effects of climate change.
- *Barriers:* Lack of agreement over importance of climate change effects and lack of urgency regarding climate effects were rated as the most significant hurdles to planning.

⁵ But note that the questions asked and the respondents who chose to answer were different between 2008 and 2012, which makes comparing results difficult.

- *Information:* Most-needed information included predictions of ecosystem impacts, social and economic vulnerabilities, flooding or saltwater intrusion, species and habitat vulnerability, the cost of climate adaptation, and how to communicate climate risks.

The Regional Framework project thus began with the recognition that in coastal Oregon, climate adaptation planning by local governments has been slow to take hold. Competing community priorities, unclear direction, limited access to information, and lack of urgency have been among the causes of delay. The majority of respondents, including both elected and other officials, believe that a combination of government and other organizations is the preferred way to initiate a community's response to planning for climate change. However, adaptation planning was occurring opportunistically and in piecemeal fashion. The status of adaptation planning in coastal Oregon was not different in 2013 from many other coastal locations in the United States, as indicated by survey research conducted by Sea Grant programs in eight other states (McIntosh and Cone, 2014). Particularly in a state with typically small, rural, coastal communities, as Oregon is, the challenges for governance institutions in addressing climate change may be extraordinary, when those institutions' capacity may be scarcely sufficient for addressing urgent and more-familiar issues.

The research literature on adaptation planning provided some practical guidance for the project design our team envisioned. The project team acted in agreement with one much-cited journal article, which

enumerated the following among key "lessons learnt":

Adaptation planning requires close collaboration of climate and impact scientists, sectoral practitioners, decision-makers and other stakeholders, and policy analysts (Füssel, 2007, p. 273).

More particularly, in 2009 a National Research Council (NRC) panel articulated six principles that they considered likely to effectively support climate decision-making: (1) begin with users' needs; (2) give priority to processes over products; (3) link information producers and users; (4) build connections across disciplines and organizations; (5) seek institutional stability; and (6) design [processes] for learning (National Research Council, 2009, p. 3). We designed the Regional Framework project in concert with these principles.

Regarding the NRC's "design for learning," we took to heart this insight from the 2014 National Climate Assessment:

There is no "one-size fits all" adaptation...Sharing best practices, learning by doing, and iterative and collaborative processes including stakeholder involvement, can help support progress (Bierbaum, 2014).

Indeed, *learning by doing, iterative and collaborative processes including stakeholder involvement*, were all elements of the workshop processes we designed and used (as described in p. 37 of the Framework report). We were persuaded that with the complex, multi-sectoral, multi-stakeholder, long-term challenge that climate adaptation represents, some kind of collaborative learning

(Daniels and Walker, 2001) among participants over time is essential. We were encouraged by prior research that demonstrated the more satisfactory public outcomes that can come from processes in which learning together is explicitly valued (Conway, 2006; McDaniels and Gregory, 2004).

Learning together would be good to value. But what were the expected impediments to that learning? We were deliberately trying to address challenges both of the kind referred to as "cross-scale" and "cross-level" (Cash et al., 2006). "Scale" is the dimension used to measure and study any phenomenon (e.g., a yardstick; governance jurisdictions), while "level" is the unit of analysis at different points on the scale (e.g., inches; federal-state-county-city-neighborhood). So, addressing climate change, as was envisioned for the project, would involve cross-scale "mismatches" (such as, could the broad "regional" climate-change science projections that are available be focused to the jurisdictional scale of counties?). Also present would be cross-level challenges associated with diverse, "plural" actors. Could the different governmental jurisdictions—federal, state, local—collaborate on a joint framework? More particularly, could federal and state agencies, which can be thought of as "single-purpose entities," interact effectively with local governments, which can be thought of as "multi-purpose entities"?⁶

Part of our approach to these challenges was to leverage the reputation of Oregon Sea Grant (OSG) as a "boundary organization" (Guston,

⁶ The single- vs. multiple-purpose frame was articulated to the research team by Jeff Weber.

2001), bringing together the diverse parties in a neutral workshop context, in which learning together would be an explicit objective, and where all governance organizations and their participants would be treated equally in the process.



3. Objectives of project research

The OSG research team⁷ conducted surveys and interviews of project participants to understand their needs and interests and to help create the workshop’s collaborative learning opportunities.

Relative to the risks outlined in the *Oregon Climate Change Adaptation Framework* (Oregon

⁷ Roles—survey implementation: Johnson; interviews: Stevenson, Johnson (pre-workshop); Duncan (post-); leadership: Cone.

Department of Land Conservation and Development, 2010) prior to the workshops, the research team wished to determine: participant risk priorities and adaptation objectives; participants and their agencies’ barriers/hurdles precluding attaining those adaptation objectives; and participant information or other resources needed to overcome those barriers/hurdles. Following the workshops, the research team wished to discover how successful

the Regional Framework workshops were in providing the support for climate decision-making articulated by the NRC (2009), in particular whether the workshops led to participant learning and engagement, whether participants felt they were closer to overcoming barriers to adaptation activities, and whether the workshops provided the information and connections to engage in climate adaptation activities.



4. Methods and Results

A. Pre-workshop survey and interviews

In order to fulfill our objectives in developing the workshops, and to understand and evaluate participant engagement in this landscape-level climate adaptation process across federal, state, and local governmental agencies and staff, the OSG research team conducted an online pre-interview survey and an initial interview of potential participants. Participant recruitment was not random: potential participants identified were federal, state, and local government agency personnel who had jurisdictional oversight over Clatsop and/or Tillamook Counties, in part or in whole; whose employer agency has a role in climate change adaptation (generally, natural resource agencies); and who were likely to have a personal and professional interest in climate change adaptation priorities along the north coast. The list of potential participants was developed by the research team with help from Regional Framework co-leader Jeff Weber.

Following approval of our research plan by the Oregon State University Institutional Review Board, a group of about 20 individuals thought likely to be interested in being involved in the workshops were asked to take the online survey and, after the survey, consent to be interviewed. The survey was developed and implemented using Qualtrics software. Eleven individuals took the online survey; 15 were interviewed. The results of the survey and interviews were used

to inform the background and basis of the first Regional Framework workshop.⁸ We summarized our findings in a presentation at the first workshop, noting that it came from participants' peers in the room:

- *Risks:* The top five risks to the north coast (Tillamook and Clatsop counties) associated with climate change identified by the interviewees were: sea-level rise, changes in stream flow levels, socio-economic effects on the coastal communities, increased fire disturbance events, and animal species shifts due to changing ecosystem conditions.
- *Responses:* Based on the interviews, this subset of respondents from this area were more involved than respondents to our 2008 and 2012 surveys—only a couple said they weren't involved in adaptation planning. However, the majority were at the understanding phase (cf. Figure 1), and only a handful were at the planning phase. No one was implementing a plan.
- *Barriers:* Hurdles to adaptation implementation were consistently reported as lack of urgency regarding climate effects, that other pressing issues were all-consuming for their agencies, and that there was a lack of agreement over the importance of climate change effects (including uncertainty over if it's a local challenge).

⁸ The pre-workshop online survey and interview questions are in Appendices 2 and 3, respectively.

- *Information:* The resource managers for the north coast, across all three levels of governance (federal, state, and local), listed the following information needs as extremely important for their work: Likelihood of different climate risks and how to prioritize the risks; long-term local climate projections; the nature and degree of flooding risk; sea-level rise; and climate change adaptation costs. These were the same answers as those given in the OSG 2012 survey. Other topics, such as ocean acidification or wildfires, were noted as important to the work of some people but not others.

B. Review of participation in workshops

Workshop sign-in rosters indicate that 84 individuals attended at least one workshop; that 84 does not include the seven members of the project team from OSG and Oregon Coastal Management Program. Sixteen of those 84 individuals attended all three workshops. There were 25 federal government employees across 11 agencies that attended at least 1 meeting; only 1 attended all 3; 29 state government employees across 12 state agencies participated in at least 1 meeting; 4 (from 3 agencies) participated in all 3. In addition, 16 participants came from 7 local government bodies; all 16 came to the first meeting and 8 (from 6 local governments) participated in all 3 meetings. Seven participants came from university or community

	Mtg 1 only [7/14/ 2014]	Mtg 2 only [9/16/ 2014]	Mtg 3 only [11/18/ 2014]	Mtg 1&2	Mtg 1&3	Mtg 2&3	All 3 Mtgs	Total	Total attended*		
									Mtg 1	Mtg 2	Mtg 3
Federal	13	1	2	4	2	2	1	25	20	8	7
State	5	3	4	5	4	4	4	29	18	16	16
Local	8						8	16	16	8	8
Uni/CC	2	3	1				1	7	3	5	3
NGO	3	1				1	2	7	5	4	3
Total	31	8	7	9	6	7	16	84	62	41	37

Figure 2. Meeting participation by organizational affiliation.

*Approximately 100 individuals were invited to each workshop, though the list changed slightly for the second and third meetings, as replacements or alternates were identified.

college (1 each represented); 1 participated in all 3 meetings. Seven came from 5 non-governmental organizations or as private citizens; 2 of these individuals came to all 3 meetings. Figure 2 summarizes.

C. Post-workshop survey

Following the workshops and the subsequent distribution of a final draft of the Framework itself, all individuals who had expressed interest in the project, including all workshop participants, were invited to take an online survey. Survey questions were designed to determine whether participants felt the workshops were ultimately useful for them, whether they were moved closer to implementing adaptation actions, and what hurdles remained.⁹ The post-workshop questions were not identical to the pre-workshop questions.

Forty-one of the 123 invited individuals submitted a completed survey—a nominal response rate of 33 percent. The following discussion refers only to those 41 submitters. Survey respondents were heavily represented by participants from

⁹ Post-workshop survey questions are Appendix 4.

state government: 17 of the 41 total. Eight respondents were from the federal government, 9 were from local government, 4 were from universities or community colleges, 2 were from nonprofits, and 1 reported out as a private citizen. The survey did not ask for the name of the organization the respondents represented, only if they were federal, state, local, non-profit, or “other,” with an opportunity to fill in the nature of the organization. Twelve respondents reported that they attended all 3 workshops; 4 of these were from state government, 6 were from local government, 1 was from a nonprofit, and 1 came as a private citizen. No federal government workers came to all 3. Recall from Figure 2 that 16 individuals attended all 3 workshops; this means that 75% (12/16) of participants in all 3 workshops responded to the survey. Seventeen respondents reporting coming to 2 meetings, 10 reporting going to 1 meeting, and 2 either did not go to any of the 3 meetings or did not disclose which meetings they attended. Overall, 46 percent of those who attended at least 1 meeting responded to the

survey¹⁰—a very positive response rate. Figure 3 summarizes.

A majority of survey respondents found the workshops useful in several dimensions. Thirty-two (78%) respondents indicated the workshops were useful to them. Twenty-eight (68%) found the workshops useful for their agency. Twenty-five (61%) found the workshops useful to address climate change adaptation in the Tillamook-Clatsop region. See Figure 4. Thirty-eight (92%) of the respondents felt their understanding of climate change priority-setting changed at least slightly as a result of the workshops.

One multiple-choice question asked how far the project went in developing a framework that partners can use to align their climate adaptation efforts. One individual picked the response, “We’re there now.” Twenty (49%) believe that “we’re much closer than before the project.” The other 19 (46%) do not believe much progress has been made; however, only one respondent said they “don’t see that

¹⁰ The math: 12 (3 meetings) + 17 (2 meetings) + 10 (1 meeting) = 39 attendees of at least one meeting *and* responded to the survey among 84 total meeting participants. 39/84= 46%.

	Mtg 1 only [7/14/ 2014]	Mtg 2 only [9/16/ 2014]	Mtg 3 only [11/18/ 2014]	Mtg 1&2	Mtg 1&3	Mtg 2&3	All 3 Mtgs	None marked	Total	Total attended		
										Mtg 1	Mtg 2	Mtg 3
Federal			1	3	2	2			8	5	5	5
State	2	2	2	2	2	3	4		17	10	11	11
Local				1	1		6	1	9	8	7	7
Uni/CC	1	2						1	4	1	2	
NGO						1	1		2	1	2	2
Private citizen							1		1	1	1	1
Total	3	4	3	6	5	6	12	2	41	26	28	26

Figure 3. Self-proclaimed organizational affiliation by meeting participation of survey respondents.

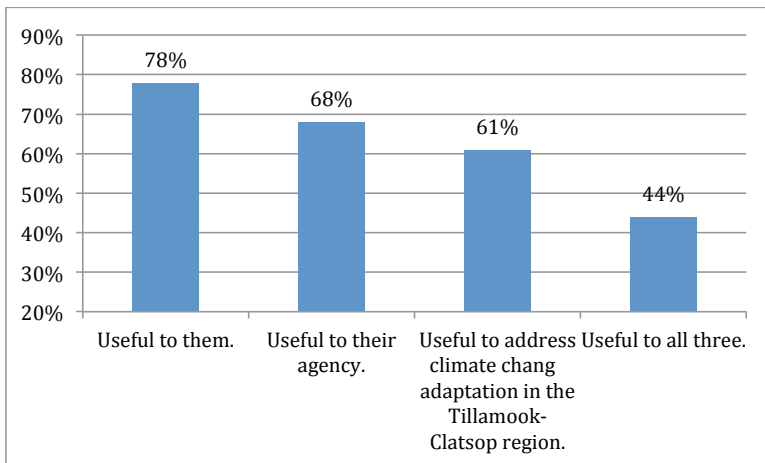


Figure 4. Respondents report how they found the workshops useful.

happening.” Nevertheless, 18 (44%) of the respondents felt they “will use the final version of the alignment framework in [their] work.”

Looking to the future, respondents articulated several hurdles for full utilization of the framework. Thirty-three respondents responded to the open-ended question, “What big hurdle or hurdles remain for your organization in implementing the adaptation objectives in the framework on the north coast?” Respondents focused primarily on two types of hurdles: Global or universal types of barriers, and framework-specific hurdles. Overarching concerns were finding time (9%), funding (33%),

staff (12%), and political will (6%) to implement the framework or take steps to address climate change adaptation strategies. Several respondents expanded on those themes by noting such challenges as: capacity for outreach to community members is limited; staff are unfamiliar with and unaccustomed to long-term planning activities; and “balancing attention to a ‘slow-moving’ risk, like climate change, with effects of risks on shorter timescales.”

D. Post-workshop interview findings

Semi-structured interviews were conducted with participants in the

Regional Framework project workshops to collect more information on the strengths and weaknesses of the project and afford comparison to survey results. Prospective interviewees were identified by the project co-leads. Nine interviews were conducted by a research assistant previously uninvolved in the project. Four representatives from local government, four from state government, and one nongovernmental representative were interviewed after the final workshop and after the distribution to them of the final draft of the Regional Framework report (Weber, 2015). The interviews were recorded, transcribed, and analyzed using qualitative research software (Dedoose.com).

When asked how important climate change adaptation was to their work, interviewees gave answers ranging from “it’s very important” to noting that, while they have no formal adaptation requirement, “there’s a great deal of political support,” for adaptation work. All, however, accorded to adaptation some degree of importance. Interviewees further indicated a willingness to continue the adaptation framework process, partnering with other institutions

to plan and enact adaptation efforts. Four interviewees indicated that they were already taking action (or planning to) on their own initiative. The other five expressed a desire for an outside party (possibly those who organized the project) to continue taking the lead in aligning the different governance levels. Five interviewees expressed hope that documentation of the workshops would help galvanize support for climate adaptation action and for improving planning. All interviewees attached importance to follow-up adaptation efforts, either taken independently or spearheaded by others. “The fate of so many reports,” said one interviewee, “is that they wind up on a shelf. There needs to be support to make sure workshop outcomes are applied in the counties.”

Interviewees cited a variety of potential barriers to follow-up action, which echoed barriers identified in the post-workshop surveys, including funding constraints, lack of institutional mandate for action on climate change, and competition for institutional resources with coastal issues that already have governmental responses being implemented, such as tsunamis and invasive species. One interviewee noted that his/her institution was “more concerned about the things that could happen overnight, while climate change is a slowly evolving condition.” Two interviewees also noted climate change skepticism as a barrier to action. According to one, “We can’t financially spend time on [climate change] till it’s a proven or more highly accepted concept.... We think it’s an important part, but until

everybody else gets around to it, then we really can’t do anything about it.”

When asked, six interviewees indicated that they would have wanted to see more local representatives at the meetings. Interviewees suggested county commissioners, land use planners, and representatives of local tribes, water districts, and forestry and agricultural concerns as candidates for similar workshops in the future. Interviewees said that local representatives would be in a good position to disseminate information about climate change and adaptation efforts to coastal communities and to

“Climate change is so complex,” said one interviewee, “looking at it through the lens of partnerships is really, really useful.”

generate more local understanding and support. “I would like this [adapting to climate change] to become a driveway conversation with my neighbors,” said one interviewee.

The call for local involvement came with some caveats, however, as one interviewee suggested that “some of the folks at the county level are not so keen on the notion of climate change.” Another interviewee noted that while the design of the project’s daytime workshops was appropriate to the target group of public employees, evening or Internet-based meetings might be better for a broader audience.

Additionally, three interviewees indicated that there should have been more upper-level “decision-makers” at the workshops, and that having upper-level buy-in would encourage participation. Interviewees suggested that their own experiences at the workshops might spark interest from

decision-makers in their respective institutions. This, they noted, could lead to action on the part of their institutions and the possibility of participation at the decision-making level.

Eight of nine interviewees expressed approval of the design and conduct of the workshops, especially the working group sessions. These interviewees further indicated that their contributions at the workshops were taken seriously by their fellows. Criticisms mostly revolved around time management, with four interviewees indicating that there was not enough time for attendees to accomplish the goals of the workshops in a satisfactory manner. All four

acknowledged, however, that the alignment process took place under a restricted time frame (and one expressed explicit appreciation for that fact). One interviewee suggested that future alignment efforts either add a fourth workshop to the original three or spend less time on introductions during the first meeting.

Interviewees indicated that participation in the Regional Framework process enhanced their awareness of the interests and capabilities of fellow participants and the institutions they represented. While some interviewees did express an interest in the workshops’ dissemination of climate science, the more common theme was interest in fellow interviewees and opportunities for future adaptation action. “Climate change is so complex,” said one interviewee, “looking at it through the lens of partnerships is really, really useful.”

5. Discussion

On the Oregon coast, progress to confront the spectrum of climate change effects has been slow, although communities and individuals are addressing piecemeal some pressing concerns, such as extreme coastal erosion and the effects of ocean acidification on shellfish production. Lack of funding, inadequate staff time, and misaligned prioritization of risks are cited as common hurdles to adaptation. Perhaps more challenging, Oregon coast professionals cite a lack of urgency in preparing for the spectrum of climate change effects identified in the Regional Framework. Despite this, some progress is being made. Both the pre-workshop interviews and the agency status reports on their climate activities, presented during the first workshop,¹¹ demonstrate that a contingent of professionals responsible for this Oregon coastal region is working on or toward climate adaptation. Most indicated that their organization was in the understanding phase of climate adaptation.

Post-project interviews and surveys suggest that this Regional Framework project has helped to build on these existing efforts. The workshops helped identify priority risks, management objectives to address those risks, and actions that could be taken in response, and developed what could be the formation of a network of Oregon

coastal professionals around climate adaptation.

Evaluated against the principles of the National Research Council (NRC) for supporting decisions around climate adaptation, our research results suggest that the project was largely successful. If a network for decision support is seen as a continuous rather than binary process (i.e., *it was achieved or not achieved*), the workshops and participant recruitment process have laid a foundation for future adaptation by incorporating nearly all of the NRC's recommendations:

- (1) *begin with user needs*: revealed by pre-workshop surveys and interviews, and used to design workshops
- (2) *give priority to process over products; and (3) link information producers and users*: post-workshop survey and interviews indicate these principles were followed and helpful
- (4) *build connections across disciplines and organizations; and (6) design processes for learning*: specifically commented on positively in post-workshop survey and interview responses.

That said, opportunities for improvement are recognized; for example, that the process of developing management objectives for adaptation in the workshops had felt rushed and perhaps not sufficiently understood by participants. Some respondents to the post-workshop survey thought a

few more meetings would be useful, as would a clearer description of the “expected path” and final product of the project early on. By and large, however, respondents were positive, suggesting that future efforts should ensure more stakeholders are in the room, such as more elected officials and policy makers, private sector representatives, and local water managers/operators.

The one clear outlier to date among the NRC principles was number (5), *seek institutional stability*, which the NRC elaborates as

Decision support systems need stable support. This can be achieved through formal institutionalization, less formal but long-lasting network building, establishing new decision routines, and mandates, along with committed funding and personnel. Stable decision support systems are able to obtain greater visibility, stature, longevity, and effectiveness (National Research Council, 2009, p. 40).

By this definition, “institutional stability” may be desired but has not yet been achieved collectively for the Regional Framework participants. Participants gained familiarity with others, and a “network” may be nascent, but commitments are harder to see. Some participants may not have been in a position to enact follow-through. In any event, no “champion” immediately came forward to lead the participants and

¹¹ Those agency status reports are available online at <http://www.oregon.gov/LCD/OCMP/pages/publications.aspx>

their colleagues beyond this framework effort.¹²

Ongoing leadership is a recognized challenge in climate adaptation. From the start of this project, the project team from Oregon Sea Grant and the Oregon Coastal Management Program recognized that future action would require commitments by some critical mass of participants and (or perhaps “or”) the dedication of a few leaders who would champion the framework. The 2012 Oregon Sea Grant survey found that both Oregon coastal elected officials and other professionals overwhelmingly believe that a combination of government and other organizations should “initiate a local response to the effects of a changing climate” (Winters, 2013, p. 7). A directive from the Oregon governor to agency directors, or those directors to their staffs, to participate in the framework process might have been helpful to increase the motivation of State participants.

We note that half (8) of the participants in our project follow-up survey who came to all 3 meetings were from the “local” sector. By comparison, only 1 participant from the federal government (out of 25) came to all 3 meetings. State participation for all 3 meetings was in between these: Only 4 participants of 29

12 The framework project co-leaders, Weber and Cone, both retired in April 2015, and who might succeed them in their programs was uncertain.

total came to all 3 meetings.¹³ These findings may suggest that locals feel a greater stake in what is, after all, an issue for particular places. While we’re not certain why all the federal and state officials chose not to sustain participation in the meetings, it likely makes sense, going forward, to look first to local leadership. That said, local *governments* are distinctly different from other participating entities and have their own participatory challenges.

They are multi-purpose and multi-function entities. This should significantly affect the basis for evaluating their actions. State and federal agencies generally have one single purpose or mission, which makes [climate] adaptation a much simpler thing to address.¹⁴

Although leadership is crucial for both initiating adaptation and maintaining momentum over time, leaders need not be in a “formal” position nor restricted to one or two individuals. Rather, informal leadership on the part of many is what is often required to maintain the adaptation initiative long term, as turnover, attrition, and waning interest likely will become factors (Moser and Eckstrom, 2010).

Interview responses indicated that local stakeholders are in the unique position of being able to garner local support for understanding and adapting to the local risks associated

13 Individuals who came to all three meetings appeared to be highly invested in the framework process, as 75% of them chose to complete the post-workshop survey, compared to 33% of the total population of interested parties invited to take the survey.

14 Jeffrey A. Weber, 25 March 2015. Personal communication to Joe Cone.

with climate change. Focusing future efforts at the local level and engaging more local stakeholders may catalyze the leadership necessary for further planning and implementation of climate adaptation in the two-county region.

Other hurdles, including funding; prioritization of other acute impacts (e.g., tsunami and invasive species); policies that restrict what kind of work can be done, when and where; and general lack of institutional capacity were expressed in post-workshop interviews. Local capacity is lacking in terms of resources to pursue large-scale adaptation endeavors, and in some cases a new or revised institutional approach to adaptation is necessary. Addressing the overall lack of resources was well beyond the scope of this project, though it might have been helpful to have been more explicit that climate change does not necessarily or always require a new suite of activities. For example, forest thinning to reduce wildfire, or riparian restoration to reduce stream temperatures, is intended to improve conditions today and likely will do so in a changing climate.

Future research may explore, in more depth and detail, the relationship between the stages of adaptation in different organizations (understanding, planning, implementing) and their dedication to a project such as this. Ways to improve local capacity through leadership could be another focus of research, as this leadership is needed. Lastly, future projects of this kind may consider a stronger research emphasis on overcoming adaptation hurdles and taking action.

Works Cited

- Bierbaum, R., A. Lee, J. Smith, M. Blair, L. M. Carter, F. S. Chapin, III, P. Fleming, S. Ruffo, S. McNeeley, M. Stults, L. Verduzco, and E. Seyller. 2014. Ch. 28: Adaptation. *Climate Change Impacts in the United States: The Third National Climate Assessment*. U.S. Global Change Research Program.
- Borberg, Jenna, Joe Cone, Laurie Jodice, Michael Harte, and Patrick Corcoran. 2009. *An Analysis of a Survey of Oregon Coast Decision Makers Regarding Climate Change*. Corvallis, OR: Oregon Sea Grant. ORESU-S-09-001.
- Cash, David W., W. Neil Adger, Fikret Berkes, Po Garden, Louis Lebel, Per Olsson, Lowell Pritchard, and Oran Young. 2006. Scale and Cross-Scale Dynamics: Governance and Information in a Multilevel World. *Ecology and Society* 11(2):8 [online] URL: <http://www.ecologyandsociety.org/vol11/iss12/art18/>.
- Cone, J., P. Corcoran, M. Russo-Kelly, and K. W. Winters. 2013. *Climate Field Notes*. Corvallis, OR: Oregon Sea Grant. ORESU-T-13-002.
- Cone, J., Shawn Rowe, J. Borberg, E. Stancioff, B. Doore, and K. Grant. 2013. Reframing Engagement Methods for Climate Change Adaptation. *Coastal Management* 41(4):345–360. doi: 10.1080/08920753.2013.803926
- Cone, Joe, and Briana Goodwin. 2011. *Working Group Considers Effects of a Changing Climate: A Report to the Port Orford Community*. Corvallis, OR: Oregon Sea Grant. ORESU-W-10-002.
- Cone, Joseph, Shawn Rowe, Jenna Borberg, and Briana Goodwin. 2012. Community Planning for Climate Change: Visible Thinking Tools Facilitate Shared Understanding. *Journal of Community Engagement and Scholarship* 5(2):5–17.
- Conway, Flaxen. 2006. Sharing Knowledge, Power, and Respect: Keys in Bringing Communities Together. *Journal of Higher Education Outreach and Engagement* 11(1):133–143.
- Daniels, Steven E., and Gregg B. Walker. 2001. *Working through Environmental Conflict: The Collaborative Learning Approach*. Westport, CT: Praeger.
- Füssel, H. M. 2007. Adaptation planning for climate change: Concepts, assessment approaches, and key lessons. *Sustainability Science* 2(2):265–275. doi: 10.1007/s11625-007-0032-y
- Glick, P., B. A. Stein, and N. A. Edelson, eds. 2011. *Scanning the Conservation Horizon: A Guide to Climate Change Vulnerability Assessment*. Washington, D.C.: National Wildlife Federation.
- Guston, David H. 2001. Boundary Organizations in Environmental Policy and Science: An Introduction. *Science, Technology, and Human Values* 26(4):399–408.
- McDaniels, Timothy L., and Robin Gregory. 2004. Learning as an Objective within a Structured Risk Management Decision Process. *Environmental Science and Technology* 38(7):1921–1926.
- McIntosh, Neal, and Joe Cone. 2014. Responding to the Effects of Coastal Climate Change: Results of a National Sea Grant Survey. Corvallis, OR: Oregon Sea Grant. ORESU-S-14-001.
- Morgan, M. Granger, Baruch Fischhoff, Ann Bostrom, and Cynthia J. Atman. 2002. *Risk Communication: A Mental Models Approach*. New York: Cambridge University Press.
- Moser, S. C., and J. A. Ekstrom. 2010. A framework to diagnose barriers to climate change adaptation. *Proceedings of the National Academy of Sciences* 107(51):22026–22031. doi: 10.1073/pnas.1007887107
- Moser, Susanne C. 2009. Making a difference on the ground: The challenge of demonstrating the effectiveness of decision support. *Climatic Change* 95(1–2).
- National Research Council. 2009. *Informing Decisions in a Changing Climate*. Washington, D.C.: The National Academies Press.

Oregon Department of Land Conservation and Development. 2010. *The Oregon Climate Change Adaptation Framework*. Salem, OR: DLCDD.

Preston, Benjamin L., Richard M. Westaway, and Emma J. Yuen. 2010. Climate adaptation planning in practice: An evaluation of adaptation plans from three developed nations. *Mitigation and Adaptation Strategies for Global Change*, 16(4):407–438. doi: 10.1007/s11027-010-9270-x

Weber, Jeffrey A. 2015. *Regional Framework for Climate Adaptation: Clatsop and Tillamook Counties*. Corvallis, OR: Oregon Sea Grant. ORESU-H-15-003.

Winters, K. W. 2013. *Coastal Climate Change: Survey Results for Oregon 2012*. Corvallis, OR: Oregon Sea Grant. ORESU-S-13-001.



Appendices

- 1. Executive Summary of Regional Framework report*
- 2. Pre-workshop survey questions*
- 3. Pre-workshop interview questions*
- 4. Post-workshop survey questions*
- 5. Post-workshop interview questions*

Appendix 1

Regional Framework for Climate Adaptation: *Clatsop and Tillamook Counties*

Executive Summary

Climate change is a landscape-scale problem that calls for landscape-scale solutions. This Regional Framework is a proof-of-concept to implement a risk-based and landscape-scale approach to planning for changes in Oregon's climate and the effects of those changes on resources, assets, and communities in Clatsop and Tillamook Counties on the north coast of Oregon.

This Regional Framework is designed to help communities, land managers, and people in Clatsop and Tillamook Counties identify and revise policies, standards, criteria, and management practices that may underestimate risks to people, property, resources, and infrastructure from future climate conditions. Underestimating risk can result in unanticipated costs to individuals and communities.

This framework builds on Oregon's state-level Climate Change Adaptation Framework. It is based on an overview of downscaled climate projections *specific to the region* and expert presentations about the effects of projected changes on natural systems in Clatsop and Tillamook Counties. By emphasizing the climate science that applies to the region, the framework will help communities focus on real risks.

To develop the Regional Framework, the Oregon Coastal Management Program (OCMP) and Oregon Sea Grant (OSG) invited federal and state agencies, local governments, and

non-governmental organizations to a series of three meetings to identify priority climate risks for the region, management objectives to address those risks, and mechanisms and actions to implement the management objectives. Most of the framework was developed by four work groups, which were organized around *management regimes* for infrastructure, public health and safety, natural systems, and working lands.

Priority climate risks and management objectives to address those risks are at the center of the framework. Priority climate risks identified for Clatsop and Tillamook Counties are:

- Sea-level rise and coastal erosion
- Increased flooding
- Changes in hydrology
- Increased forest fires
- Increased average temperatures

After identifying the priority risks for the region, the work groups developed a set of management objectives for adaptation to address the anticipated effects of the priority risks within each management regime. The overarching management objective for each management regime is

Infrastructure: Manage risks to infrastructure from flooding, wildfire, and changes in stream hydrology and ocean water levels to ensure safe, reliable services

Public health and safety: Reduce risks of illness, injury, death, and property damage from flooding, wildfire, and heat events.

Natural systems: Develop and implement coordinated management strategies that enhance, protect, and restore high-quality and important habitats to mitigate the effects of higher temperatures, changes in hydrology, and changes in ocean chemistry and water levels.

Working lands: Manage the use of working lands to sustain production of food and fiber (forest, farm, and fishing activities) with projected changes in average temperatures, precipitation, and stream hydrology.

Each of these overarching objectives is expanded upon with a set of more-detailed objectives. In all, the framework contains almost fifty management objectives for adaptation, and implementation mechanisms and suggested actions to achieve each objective.

The next phase in developing and implementing the framework will rely on endorsement and support by the agencies and communities that have management responsibilities in northwest Oregon. These are the same entities that developed the framework. At the practical level, the next step is to continue regional-level collaboration to resolve conflicts, if possible, between some of the adaptation objectives. Development of this framework highlights a gap in our current structures for

governance for addressing important—some would say critically important—landscape-scale issues such as climate change. Finally, to continue the momentum behind this framework, an important task will be to identify *key actions* and *lead actors* for each of the adaptation objectives.

The management objectives state what needs to be done, and the implementation mechanisms suggest how the objectives can be achieved; but no entity has continuing oversight or dedicated resources to ensure the objectives actually

get implemented. A mechanism is needed at the regional level to foster overall implementation of the framework. An important action in implementing the framework will be to consider establishing a regional ad-hoc body or intergovernmental mechanism to oversee its implementation. The first task that the team should take on would be to identify priority actions, or “low-hanging fruit,” among the suggested actions, and to identify champions or lead entities for priority management objectives.

This Regional Framework *is not a plan*. A plan would contain detailed commitments and clear mechanisms for their implementation. The Regional Framework is a starting point. In time, the experience of implementing the framework, and refining, updating, and adapting it as warranted, would lead to distinct public benefits in collectively preparing for and responding to the effects of a changing climate on the north Oregon coast. That would be a success worth striving for.

Appendix 2

Pre-workshop survey questions

On first page of survey:

I acknowledge I have read and understood the contents of this form, and have been given full opportunity to discuss the implications of this consent of my own free will.

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>



EXPLANATION OF RESEARCH

Project Title: Interviews and survey to help identify climate change adaptation priorities at a landscape level in Oregon
Principal Investigator: Monty Johnson,
Co-Investigator(s): Joseph Cone, John Stevenson, Kirsten Winters
Sponsor: NOAA
Version Date: 2/21/2014

Purpose: You are being asked to take part in a research study. The purpose of this research study is to align state and federal agency climate change adaptation priorities within a specific landscape – in this case, Clatsop and Tillamook counties on the north Oregon coast. This project, we hope, will improve the foundation, available resources, and capacity for local governments (cities, counties) to implement adaptation measures.

Activities: The study activities include a 17 question online survey, and short pre- and post-project interviews. (Not a part of the research is two (or perhaps three) workshops that will follow the initial interviews, probably in mid-2014.)

Time: Your participation in the initial online survey and each of the interviews (pre-project and post-project interviews) should take approximately half an hour each.

Risks: There are no foreseeable risks to participating. Responses will be kept confidential. Your name will not be associated with your online survey or interview responses. The interview will be recorded for later analysis, but your name will not be recorded and the interview will only be identified by an interviewee number. Audio recording is optional, but will improve the study. **Internet, online survey and email:** "The security and confidentiality of information collected from you online cannot be guaranteed. Confidentiality will be kept to the extent permitted by the technology being used. Information collected online can be intercepted, corrupted, lost, destroyed, arrive late or incomplete, or contain viruses."

Benefit: We do not know if you will benefit individually from being in this study. However, our intent for this project is to provide a stronger, clearer geographic, scientific, and institutional context for local communities and state and federal agencies to adopt measures to address climate adaptation priorities. This should make climate adaptation more streamlined at all levels of government.

Payment: You will not be paid for being in this research study.

Confidentiality: It is possible that others could learn that you participated in this study but the information you provide will be kept confidential to the extent permitted by law.

Voluntary: Participation in this study is voluntary. You are free to skip any survey or interview questions that you would prefer not to answer, although it would be most helpful if the survey and interviews were completed.

Study contacts: If you have any questions about this research project, please contact: Monty Johnson, monty.johnson@oregonstate.edu or 541-737-2748. If you have questions about your rights or welfare as a participant, please contact the Oregon State University Institutional Review Board (IRB) Office, at (541) 737-8008 or by email at IRB@oregonstate.edu

1. What is your job title (or public role) as it relates to a changing climate?

[one-line write-in]

2. How many years have you served in your current organizational capacity?

[numerical write-in]

3. In an average week, approximately what percentage of your work deals with management issues relating to the coast?

<input type="checkbox"/>	<i>Under 20% (less than 1 day)</i>
<input type="checkbox"/>	<i>21-40% (1-2 days)</i>
<input type="checkbox"/>	<i>41-60% (2-3 days)</i>
<input type="checkbox"/>	<i>61-80% (3-4 days)</i>
<input type="checkbox"/>	<i>Over 80% (more than 4 days)</i>
<input type="checkbox"/>	<i>Don't know</i>

4. How do you think climate change may change the local conditions and features of the natural environment in your area of responsibility? Even if you have not previously considered the potential effects of climate change on your community or region, please offer your best estimate. (Please select one per row: scale?).

	Likely Increase	Stay the Same	Likely Decrease	Don't Know	Not Applicable
<i>Air temperatures</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Ocean temperatures</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Ocean acidification</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Stream temperatures</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Precipitation</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>water supplies</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Flooding</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Rate of sea-level rise</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Storm frequency and/or intensity</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Shifts in geographic ranges of land species</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Drought, Wildfire</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Occurrence of algae blooms</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Other (please specify)</i> _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. Please review the following examples of information as they relate to a locally changing climate. First, rate the importance of that type of information to your work (Scale: Extremely important, moderately important, slightly important, not at all important. Please select one per row).

	Extremely Important	Moderately Important	Slightly Important	Not at all Important
<i>Short-Term Local climate projections: seasonal to annual</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Longer-Term Local climate projections: decadal to century</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Likelihood of different climate risks, and priority risks for the community</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Sea-level rise</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Shoreline change</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Flooding or saltwater intrusion</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Predictions of ecosystem impacts</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Ocean acidification</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Spread of invasive species</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Species and habitat vulnerability</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Drought risk</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Wildfire risk</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Heat wave and freezing spells</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Social vulnerability</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Economic vulnerability</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Cost of climate risks/climate-related natural hazards</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Cost of climate adaptation</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Other type of information and importance (please specify)</i> :_____:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. Again, review these same items of information as they relate to a locally changing climate. Now, indicate the amount of information you have on each item.

	all of what I need	most of what I need	some of what I need	none of what I need	don't need this information
<i>Short-Term Local climate projections: seasonal to annual</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Longer-Term Local climate projections: decadal to century</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Likelihood of different climate risks, and priority risks for the community</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Sea-level rise</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Shoreline change</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Flooding or saltwater intrusion</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Predictions of ecosystem impacts</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Ocean acidification</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Spread of invasive species</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Species and habitat vulnerability</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Social vulnerability</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Economic vulnerability</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Cost of climate adaptation</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Other type of information and importance (please specify)</i> _____.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. Regarding communicating climate risks with those of backgrounds different from your own, how much information do you have?

all of what I need	most of what I need	some of what I need	none of what I need	don't need this information
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. What is your agency's number one priority for climate-change adaptation?

[one-line write-in]

9. Do you know why that's the number one priority?

[one-line write-in]

10. At what geographic scale is this the priority?

Federal	State	Regional	County	Landscape	Watershed
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. Does your agency have different priorities at different geographic scales? For example, the adaptation priorities at the State level differ from priorities at the county or landscape level.

Yes	No	Don't Know	Not Applicable
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12. If you know what your agency considers its priority climate risk on the north Oregon coast, write it below.

[one-line write-in]

13. As you've considered, or become involved in, climate adaptation planning, you may have encountered hurdles—defined as obstacles that can be overcome. What hurdles come to mind, maybe your top two or three, and have you overcome them?

	Hurdle	Overcome?	
<i>Unclear that climate change effects present a local problem</i>	<input type="checkbox"/>	Y <input type="checkbox"/>	N <input type="checkbox"/>
<i>Unclear what the priority climate risks are to my community</i>	<input type="checkbox"/>	Y <input type="checkbox"/>	N <input type="checkbox"/>
<i>Lack of agreement over importance of climate change effects</i>	<input type="checkbox"/>	Y <input type="checkbox"/>	N <input type="checkbox"/>
<i>Lack of access to scientific information to define problem</i>	<input type="checkbox"/>	Y <input type="checkbox"/>	N <input type="checkbox"/>
<i>Lack of know-how to analyze relevant information that is available</i>	<input type="checkbox"/>	Y <input type="checkbox"/>	N <input type="checkbox"/>
<i>Lack of trust in available science</i>	<input type="checkbox"/>	Y <input type="checkbox"/>	N <input type="checkbox"/>
<i>Climate change effects don't appear to require our response</i>	<input type="checkbox"/>	Y <input type="checkbox"/>	N <input type="checkbox"/>
<i>No legal mandate to take climate change impacts into account</i>	<input type="checkbox"/>	Y <input type="checkbox"/>	N <input type="checkbox"/>
<i>Unclear how climate change relates to my job</i>	<input type="checkbox"/>	Y <input type="checkbox"/>	N <input type="checkbox"/>
<i>Current pressing issues are all-consuming</i>	<input type="checkbox"/>	Y <input type="checkbox"/>	N <input type="checkbox"/>
<i>Insufficient funding to prepare a plan</i>	<input type="checkbox"/>	Y <input type="checkbox"/>	N <input type="checkbox"/>
<i>Insufficient staff or staff resources to prepare a plan</i>	<input type="checkbox"/>	Y <input type="checkbox"/>	N <input type="checkbox"/>
<i>Lack of leadership to develop planning options to address identified risks</i>	<input type="checkbox"/>	Y <input type="checkbox"/>	N <input type="checkbox"/>
<i>Lack of data/information to assess solution options</i>	<input type="checkbox"/>	Y <input type="checkbox"/>	N <input type="checkbox"/>
<i>Opposition of elected officials to address the effects of climate change in local planning and management decisions.</i>	<input type="checkbox"/>	Y <input type="checkbox"/>	N <input type="checkbox"/>
<i>Lack of public support to plan for climate effects</i>	<input type="checkbox"/>	Y <input type="checkbox"/>	N <input type="checkbox"/>
<i>Explicit opposition from residents and/or the business community</i>	<input type="checkbox"/>	Y <input type="checkbox"/>	N <input type="checkbox"/>
<i>Explicit opposition from other coastal stakeholders</i>	<input type="checkbox"/>	Y <input type="checkbox"/>	N <input type="checkbox"/>

14. If workshops that convened federal, state, and local agencies to address climate change and align priorities were convened and had the potential of being useful to you, how likely would you be to participate?

Very Likely	Somewhat Likely	Neutral	Somewhat Unlikely	Very Unlikely
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Demographics

15. Your age.

[numerical write-in]

16. What is the highest level of education you have completed?

<input type="checkbox"/>	<i>Less than 12th grade (no diploma)</i>
<input type="checkbox"/>	<i>High school graduate or equivalent</i>
<input type="checkbox"/>	<i>Some college, no degree</i>
<input type="checkbox"/>	<i>Associate's degree</i>
<input type="checkbox"/>	<i>Bachelor's degree</i>
<input type="checkbox"/>	<i>Graduate or professional degree</i>

27

17. What community do you live in?

[one-line write-in]

Appendix 3

Pre-workshop (initial) interview questions

Background for interviewers: The overall scope and purpose of the project would be presented prior to the interview in an introductory email. That email is the recruitment document.

All interviews will be transcribed to capture the full narrative response. All questions should be asked in the order presented here, unless the question has clearly and certainly already been answered. Better to ask again, if not certain.

Script for interviewers

Informed Consent: Before we begin, I need you to understand and consent to the interview. The interview format has been approved by Oregon State University, and this form [hand it to interviewee] lets you know that this interview poses no risk to you and that all of your responses will be confidential. I'll be recording this for later analysis, but your name will not be recorded and your spoken responses will be identified only by an Interviewee number. The interview should take about 30 minutes, and you can stop at any time, though it'd be most helpful if you complete it. We have 17 additional written questions online that we asked you to complete before the interview. [Thank (or remind) this interviewee.] Any questions? Do I have your consent to continue?

Thank you. I plan to ask you a series of questions that we're asking all participants in this project, and so to not influence your responses, I won't elaborate on the question or try to point you in any particular direction. I'll be silent except for the questions. We really want to know just what you think.

Interview questions

1. Let's cast the net broadly to begin. So, how important is it *in your work* to address the effects of climate change through what's called "mitigation" – that is, the reduction of greenhouse gas emissions from energy use or land use?
2. How important is it *in your work* to address the effects of climate change through "adaptation," -- efforts to plan or prepare for, or manage the projected impacts of climate change?
3. How well informed are you about the projected effects of a changing climate in your area of responsibility?
4. Have you seen evidence of climate change in your area of responsibility?
5. Many human activities involve risks, and natural conditions also present risks to people. How do you define "risk"?
6. People define "risk" in different ways. Going forward in the interview, we'll use "climate risks" to mean the likelihood and level (consequences) of harm to nature or to society caused by a changing climate.

So, what about risks—the probability and consequences of harm—occurring from a changing climate? What are the top three or four risks you associate with a changing climate?

[Note: Keyword the responses.]

7. What do you think is the greatest climate-related risk to communities and natural systems on the north Oregon coast?

8. Shifting gears a bit from *what* to *who*, and turning your attention to your agency, I have an organizational question: Is your agency able to focus on efforts to prioritize climate-change risks for a defined landscape, such as the north Oregon coast?

[Follow-up if not answered: Suppose the priorities for that defined landscape differed from the priorities set by your agency for a larger geographic scope? Would that make it hard to devote staff time and other resources on that smaller landscape?]

9. In your opinion, who should initiate a landscape-scale response to the likely effects of a changing climate? By landscape scale, I mean a region of the state of two or more counties.

10. You just identified [x] as who should initiate the local response. Why?

11. If you are professionally involved in climate “adaptation planning” -- that is, planning to adapt to the effects of climate change -- what prompted your involvement?

For I am NOT involved, skip to Q. 14.

12. *IF INVOLVED*, how would you describe your current phase of climate change adaptation planning and implementation?

13A. *FOLLOW UP A*: You indicated you are currently in an “understanding” phase of climate change adaptation. Can you describe where you are with that and with whom?

Note any mention of the concept of risk, by name.

OR

13B. *FOLLOW UP B*: You indicated you are currently in a “planning” phase of climate change adaptation. Can you describe where you are with that and with whom?

Note any mention of the concept of risk, by name.

OR

13C. *FOLLOW UP C*: You indicated you are currently in an “implementing” phase of climate change adaptation. Can you describe where you are with that and with whom?

Note any mention of the concept of risk, by name.

14. In the online survey, we asked a question about hurdles – obstacles to be overcome. I'd like to ask it again here, with a focus on the project we're considering. What do you think would be the big hurdle or hurdles in developing alignment of priorities among state, federal agencies and local interests with respect to climate change on the north coast?

15. Now, three big-picture questions to end. First, relative to other concerns you may have in this area, how does climate change on a landscape scale – the north Oregon coast -- compare? Where is it on your list of priority concerns?

16. Do you feel a professional responsibility to plan for the local effects of climate change? Why?

17. How would you say the agency/institution that you work for is doing, relative to planning for climate change?

Appendix 4

Post-workshop survey questions

1. Did you find the workshops—convening federal, state, and local agencies to address climate change and align priorities—useful:

- to you? [Y/N/m]
- to your agency? [Y/N/m]
- to address climate change adaptation in the Tillamook-Clatsop region? [Y/N/m]

2. How much has your understanding of climate change priority-setting changed as a result of the workshops?

[Very much, somewhat, slightly, not at all, no opinion]

3. How far did this project go in moving your agency/organization toward aligning climate change risk and adaptation strategies for the north coast area? [select one]

- We're there now.
- We're much closer than before the project.
- We're not much closer than before the project.
- No real movement yet, but I see the path ahead.
- No real movement yet, and I don't see that happening.

4. The landscape approach for Clatsop and Tillamook counties undertaken in this alignment project . . . [select one]

- fostered collaboration and working outside everyday 'silos'
- provided clarity about addressing climate change
- will foster collaboration and working outside everyday 'silos' in the future
- will gain efficiencies in community measures to address climate change

[Strongly agree, agree, not sure, disagree, strongly disagree; no opinion]

5. What big hurdle or hurdles remain in implementing the alignment among state, federal agencies and local interests with respect to climate change on the north coast? Please write in complete sentence/s, so we can understand the idea in context.

[write in]

6. Which of the following do you personally expect to occur as a result of this alignment project for the Tillamook and Clatsop county area? [Mark all that apply.]

- I will *better* understand critical climate risks
- I will *better* understand some appropriate management responses
- I will have conversations with supervisor(s) to elevate climate adaptation planning
- I will use the final version of the alignment plan in my work
- I recognize potential colleagues in future climate adaptation planning
- I will seek partnerships to explore actions we might take together on climate change
- None of the above
- Other _____

7. As it's possible the process used in this project might be employed elsewhere, we'd appreciate any suggestion you have for improving it.

[write in]

> Finally, just a few general questions about you:

8. Which workshops did you attend?

[we list them by date and place]

9. Where do you work? [select one]

- Oregon state government
- Federal government
- Local government
- Non-governmental organization
- Other _____

10. Approximately how much of your professional time is related directly to climate adaptation activities?

[None, less than 10%, 10-25%, 25-50%, 50-75%, 75-100%]

11. **If you are willing to be interviewed** by phone by one of the Sea Grant research team in a brief (10 minute) set of follow-up questions, please email Monty Johnson at Monty.Johnson@oregonstate.edu. Your comments will not be attributed to you.

Thank you very much for responding to this survey.

The findings of the survey and interviews will be part of a final report, to be published by Oregon Sea Grant, and will be available on the blog page at <http://blogs.oregonstate.edu/northcoastclimate/>. All workshop participants will be sent an email informing them when the final report is complete.

Appendix 5

Post-workshop interview questions

1. How important is it in your work to address the effects of climate change through “adaptation,” -- efforts to plan or prepare for, or manage the projected impacts of climate change?
2. What do you see as your contribution to the 3-meeting and alignment process?
3. What aspects of the adaptation alignment meetings and outcomes are most useful to the work that you do?
4. What will you take back to your home institution/agency from the 3-meeting and alignment process?
5. How would you define “success” resulting from the workshops and alignment efforts? Was this effort a “success?”)
6. Who was missing who should have been involved in the conversation and meetings?
7. Looking back on the project design, (goals, timeline, process)
 - > What seemed to work well?
 - > What did not seem to as work well?
8. Do you feel that your ideas and concerns were included into the project?
9. What do you think the next steps in this north coast alignment process should be?
10. What would keep your home institution/agency “in the game?” in this alignment process?



Corvallis, Oregon

ORESU-S-15-001