Climate Change Adaptation by Washington State Agencies: Implementation and Performance

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A thesis
submitted in partial fulfillment of the
requirements for the degree of

Master of Marine Affairs

University of Washington
2017

Committee:
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Program Authorized to Offer Degree:
Marine & Environmental Affairs

University of Washington

Abstract

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In 2009, the Washington State legislature passed the Washington State Climate Leadership Act which, among a number of climate mitigation measures, directed state agencies to collaboratively produce an integrated climate response strategy and use that strategy when planning or designing agency policies or programs. Washington's Integrated Climate Response Strategy (WICRS) was published in 2012. Not long after, an informal network of climate adaptation practitioners from several state agencies (ICAN), described an interest in understanding the status of their climate adaptation planning. In response to this interest, the University of Washington's Climate Impacts Group in collaboration with the School of Marine and Environmental Affairs designed a study to answer: *(1) What is the status of climate change adaptation across and within Washington State agencies? (2) What approaches are other states employing to track performance on adaptation plan implementation? (3) What types of monitoring and evaluation frameworks can agencies*

apply to their adaptation efforts going forward? Primary and secondary data was collected and analyzed using a performance measurement framework through a review of agencies' adaptation activities related to WICRS, an online survey, focus group discussions, and a review of survey results designed and disseminated by ICAN leadership. Throughout the research process, ICAN was updated on the study's findings and relevant feedback was integrated into the study's design.

This research provides evidence of some state agencies' active engagement in climate adaptation activities and subsequent implementation of WICRS, but the use of the Strategy in driving these activities is limited. Unlike some other US states engaging in climate change adaptation, Washington has no implementation plan or centralized method of tracking or reporting climate adaptation efforts. This research suggests that Washington State agencies can use a logic model framework derived, in part, from WICRS to track, coordinate, and compare their adaptation efforts. The information acquired through that practice could be used to demonstrate compliance with the state mandate, report performance to stakeholders, and evaluate the impacts of adaptation interventions on Washington State's climate preparedness.

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Introduction

In 2009, the Washington State legislature passed the Washington State Climate Leadership Act which, among a number of climate mitigation measures, directed state agencies to collaboratively produce an integrated climate response strategy and use that strategy when planning or designing agency policies or programs. Washington's Integrated Climate Response Strategy (WICRS) was published in 2012. Not long after, an informal network of climate adaptation practitioners from several state agencies (ICAN), described an interest in understanding the status of their climate adaptation planning. In response to this interest, the University of Washington's Climate Impacts Group in collaboration with the School of Marine and Environmental Affairs designed a study to answer: *(1) What is the status of climate change adaptation across and within Washington State agencies? (2) What approaches are other states employing to track performance on adaptation plan implementation? (3) What types of monitoring and evaluation frameworks can agencies apply to their adaptation efforts going forward?* Primary and secondary data was collected and analyzed using a performance measurement framework through a review of agencies' adaptation activities related to WICRS, an online survey, focus group discussions, and a review of survey results designed and disseminated by ICAN leadership. Throughout the research process, ICAN was updated on the study's findings and relevant feedback was integrated into the study's design.

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Climate change adaptation

As described in Washington State's Integrated Climate Response Strategy, "adaptation" is the act of responding to the impacts of climate change (Adelsman et al., 2012). This generally involves taking steps to reduce vulnerability and increase resilience, adaptive capacity, and transformability to prepare for likely future conditions. While there is no consensus on the definitions of these terms, they are used frequently in climate change and natural hazard literature. Vulnerability can be thought of as a quality of combined exposure to stresses, sensitivity to disturbance, and adaptive capacity (Gallopín, 2006). Sometimes treated as a synonym for adaptation, adaptive capacity involves being able to cope with changes in an environment and expand the variety of conditions tolerated (Gallopín, 2006). Resiliency is closely tied to adaptive capacity, but in addition to having the capacity to cope with a disturbance, a resilient system is able to absorb shocks and reorganize while maintaining the same identity (Walker and Salt, 2012). Maintaining a social or ecological system's identity--its structure, functions, and feedbacks—is often considered ideal in response to climate change.

However, there is also an option of transformation which involves the system reorganizing and becoming a different system (Walker and Salt, 2012).

Individuals, communities, businesses, sectors, regions, government agencies, and organizations of all kinds have the ability to adapt their behavior and operations to reduce the risk of adverse impacts due to climate change. Organizations can engage in an assessment process that would look at the vulnerability of important assets and inform the creation of actionable plans and strategies (Snover et al., 2007). Impact profiles vary from location to location, so adaptation strategies must also be place-based (Barros et al., 2014). Once a plan is in place, investment by relevant stakeholders facilitates its implementation (Chambwera et al., 2014). There are, however, significant hurdles in accessing these investments, implementing strategies, and defining successful adaptation for useful evaluation of the plan's effectiveness [(Ekstrom & Moser, 2014); (Eisenack et al., 2014); (Moser & Boykoff, 2013)]. "It's very hard to tell a prevention story because, what do we say? 'You're not sick.' I mean, that's the success." (Group 11, 2017). The long term, evolving, and site-specific nature of climate impacts make it difficult to prioritize adaptation over immediate threats, develop broad strategies that will not increase the vulnerability of populations, and measure the impacts of interventions that are not likely to be apparent for a long time. Despite these and other challenges, adaptation efforts are occurring worldwide.

The benefits of adapting to the changing climate include the improvement of social, ecological, economic, and governance systems (Denton et al., 2014) and the sustainable protection of life and infrastructure. Adaptation strategies can be designed to have co-benefits of

reducing greenhouse gas emissions and preparing for changing conditions. Mitigation, or actions addressing the sources and drivers of these changes is necessary, but without proactive adaptation, projected and experienced impacts will continue to pose serious threats to human (and other ecological) safety and well-being. Existing institutions should be prepared to cope with the expected changes in frequency, timing, and severity of hazards that are affecting human health and mortality around the globe.

Adaptation strategies can range from elevating a waterfront home to accommodate rising sea levels, storm surge, or floods to adjusting farming practices to account for changing growing seasons and timing of water availability to negotiating new international policies to govern the Arctic in conditions with less ice cover. Governments at all scales ideally play a large role in climate adaptation by providing strategic direction, resources, and structures for adaptation that are consistent within and across jurisdictions. In the United States, adaptation plans exist at all levels of government: federal, including First Nations, state, regional, and local (see examples in the footnotes). Climate adaptation planning by governing bodies within the Unites States is still relatively new with some of the first adaptation plans published in the early twenty-first century. In 2009, Executive Order (EO) 13514 established the US Climate Change Adaptation Task Force, however, it was not until 2013 that the President's Climate Action Plan and EO 13653 directed federal agencies to develop adaptation plans of their own. At that time, implementation and evaluation of these plans was limited (Hansen et al, 2013) and leadership came from subnational institutions. As of 2015, nearly 40 federal agencies have climate adaptation plans (Leggett, 2015), yet, knowledge of the effectiveness and impact of such efforts is largely unknown.

Adaptation in Washington State

Within the State of Washington, some tribes, state agencies, regional bodies, counties, local governments, non-governmental organizations, businesses, communities, and individuals have been involved in planning for the impacts of climate change. While the state government is only one part of the whole state's adaptation efforts, it prioritized the issue of climate change and directed state agencies to adapt state-level decision-making to consider projected future conditions. Governor Gregoire authored EO 09-05 in 2009 which, in part, called on a handful of state agencies to develop recommendations on sea level rise vulnerabilities and water resource management. It has since been rescinded and replaced with EO 14-04 which is focused on energy-efficient transportation. The State Agency Climate Leadership Act (E2SSB 5560), on the other hand, remains in Washington's revised code. This piece of legislation, passed by the state's 61st legislature in 2009, directed state agencies to lead by example in the reduction of the state's carbon footprint and preparation for projected impacts of climate change. E2SSB 5560 required the Department of Ecology (ECY) to both lead efforts in the development of an integrated climate response strategy with the departments of Agriculture, Community, Trade, and Economic Development (now Commerce), Fish and Wildlife (DFW), Natural Resources (DNR), and Transportation (WSDOT) and collaborate with local governments and other state agencies to develop their own plans of action. Under this directive, state agencies are also directed to prioritize adaptation actions when designing, planning, and funding programs, policies, and infrastructure projects.

In response to E2SSB 5560, the Department of Ecology published *Preparing for a Changing Climate: Washington State's Integrated Climate Response Strategy* (WICRS) in 2012. Individuals from each of the mandated agencies, plus, additional staff from the Department of Health (DOH), the Climate Impacts Group, and the National Wildlife Federation played large roles in the plan's development. The plan describes Washington's need to adapt, reports projected impacts and vulnerabilities on different sectors like forests and agriculture, prioritizes seven overarching strategies, and lays out 217 recommended actions to guide state agencies' activities. The text of these individual actions was used to search publicly available resources for evidence of the plan's implementation (methods and results are described in detail in later sections of this paper). Evidence of state agency efforts was found for approximately two-thirds of the 217 actions. Individual agencies, multiple agencies (individually), and multiple agencies (collaboratively) were responsible for these activities which ranged from enhancing health surveillance and electronic reporting to restoring riparian zones, estuaries, wetlands, and floodplains. The state agencies found to be involved were not only those involved in writing WICRS, but also included the Office of the Insurance Commissioner (OIC), Recreation and Conservation Office (RCO), Emergency Management Division of the Military Department (EMD), and Department of Enterprise Services (DES).

Some, but not all, of these agencies have been involved in the Interagency Climate Adaptation Network (ICAN). Formed not long after the publication of WICRS, this informal network has met quarterly "to bring together all the different agencies working on climate change and...create a community of practice...share knowledge and coordinate activities." (Group 4, 2017). ICAN has also served as the main forum for discussing this research. In

December 2016, the leadership of ICAN—at the time, four individuals from four different agencies (DFW, DNR, DOH, and ECY)—organized and hosted the first potentially annual Washington State Agency Climate Adaptation Forum to encourage more collaboration between state agencies, in particular, and expand the reaches of adaptation discussions beyond those involved in ICAN. Two hundred-and-eighteen individuals, mostly state agency staff, registered to attend. This workshop facilitated statewide conversations on climate adaptation and increased awareness of the amount of adaptation work occurring within different agency programs and of opportunities for increased inter- and intra-agency coordination.

The current state of adaptation within Washington State agencies, as viewed by some of these agency staff in attendance, was described in a follow-up survey disseminated shortly after the Forum. Thirty-eight out of 87, or 44%, of respondents viewed their agency as "engaged in some activities relating to climate change adaptation, but needs to be better organized and do more on implementation." This survey, along with the data collection methods, will be described and discussed in further detail in the methods and results sections of this work to further understand the status of climate adaptation amongst Washington State agencies.

Performance measurement and evaluation

As more institutions, communities, and individuals become aware of and concerned about issues like climate change, they become topics of political importance. This agenda setting initiates a cycle of policy formulation, adoption, implementation, and evaluation (Gupta, 2010). Initially, a program or intervention would be designed to address an issue and resources would

be allocated to facilitate its implementation. To understand the efficiency of implementation and resulting impacts on a system, performance must be measured. This provides accountability to relevant stakeholders and direction to decision-makers.

Once the need for performance measurement is established for a given intervention, a fitting framework for monitoring and evaluation (M&E) should be developed during policy formation. Monitoring—ongoing collection of data on performance measures (synonymous with performance measurement)—and evaluation—periodic assessment of whether objectives were met appropriately—can inform improvements during a program's development and implementation and decisions about whether to continue or terminate a program [(McDavid et al., 2012); (Turner et al., 2014)]. Performance indicators should be developed to reflect the status of implementation and track results over time. When compared to baseline data, a collection of indicators can describe progress and be used to evaluate performance. It is possible for a program's implementation process to be considered successful even when it has not achieved its desired change (McDavid et al, 2012). That is why evaluation must be conducted carefully and tailored to the specific context of an intervention. There are a number of approaches to program and decision-oriented evaluation, many of which are described by Fitzpatrick, Sanders, and Worthen (2011). For example, objectives-oriented program evaluation focuses on the extent to which specific goals are achieved to determine whether a program should continue receiving funding, be significantly altered, or be thrown out. Alternatively, utilization-focused evaluation is a participatory model that provides contextual information on programs and policies to inform decisions, clarify options, and identify improvements. Which approach is used is largely

dependent on the needs of the managers to change the implementation process or external stakeholders.

Logic models are evaluation tools used widely by government agencies and other organizations to provide a simple, visual summary of the flow from dedicated resources to a long term desired change. These dedicated resources, called inputs, are mobilized to implement an intervention and produce a product or complete a task [(McDavid et al., 2012); (Simister, 2015)]. Inputs often include elements like funding, personnel, knowledge, and equipment. The immediate, tangible result of using these resources are outputs. They are the actions (activities) completed or products and services delivered. State agencies have the most control over these three elements. Outcomes are the expected change or specified objective of a program or intervention (ECA, n/a). Finally, impacts are the broad target conditions for the system (Salafsky & Margoulis, 1998). An impact, such as 'reduced vulnerability to effects of climate change,' may be reached directly or indirectly over a long period of time in response to an intervention (Odhiambo, 2013). The flow from inputs to impacts describes the theory of change behind an intervention and can be used to work backwards through the model to identify gaps and opportunities in the program's operational functions (McDavid et al., 2012).

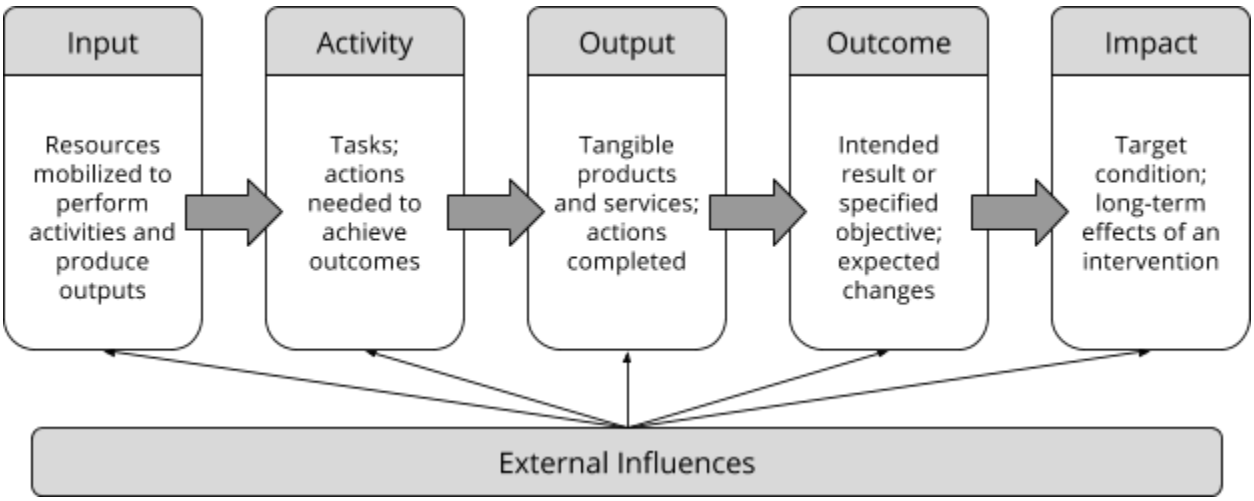

Figure 1. Logic model framework

With climate change adaptation, there are a number of challenges with monitoring and evaluating performance, yet, tracking progress in climate adaptation is becoming more vital (Lesnickowski, 2016). In order for decision-makers to weigh the costs and benefits of interventions designed to protect people and human interests from the impacts of climate change, there needs to be an understanding of what has worked in the past and why. The difficulties in measuring and evaluating climate change adaptation efforts are similar to the obstacles for adaptation planning mentioned previously and include challenges in defining adaptation, resilience, and success, identifying appropriate performance measures for long-term impacts, comparing indicators with shifting baselines, and evaluating the difference between the attribution of an intervention to an observed change versus its contribution to the change (Bours et al., 2014). These challenges have made the use of a number of M&E frameworks ineffectual. However, in recent years, a number of performance measurement frameworks specific to climate change adaptation have been proposed for a variety of governance structures (Bours et al., 2014). Their use beyond select case studies is unknown.

Adaptation performance measurement by US states

The purpose of M&E for climate change adaptation is "to monitor progress towards improved adaptive capacity or to measure the effectiveness of adaptation policies and activities" (pg. 32, Turner et al., 2014). As Bours et al. (2014) phrased it, "monitoring and evaluation of climate change adaptation and resilience can and should serve not only to document and demonstrate the effectiveness of interventions, but also generate knowledge, learning, and evidence to inform this emerging area of policy and programming." While adaptation-specific M&E frameworks may not be in use within the United States, there are some general performance measurement systems in place. At a federal level, the US has a statute, the Government Performance Results Act (modernized in 2010) that requires quarterly program assessments using a logic model framework for federal agency accountability and performance improvement. There is no nationwide guidance on adaptation performance measurement. Of the federal agencies with adaptation plans, few are evaluating their adaptation actions (Leggett, 2015). This is also true for states in the US.

Based on an internet search guided, in part, by the Georgetown Climate Center's state and local adaptation plan database, there are at least 26 states with some form of state-level adaptation plan. Of plans similar in scope to WICRS and with sufficient publicly available information on implementation, four states—California, Maryland, New York, and Rhode Island—were found to have performance measurement systems in place. To answer this study's second research question—*what approaches are other states employing to evaluate the*

implementation of their adaptation plans?—another more extensive, but not exhaustive, internet search of these four states' adaptation efforts and comparative case study was conducted. This data collection suggested that few states are evaluating their adaptation progress and those that are use a variety of approaches; some of which are described below. Techniques used by these states to track and report the implementation of their adaptation plans, and subsequently, adaptation in the state, may be of use to the State of Washington.

California's most recent adaptation plan, *Safeguarding California*, published in 2014, is a comprehensive planning document driven by Executive Order S-13-08 written to inform the State government of the actions needed to protect California's resources. In response to another executive order, an implementation strategy, with a structure more like WICRS with sector by sector impacts and proposed strategies and actions was created in 2016. It differs, however, in its inclusion of summaries of current activities led by state agencies in accordance with *Safeguarding California*, assignment of tasks to particular state agencies, implementation timelines, and monitoring and evaluation action plans. Progress towards these objectives has been documented by California's Natural Resource Agency in implementation progress reports and email updates, and will be included in the first tri-annual, participatory adaptation plan update to be published in 2017. Given the details in the executive summary and extent of community outreach, it can be assumed that these activities are strongly supported by the State's leadership and a significant amount of resources have been dedicated to these plans' success.

The State of Maryland also has plans to guide the implementation of adaptation activities and reports on its progress. Maryland's Comprehensive Strategy is split into two phases. The

first, published in 2008, following EO 01.01.2007.07, focused on the impacts of sea level rise and coastal storms. Within this part of the plan, there were a number of current actions and implementation targets. By 2010, performance measures for seven priority sea-level rise-related policies were housed within the Governor's Delivery Unit, Maryland's open data reporting system (MDE, 2010). Work plans for the Adaptation and Response Working Group serve as additional detailed implementation guidelines. The second phase of Maryland's plan, published in 2011, focused on societal, economic, and environmental resilience, but does not include specific implementation guidance, yet, according to a few of the Commission on Climate Change: Adaptation and Response Working Group's work plans and memos from 2016 and 2017, the State is in the process of developing performance targets for state agencies' adaptation actions and implementation priorities.

New York's highly detailed Climate Action Plan Interim Report drafted in 2010, while never finalized, had a chapter on adaptation which reviewed vulnerabilities, recommended actions, potential costs, and timelines for implementation. Adaptation in the State, however, is not driven by this plan, but instead is lead at a local level. The State of New York plays a role in these efforts, by guiding and certifying Climate Smart Communities. This process involves a performance review of the community's preparations for climate change impacts. Updates on progress have been reported via the annual State of the State and End of Session reports and lists of certified communities can be found on the State's website.

A Resilient Rhode Island, Rhode Island's first climate action plan, published in 2014, tabulates a number of goals, objectives, and actions delegated to specific parties with explicit

instructions for implementation. Action plan updates, documents restructuring implementation priorities, and annual reports describe and evaluate state agencies' activities. Many of these documents assign tasks and track progress like a checklist rather than descriptive narratives.

STATE PLAN	DIRECTIVE	AGENCY LEADERSHIP	IMPLEMENTATION PLAN?	TRACKING ADAPTATION?	REPORTING ADAPTATION?
*Safeguarding **California**: Reducing Climate Risk (2014)*	Executive Order (EO) S.13.08 (2008)	California Natural Resources Agency *Collaborative planning*	Yes. *EO B.30.15 (2015)* *Multi-agency implementation*	Yes. *Implementation progress reports*	Yes. *Plan updates, email updates, workshops*
*Comprehensive Strategy for Reducing **Maryland**'s Vulnerability to Climate Change (Phases I & II, 2008 & 2011)*	Executive Order 01.01.2007.07 (2007)	Commission on Climate Change: Adaptation & Response Working Group *Collaborative planning*	Phase I - Yes. (within State plan) Phase II - No. *Multi-agency implementation*	Yes. *Adaptation indicators (not currently), developing performance targets*	Yes. *Annual reports, Adaptation & Response Working Group work plans*
***New York** State Climate Action Plan Interim Report (2010)*	Executive Order 24 (2009)	Climate Action Council *Collaborative planning*	Yes. (within plan) *Never finalized. (local action plans)*	No. *BUT Certify Climate Smart Communities*	Yes. *State of the State & End of Session reports*
*A Resilient **Rhode Island**: Being Practical About Climate Change (2014)*	Executive Order 14-01 (2014)	Executive Climate Change Council *Collaborative planning*	Yes. (within State plan) *Multi-agency implementation*	Yes. *Implementation prioritization documents*	Yes. *Plan updates, annual reports*
*Preparing for a Changing Climate: **Washington** State's Integrated Climate Response Strategy (2012)*	Legislative mandate E2SSB 5560 (2009)	Department of Ecology *Collaborative planning*	No. *Multi-agency implementation*	No.	No.

Table 1. Comparative case study matrix: US states' adaptation planning, implementation, and reporting. *Secondary research conducted between June and September 2016 using publicly available internet resources.*

Based on the internet searches conducted in 2016, none of these states use broad (encompassing all sectors), statewide performance measurement structures to monitor and track adaptation within their borders. Each one, however, does some systematic qualitative and quantitative evaluation of the implementation of their plans. Some key elements of these plans are summarized in Table 1. In comparison, Washington State, while having a similarly scoped and formatted strategy to these other states', has no implementation plan or defined monitoring and evaluation framework. This presents an opportunity for the State to engage in performance measurement to identify and communicate its successes and needs to its constituents.

Monitoring and Evaluation of Adaptation Interventions

To answer the third research question of this study—*what types of monitoring and evaluation frameworks could be applied to Washington State agencies' adaptation efforts going forward?*--relevant literature was reviewed and frameworks were analyzed for their perceived practicality and usefulness to Washington State (and potentially other US States). Bours, McGinn, and Pringle (2014) produced a report that summarized and categorized over twenty adaptation frameworks (Appendix J). Those listed reflect the current state of research and reporting in the field of climate adaptation performance measurement, which is largely led by international organizations developed for use by nations across the world. Other frameworks in the fields of sustainability or natural hazards mitigation could evaluate conditions including changes in agency capacity (maturity models) or changes in vulnerability [(Silvius & Schipper, 2011); (Ford et al., 2013)]. While some of these may be useful resources for state agencies, none are recommended for explicit use in Washington.

The sample of states discussed above seem to be leading adaptation efforts in the United States. Their evaluations appear to be plan-specific and process and outcome-based. No evidence was found that suggest these states followed any of the adaptation-specific frameworks proposed in the literature. Their focus on achieving outcomes may indicate that some variation on a logic model framework was used. While the appropriateness of outcome evaluation for climate change adaptation has been challenged (Ford et al. 2013) the benefits have led to its continued use. It is relatively simple and can supply decision-makers with the information they need to evaluate the intervention. It is also flexible and could be results-driven, with outcomes like water conserved, or could be process-oriented and evaluate the implementation of an intervention. This outcome-oriented approach, including the use of logic models, aligns well with the format of adaptation plans, like those produced by states in the US and with existing state agency operations. The logic model performance measurement framework was used to design this research.

Research Methods

Data was collected between June 2016 and March 2017 from four sources: a systematic review of Washington's Integrated Climate Response Strategy, an internet survey, focus group discussions, and results from the Washington State Climate Adaptation Forum feedback survey. These four sources were triangulated using a performance measurement framework. Data analysis methods included the calculation of frequencies for the Strategy review and surveys. The focus groups and written responses to the feedback survey were coded—a process of data translation from particular details to general themes and concepts which can be considered

synonymous with categorization (Saldaña, 2015). The value of coding lies in the translation of the data (the transcripts) into bite size, comparable pieces. Inputs, activities, outputs, outcomes, and impacts were used as predefined structural codes under which important excerpts could be binned. An 'excerpt' is a quote sourced from a transcript that applied to at least one structural code. Each excerpt was summarized using a descriptive code, the most text-specific code. These then were analyzed and sorted into higher-level pattern codes. Axial codes were determined by grouping pattern codes and influenced by climate adaptation literature and WICRS. Many of the research results are discussed in terms of these axial codes. The research design, data collection methods, and data analysis methods for each of the four data sources are described in detail below.

Review of implementation of Washington's Integrated Climate Response Strategy

During the summer of 2016, Washington State agencies' websites and other internet resources were searched for mention of climate adaptation and relevant activities. Websites of the agencies that authored WICRS, those listed as "Climate Change Partners" on the Department of Ecology's (ECY) website, those cited in the Climate Impact Group's State of Knowledge report, and others identified by adaptation professionals in Washington State were explored. Variations on the phrase 'climate change adaptation' (eg. preparedness, adapt, climate adaptation) were used to search the websites and relevant publications available online. Activities and documents found were noted including activities mentioned in the Department of Fish and Wildlife's (DFW) Climate Change Digests. The Georgetown Climate Center's

Completed Goals report and climate change preparation overview for Washington State (which had not been updated since 2014) were also reviewed and noted.

Following this review, a broad internet search was conducted to find evidence for each of the 217 actions in WICRS. Keyword searches using 'washington state' plus phrases from each of the actions were entered into Google search. The phrases were selected for each action individually to include adaptation buzzwords like 'building capacity' and 'vulnerable communities' along with identified outputs like 'tool' or 'assessment' and partners like 'local health departments'. There were 3-15 searches conducted per action, depending on the length and detail of the recommendation. The top 20 search results were scanned and selected for review if ‘washington state’ and significant proportion (>2/3) of the phrase were found in the search result. To review each source, word searches using the same methods as for agency websites were conducted. Evidence for each action was recorded and relevant publications were organized by authoring agency (See Appendix A).

Each action from WICRS was categorized as having no evidence or some evidence. "No evidence" was defined as actions that had no search results that met the criteria described above. "Some evidence: single agency" means that one state agency was linked with all the evidence found for that action. If for one action, there was evidence from multiple state agencies individually, they were labelled "some evidence: multiple agencies". "Some evidence: agency collaboration" was assigned to actions where at least one piece of evidence was linked to at least two agencies which included relations like co-authorship, consulting partners, or membership on a multi-agency commission or council. To aid in comparative analysis, each action was also

assigned to one or more activity types, described in more detail within the focus group methodology, to describe the relative prioritization of different types of adaptation activities in Washington State. The results were shared with ICAN at a network meeting in October 2016 and the feedback given influenced the development of the survey and focus group questions.

Washington State Agency Climate Adaptation survey

The adaptation survey was designed using a performance measurement framework to get a qualitative assessment of some inputs, activities, and impacts of state agencies' efforts. Questions (Appendix B) were developed to supply data on the relative importance of climate change adaptation to agency leadership, availability of climate information and expertise, quality of staff training, extent of coordination with other parties, degree of consideration of climate adaptation in agency programs and policies, and perceptions of participant agencies' success in statewide adaptation. The nine questions elicited respondents to rank their agency on a likert scale with the following options: none, limited, moderate, high, or don't know. The first four questions addressed inputs to climate adaptation work--prioritization by agency leadership, quality of relevant and available trainings, access to expertise, and access to data on relevant climate impacts. The next three asked about coordination of activities with other state, local, or federal agencies. Definitions of what constituted local or federal agencies were not specified. Question eight solicited responses on the perceived extent of adaptation mainstreaming by asking participants to rank the degree of consideration of climate adaptation in their agency's evaluation of programs and policies. The last question identified respondents' perceptions of their agency's success-to-date in preparing Washington State for the projected impacts of climate change.

These questions were addressed using survey methods to identify and quantify common characteristics and variance of opinion within a potentially large sample population of state agency personnel (Jansen, 2010). Once developed, a draft set of questions was shared with ICAN leadership for review and feedback was considered and selectively incorporated before the survey was administered. These individuals may have also completed the survey, so results may be slightly biased (could account for four of the survey's 49 respondents.

The adaptation survey participants were recruited with help from ICAN leaders and members. The survey was disseminated within two weeks of the Adaptation Forum to all registered attendees and to focus group participants after each focus group session. A brief explanation of the research and a link to the survey were distributed to these individuals by email either personally (in the case of the focus groups) or collectively after the Forum. All recruited state agency staff were encouraged to pass the survey along to their colleagues. Therefore, the population sampled was restricted to this community of climate change practitioners or those interested in climate change within Washington State agencies. There was also no way to parse out whether or not an individual responded more than once or what position they held within an agency.

The data collected was analyzed using statistical frequencies which gives information about staff perceptions of their agency relative to the response options provided. It does not invite analysis of causation. It was assumed that individuals who selected 'limited' as a response to any question in this survey were reading it as a level between moderate and none rather than, for example, believing their agency has high rates of coordination with other state agencies, but

is still limited by certain factors. Each of these questions were binned using the structural codes—eg. inputs, activities, and impacts—in order to be compared with the other analyses.

Feedback survey on Washington's Adaptation Forum

A week after the December 6th Forum, the event planning team (ICAN leadership) sent an internet survey to the 218 registered attendees from various state agencies, other government agencies, and NGOs asking for feedback on the event. Two questions from this survey (Appendix D), spoke to the respondents' agency activities and barriers and were thus analyzed for consistency with the results of the primary research in this study. Both questions were multiple choice, but also invited written comments which were coded. Question 5 prompted respondents to identify what stage of adaptation planning their agency is in and Question 6 asked respondents to select barriers to adaptation their agency is facing. These were also assigned to structural codes.

Focus group discussions

Focus groups, dynamic group discussions directed and observed by a moderator to collect data (Harrell & Bradley, 2009), were conducted to better understand why state agencies are undertaking adaptation activities (and which they are pursuing), what obstacles they are facing, how they are defining success, and how they are measuring their progress. They are sometimes used to evaluate how well programs are functioning and how they can be improved (Krueger & Casey, 2002). Another important benefit of the use of focus groups was the facilitation of

internal agency discussions. Some of the groups formed were, for the first time, having conversations about adaptation across programs within their agency. These discussions allowed members of the same agency to update one another on their activities and consider their progress in adapting to climate strange.

The open-ended focus group questions (Appendix C) were designed within the performance measurement framework to provide context and depth of information to the analysis of the other data sources. Questions 2 and 6, in particular, were informed by questions asked during the October ICAN meeting and formulated to determine whether the evidence of implementation of the Strategy found during secondary data collection were intentional and whether the evidence found was strongly biased by an agency's perceived need to publish or communicate their adaptation efforts. This list of seven questions asked agency personnel about priority activities for the agency, their use of WICRS, collaboration with other state agencies, performance measurement, success stories, agency need to communicate successes, and barriers to adaptation. Along with the adaptation survey, the draft questions were sent to ICAN leadership and feedback was incorporated.

Attendees of ICAN meetings and other climate adaptation advocates within different state agencies were approached by their colleagues or Climate Impacts Group employees about participating in this study. If interested, they were asked to organize a group of three to five of their colleagues at the agency. Given this format, groupthink—the phenomenon that, when in a groups, humans tend to form consensus independent of logical conclusions—may have influenced the discussions and biased the results. The questions were sent to these groups before

the discussion sessions. One focus group had a meeting to prepare their responses. The groups that were formed consisted of individuals with varying roles and responsibilities. A couple of groups were organized to represent a specific program within the agency. These factors, the presence of a communications employee or agency leadership may also have influenced the discussions and results. However, rather than denying people access to this conversation, participants' positions within the agency were noted and considered during data analysis.

Focus groups were conducted consistent with Krueger and Casey's (2002) recommendations. Each session was held at the agency or program's offices and lasted approximately ninety minutes. Upon consent to participate, the discussions were audio recorded and a few ground rules were mentioned: the group could determine how to structure their own responses, there was no need for consensus (all answers would be noted), and there were no right or wrong answers. Focus groups of personnel ended up varying in size from two to eight individuals in addition to one or two moderators. The moderator's role was to introduce the study and ground rules, direct the conversation so that each question could be answered, and observe and record the responses. In most cases, all seven questions were answered. If time allowed, an additional question was asked to encourage further discussion and feedback on the content of the conversation.

Following each focus group session, the audio recordings were transcribed and analyzed. The transcript text was then coded. The descriptive, pattern, and axial codes derived from this data are tabulated by structural code in Appendices F-I. While focus group data cannot be analyzed using frequencies that generalize participants' sentiments (Harrell & Bradley, 2009),

the data were tallied for pattern identification. The numbers in parentheses following each code in these appendices represent the number of excerpts or quotes that directly relate to that code. For example, "5" next to the descriptive code "state mandate" would signify that there were five accounts of state mandates that were determined to be inputs. Excerpts were not counted if they described the same code in the same context as another, i.e. if there were two individuals who said, "E2SSB 5560 led to the development of the Integrated Response Strategy", the excerpt would have been counted once.

Findings

The data collected on climate change adaptation in Washington State agencies provided a wealth of information on the perceptions and functions of the agencies involved in this study. Participants included 49 adaptation survey respondents from ten agencies, 61 focus group participants from 9 agencies (13 focus groups), and 88 forum survey respondents from eleven state agencies. Proportions of the number of participants per agency are depicted in Appendix E. The agencies represented in each dataset vary, but the largest participating populations tended to remain the same. The results from each source were compared, analyzed, and summarized to produce the following findings.

1. Washington State agencies are implementing a large proportion of the actions enumerated in the Climate Response Strategy, albeit those that participated in focus groups were doing so unintentionally.

"Does it count if we're using it and don't know it?" (Group 13, 2017). Most focus groups had mixed levels of awareness among the participants. WICRS rang a bell for some, some were entirely unaware of the Strategy's existence, and others were involved in its development. The use of WICRS by state agencies was described as limited to influencing some agency personnel's thinking. In one case, it was used to guide the development of a program's strategy. The most commonly identified reason for not using WICRS was the lack of an implementation strategy. Other reasons given for its lack of use included that it was not actionable and its implementation had no champions, no directive, and no funding.

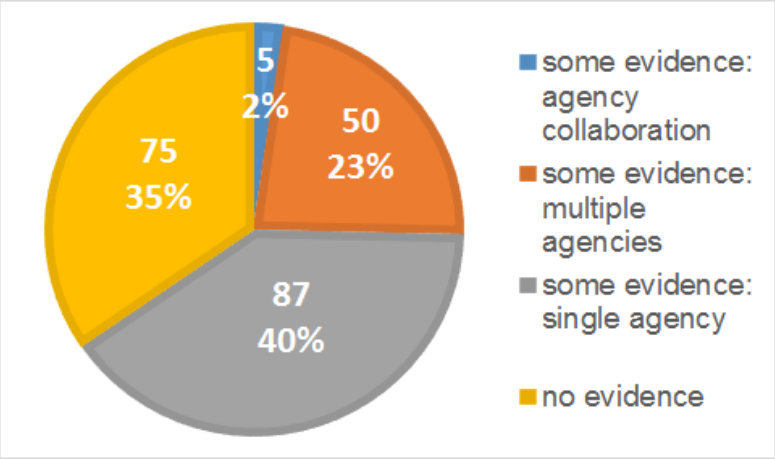

Figure 2. Results of secondary data collection. *The pie represents the total number of actions in the strategy.*

Despite the limited use of the Strategy, evidence of agency activity was found using the secondary data collection methods for 142 of 217, or approximately two-thirds, of the recommended actions listed in WICRS (Figure 1). In four focus group discussions, participants matched their activities to six WICRS actions during their discussions. Assuming that each activity mentioned in the focus groups fulfilled one of the WICRS activities, again, approximately two-thirds or 68% of the activities would be at least

underway. The total number of different activities discussed during the focus groups amounted to 233. When axial codes were assigned to the strategy, the 217 actions were comprised of a total of 343 separate activities.

2. Direction from executive leadership, legislation, and agency constituents followed by information and expertise and financial resources were the most stand-out inputs to climate adaptation amongst the state agencies' staff who participated in the focus groups.

Participants in the focus groups discussed inputs to adaptation activities 109 times. Of these, about 31% were coded as directives indicating they may be important for facilitating adaptation activities. The most common source of direction came from executive leadership which included the Governor's office, agency Directors, and upper-level program managers. This existing leadership is also apparent in the responses to the first adaptation survey question (Appendix B) which indicated that agency personnel felt that adaptation was a relatively high priority to agency leadership. However, some focus groups and respondents to the forum survey still considered limited leadership an obstacle to action (discussed in more detail under Finding 7).

Direction also came from a number of state and federal mandates and a couple instances of expressed need by agency constituents. Compared to the 22 excerpts, or quotes, related to executive leadership, 9 were attributed to legislative direction, and 3 were needs from local governments, shellfish growers, and farmers, depicted in Figure 2. This suggests that top-down directives may have influenced some of these agencies'

efforts by several magnitudes more than bottom-up requests initiated by local resource managers.

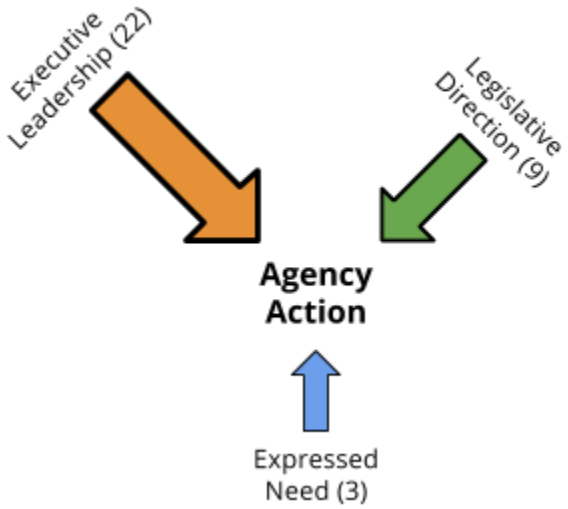

Figure 3. Relative influence of directive source on agency adaptation action. *Scale of arrows approximate relative influence.*

In addition to directives, information and expertise (25 excerpts) were identified as inputs to adaptation activities. Access to information was considered high by 37% of adaptation survey respondents. Internal knowledge (9), largely awareness within the agency, was a common input. External knowledge (6), which included local knowledge (3) and published research (2), seemed to be somewhat accessible but less needed for adaptation than knowledge within an agency. This trended in the opposite direction for internal (3) and external expertise (5) which 35% of adaptation survey respondents felt were highly accessible.

Financial resources, human resources, fora for collaboration and coordination, and other support were also discussed during focus groups. Sources of project funding described by focus group participants came mostly from the State (7), with a couple

inputs from federal agencies (3), and one grant from an NGO. For human resources, it seemed that the overall enthusiasm of staff for work on climate adaptation in the form of effort and drive (6), project ownership (1), general interest (1), and personal traits (1)—9 excerpts total—was just as important as staff time (5) and the existence of staff with climate change in their titles (4). Other types of support (7) including external interest (4), like scientific intrigue (2) was also mentioned. Finally, there were four inputs coded as fora for collaboration where the existence of an interagency workgroup or network gave staff the opportunity to engage in coordinated action.

3. Coordination between state agencies, agency programs, and other parties has a significant role to play in the State.

In both WICRS and focus group discussions, collaboration and coordination were the most frequently coded activities. One hundred-and-six of the actions recommended in WICRS included elements of collaboration or coordination. In focus group discussions, 77 different activities, or one-third of all activities mentioned, involved coordination or collaboration. This suggests that agencies are and should be working with relevant stakeholders and partners to build a more prepared Washington.

Adaptation survey responses revealed that 43% of agency staff believed there were moderate levels of coordination between their agencies and other state agencies. In contrast, coordination with federal and local agencies was considered limited. The focus group results support that more coordination is occurring between state agencies than

with any other partner alone, but these conclusions are biased considering the question that prompted many of the discussions on collaboration asked explicitly for examples of activities carried out with other state agencies. However, as Figure 3 shows, there was still a substantial amount of conversation relating to other actors. Some focus group participants emphasized the importance of vertical coordination with federal and local agencies to their adaptation work.

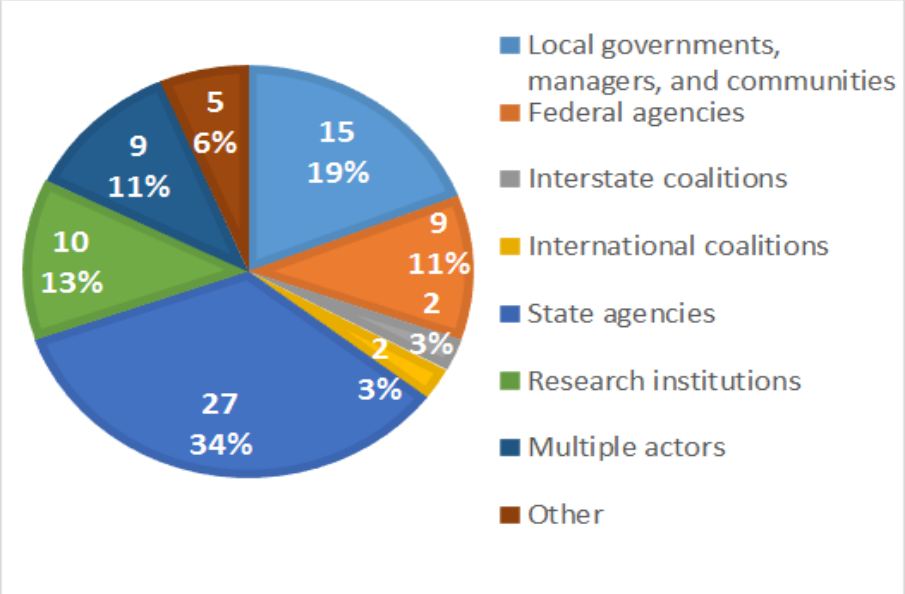

Figure 4. Collaboration and coordination between Washington state agencies and other actors.

In terms of the types of adaptation activities these actors have collaborated on, the majority involved holding recurrent, capacity-building conversations, sharing information, and reaching out to stakeholders. Other activities included technical support of and engagement with local governments, managers, and planners (15) and research and tool development with research institutions (10). State agencies are also collaborating on planning efforts, guidance development, and rulemaking. Some participating agencies

also discussed coordination between different programs within an agency (5) as important activities as well.

4. State agencies are engaged in a lot of activities relating to adaptation. Of those described by focus group participants, most are in the realm of policy and administrative management or climate change research, tool development, and monitoring.

Besides collaboration and coordination (77 excerpts), focus group participants described involvement in 51 activities coded as policy and administrative management, 51 research-related activities, 38 education-related activities, and 14 direct risk reduction activities. The ratio of WICRS activities falling under these categories, (106):89:65:48:35, shows a similar emphasis on policy actions. A quarter of the policy and administrative management activities mentioned involved mainstreaming climate considerations into planning, implementation, and decision-making. The extent to which agencies take adaptation into consideration, based on the adaptation survey results, is quite variable with three respondents claiming their agency does not consider climate change when evaluating agency actions; 19 said consideration is limited; 14 reported moderate consideration; and 9 ranked it as high. These results may reflect the variable levels of institutionalization of adaptation efforts.

New policies and changes to administrative management were recognized in all stages of the policy cycle. Focus groups discussed new policies, including new plans and regulations, and administrative changes like creating a climate change position (16). Agencies also reported a number of plan update and implementation activities (13).

According to the forum survey, 7 of 87 respondents believed their agency had an adaptation plan and was fully engaged in implementation. Approximately 44% of respondents felt their agency was engaged in some adaptation-related activities, but needed better organization and more implementation. Some focus group participants discussed evaluation largely centered around prioritizing funding and implementation of projects that are climate conscious.

There is also a lot of research being done by participating agencies internally and in collaboration with other agencies or research institutions. There was evidence of more research on climate impacts (26), including vulnerability assessments (13) and trend analyses (7), than on adaptation (7) which was often in the form of pilot projects (4). Monitoring of data and performance was also one of the more common activities (12). Four activities related the development of tools for additional impact research and data monitoring. Agencies appear to be using this research and tools to build institutional capacity (20), raise awareness (10), and disseminating information (8) internally and externally. Education activities include training local constituents (10) and agency staff (7), raising public awareness of adaptation strategies (5), and holding conferences and meetings to share experiences and practices (6). In addition to raising awareness locally, nationally, and within relevant industries, state agencies are also making efforts to maintain internal awareness suggesting a true investment in adaptation. These focus group results, however, do not measure the quality or effectiveness of these activities. In fact, the second adaptation survey question which asked about the quality of available staff training received 24 ‘limited’ responses (51% of respondents).

On-the-ground risk reduction activities like correcting infrastructure or water banking are limited and largely concentrated on water resource management. Only 6% of the activities mentioned in the focus group sessions were related to reducing vulnerabilities in Washington. Ten of the fourteen were related to water rights, conservation, and other management activities. These results may suggest that some have not been implemented yet. It may reflect agencies' functions which may or may not be relevant to direct risk reduction activities.

5. The most frequent outputs described by focus group participants were educational resources for various stakeholders, but the establishment of rules correlated consistently in achievements of outcomes.

More than half of the outputs listed by focus group participants were informational products. Educational resources (10) geared towards the public (5) and local managers (5) represented the largest share of information. Finalized impact assessment reports (7) and databases (3) were also produced by a number of agencies. The other axial codes for outputs included events which were mostly educational, plans—two updated agency strategies, two implementation plans, and two management plans, three new rules, and one completed project.

Within focus group discussions, there was evidence that some of these outputs led to the fulfillment of outcomes pulled directly from WICRS strategies. Information

outputs were explicitly linked through focus group discussions to two of twenty-four outcomes. The single completed project described achieved another outcome. Two out of the three rules adopted were also explicitly tied to two separate outcomes. These explicit causal theories are represented in the logic model (Figure 4) below.

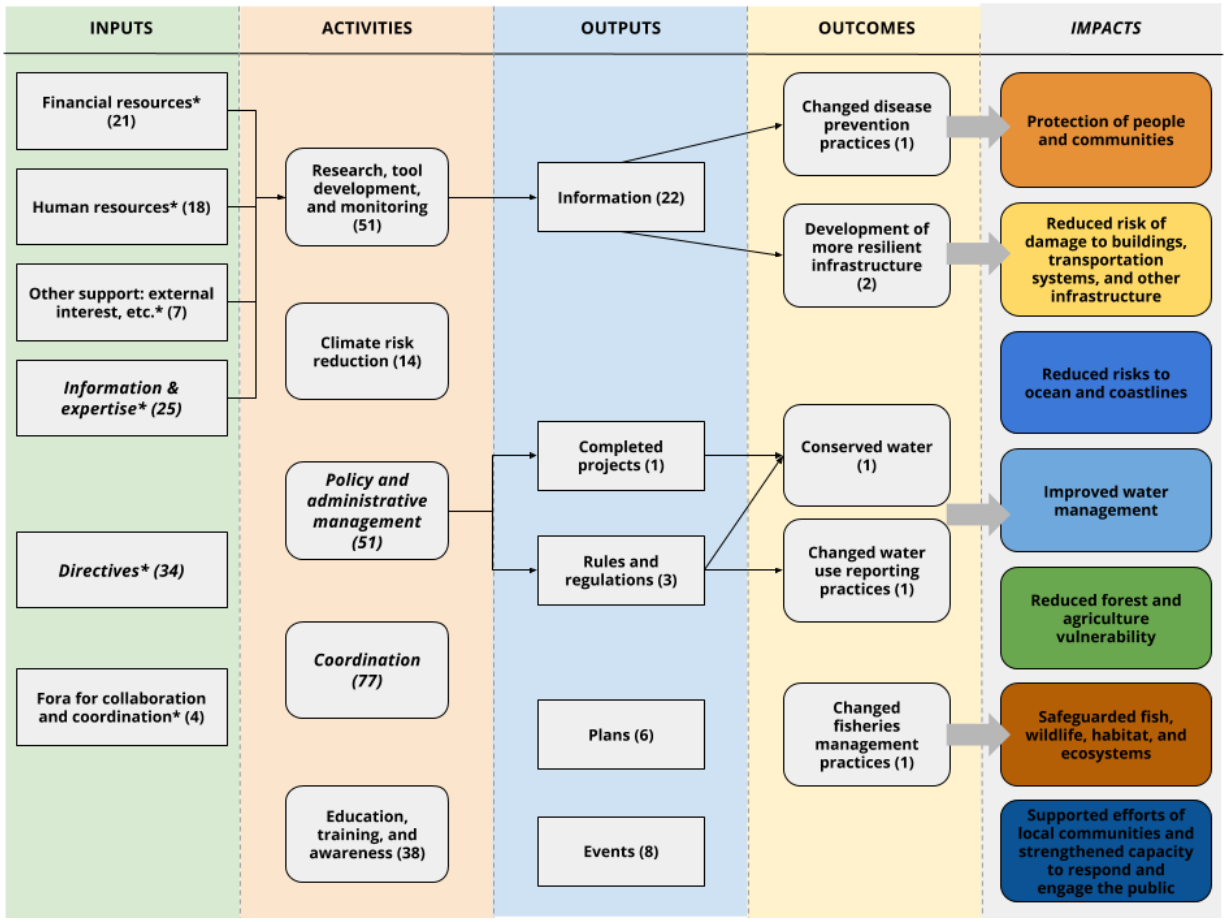

Figure 5. Washington State agency climate adaptation logic model. *The program—inputs through outputs—is described using axial codes. The outcomes and impacts are sourced directly from WICRS. The outcomes represented are summaries of the five (of 24 recommended) strategies that have been described during the focus group sessions. Numbers in parentheses represent the amount of supporting excerpts from focus group discussions. The impacts reflect the seven priority strategies in WICRS. Italicized phrases represent results explicitly supported by more than one data source (eg. focus groups and adaptation survey). Asterisks next to input represent where barriers identified barriers (focus groups and forum survey).*

6. While success is hard to define, there is evidence that some of the Strategy's outcomes are being achieved. However, there is no centralized method of evaluating performance or reporting accomplishments.

As evident in the logic model above, there is one intervention that was described in a focus group session which participants traced directly from input to outcome. Impacts were not explicitly described in focus group discussions, but could be inferred from an analyst's standpoint. There are almost certainly additional logical chains and activities that were not described. These could not be included in the logic model.

All of the focus groups mentioned having general performance tracking systems and structures in place, but monitoring and evaluating adaptation efforts are limited. Five of the participating agencies also described having formal reporting mechanisms like Results Washington, but again, statewide progress on climate adaptation is not reported. In the focus groups, two agencies claimed to be working on performance measurement systems relevant to adaptation and 5 reported doing some adaptation tracking, however, much of what was being described seemed to be incidental or an afterthought. For those who described tracking adaptation progress, the existence of climate adaptation elements in their agency or program's strategic plan drove the monitoring efforts. Reasons why agencies were not measuring adaptation performance included substantial challenges in tracking adaptation, limited capacity, lack of directive, and disconnect between state-level and program-level tracking systems. There was no guide for implementation of WICRS, so, there has been no tracking of the State's completion of the Strategy's

actions. In fact, one participant explained that the plan was never meant to be tracked. Another focus group felt that adaptation was so integrated into their operations that tracking it separately does not make sense.

These discussions may relate to the difficulties in defining successful adaptation. When asked to rank the success of their agency in preparing Washington for climate change impacts, half of the respondents selected 'limited' which may indicate barriers to adaptation or difficulties measuring success. This adds a variety of alternative explanations for these results. In the adaptation survey, this question was the only one skipped by a respondent. Also, the variation in responses to the question of agency success-to-date—6% none, 50% limited, 29% moderate, and 9% high—may illustrate a lack of consensus on a definition of successful adaptation. Similarly, a variety of different elements of success were discussed throughout the focus group discussions. When successes at different stages within the logical framework were compared, the results showed that there were success stories attributed to each element with no identifiable pattern within or between agencies. Focus group participants offered definitions ranging from "hey, that was successful that we went out there and we looked at it" (Group 5, 2017) to "just getting people in the office to start thinking about climate change" (Group 10, 2017) to "long-term, we're successful if we're meeting [people's water] needs" but they were not necessarily representative of ideas held by the group as a whole. The only consistency came from participants' responses to the focus group question about progress tracking. Assuming achieving an agency's strategic objective is considered a success,

four of nine participating agencies were tracking adaptation progress via their strategic plans and would, therefore, have defined success in meeting those objectives.

7. The most significant barriers to adaptation—inadequate institutional support and lack of resources—align with the inputs most frequently described in the focus groups indicating at least in some cases, these obstacles are being overcome. Inadequate information and public attitudes do not seem to be large obstacles.

Of the four enumerated barriers limiting an effective response to climate change listed in WICRS, inadequate institutional support for adaptation (53) and lack of resources (51) seem to be substantially larger obstacles based on focus group discussions than inadequate information and experience (36) and public beliefs and attitudes (15). Generally, the multiple choice and written responses from the forum survey both separately support this ranking. Many staff considered lack of urgency (48 respondents), legislative mandate or executive support (59 respondents), and lack of guidance (43 respondents as barriers to agency progress on adaptation. 67, or 77% of respondents selected lack of financial resources and 21 selected lack of agency commitment. In addition, the written responses mentioned inadequate institutional support including the lack of a forum for coordination.

The rankings between the focus groups and forum survey responses differ slightly on public attitudes and lack of information. Some focus group respondents discussed public attitudes as a relatively minor and surmountable obstacle, whereas, 41% of survey

respondents considered it a barrier with an additional two written responses relating to denial and unwillingness to act. In the forum survey, inadequate access to science and tools was the lowest ranked barrier. While in opposition to focus group findings, this is supported by clear adaptation survey results that information is accessible as far as respondents were concerned—zero said it was inaccessible, three did not know, and 37% thought it was highly accessible—and expertise was similarly accessible.

Institutional support and lack of resources were the most commonly identified barriers to climate change adaptation for participating state agency personnel, yet, the focus groups reported that those input also facilitated a number of adaptation activities. Further evidence of agency action despite identified barriers is found in the results of both surveys. Only four of 88 individuals expressed that their agency was doing little about climate adaptation. Similarly, while success of agencies was ranked as largely limited by respondents to the adaptation survey, only three of 49 individuals said their agencies had no success. Therefore, it is clear that despite coming across barriers to climate change adaptation, Washington State agencies, at least in some cases, are overcoming these barriers.

Discussion

This research found that there is significant interest in climate adaptation amongst Washington State agencies. Not only did 218 individuals register for the State Agency Adaptation Forum, but approximately 50 to 100 state employees participated in each data collection method, although these estimates include individuals that engaged in more than one

method. These participants were recruited through a community of adaptation practitioners which limits on the generalizability of these results to all state agencies. While these numbers supplied sufficient sample sizes, the differences in the agencies represented, proportions of respondents per agency, and positions held by staff may have also influenced the results. For focus groups in particular, there were a number of variables that were noted including the presence of an agency director or manager, degree of adaptation expertise, group size and familiarity, diversity in job responsibilities, and number of programs represented. Each of these variables may have affected the results, but they also shed light on some of the dynamics within and among state agencies that would otherwise not be represented.

Use of WICRS

The results of the focus groups highlighted three important observations regarding participating agencies' use of the Strategy. First, although it has shaped some individuals' thinking, awareness of its existence was highly variable and its direct use was very limited. Second, E2SSB 5560 directs state agencies to "strive to incorporate adaptation plans of action as priority activities" and "shall consider: the integrated climate change response strategy when designing, planning, and funding infrastructure projects; and incorporating natural resource adaptation actions and alternative energy sources when designing and planning infrastructure projects." While this language is relatively weak, it is nonetheless binding. Third, its lack of use may be a missed opportunity to measure and report progress. As it is, this research is likely underreporting state agencies' adaptation efforts. WICRS provides a structure that agencies can use to defend their activities.

As described in the findings, two of the three participating agencies that were not involved in the Strategy's development were not at all aware of its existence, the third had one individual that came across it when getting familiar with Washington's laws. The other six participating agencies had individuals in the focus group discussions that were involved in the Strategy's development. Individuals from different agencies said "the value turned out to be the process of developing [the Strategy]" (Group 10, 2017); "so much of the value was in the work we did to distill it to what got in the strategy...it was really an educational experience" (Group 3, 2017). So, while the Strategy is influencing some individuals' decision-making processes, there are other agency staff who had not been aware of the Strategy before their focus group discussion.

Only one account of using the physical document to inform the development of a strategic plan was described. This lack of use was explained by some individuals in the focus groups as being the result of not having an implementation strategy due to a lack of human resources, directives, and financial resources. Limited actionability due to the size of the workload (218 unassigned, sometimes resource intensive actions) and lack of prioritization has kept the strategy on the shelf.

Based on this evidence, it does not appear that WICRS is a necessary input into these agencies' adaptation activities, yet, its consideration in decision-making is required by law. In accordance with E2SSB 5560, WICRS was produced in 2012 through a collaborative effort that went beyond the mandated agencies. Some state agencies are incorporating adaptation plans of

action as priorities and, while not necessarily referring to the Response Strategy, are incorporating natural resource adaptations into the design and planning of infrastructure projects and other actions.

Logic model framework

An evaluation of outcomes using the log model framework depicted in Figure 4 would allow state agencies to monitor and measure their performance to evaluate the effectiveness of implemented interventions. For focus groups, each datum, or excerpt, was coded as an input, activity, output, or outcome and additional notes were taken on responses to each question, barriers, definitions of adaptation, definitions of success, and agency needs. Excerpts were also coded into at least three (axial, pattern, and descriptive) more detailed categories. The tallied data used in the results present information on the relative importance of the codes in relation to one another. The method of analysis assumes the more often a code came up, the more respondents were thinking about it, and the more important it was to the agency represented. The counts could not be used to determine the percent of participants that shared a certain sentiment because not all respondents spoke on each detail. In fact, a few individuals attended just to listen in.

For adaptation survey data analysis, the frequencies of respondent's ranking selections (high, moderate, limited, none, don't know) represent the percent of participating agency personnel that felt that their agency ranked relatively high, for example, in accessibility to a certain input, engaging in a certain activity, or reaching a certain impact. What the responses were ranked against (the other options, past agency operations, other agencies) was not

controlled and may have led to alternative interpretations of the questions. Given these limitations, the following can be said about the results for each element of the logic model.

Inputs

While the inputs could be ranked by excerpt counts, directive counts were likely inflated in certain focus groups as a result of the agency director or program managers present. Even with these considerations, directives seemed to play a significant role in the ability of participating agency personnel to pursue interventions and agency leadership to prioritize adaptation activities. Directives also seemed to facilitate the allocation of additional resources like staff time and funding. In terms of financial resources, there were slightly more accounts of activities being funded with state resources than federal or NGO resources. This suggests that Washington places importance in climate adaptation relevant to some other institutions in the State. Activities were also facilitated by access to internal and external information and expertise. One of the data limitations for practitioners, brought up multiple times in the focus groups, was the lack of resolution of projections and information at the parcel-level scale. An interesting observation related to human resources was that staff attitudes, work ethic, and interest in adaptation seemed to play a larger role than the number of staff with climate change in their title. It has been these "climate champions" that are leading ICAN and other adaptation efforts, not all of whom are specifically responsible for working on climate change issues. The identification of these inputs and patterns can help state agencies monitor and evaluate which are the most vital to facilitating adaptation activities and inform decisions on where to allocate resources.

Activities

The largest proportion of activities discussed in the focus groups included elements of coordination and collaboration. Considering climate impacts do not know the same political boundaries as Washington does, it is appropriate that coordination is a priority and participating state agencies are coordinating with a number of different actors. Discussions of collaborative work with tribes, however, were lacking in the focus groups.

The results also indicated that there were more excerpts relating to research and policy activities than education and risk reduction activities. This may suggest that there are opportunities to engage in more education and risk reduction work, or stakeholder needs for information and policies from state agencies, or because the state agency's functions are to produce policies and information. So, this ranking implies that the higher numbers of, say, mainstreaming activities signify that changes in policy are being instituted at the state-level. In terms of research, there seem to be more studies related to climate impacts than to adaptation strategies. The number of pilot projects discussed may represent a shift in the research agenda which could suggest advancing adaptation practices, but no conclusion can be made without knowledge of baseline information (the number of adaptation pilot projects before WICRS). One detail about the education activities that stood out were repeated accounts of focus group participants making efforts to stay informed on climate change. This supports the earlier discussion of the importance

individual championing of climate adaptation causes. The results identifying relatively few risk reduction activities may be a function of participating parties' roles and responsibilities in the State. They also suggest that water management is a high priority for many of the focus group participants.

An activity not explicitly represented in the results was climate communication. Internally, most state agency staff (understanding the sample population was largely natural resource agencies) are open to discussions of climate change, but program silos and ineffective flow of information from leadership to management to staff has limited conversations and projects focusing on adaptation. External communications are even more complicated with varying agency functions and constituents and stakeholder or public values. Some focus group participants said they absolutely saw a need to communicate their efforts to the public. Others said no and about half of the respondents were somewhere in between and some suggested a need communication plan in which using the phrase 'climate change adaptation' may or may not be appropriate.

Outputs, outcomes, and impacts

The axial codes for outputs included information, plans, events, rules and regulations, and completed projects. While information was the most commonly discussed output during focus groups, its effectiveness in catalyzing change was not discussed. Completed projects and rules and regulations, on the other hand, were explicitly traced using a logic model framework to outcomes and impacts. The seven

priority strategies in WICRS make appropriate desired impact descriptions and the more detailed strategies make clear outcomes that could be used to measure adaptation progress in Washington State.

Performance evaluation

Focus groups, in response to question 4 (about performance measurement), described how they track performance generally and if they track adaptation specifically. This prompted discussions of existing systems used to track progress and the activities and outputs involved. In some focus groups it also brought awareness to indicators already measured that could also be used as proxies for adaptation successes. In these cases, the conversation also evolved into discussions about defining adaptation. This information is important because how adaptation is defined by state agencies could dictate how adaptation performance measures are integrated into current M&E systems.

Each participating agency has systems in place to monitor their performance using a variety of performance measures and/or their strategic plans. Some mentioned reporting performance at the state-level as well. One individual described tracking funding allocations which may hint that the agency uses a logic model framework. If this is the case, using a logic model to monitor and evaluate adaptation may minimize the time and energy required to integrate an adaptation tracking process into agency operations. One focus group felt this integration had already been built into agency operations and each participant agreed that there was no need to track adaptation independently. Of the agency staff that described some

adaptation tracking, their reasons for doing so included climate elements exist in their strategic plan, it is integrated into other performance tracking, or they were being held accountable. Reasons for not engaging in adaptation performance measurement included the difficulties in tracking adaptation, limited capacity, lack of directive, and disconnect between state and program-level indicators. If tracking adaptation is deemed necessary, this process will need to be more clearly defined (for which this research may be useful).

The discussion above speaks to the monitoring component of performance evaluation. There was minimal conversation about evaluation of adaptation measures. Some of the focus groups did mention it (even if in a roundabout way) during discussions of success. Even this discussion was limited to "I can't call it [trying to address cold water refuges] a success because it's never been completed". There were other individuals expressing uncertainty about defining success, but adaptation by the participating state agencies was still occurring.

"While the excitement for adaptation...is growing, adaptation evaluation, like all evaluation, should not be undertaken unless there is an audience interested in and capable of receiving and using the findings." (Arnott et al., 2016). At this time, it does not seem like state agencies are being held accountable for communicating their adaptation activities, so there is a lack of urgency to measure their performance. "Right now we're not being held accountable because the public doesn't see us as having that [communicating adaptation successes] responsibility....Well, they'll hold us accountable if something goes awry"(Group 3, 2017). Yet, state law did direct state agencies to prioritize adaptation. Monitoring and evaluation of state

agency climate change adaptation would provide accountability, encourage organizational learning, encourage learning and inform decision-making.

Conclusion

To summarize, Washington State agencies were directed to create and use an integrated climate response strategy to guide their adaptation efforts. There was, however, no roadmap developed to translate the strategies and actions into agencies' daily operations (See Figure 5). The intent of this research was to offer some description of how this integration has been occurring and a method of translation of WICRS and agency operations into the same language of inputs, activities, outputs, outcomes, and impacts.

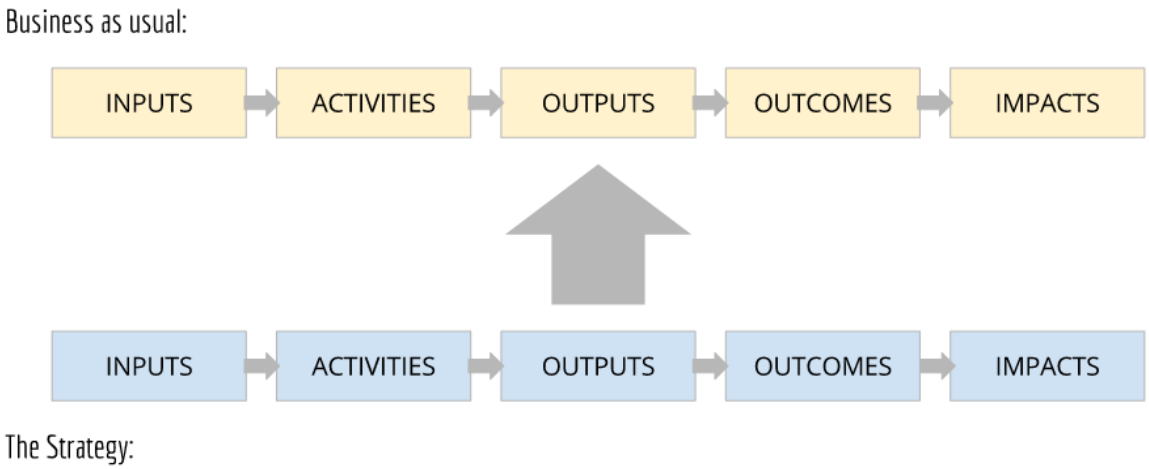

Figure 6. Needed and proposed translation of adaptation efforts into agencies' operations

This research found that Washington state agencies are preparing for the impacts of climate change by taking, often coordinated actions, to build adaptive capacity, mainstream climate considerations, and reduce Washington's vulnerability to climate change impacts. However, there is no formalized movement within the state to ensure cohesion across political

and sectoral jurisdictions or prevent maladaptation. The State's Climate Response Strategy, while thorough and informative, has has limited influence on agency activities. It seems that after the Strategy's publication, adaptation considerations and interest have been cultivated by climate champions within a number of state agencies, some of which has been facilitated by ICAN or similar workgroups. Given appropriate resources, information, and support, state agencies could continue implementing adaptation interventions and begin monitoring and evaluating their work to increase flexibility of agency operations and develop a safer, more resilient Washington.

It is recommended that, if Washington State agencies determine it is useful to track adaptation, outcomes from WICRS could be used to track, coordinate, and compare climate adaptation efforts. Whether it would be more appropriate for state agencies to track adaptation progress or implementation progress individually or better together, agreement on outcomes would allow agencies or program to backtrack through the logic model to determine what inputs, activities, and outcomes are needed. If multiple agencies are working on one outcome, efforts could be more easily coordinated (maybe through a forum like ICAN) or at least compared at the state-level using the same language.

Potential next steps could include reporting the results of this study to relevant stakeholders. If appropriate, a climate communication strategy could be developed. At the same time, agencies could initiate conversations about which, if any, adaptation strategies from WICRS should be prioritized. It would be useful for state agencies to take stock of what their inputs, activities, and outputs around adaptation have been and in so doing, define adaptation. These results could be reported through Results Washington using a measure of the degree of implementation of

WICRS. Using the codes from this study and by following the logic model framework, Washington State agencies should be able to match the Strategy's guidance to their current operations in order to facilitate statewide preparedness for the projected impacts of climate change.

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APPENDIX A - Table of climate adaptation-related documents encountered during secondary research
*Illustrative; not all inclusive

Agency	Title & year of relevant publications by state agencies
WSDA	Washington Agriculture - Strategic Plan 2020 and Beyond (2008), Pesticide Management Strategy: Water Quality Protection (2009), A Report to the Legislature from the Honey Bee Work Group (2014), Protecting the Health of Washington Poultry & Livestock (c.2010), Washington State Farmer's Market Manual - 2nd Edition (2012), Washington State Agricultural Disaster Assistance (2010), Interim Report: 2015 Drought and Agriculture (2015), Washington's Notification Rule and Hold Requirement (2015), Plants and Seeds Whose Sales Are Prohibited in Washington State (2016)
COM	Utility Resource Plan (2014), Results Commerce: Quarter Performance (2015), Washington State Energy Strategy (2012), Planning for Climate Change (2008), Urban Growth Area Guidebook (2012)
ECY	Purchasing Reference Guide for Environmentally Preferable Purchasing (2010), Columbia River Basin Long-Term Water Supply and Demand Forecast Draft (2016), Preliminary Draft of SMA Rule Amendments: Sea Level Rise (2016), Shoreline Master Programs Handbook (2012), Leading the Way on Climate Change (2008), Sea Level Rise in Coastal Waters of Washington (2008),Scientific Study of Ocean Acidification in Washington State Marine Waters (2012), Yakima River Basin Integrated Water Resource Management Plan (2012), Healthy Watersheds, Healthy People (2008), ECY website - Climate Change, 2005 Drought Response Report to the Legislature (2006), Impacts of Climate Change on Washington's Economy (2006), Facing the Challenge of Climate Change (2007),Focus On: Climate Change and Jobs (2008), Focus On: Citizen Engagement (2008), Focus On: Preparing for Impacts (2008), 2009 Green Jobs and Climate Action Legislation (2009), Predicted Impacts of Climate Change on Groundwater Resources of Washington State (2016),Washington State Coastal Hazards/Sea Level Rise Workshop Summary (2012), Puget Sound and the Straits Dissolved Oxygen Assessment (2014), Wetland Guidance for CAO Updates: Western Washington Version (2016), Wetland Guidance for CAO Updates: Eastern Washington Version (2016), Wetlands in Washington State: Volume 2 (2005)
WDFW	WDFW Climate Change Goals (2010), Climate Change Digests (2011-2015), Management Strategy for the WDFW's Forests (2014), Safeguarding WA Fish & Wildlife in an Era of Climate Change: A Case Study of Partnerships in Action (2013), State Wildlife Action Plan (2015), Stream Habitat Restoration Guidelines (2012), Marine Shoreline Design Guidelines (2014), F&W Planner Newsletter (2004-2013), Climate Change Effects on Habitats (2010-2011), Effects of Sea Level Rise on Spawning Habitat of Two Beach Spawning Fishes (2009), Water Crossing Design Guidelines (2013), WDFW website - Climate Change, Integrated Streambank Protection Guidelines (2003), Protecting Nearshore Habitat and Functions in Puget Sound (2010), Land Use Planning for Salmon, Steelhead and Trout (2009), Your Marine Waterfront (2016), Channel Design (2001), Marine and Estuarine Shoreline Modification Issues (2001), WDFW Wind Power Guidelines (2009), Fish and Shellfish Conservation and Management, Habitat Conservation Plans and Management Publications, Threatened and Endangered Species Recovery Plans, 2015-2017 Strategic Plan (c.2015), Aquatic Nuisance Species Management Plan (2001), Landscape Planning for Washington's Wildlife (2009), High Flows for Fish & Wildlife in Washington (2009),Lands 20/20 (2005), Priority Habitats and Species Lists (2014), Puget Sound Steelhead Foundations: A Primer for Recovery Planning (2011)
WDOH	Strategic Plan Update 2014-2016 (2014), Washington Tracking Network, DOH website - Climate & Health
DNR	DNR Strategic Plan 2014-2017 (2014), Geologic Information Portal, Mapping and Monitoring Bluff Erosion with LiDAR (c.2014), Tree Link News, Forest Watershed Ecosystem Services (2012), Landslide Hazards Fact Sheet (2016)
WDOR	Open Space Taxation Act (2014), Designated Forest Land (2015)
WSDOT	Climate Impacts and Vulnerability Assessment Report (2011), WSDOT website - Climate Change - Adapting and Preparing, WSDOT's Strategic Plan (c.2015), Reforms and their Status (2015), Results WSDOT (2015), The Gray Notebook, Guidance for NEPA and SEPA Project-Level Climate Change Evaluations (2014), 2016 Washington State Public Transportation Plan (2016), Design Manual (2016)
WMD, EMD	Washington State Guide to Weather Safety (N/A), Emergency Preparedness Guide (2013), Resilient Washington State (2012), Washington State Comprehensive Emergency Management Plan (2016), State Hazard Mitigation Plan (2014)
OIC	OIC website - Climate Change, Insurer Climate Risk Disclosure Survey Report & Scorecard (2014)
OWSC	Weekly Drought Monitoring Report (2015)
PSP	2015 State of the Sound: Report of the Puget Sound Vital Signs (2015)
RCO	Washington Invasive Species Council Annual Report to the Legislature (2015), grant application materials,Washington: Making a Difference to Salmon (2016), RCFB Strategic Plan (2016), SRFB Strategic Plan (2015), Invaders at the Gate: WISC Strategic Plan (2008), RCO Strategic Plan (2015), Washington Biodiversity Conservation Strategy Report (2003), The Washington Comprehensive Monitoring Strategy for Watershed Health and Salmon Recovery: Comprehensive Strategy (2002), The 2013 State Comprehensive Outdoor Recreation Plan (2013), Washington State Trails Plan (c. 2013), Boating Grant Programs Plan (2015),Washington Public Lands Inventory (2014), Grant Manuals (c.2016)

Publications listed were found online via agency websites and google search between June and September 2016. Additional documents have been published since this secondary research and some are likely now inaccessible.

APPENDIX B - Washington State Agency Climate Adaptation Survey questions

For your agency, how would you rank:
*Words in brackets did not appear in the survey.

[INPUT] *The priority placed on climate change adaptation by agency leadership.*

1	2	3	4	NA
none	limited	moderate	high	don't know

[INPUT] *The quality of additional training related to climate science or adaptation that is available to agency staff.*

1	2	3	4	NA
none	limited	moderate	high	don't know

[INPUT] *Access to individuals or organizations with technical expertise related to climate change adaptation (either within or outside your agency).*

1	2	3	4	NA
none	limited	moderate	substantial	don't know

[INPUT] *Access to data that describe climate changes or climate impacts relevant to your agency's activities.*

1	2	3	4	NA
none	limited	moderate	substantial	don't know

[ACTIVITY] *Coordination with other state agencies on climate adaptation issues.*

1	2	3	4	NA
none	limited	moderate	substantial	don't know

[ACTIVITY] *Coordination with local agencies on climate adaptation issues.*

1	2	3	4	NA
none	limited	moderate	substantial	don't know

[ACTIVITY] *Coordination with federal agencies on climate adaptation issues.*

1	2	3	4	NA
none	limited	moderate	substantial	don't know

[ACTIVITY] *The degree to which future climate is considered by your agency's staff when evaluating agency actions.*

1	2	3	4	NA
none	limited	moderate	substantial	don't know

[IMPACT] *Success of your agency to-date in preparing Washington State for the projected impacts of climate change.*

1	2	3	4	NA
none	limited	moderate	substantial	don't know

APPENDIX C - Focus group discussion pre-prepared questions

*Words in brackets represent the structural codes expected in the responses for each questions. "Performance measurement is not a structural code used in the analysis, but describes the theme of the expected discussion. They were not revealed to focus group participants.

1. [INPUTS, ACTIVITIES] Currently, what are some of the high priority steps (up to 3) your agency is taking to prepare for and adapt to the projected impacts of climate change?

2. [INPUTS] Do you use Washington's Integrated Climate Response Strategy when prioritizing, planning, or updating your agency's programs and policies? If yes, how? If no, what do you believe are the reasons you are not using the Strategy?

3. [ACTIVITIES] Would you offer one example of a climate adaptation activity your agency has collaborated on with one or more state agencies and one example of an activity your agency has undertaken on its own? How does your agency decide whether or not to collaborate?

4. [OUTPUTS, ACTIVITIES] What aspects of performance does your agency already track? How is climate adaptation progress tracked or measured within your agency?

5. [OUTPUTS, OUTCOMES] What would you consider a "success" story in climate change adaptation in your agency? What goal(s) or objective(s) were accomplished?

6. [Performance Measurement] Does your agency see a need for communicating your climate adaptation activities and successes to the public? If so, how?

7. [INPUTS, ACTIVITIES] What do you think are your agency's most significant barriers to greater consideration of climate change adaptation in daily decisions?

APPENDIX D – Climate Adaptation Forum feedback survey results

Question 5:

Based on what you learned at the Forum, select one statement that best represents how you view your agency.

My agency has a plan or policy related to climate adaptation and is fully engaged in implementation
My agency has a plan or policy related to climate adaptation but needs to do more on implementation
My agency is engaged in some activities related to climate adaptation, but needs to be better organized and do more on implementation
My agency is doing little about climate adaptation.
~~*I don't work for a state agency~~
Don't know

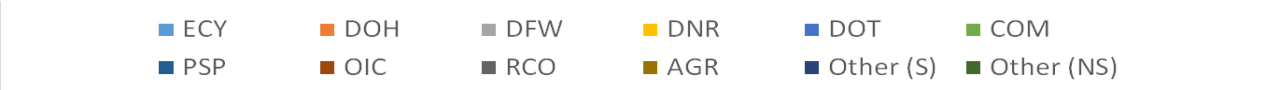
*not analyzed

Question 6:

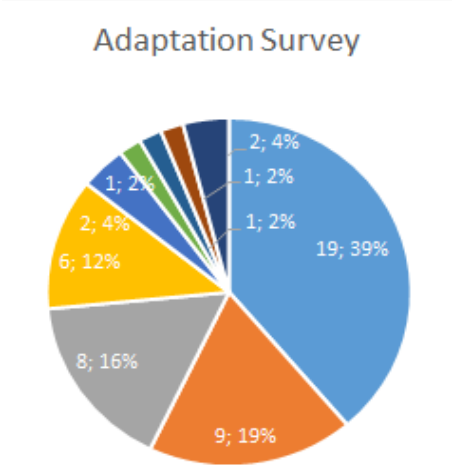
Which of the following do you see as barriers to improving State agency progress on climate adaptation? (choose all that apply)

Public attitudes about climate change
Lack of financial support or dedicated funding
Lack of a sense of urgency by state agency managers
Inadequate access to science and tools
Lack of a legislative mandate or executive support
Lack of guidance on climate response strategies - what to do and how to do it
Lack of agency commitment
Other (please specify)

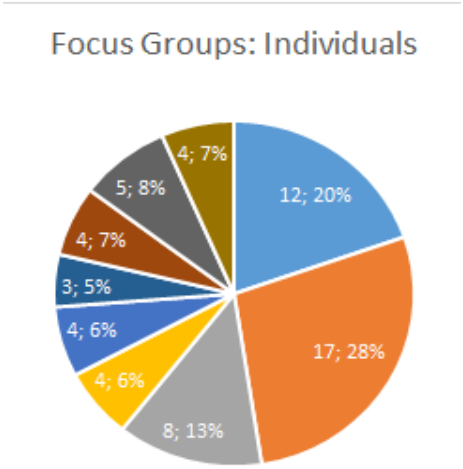
APPENDIX E - Washington State agency participation in primary research



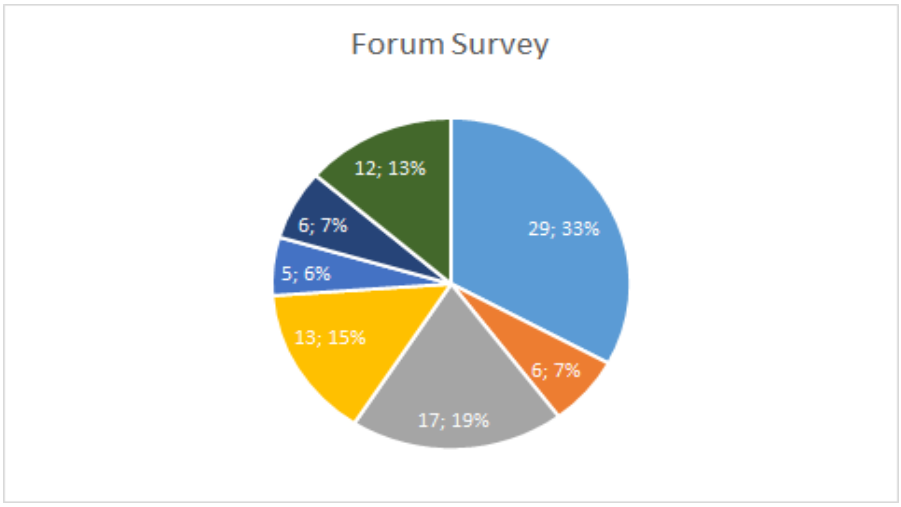
* S = Other Washington State agencies; NS = Other Non-Washington State agency organizations



Total: 49



Total: 61



Total: 88

ECY: Department of Ecology
DNR: Department of Natural Resources
COM: Department of Commerce
OIC: Office of the Insurance Commissioner
DOH: Department of Health

DFW: Department of Fish and Wildlife
DOT: Department of Transportation
PSP: Puget Sound Partnership
RCO: Recreation and Conservation Office

APPENDIX F - Table of input codes sourced from focus group discussions

Structural code - INPUTS		
Axial codes	**Pattern codes**	**Descriptive codes**
Directive (34)	Legislative direction (9)	State mandate (5); Authority (2); Unspecified mandate (2);
	Executive-level leadership (22)	Governor's office (4); State agencies (9); Program management (5); Federal agencies (3); Mayor (1)
	Expressed need (3)	Local governments (1); Shellfish growers (1); Farmers (1)
Financial resources (21)	Direct funding (11)	Federal funds (3); State funds and grants (7); NGO grants (1)
	Other (8)	General (7); Funded position (1)
Fora for collaboration & coordination (4)	Workgroups (2)	Planning team (1); Research team (1)
	Interagency networks (2)	Climate Adaptation Network (1); Coastal Hazards Resilience Network (1)
Human resources (18)	Personnel (7)	Good people (1); Climate-focused staff (3); Effort or drive (3)
	Internal interest (6)	Dedicated facilitator (1); Project ownership (1); Climate change champion (3); General interest (1)
	Staff time (5)	General (5)
Information & expertise (25)	Expertise (9)	External expertise (5); Internal expertise (3); Expert panel (1)
	Internal knowledge (9)	Awareness (8); Data (1); Information sharing network (1)
	External knowledge (6)	Local knowledge (3); Published research (2); Data sets (1)
Other support (7)	Capacity (1)	General (1)
	External interest (4)	Scientific intrigue (2); Work invitation (1); Global engagement (1)
	Resources (2)	General (1)

*External drivers (not explicitly "expressed need"): **Climate impacts** (8)--severe weather (1), flooding (1), drought (4), fire (1), unspecified (2) and **Interest in remaining nationally competitive** (2)

APPENDIX G - Table of activity codes sourced from focus group discussions

ACTIVITIES		
Axial codes	**Pattern codes**	**Descriptive codes**
Climate risk reduction (14)	Habitat conservation (1)	Wildlife area planning (1)
	Infrastructure corrections (1)	Fish barriers (1)
	Water resource management (10)	Water rights (2); Water conservation (2); Reservoir management (1); Water banking (1); Aquifer management (2); Flow management (1); Unspecified (1)
	Other (2)	Housing inventories (1); Unspecified (1)
Policy and administrative management for climate change (51)	Mainstreaming or considering climate sensitivities (13)	Project design (3); Risk assessment (1); Project implementation (1); Decision-making (1); Changing operations (5); Unspecified (2)
	Administrative changes (8)	Hiring climate change staff (2); Changing or new organizational structure (3); Securing funding (3)
	Policy creation (8)	Agency strategic plan (2); Rule development (5); Program strategic plan (1)
	Agency or program planning (7)	Emergency response planning (1); Plan updates (5); Plan development (1)
	Plan implementation (6)	Agency strategy (2); Project-level guidance (1); Drought strategy (2); Water strategy (1)
	Evaluating project proposals and performance (9)	Developing a performance measurement framework (1); Federal proposals (2); New evaluation criteria (1); Prioritizing projects (4); New application requirement (1)
Education, training, and awareness on climate change (38)	Institutional capacity building (20)	Staff training and continued learning (7); Educating, training, and guiding constituents (10); Updating guidance (2); Capacity development program (1)
	Raising awareness (10)	Nationwide (1); Public (5); Industry (2); Unspecified (2)
	Information dissemination (8)	Current practices (6); Translation of communications (1); Projections (1)
Climate change research, tool development, and monitoring (51)	Impacts research (15)	Species resilience (2); Ocean acidification impacts (1); Impact analysis (1); Rating environmental conditions (1); Trend analysis (7); Developing indicators (1); Unspecified (2)
	Adaptation research (7)	Pilot projects (4); Pest control (1); Site selection (1); Policy evaluation (1)
	Tool development (4)	Models (2); Early warning system (1); Database (1)
	Vulnerability assessments (13)	Ecosystem sensitivity (1); Modelling (5); Resiliency analysis (2); Statewide (1); Asset mapping (1); Unspecified (3)
	Monitoring data and performance (12)	Environmental conditions (2); Species (3); Syndromic surveillance (1); Lab reporting (1); Local operations (1); Unspecified (4)
Coordination on climate change measures and activities *between state agencies and* relevant actors (77)	Local governments, planners, managers, and communities (15)	Technical support (6); Information sharing (3); Conversations (1); Engagement (5)
	Federal agencies (9)	Proposal review (2); Use of guidance (1); Participation in efforts (4)
	Interstate coalitions (2)	Information sharing (1); Conversations (1)
	International coalitions (2)	Water management (1); Conversations (1)
	State agencies (22)	Planning (1); Rule-making (1); Research (1); Developing guidance (1); Information sharing (3); Conversations (6); Forming workgroups (4); Participation in networks (3); Support (1); Outreach (1)
	Intra-State agency (5)	Planning (2); Information sharing (1); Conversations (1); Outreach (1)
	Researchers and boundary organizations (10)	Research (4); Funding (1); Tool development (2); Data use (1); Writing (1); Unspecified (1)
	Multiple actors (9)	Habitat connectivity (1); Conversations (3); Sharing information (1); Building partnerships (2); Participation in network (1); Unspecified (1)
	Other (insurance industry and epidemiology community)	Conversations, insurance (3); Conversations, epidemiologists (1); Outreach, insurance (1)

**Initial thoughts or discussions were not included (24). Repetitive conversations or meetings were.

***Excerpts coded as WICRS development were not included (6).

Axial categories adapted from Figure 5 (OECD, 2011)

APPENDIX H - Table of output codes sourced from focus group discussions

OUTPUTS		
Axial Codes	**Pattern Codes**	**Descriptive Codes**
Information (22)	Educational resources and guidance (10)	For the public (5); For project managers (5)
	Tools (4)	Databases (3); Not specified (1)
	Reports (8)	Impact Assessments (7); Not specified (1)
Plans (6)	Management (2)	Sectoral strategy (2)
	Implementation (2)	Agency implementation plan (1); Impact response plan (1)
	Agency strategic plan (2)*	
Events (8)	Conferences (2)	For industry (1); For state agencies (1)
	Educational events (6)	Workshops for State agency staff (2); Trainings for local managers (3); Not specified (1)
Rules & regulations (3)	Rules (3)	Water quality (1); Water management (2)
Completed projects (1)	New system (1)	New water bank (1)

*The interagency strategic plan, WICRS, not included because it would ideally be an input (directive or information) to adaptation activities.

APPENDIX I - Table of outcomes sourced from focus group discussions

OUTCOMES	
WICRS Strategy addressed	Summary
(A-1) *Protect the communities that are most vulnerable to impacts of climate change.*	Changed disease prevention practices (1)
(B-3) *Manage species and habitats to protect ecosystem functions and provide sustainable cultural, recreational, and commercial use in a changing climate.*	Changed fisheries management practices (1)
(D-1) *Manage water resources in a changing climate by implementing Integrated Water Resources Management approaches in highly vulnerable basins.*	Conserved water (1)
(D-4) *Build the capacity of state, tribal, and local governments; watershed and regional groups; water managers; and communities to identify and assess risks and vulnerabilities to climate change impacts on water supplies and water quality.*	Changed water use reporting practices (1)
(G-3) *Reduce or avoid climate risks by considering climate in the planning, funding, design, and construction of infrastructure projects and by promoting improved design and construction standards in areas vulnerable to climate risks.*	Development of more resilient infrastructure (2)

APPENDIX J – Monitoring and evaluation frameworks for climate change adaptation

Organization	Year	Title
UNDP	2007	Monitoring and Evaluation framework for adaptation to climate change
IDS	2008	Evaluation of adaptation to climate change from a development perspective
GEF-IEO	2011	Tracking progress for effective action
SCR	2011	Learning to ADAPT
GIZ, BMZ, WRI	2011	Making adaptation count
OECD	2011	Monitoring and evaluation for adaptation
UKCIP	2011	AdaptME Toolkit
GEF	2012	Climate change adaptation monitoring and assessment tool (AMAT)
CARE	2012	Participatory monitoring, evaluation, reflection and learning (PMERL) project for community-based adaptation (CBA)
ISET	2012	Climate resilience framework (CRF) training manuals
GIZ, BMZ	2012	Adaptation made to measure
ARCAB	2012	Monitoring & evaluation for community-based adaptation
AF	2012	Results framework and baseline guidance: Project-level
UNFCCC	2013	Adaptation M&E discussion papers
IIED	2013	Tracking adaptation and measuring development (TAMD)
TANGO	2013	The TANGO approach to livelihoods resilience measurement and evaluation
GIZ, BMZ	2013	Monitoring and evaluating adaptation at aggregated levels: A comparative analysis of ten systems
IISD	2013	Climate resilience and food security: A framework for planning and monitoring
UNEP	2013	Programme of research on vulnerability, impacts, and adaptation (PROVIA)
UNDP	2013	Community-based resilience assessment (CoBRA) conceptual framework and methodology
GRI	2013	G4 Sustainability Reporting Guidelines
DTF	2013	Evaluation policy and standards for lapsing programs
GIZ	2014	Saved health, saved wealth: An approach to quantifying the benefits of climate change adaptation
CIF	2014	Pilot Program for Climate Resilience (PPCR) monitoring and reporting toolkit
OECD	2014	Monitoring and evaluation of climate change adaptation: methodological approaches
IDS	2015	Logframe for M&E of resilience programming interventions
BRACED	2015	The 3As: Tracking resilience across BRACED
GEF	2016	Strengthening the monitoring and evaluation of climate change adaptation
EU, STAR-FLOOD	2016	A framework for evaluating flood risk governance

Beginning with list from Bours et al. (2014), with additions from Turner et al. (2014) and literature search for 'climate change adaptation' and 'performance measurement' or 'monitoring and evaluation' for the years 2014 through 2017. Italicized organizations represent sources that could not be found for further analysis.