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"Wicked" is a term used to describe issues that have indistinct boundaries, unclear solutions, and intense conflict. Timber management, rangeland management, and salmon management are examples of wicked natural resource problems found in the Pacific Northwest. There have been many attempts at management plans for Columbia River salmon recovery efforts and yet managers and decision makers are often at odds with each other, there is continued tension among stakeholders, and recovery efforts are expensive. Several methods have been attempted to improve decision-making in the Columbia River Basin including ecosystem management and adaptive management, but with little improvement. More recently, collaborative approaches have become increasingly popular among government agencies and non-governmental organizations in many disciplines. In this paper, I examine the use of collaboration in resource management, the effectiveness of these approaches, and the limitations and advantages of collaboration. In part, this evaluation is based on an internship with the National Policy Consensus Center in Portland, Oregon.

An Evaluation of Collaborative Problem Solving in Wicked Natural Resource Problems

by
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I understand that my final report will become part of the permanent collection of the Oregon State University Professional Science Master's Program. My signature below authorizes release of my final report to any reader upon request.

Amy L. Cook, Author

Wicked Problems: Definitions, Context, Solutions

Definition of Wicked Problems

Wicked problems: this has become a common term in the lexicon of natural resource managers, land managers, policy makers, technocrats, and academics. The term was first used when Rittel and Webber (1973) referred to using science to solve social policy problems as impossible because social policy issues are "wicked." Conklin (2005) further defines wicked problems with terms such as "chaos", "futility", and "fragmentation." For these researchers, as well as many others, the use of the term "wicked" stems from trying to define and solve complexity when dealing with the social dynamics of difficult issues. These attempts are wicked, and often end in more problems, because they are replete with conflicting values, there are no easy solutions that will satisfy all parties involved, and the complexity cannot be answered by science alone. Rittel and Webber identified ten characteristics of wicked problems: (1) A lack of definition of the problem itself; (2) An inability to set limitations on solving the problem; (3) Ambiguous answers to the problem; (4) No easy way to test possible solutions; (5) Possible solutions are not adaptable, but result in firm consequences; (6) Solutions to wicked problems are not clearly definable; (7) Each wicked problem is unique; (8) A wicked problem is a symptom of another problem; (9) Explaining the problem is often subjective and arbitrary; (10) Those trying to solve the problem are liable for all consequences that stem from possible solutions.

Wicked problems have been around for many years, although are certainly now more exaggerated and prevalent. The current terminology was first used to describe social issues but now natural resource managers, policy analysts, and decision makers frequently use the term "wicked" to describe the difficult issues related to dwindling natural resources. This is

warranted, as agencies, stakeholders, and the public are often embroiled in unending conflict over land, water, endangered species, and the effects of climate change.

There have been many approaches designed to try to solve these wicked problems. Managers, policy analysts, and decision makers continue to try to find new solutions in an effort to allow for increased stakeholder input as mandated by environmental laws set forth in the 1970's. This need for public input has contributed greatly to the increase in complexity, as well as the increasingly pluralistic society in recent decades. This increase in mandated public input led many non-governmental organizations (NGOs) to use litigation as a tool to enforce environmental law. In recent years, agencies and NGOs have begun to look to non-litigation methods for problem solving (GAO 2008). There are government organizations, private companies, and non-governmental organizations dedicated to various theories and solutions for problem solving and decision-making. Often the proposed solution for scientists is to gather more data, whether social or biological. Sometimes it is to have more meetings. Books, seminars, classes, and numerous theories have been developed in an attempt to teach people how to work with people in a productive manner that will lead to problem solving.

Collaboration has become one of the latest, and most popular, methods that has been purported to be the answer to many of modern society's resource and environmental dilemmas (Conley and Moote 2003). Could collaboration be the most effective solution for natural resource wicked problems with a long history and that cross the bounds of social, economic, environmental, and cultural lines, and that continue to be unmanageable?

In the Pacific Northwest, several well-known "wicked problems" exist that have a long history, cross the bounds of social, economic, environmental, and cultural lines, and are difficult to manage. Managing national forests has resulted in high profile legal, social, and economic

strife since listing of the Spotted Owl (*Strix occidentalis*) in 1990 (Kirschner 2010). Public rangeland management is also a resource and management issue that is often viewed as a wicked problem (Chapin et al 2008). Salmon management is likely one of the greatest of all wicked problems, in the Pacific Northwest and beyond (Lach et al 2006). Salmon management in the Columbia River Basin is a complex web of culture, society, economics, policy, and law that continually challenges managers, policy makers, and the public. Collaboration could be a way to overcome the obstacles in such a wicked problem. In this paper, I will evaluate the potential use of collaborative problem solving after insight gained from an internship using collaborative problem solving in both natural resource and social issues. These insights will be applied to salmon management and the possible use of collaborative problem solving in the Columbia River Basin.

Salmon as a Wicked Problem

Salmon management has been in place in the Columbia River almost since the first salmon was commercially harvested in the mid-1800's (Lichatowich 1999). It did not take many years of intensive harvest to create the need for intensive management. From the beginnings of the salmon controversy in the Pacific Northwest, the salmon issue is a case study that fits perfectly with the tenets of Rittel and Webber's definition of a wicked problem. Once it was determined that there was a decline in harvest was it due to overharvest, habitat destruction, or passage issues? All were happening concurrently. At that point, the salmon issue aligns seamlessly with the rest of the characteristics that Rittel and Webber use to define wicked problems. Solutions are unclear and ambiguous, whatever solutions are proposed create other problems and there is no way to foresee these, solutions are not easy to adapt to but result in longstanding decisions, and blame is distributed to those entities proposing solutions, typically

the management agencies. Ultimately, in the Columbia River Basin, more than 150 years later, billions of dollars have been allocated in disparate efforts to recover salmon stocks throughout the Pacific Northwest. Efforts have been multi-faceted but not always well coordinated, without strong adaptive management to evaluate cause and effect relationships between management actions and the goals of salmon recovery (Lackey 2013). The scenario is now more complicated with additional uncertainty in the role of hatcheries, the effects of climate change, the effects of human population growth, the role of ocean conditions, and water shortages. The Columbia River salmon stocks that were listed under the Endangered Species Act during the 1990's show no clear long term recovery since listing and there is growing disagreement regarding the use of hatchery supplementation to aid wild runs (NMFS 2011a,b,c).

Past Solutions to Wicked Problems

Ecosystem management rose out of the need to find solutions to increasingly complex situations and environmental problems, such as air and water pollution, that were becoming part of the common political and public conversation during the late 1960s and the 1970s. However, the initial concept actually began in the 1930s and 1940s, when scientists such as Aldo Leopold began to see the need to look at natural systems, and their management, holistically (Grumbine 1994). In 1988, Agee and Johnson wrote the first book on ecosystem management (Agee and Johnson 1988, cited in Grumbine 1994). Early management regimes that employed a single species focus were no longer sufficient as more environmental laws were created and the increase in lawsuits as a stakeholder tactic forced management agencies to find ways to include more public opinion in decision-making and policy development (Crow 1994). Stakeholders no longer included just hunters, anglers, miners, and loggers but also the general public who wanted to be part of the dialogue of resource management. Ecosystem management was a way to

incorporate science and management thereby offering appeasement to these multiple interests (Robbins 2012). Ecosystem management was rooted into federal policy during the Clinton administration when Secretary of the Interior Bruce Babbitt announced that federal management activities would focus on ecosystems and not on single species management (Grumbine 1994).

Ecosystem management evolved parallel to adaptive management and the terms have been used interchangeably. Developed by C.S. Holling and Carl Walters in 1978, adaptive management, like ecosystem management, came at a time when resource and environmental management was increasingly contentious (Allen et al 2011). This required new theories and ideas in an attempt to solve these complicated problems, again in an attempt to formally incorporate the needs of an increasing number of stakeholders that demanded involvement in management decisions. Federal agencies began to tout adaptive management as the key to solving resource problems and it has been included in many management plans since its inception. The Department of the Interior defines adaptive management as "...a means to more effective decisions and enhanced benefits. Its true measure is in how well it helps meet environmental, social, and economic goals, increases scientific knowledge, and reduces tensions among stakeholders." (Williams et al. 2009). In 2009, the National Oceanic and Atmospheric Administration Fisheries Service (NMFS) added to the Federal Columbia River Hydropower System's Biological Opinion to include an adaptive management plan, the Adaptive Management Implementation Plan (Federal Columbia River Hydropower System 2009). This illustrates the continued belief that adaptive management is thought of as a crucial part of decision making for complex issues.

The common theme in both ecosystem and adaptive management was that there needed to be a way to incorporate human values and preferences into resource management.

Unfortunately, these human dimensions are complicated and are at the crux of a wicked problem. In contrast, the science itself often is comparatively simple and does not always lead to a value debate. State a hypothesis, design a study, and prove it right or wrong. Science provided us with the technological knowledge necessary to develop electricity, genetic engineering, and heart transplants in relatively short order. Economics, policy and politics, and social wants and needs have supplied us with litigation, regulation, and stalled policymaking as society has become increasingly knowledgeable and diversified. What to do with that science has become the problem. It is much more difficult to tell society that policy must be designed around science that does not align with their needs and wants. Therefore, there has been the need for a new way to address these issues.

Salmon and Management Strategies

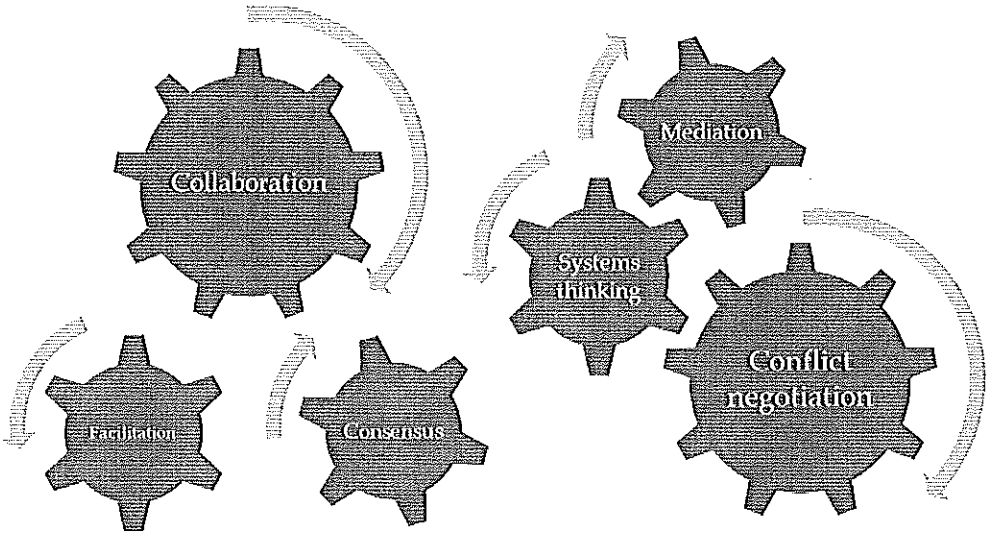
In regards to broad scale salmon recovery, ecosystem and adaptive management have not solved the problem to date. There are increasing efforts at habitat restoration throughout the Columbia River Basin but the current socio-political environment is one in which there is mistrust and anger among some stakeholders, many would say that too much money is being spent on recovery efforts, long standing policies are hard to change, and there is no clear path for how to proceed. This has been the scenario for many "wicked" problems. What seems to happen is that so much time and effort is put into creating management plans, and defending them during the course of litigation, that the focus on what the real problems are is lost. Ecosystem management can only be partly applicable to salmon management because in reality when a species is listed under the ESA single species management becomes the necessary protocol. This puts managers, decision makers, policy analysts, and the public in a conundrum. Managers working under an adaptive management plan are also often limited in flexibility, time,

and resources to make these adaptations. Experimenting with various strategies for listed species is even more difficult. Adaptive management can be effective for simple problems with easily testable options, but this does not apply to large-scale salmon management, such as in the Columbia River Basin (Rist et al. 2012). The additional issue is that in wicked problems such as salmon management applying the knowledge learned most likely means that one or more stakeholders will lose. It does not seem that the public or managers are willing or able to designate winners and losers in order to save salmon, partly due to ESA stipulations, treaties, and the threat of lawsuits (Lackey 2006). Regardless of this, agencies and various organizations continue to try to tackle these issues. To accomplish this, collaboration has begun to become a popular method of problem solving and decision-making for wicked problems in natural resource management.

Collaboration as a Tool for Wicked Problem Solving

Collaborative theories come in the form of several methods, systems, and schools of thought. Sometimes consensus is seen as an alternative method of decision-making but it also can be looked at as a possible outcome of collaboration, or as a tool used in conjunction with collaboration (Ansell and Gash 2008). For this investigation, I looked at collaboration with consensus used as a tool during collaboration and consensus was sought during the course of the projects I interned on. Numerous words are used parallel and in conjunction with collaborative decision-making, management, and governance techniques. Collaboration in the context of my internship is determined as all groups working together and agreement is reached in which everyone finds the solution workable. This does not mean that all partners get what they want and it should not mean that some win everything and some lose everything. Additionally, this

approach takes into consideration that all partners do have individual needs, wants, and values (Daniels and Walker 2001).



Some might consider collaboration a way of communicating ideas to various parties. At the other end of the spectrum there are conflict assessments, systems thinking, negotiation techniques, mediation, situation mapping, and various modeling techniques that can go into collaborative works. In some arenas "collaboration" has been added to adaptive management as well (Susskind et al. 2011). Psychology, policy, law, economics, social services, and of course natural resource management, in addition to many other disciplines, all utilize collaboration.

Many federal mandates and laws direct the use of collaboration for dispute resolution as well as for problem solving and stakeholder involvement. The U.S. Government Accountability Office has prepared suggestions on how federal agencies can facilitate collaboration (GAO 2005). They have defined collaboration as "any joint activity that is intended to produce more public value than could be produced when the organizations act alone." In fact, collaboration is very much a "buzz word" of all levels of government. The National Science Foundation (NSF) has a very long list of programs in which the NSF collaborates with other federal agencies

(National Science Foundation no date). Within the National Oceanic and Atmospheric Administration's Office of Program Planning and Integration, there is a Regional Collaboration Initiative. The Bureau of Land Management has a Collaboration and Dispute Resolution Program (BLM 2013). The U.S. Forest Service has adopted an "all lands" approach that includes collaboration with the public and landowners (USDA 2011). The U.S. Fish and Wildlife Service has a long-standing program of collaboration with its "Friends" groups as well as a new initiative to tackle climate change utilizing collaboration (USFWS no date).

It seems clear that collaboration has been successful as a public outreach and project based tool otherwise it would not be such a mainstream concept pervasive throughout federal government and policy, but how can it aid in natural resource policy decision-making? Is it a fix for our wicked problems? Collaboration has helped to overcome funding challenges, regulatory and policy constraints, and to build trust with private stakeholders. Collaboration was a key factor in altering the path of rangeland management in Eastern Oregon (Hatfield and Hatfield 1991). The Trout Creek Mountain Working Group began as an environmentalist and a rancher discovered that they both had common goals for overgrazed lands. Two of the Country Natural Beef founders, Doc and Connie Hatfield, also joined along with representatives from the Bureau of Land Management and other ranchers. By collaborating with environmentalists, other ranchers, and land management agencies, they were able to increase profits while also managing land in a way that was good for wildlife (Hatfield and Hatfield 1991). A key component of the Trout Creek Mountain Working Group was decision-making by consensus and several management plans have been created because of this collaborative group.

The U.S. Forest Service in Sweet Home, OR was able to collaborate with the South Santiam Watershed Council and Cascade Timber Consultants, combined with public input, to

create management plans for their Cool Soda Planning Area[1] (USDA 2012). These examples and others illustrate collaborative efforts in decision making in relation to timber and grazing, but anadromous fish present a large number of complications not present on timber or rangelands. They are an iconic species, their migratory behavior makes ecosystem management difficult, and the protection of specific runs requires large-scale management plans that affect many stakeholders. Ultimately, decisions involving wicked problems such as salmon management come down to a discussion of values, as was the case with the Trout Creek Mountain Working Group. However, with the extenuating circumstances that salmon incur can collaborative processes be a tool to aid decision-making in the Columbia River Basin?

Observations from an Internship with the National Policy Consensus Center at Portland State University

National Policy Consensus Center

The National Policy Consensus Center[2] (NPCC) is housed at Portland State University in Portland, Oregon. NPCC researches and develops collaborative governance techniques for projects at the local, state, and national level. There are two primary programs at NPCC including Oregon Solutions[3] and Oregon Consensus[4]. The Policy Consensus Initiative[5] (PCI) is a non-profit entity that provides board oversight to NPCC by guiding research and development. NPCC has a national program to build collaborative capacity statewide and nationally. Additionally, NPCC offers a training and internship program to provide graduate students with the experience and skills necessary to resolve complicated public policy issues.

[1] http://www.sswc.org/wp-content/uploads/2013/04/Cool_Soda_All-Lands_2012_Final_compressed_040313.pdf
[2] http://www.policyconsensus.org/
[3] http://orsolutions.org/
[4] http://oregonconsensus.org/
[5] http://www.policyconsensus.org/

Oregon Consensus provides short-term assistance for problems that have come to an impasse. Oregon Consensus focuses on conflict resolution and policy development. Examples of projects that Oregon Consensus has completed are the Harney Basin Wetlands Initiative[6], a collaborative of government, landowners, and non-governmental organizations combatting invasive carp, and the Renewable Energy and Eastern Oregon Land Conservation Partnership[7], convened to address sagebrush and sage grouse issues in conjunction with energy development in Eastern Oregon. Oregon Consensus also recently finalized an assessment for NOAA in which over 200 interviews were conducted asking stakeholders about salmon and steelhead recovery efforts in the Columbia River Basin[8]. NOAA hopes to use this assessment to better understand the views of stakeholders in the Basin as future recovery efforts are developed. While this is not a collaboration process per se it is a large scale step in utilizing stakeholder input.

Oregon Solutions provides long-term support for implementing collaborative projects between stakeholders. Oregon Solutions was created after the passage of Oregon's Sustainability Act of 2001 and is mandated by Oregon legislature. If an Oregon Solutions project comes to an impasse the project is transferred to Oregon Consensus for conflict resolution and mediation. Oregon Solutions helps the project partners create a Declaration of Cooperation that will guide future partnerships based on commitments from each partner supporting the end goals of the collaborative project. Examples of recent Oregon Solutions projects are the Stream Restoration Partnership[9] in which the goal was to make private land restoration easier. Oregon Solutions also assisted with the Columbia River-Umatilla Solutions

[6] http://oregonconsensus.org/projects/harney-basin-wetlands-initiative/
[7] http://oregonconsensus.org/projects/renewable-energy-and-eastern-oregon-land-conservation-partnership/
[8] http://oregonconsensus.org/projects/project-1/
[9] http://orsolutions.org/osproject/stream-restoration-partnership

Taskforce[10] in an attempt to withdraw water from the Columbia River in a way that will benefit both fish and farms.

NPCC Internship Project Backgrounds

While working with NPCC I interned on two Oregon Solutions projects and one Policy Consensus Initiative (PCI) project, with very different dynamics to each. The first project, The South Santiam Community Forest Corridor[11] (SSCFC), was initiated by the Forest Service's All Lands approach. This was an attempt to bring together the community of Sweet Home, private and public land management agencies, community leaders, county and state representatives, and tribal representatives. The goal was to create a plan that would provide economic revitalization after timber declines in the 1990's and 2000's. This proposed plan also would provide continued timber resources from the land while creating additional new non-timber markets. Also proposed is to protect culturally important sites within the twelve mile corridor, and to create a trail and recreation system to increase visitor satisfaction as well as community well-being.

The second Oregon Solutions project I interned on was the Clackamas ONEStop[12] (ONEStop). This was a partnership of state, county, federal, and local representatives, both private and public, working together to create a virtual "warehouse" of resources to Clackamas County food producers. This purpose has been to provide anything from farm equipment support to legal assistance. Partners will provide one-on-one assistance and the website will not just be a storehouse for links but will connect farmers with people at various agencies and organizations that can help them answer their questions and resolve problems.

[10] http://orsolutions.org/osproject/crustaskforce
[11] http://orsolutions.org/osproject/SSCFC
[12] http://orsolutions.org/osproject/CCOS

The third project I was on was a PCI research project. PCI's goal is to help states to network and build capacity in collaborative governance. The Transportation Research Board (TRB) wanted to evaluate the use of their collaborative governance tool, Transportation for Communities – Advancing Projects through Partnership (TCAPP). PCI worked with the U.S. Institute for Environmental Conflict Resolution and the Oregon Department of Transportation to secure a grant for conducting the research necessary to determine if the TCAPP tool could help Oregon metropolitan planning organizations and the Oregon Department of Transportation in building capacity in collaboration for transportation planning.

These three projects were all very different in scale, scope, and participants. The South Santiam Community Forest Corridor project is an attempt to revitalize a 12-mile corridor along the South Santiam River and so it had well defined spatial parameters but not well defined stakeholder boundaries. The stakeholder list was very large and grew while the project was developing. It also had numerous sub-goals and therefore sub-committees. These included a leadership team, a partner team, a working forest committee, a tourism, recreation, and health committee, a Cascadia Cave committee, and midway through the process, a governance committee. Logistics became somewhat of an issue because of the development of a large list of stakeholders and the difficulty this creates when deciding who should be a decision maker and who should come to what meetings.

The second project, the ONEStop, was quite different in that the stakeholder list was smaller and better defined (as to who should be there), but outcomes were not fully defined in the beginning. The project had been an idea in the minds of some of the partners for approximately ten years. It was known that there needed to be a resource to help Clackamas County food

producers but what was not known was how best to reach them, if a virtual environment would be easy and accessible, and who could be the contacts to help reach the farmers.

The third project, TCAPP, was also completely different from the first two. It was very different in that all meetings were conducted virtually, the stakeholder list was very small, and it was not a collaborative project per se but was a research project in which NPCC and PCI were attempting to evaluate the use of collaboration and greenhouse emission planning tools. During the TCAPP project, it was much harder to engage partners because there was no real tangible result, or benefit, for them.

Advantages and Limitations of Collaboration Identified While Interning at NPCC

After investigating various case studies and working in this internship it seems that collaboration can be an effective tool in natural resource management in some scenarios. Unfortunately, managers and decision makers often need to solve problems as efficiently as possible and move on to the next challenge. Although new and promising, there are situations where collaboration might be applied but is not an effective solution. Adaptive management has been used repeatedly in situations where it is not effective (Rist et al. 2012). By identifying some of the limitations and advantages of collaboration, decision-makers and managers may be able to predict where collaboration will be an effective tool, and where it may add value to the process. Alternatively, identifying limitations and advantages may help to predict where a top down management scheme or different methods of decision-making and problem solving such as cooperation or advising would be better. This may also prevent the continued use of a one-size fits all approach to natural resource problem solving. As discussed earlier, the use of collaboration has been driven by limited agency resources, laws and regulations, and reduced funding for many federal agencies (GAO 2008). Many agencies are struggling with flat or

reduced budgets and collaboration between agencies is the only way to accomplish management goals. Laws and regulations dictate that public opinion is included in most federal actions and many agencies see collaboration as a way to involve the public and to possibly reduce litigation. Additionally, many management issues, particularly at the landscape level, are not regulated by just one agency, which further requires dialogue between agencies. It is easy to latch onto these new theories in problem solving when conditions are dire, time is limited, and political constituencies demand action. If this is done without thought for these limiting factors then the problems may end up more wicked than they were in the beginning.

The SSCFC project inspired the question as to whether or not collaborative governance and decision-making could be a tool to aid in the implementation of the Endangered Species Act, particularly in such a contentious species such as salmon. I wondered if decision-makers and managers could utilize these theories and processes before, and during, listing to help mitigate the effects such as litigation, economic instability, and public mistrust that can happen during the course of federal policy implementation. The SSCFC had been envisioned years prior when community leaders saw that the town of Sweet Home was facing severe economic instability after the downturn in logging and listing of the spotted owl. The situation that the community of Sweet Home has faced is very similar to what fishing communities and tribes around the Columbia River Basin also face when various options for salmon recovery are discussed. Although 13 salmon and steelhead populations on the Columbia River have been listed under the Endangered Species Act, could a collaborative group such as the one being formed for the South Santiam Community Forest Corridor be scaled to work at the level needed for stakeholder involvement in salmon management in the Columbia River Basin?

Before these questions can be answered, there is the need to realistically identify some of the limitations and advantages in collaborative efforts. I learned a great deal while I was working in my internship with NPCC and it spurred much thought into the practical use of collaboration in public policy. I also realized that policy makers often struggle to find solutions to complex policy questions and some of the measures that are utilized, such as creating adaptive management plans that are not feasible, can be disguised as an easy answer when there actually are no easy answers. Managers need to be careful of "feel good" solutions and provide some critical analysis as to whether new tools are in fact strategies that should, or could, be employed.

I identified seven factors that can work as guidelines in evaluating the use of collaborative tools (Table 1). These observations were gathered during my internship with NPCC but have also been influenced by theories learned over the course of the past two years of study in policy, sociology, economics, and science. The Trout Creek Mountain Working Group case study also provides a good example of collaboration in a contentious scenario (Hatfield and Hatfield 1991). These seven factors could be used to help guide the decision of either using collaboration or to more precisely decide whether collaboration is best used as a decision-making tool or to accomplish a project. Some of these observations are both limitations and advantages depending on the scope.

Table 1.—Seven factors affecting the use of collaborative problem solving in wicked problems.

Factor	Description	Example
Theory vs. Practice	Wicked problems can cause even the most carefully crafted theory to fail in practice.	Bringing the SSCFC group on a field trip allowed much more natural conversation and facilitated partners getting to know each other better.
Group Size	Group size can facilitate or inhibit a collaborative process.	The SSCFC was large enough to require multiple subcommittees making logistics and meeting dynamics difficult.
Chosen Partners	Care must be practiced that partners and stakeholders are chosen without preference for a biased outcome.	The Trout Creek Mountain Working Group purposefully worked with contentious partners to have a full understanding of the problem.
Stakeholder and Interest Representation	It is crucial to include all necessary stakeholders in order to avoid future conflicts.	The ONEStop was able to identify possible obstacles by including a good range of stakeholders.
Extensive Prior Knowledge	If one or more members have extensive prior knowledge or experience with the issue, it must be recognized that new members may not.	The SSCFC and ONEStop projects were envisioned years before designation as Oregon Solutions projects and so new partners and possibilities had arisen.
Uncertainty	Uncertainties should be recognized, addressed, and be made as transparent as possible to all members of a collaborative group.	The ONEStop project had uncertainty over the design of the website and so had to take additional time to gather more information.
Time Commitment	Collaborative efforts can be time consuming depending on the purpose. Stakeholders should be made aware of the time commitment and should be prepared to follow through to project completion.	Both Oregon Solutions projects were delayed due to extra time needed to accomplish tasks.

Theory vs. Practice

One of the first key points of collaboration that I observed is that the theory of collaborative techniques can be much different from practice. Regardless of whether or not a facilitator is used, or a theoretical collaborative approach is applied, the dynamics of meetings

with various stakeholders who often may have emotional connections with the subject matter can override any planned outcome of the meetings. This can rapidly lead to disconnect between theory and practice. A collaborative process may begin with a strict plan of how to proceed, based on consensus and collaborative theories but at times there is the need to allow a more fluid, open process to occur. One in which natural dialogue is not constricted by agenda timelines or facilitation styles. Wicked problems involve strong emotions. Allowing a "venting" session to occur can deflate tensions that are brought to the table from the beginning. It can also be helpful to allow a natural process in order for partners to get to know each other. During some collaborative efforts facilitators are used to manage the communication. However, some stakeholders may feel uncomfortable in a role-playing scenario or other consensus building and facilitation techniques. In addition, the process of building trust may happen more quickly under a more natural social setting and less so when partners only interact in structured meetings (Kumar and van Dissel 1996). In the course of the SSCFC project we decided to take a field trip to the key sites along the corridor. This not only provided us with some hands on knowledge of the important cultural and recreational sites within the corridor but also gave everyone a chance to know each other beyond what can occur during idle chitchat in meetings. Although allowing time for each stakeholder to discuss their opinions in a natural way may be beneficial if a collaborative process, and the stakeholders involved, cannot move beyond the emotional venting then collaboration may not be the proper process for decision-making. Ultimately, it takes some amount of finesse and expertise to gauge how to balance these dynamics (Weber 2013). A facilitator can be beneficial in this manner but this person should be neutral and aware of the characteristics of the stakeholders and the issue.

Group Size

I observed different dynamics with small groups versus larger groups. This is a very important factor to consider when evaluating the effectiveness of collaboration. Group size can be an advantage or a limitation. Small groups may allow for a more natural and fluid process with less facilitated structure, more discussion, and a greater chance of each participant having a say in discussions. Alternatively, I noticed some amount of "group think" in some of the meetings with many participants. With time and resources limited, the very reason a collaborative approach is often used, a large group can more easily overlook small details. A high number of stakeholders also can make logistics difficult. Changes in meeting times, dates, and locations become even more challenging when there are more people. If too many people are involved there is not enough time to allow everyone a chance to discuss and contribute to the process. The simple act of keeping a meeting on track and letting everyone have their input can be cumbersome if there are many attendees. However, complicated issues may require input from many stakeholders. Group size was a factor during the SSCFC meetings when there was a very large number of stakeholders and even more that were being identified as possible partners. A significant way into the project it was realized that there needed to be reorganization for this reason. Certain members were considered essential to the leadership team, others were listed as partners, and lastly some were considered an important part of the technical advisory body. It is difficult to balance the inclusion of the necessary partners and stakeholders while not overwhelming the process by having too many people. Further challenges are possible when a large group breaks up into smaller groups but still needs to provide communication to all parties. This transfer of information can lead to confusion, missed details or misunderstandings.

Ultimately, a large stakeholder group will likely increase time, organization will be incredibly important, and designating people to lead the process will be critical.

Chosen Partners

I discovered that carefully evaluating the chosen members of a collaborative is a very important task. Just as "cherry picking" the best data for a scientific report will lead to biased results, "cherry picking" stakeholders may lead to short term successes with long term failure. The consequences may include all of the effects that a collaborative group is attempting to avoid, litigation, increased spending, and increased time, because one or two stakeholders were left out of the process or if those included were picked based on personality preference, prior relationships, or popularity. Although the Trout Creek Mountain Working Group, described earlier, was able to develop effective management plans they initially chose to work with partners that typically did not have a good relationship at all. This required significant diligence to work past the personality differences (Hatfield and Hatfield 1991). This concept also highlights the need to look at why different collaboration efforts are employed before accepting the use of collaborative techniques as a broad scale tool. While collaboration has been touted as a process to incorporate stakeholders it is often used as a process to overcome financial and policy constraints in order to accomplish project specific goals. These are two very different processes. Collaboration as a policy decision-making tool, that allows all stakeholders at the table, is much more difficult and not as common (Charalabidis and Koussouris 2012). Collaboration as a decision-making tool could become very problematic if stakeholders are cherry picked in order to result in a preferred decision, particularly a policy decision.

It was clearly stated in the process of the Oregon Solutions projects that partners are chosen based on their ability to make decisions as representatives of their organization. This

means that these representatives are typically lead persons, managers, owners, or executives, and have full understanding of their agency or organization. This method is necessary in order to agree to commitments that will be designated in the Declaration of Cooperation but it does beg the question as to whether there is the possibility that some bias exists if this process occurs without full disclosure of the reasoning. There could be those that feel "left out" because they were not included due to this process design. This process is necessary for the Oregon Solutions method and likely is accepted and works because the Governor designates the Oregon Solutions projects. For other collaborative efforts the choice of collaboration partners is an important consideration that will be dependent on the issue and the goals and will require an honest evaluation of the problem.

Stakeholder and Interest Representation

Group size is correlated with representing the necessary stakeholders and interests and another area where a delicate balance is required. A project team can inadvertently leave out key demographics from the process. When looking for full representation of the public and stakeholders it is necessary to fully examine who should be involved in the effort. Alternatively, there can be redundancy if too many people from one agency are included on a project. In addition, many collaborative groups are agency or organization based but that leaves out the public, such as is the case with the Oregon Solutions process. This may require additional representation in order to incorporate as many public views as possible. However, balancing this with creating an effective team that is neither too small nor too large is difficult. The SSCFC had many team members on various committees but there were no community representatives such as landowners. There was some question as to whether or not we were missing feedback from the very people that would be living with the decisions made during this collaborative, the

public. On the other hand, if community members were included there could be the risk of much more dissension, they might not represent all community opinions, and it could dramatically increase the time of the project. A key component of Oregon Solutions' collaborative projects is that the key stakeholders brought to the table are able to make decisions for the organization they represent. This does not apply to members of the public. The Declaration of Cooperation commitments are meant for long term, large-scale organization and agency assistance to accomplish goals. One answer that allows for public participation was to hold a town meeting and dinner for the community of Cascadia, which is included in the forest corridor, and to answer questions and receive feedback. Several had heard about the efforts already and some had specific concerns unrelated to the forest corridor such as needed utilities on rural properties. One issue most talked about was the need for a post office after the Cascadia Post Office had burned down. Congressional representatives were on hand to address these non-project related issues and the outcome of the public meeting was that the participants were satisfied with the efforts being put forth by this collaborative project and were able to voice some long-standing concerns that they had not had an arena to do so in prior. This method of including the community worked well for this project but each collaborative process will be different in regards to how to incorporate public opinion. Public meetings were held in the community of Sweet Home as well but attendance was low.

I observed that stakeholder and interest representation could be a limiting factor if it is not fully understood and known prior to planning. One of the barriers that became apparent during the ONEStop planning was that the vast majority of the farmers that are currently operating in Clackamas County are over the age of 56. This could be an important consideration when designing a virtual, internet-based portal that needs to be usable by a wide variety of

capabilities. Another consideration is that if the demographics of the community affected by any outcomes from the collaborative effort are very different from the representation of the partners making decisions in the collaborative then there is the possibility for an outcome that is not conducive to those affected. This could lead to future conflict. The decision makers may not consider the possibility of computer and internet access, working long days outside and not having the time, energy, or capability to work on a computer after farming, and whether or not mobile access is required. Including a wide range of stakeholders who represent various demographics can lessen the possibility of this happening. The ONEStop did have input from local farmers so that was helpful in gathering some of this information.

In the SSCFC process, it was realized a few months into the project that there were no representatives from a fish and wildlife agency and so someone was asked to join the process several months after it had started. This was an oversight and one of the consequences of having an already very large stakeholder list in which a group is balancing managing size with representing all interests. While the need to fill this demographic was accomplished this did result in a problem because this person had some disagreement with documents that had already been created and had to catch up to the work already done. Additionally, sometimes one person from an agency does not cover all of the specialties that the agency represents. There are diverse reference points within agencies and so finding someone who can provide expertise for all species in a landscape project can be difficult. Then the question is whether to include specialists in each department or a generalist for the agency. Furthermore, including a new member in the collaborative effort after the process has begun then results in some of the questions discussed below when certain members of the project team have extensive prior knowledge. The take home message is that it is important to decide beforehand whether

additional members will be included throughout the process and how it will be handled when new members have dissenting opinions with prior work the group has already accomplished.

Representation can contribute greatly to the success of a collaborative effort. Having a team of people from varying backgrounds will contribute to a much wider range of ideas. The ONEStop project had been an idea generated by a few people for many years before it became an Oregon Solutions project. When it became time to turn this idea into a reality, and it was designated as an Oregon Solutions project, the project team was created and it very much helped clarify and define what exactly would work best. This is particularly true when the input of farmers themselves were incorporated. Various agency representatives were able to bring the insights they had gained from working with farmers as well. The key to representation and collaboration is to be aware of the mix of stakeholders and who may need to be included or who may not be necessary or may be redundant, to balance this with overall scale of the effort, and to make sure the goals of the collaborative effort are being met by the stakeholder diversity included. This also requires a thorough evaluation of the problem itself. If this is not possible it may make a collaborative process unlikely to be effective.

Extensive Prior Knowledge

Obviously, a collaborative project begins with some history that may or may not begin with the stakeholders who initiate the collaborative problem solving method. Recognizing that those who initiate this process may have a different way of framing the problem than those that are brought in later can be important in mitigating conflict. Consideration of this factor, as a collaborative group is formed, can be essential to creating an effective working relationship, particularly if using consensus decision-making. Several of the project team members, on both the SSCFC and the ONEStop, had envisioned the project end goals years before the project

started. This seemed to create some disconnection between those with prior knowledge and those without, and highlights another observation that I found throughout my experience. When some team members have long-term prior knowledge and experience with the issue, project, or desired goals it may make it more difficult for new stakeholders to feel that they have an equal role in the decision-making. It also requires new stakeholders to "catch up" to the ideas and information that has been discussed previously. Conversely, it may be difficult for the stakeholder with extensive knowledge to understand the opinions of new stakeholders. This is very similar to hidden agendas and is a very subtle dynamic. Often the conveners or the leaders of the project are the people who had envisioned the idea long before inviting new participants in on the collaboration. When new people do come into the process they often bring with them ideas and policy preferences that the others had not considered and these could be ideas that are not wanted or foreseen, or are seen as barriers. These new ideas can also just come as a surprise that requires time to reflect and respond. This is more likely if the process has been on-going for some time already, prior to the involvement of new participants. At this point, a new dilemma is introduced depending on the intensity of the disparity between the prior knowledge and differing opinions of new members. Does the group reject the new member because their ideas are contrasting to what has already been established? Alternatively, does the group move back in the work accomplished, possibly backtracking several months of progress, to include ideas brought by new group members, which may be contrary to previous thoughts? This can quickly spiral back into the territory of a wicked problem. If the process of how to deal with new stakeholders and dissenting opinions is not clearly defined prior to beginning the collaborative process it can hurt the trust in the partnerships being formed, can delay end goals, and can create further

uncertainty. One solution is to employ a neutral outside facilitator that can provide a more objective viewpoint between the stakeholders.

Uncertainty

The level of uncertainty, in any stage of the collaboration process, can be a limiting factor although there will always be some amount of uncertainty. Uncertainty can be in whom to include in the collaborative process, what the end goals are or could be, how best to accomplish those goals, uncertainty as to whether or not everyone is hoping to accomplish the same goals, and uncertainty can be how the public will react to the results that the collaborative produces. Uncertainty can also be prevalent in the knowledge of the subject or problem, the scientific data available to assist in decision-making, and the ability to gather future data. Uncertainty is pervasive throughout all of these seven factors. I observed various levels of uncertainty in both the SSCFC and ONEStop projects. ONEStop partners had a good idea of what the final product would look like but the implementation method was unclear and also the reaction that the users of the virtual portal would have was uncertain. It took a few meetings and various viewpoints and opinions to realize that initial ideas on implementation were likely not going to be perceived well by users and so even though it required additional time, the project conveners decided to back track somewhat and re-evaluate the implementation plan. Because this was a smaller group, it was much easier to adapt to this sudden change and only took one meeting to re-assess what was needed. During the course of the SSCFC meetings, and the sub-committee Working Forest meetings, we faced continual barriers regarding how to reach the goals of creating a working forest within the relatively small 12-mile corridor. This resulted in some difficulty because it was a small sub-committee and it was uncertain what other resources could be employed and how to employ them. Uncertainty can lead to an increase in the amount of time

required to accomplish goals and can also cause the effects from the other factors to become exaggerated. Uncertainty may spur the desire to bring in many more people, leading to problems with group size. Bringing in new people then causes some of the problems of extensive prior knowledge. One solution is to identify sources of uncertainty as much as possible in the beginning, and to discuss how the group will deal with uncertainty as it arises during the process.

Time Commitment

While increasing public involvement and sharing resources has been offered as one of the primary reasons governmental agencies utilize collaboration it does require a large time commitment. Specific goal oriented projects may see collaboration as a way to save time because goals can be accomplished more quickly by using shared resources. Alternatively, time commitments can be significant depending on the amount of uncertainty, the number of stakeholders, and the dynamics of the problem. Time commitments are particularly significant in the Oregon Solutions projects. The Oregon Solutions process involves numerous meetings of which the end goal is a Declaration of Cooperation. It is in this Declaration of Cooperation that the various partners sign for their full commitment to implementing the project. What is hard for some is that the lengthy process of working towards the Declaration of Cooperation is significant already, and then to add a commitment of unknown length to the actual implementation can be daunting. This adds to the uncertainty. One of the reasons for a collaborative effort is to utilize resources across a multitude of partners but at times even committing to a meeting can be challenging. In addition, what I have seen is that collaborative efforts have become so commonplace that many people are on multiple collaboration teams. At some point, the situation is back where it was in the first place; too little people, too little time, and too little money to finish everything everyone wants to accomplish.

As mentioned above the TCAPP project was a research effort to evaluate an online tool that will aid in greenhouse gas emission planning for transportation planners. What was found in some cases was that some of the metropolitan planning organizations barely had enough time to set aside for greenhouse gas emission planning much less to evaluate the use of an additional tool, even if it could be helpful in the end. Combined with considering time commitments there needs to be analysis of whether or not the collaborative effort will actually result in meeting desired goals and if that is worth the time commitment. Groups must be careful to not join into collaboration just for the sake of collaborating, if in the end it is just adding to more meetings and less time for productivity. Additionally, collaborative processes can be time consuming if not planned correctly, if the group is allowed to spin their wheels on key issues, and if no protocol for decision-making is designated prior to collaboration. Partners must be fully aware of this and able to commit to the length of the project for it to be effective.

Lessons Learned During Internship at NPCC

This internship required a significant shift in my own thinking due to my background in salmon monitoring and research in which decisions are typically made quickly, and in a top-down fashion. Although I have done some work in a collaborative atmosphere, the Oregon Solutions process is deliberate and comprehensive, in time and scale. I finished this internship learning not only about collaboration processes but also about the work that agencies do at the local, state, and federal levels, and the ways that various organizations can and cannot work together to accomplish goals. While the limitations and advantages are broad scale factors that could be used to evaluate whether a problem would benefit from a collaborative approach, the lessons learned that I outline below are observations that were significant to me as a person who does not work in the field of collaborative problem solving. These lessons learned could be

helpful to other students, to agency staff, or to the general public as a way to determine if a collaborative process is compatible with their goals, personalities or capabilities.

Lesson 1: Collaboration is often slow, time consuming, and frustrating.

One of the first, and greatest, learning lessons for me throughout this internship was that the collaborative process could be slow and there may be times when the process either is delayed or has to backtrack significantly. As compared to making a decision during the course of scientific research, when a dilemma is encountered, collaborative groups must work together at every point particularly if using consensus decision-making. If a facilitator is used much of the time spent is background work and logistics on the facilitator's part. However, the actual work of the collaborative group can also be time consuming. With collaborators often splitting their duties between a full time job and various boards, committees, and volunteer efforts schedules can quickly become overfilled. An agency may see the time commitment of just one representative of the agency for two or four hours per month to be a time and money saving measure however adding up the total time spent for all members of a collaborative group can paint a different picture. Adding to this is any additional time that is required due to unforeseen circumstances and it is possible that the cost of working in collaboration is significantly more than not. In addition, extremely complex and wicked problems may take a longer time due to a mix of personalities, diverse stakeholder groups, and the need to reduce structure on the process and increase time for a more fluid, dynamic process. Contrasted with the cases in which a group may need to allow more time there may be other situations in which quick and adaptive decision-making will need to be utilized. A collaborative may be able to do this but it is very dependent on several of the factors listed above. Who is representing their agency or organization, the number of people involved in the process, the issue itself, and the availability of options all

factor into the ability to be flexible. Additionally, these factors are on top of creating standards for civil meeting discourse and addressing meeting dynamics (Weber 2013). For these reasons, federal, state, and local agencies as well as private organizations should consider the pros and cons of collaboration before assuming collaboration would be a solution to natural resource problems, wicked or otherwise.

Lesson 2: Collaboration works very differently when applied to decision-making vs. project completion.

There needs to be a distinction between using collaboration for policy decision-making and using collaboration for project completion. Collaboration for project completion is more common and much easier to accomplish because there is a defined goal. Removing a culvert, restoring a wetland, or building a fish ladder are all very specific goals that agencies and landowners can easily agree to do or not do. The process is more straightforward because the options are limited. Decision-making on the other hand, and more specifically policy or management decision-making is much more difficult. The factors discussed above would be all the more important if decision-making is the goal. Decision-making usually involves long-term consequences that all parties have to be prepared to adhere to for an indefinite amount of time.

Lesson 3: Collaboration between agencies is very different from collaboration with the public.

Third, and in conjunction with defining the goals of forming a collaborative group I also learned that there is a distinct difference between collaboration between agencies and organizations and between agencies and the public. As defined by my experience at NPCC a collaborative governance model is one in which the stakeholders involved in the collaboration have the ability to make decisions for the agency or organization they represent. This should not be confused with an advisory body in which stakeholders work alongside decision makers, and can make recommendations, but do not actually have a role in decision-making. Collaboration

should also not be confused with cooperation in which agencies may work together but each makes their own management decisions. Collaboration between agencies can be easier than with the public involved because there is less concern for values or emotions, the partners do not have any personal stake in the process, and agencies can discuss technical details without having to interpret to various audiences. This is an important distinction to make when touting the effectiveness of collaboration because agency collaboration, as is often used to accomplish restoration projects, is likely to be easier than one that requires including the public in the process.

Lesson 4: Agencies often use collaboration to overcome financial and policy constraints without the intent of increasing public participation.

This is very similar to Lesson 3 in that it is a reason to carefully identify the purpose of collaboration when evaluating if it will be an effective form of problem solving for a particular issue. When looking to collaboration there might be a desire to compare case studies and there could be significant emphasis on "success" stories that do not actually make an equal comparison. If one were to look at collaboration success stories in the Columbia River Basin they would likely find many projects that illustrate how effective collaboration can be. The important thing to note is whether or not these cases were involving the public, had a project goal or a decision-making goal, and who the stakeholders were.

Lesson 5: Clearly stated and universally accepted goals are essential for successful collaboration.

The fifth learning lesson that I have taken from this internship and research is the importance to form well-developed goals. These goals should not only be well developed but should also be fully defined. While project based collaborative groups may find goal formation simple, decision-making groups may find it more difficult and may get lost along the way to the

goal. The process of collaborating can get cumbersome and if it does become time consuming it can be difficult to remember for what purpose the group was formed. Unforeseen barriers can cause the group to lose sight of what the project goals were. In addition, there may be the desire to collaborate for the sake of collaborating. If this is the case, and no planning of procedure or process was considered ahead of time, the effort may be useless. In other scenarios, the collaboration may be the goal. Possibly, there is no real end project or decision in sight but group members are forming in order to prepare for future issues. These distinctions should be clear and transparent early on in order to avoid unnecessary time, money, and effort, particularly on the part of governmental agencies.

Lesson 6: Success in collaboration may be difficult to define but a clear definition, tailored to each individual group, is necessary for an effective outcome.

Defining success can affect the entire approach, outcome, and process of a collaborative effort. One of the project goals of the SSCFC was to increase recreational opportunities in the corridor. If this did not happen does that mean the project was unsuccessful? Defining measures of success provides a way to quantify the effectiveness of the collaborative effort. Success may mean that a group was able to meet every month for a year, regardless of goal completion. Success may mean that relationships were built and that stakeholders that were once enemies can now have a dialogue. Alternatively, a group may decide that the collaborative is only successful if stated goals are attained, such as delisting a species or providing fish passage in a stream.

However, care must be taken to not use collaboration as a feel good tool only, which could incur increased cost and time if not used appropriately. If a group decides that success can be more than goal completion, and all partners agree to that as a possible outcome, then it could be a way to increase the flexibility and adaptability of a collaborative effort if goal completion seems unlikely or if barriers prove impossible to overcome. This is not to say that this is a way

to "give up." However, it could be a method that may increase the possibility for future partnerships after the challenges that make goal completion impossible are mitigated.

Columbia River Salmon

Looking back at the salmon issue in the Columbia River Basin I think it is necessary to apply these observations and lessons to the possibility of using collaboration in policy decision-making. Can it make a difference in this longstanding, wicked problem? Applying the factors identified above causes pause. There is a significant amount of uncertainty in the form of population numbers, data needs, what the next steps should be, recovery tactics, effects on landowners and the public, and whether recovery tactics will be effective. Managing the number of stakeholders while representing all interests is a delicate balance but this is not something that can be well controlled with ESA listings, and particularly with salmon. Stakeholders involved with ESA listed species often are beyond geographic and economic constraints and often hold non-use value in the species, again this is particularly true for salmon. Even more significant is that the stakeholders who value salmon as an economic or cultural resource have a deep, emotional connection to salmon. As the salmon conundrum in the Columbia River Basin has proven very well there are many stakeholders in salmon recovery efforts and all demand a seat at the decision-making table.

However, there has been a significant amount of collaboration in recovery efforts on a small scale and a project-by-project basis. Therefore, some may conclude that collaboration is an effective tool in salmon management. This is where the lessons learned need to be addressed. This distinction is the key to both collaboration efforts and to adaptive management. The successful collaboration efforts are typically between agencies and do not involve the public (lesson 3), the collaborations have clearly defined goals (lesson 5), and the collaborations are a

way to utilize shared resources between agencies (lesson 4). Any single effort made, at a basin wide scale as large as the Columbia Basin, is unwieldy and cumbersome. It does not lend itself to adaptability or flexibility. This is the primary reason that adaptive management does not work large scale (Rist 2012, Walters 1997). Alternatively, project based collaborative groups allow room for these dynamics and help to bypass the limiting factors identified above. A restoration in Bridge Creek in the John Day Basin brought together the Bonneville Power Administration, the U.S. Fish and Wildlife System, the Confederated Tribes of the Warm Springs Indian Reservation, the Wheeler Soil and Water Conservation District and a local landowner to create passage for steelhead (Bonneville Power Administration, 2011. The Lower Columbia River Estuary Partnership collaborated with Bonneville Power Administration, Oregon State Parks, and West Multnomah Soil and Water Conservation District to enhance riparian habitat on Sauvie Island (Lower Columbia River Estuary Partnership no date). These are all successful endeavors accomplished through collaboration but they are not a basin wide policy solution to salmon recovery. The similarities are that they have well defined goals and boundaries. What they do not address is the broad scale decisions that are at the root of this policy problem.

One aspect that may need consideration is the definition of success in salmon management, the definition of what "helping" is, and whether or not the solution is definable. If the goal is to allow all stakeholders a stage in which they are able to communicate together then success may be attainable. If success is defined by removing all Columbia River salmon runs from the ESA list then it is definitely less attainable. If in creating more opportunities for collaboration the purpose is to reduce litigation in the basin then success may be attainable, by allowing communication between parties. If the goal is to appease all of the wants of various stakeholders by consensus then success is very unlikely. The large-scale situation assessment

that was recently performed by Oregon Consensus in order to provide the National Marine Fisheries Service with stakeholder information could be viewed as one way to achieve a measure of success in terms of gathering stakeholder input. However, it is likely that even with over 200 interviews there are differing opinions that did not get included.

Conclusion

Having worked in the Columbia River for several years I observed that what the current collaboration efforts in the Columbia River Basin do not remedy, because they are focused on habitat or project specific goals, is the sentiment from a variety of community stakeholders such as commercial and sports fishermen. In my experience there is continued frustration from recreational anglers about allowing gill-netters to fish, frustration that there are not enough hatchery fish to make the purchase of a sport fishing tag worthwhile, and frustration that no one in the management agencies are listening to what anyone else has to say. So while there is increased collaboration, as has been mandated by federal agencies and is needed to circumvent tight budgets for restoration activities, it seems an important demographic is being overlooked. The communities, defined not by geopolitical borders but by social borders, of people that depend on fish for livelihood, health and wellbeing, or the communities that have strong moral or aesthetic value in salmon, are subject to large-scale forces that they do not have a say in. How to overcome this problem is another problem, as is the case with wicked issues.

After analyzing Rittel and Webber's definition of a wicked problem, applying these characteristics to the salmon issue, and factoring in the lessons learned while interning I conclude that there are three primary drivers that inhibit collaboration, or any one approach, from solving the salmon problem in the Columbia River. Due to scale, values, and the constraints of the Endangered Species Act the solutions come not from collaboration alone, or adaptive

management alone, but from a combination of these types of efforts. I posit that there are three separate forces at work in the Columbia, the top down federal management, the mid-level movement of restoration projects throughout the basin, and finally the bottom up approach with local "communities" attempting to maintain their stake in the resource. It is within these three scales that work happens but it is difficult to bridge them. There is little overlap in these approaches and it leaves a grey area full of uncertainty. It is in this area that there may be benefit in collaboration by creating a space for cross-over and discussion between stakeholders at various scales. As mentioned earlier there is significant collaboration and cooperation in the Columbia River Basin. Agencies often work together to accomplish project goals and cooperate to facilitate management. However, the use of collaboration in decision-making is much more difficult, particularly in the salmon impasse, because of this increased number of stakeholders.

The ultimate dilemma in such a value-laden issue is that no amount of collaboration is likely to create a win-win solution in which all parties can come to agreement. Management agencies may come to an agreement. Angling associations may come to an agreement. Wild salmon advocates may come to an agreement. But there is little likelihood that all of these stakeholders can find a common solution together regardless of whether or not a collaborative effort at that scale (the entire Columbia River Basin) would be feasible. Someone is going to have to lose eventually, in regards to salmon recovery planning. Deciding who and how has not been determined but with proper planning, preparation, and understanding of the outcomes and goals collaboration may be a solution to ease public sentiment when this does happen. If employed with the desired outcome, or success, being not necessarily problem solving, i.e. recovering all wild stocks of salmon, but to allow for discourse, collaboration may be an effective tool. Collaboration could increase the potential of understanding between stakeholders,

and ease the effects of future decisions that will cause some stakeholders to lose in a zero sum scenario such as salmon management. The use of collaboration in fisheries policy framing and decision-making is much more difficult but may help to begin to bridge the arguments between stakeholders as it did for Oregon Country Beef and rangeland managers in examples highlighted above. Salmon management is complicated by constraints from the ESA as well as treaty rights and using litigation is often easier than problem solving. Because there is such uncertainty in salmon recovery efforts, there is no possibility for a win-win solution, and not all stakeholders can be represented in one collaborative effort, collaborative governance and decision-making will not be able to solve the Columbia River salmon issue but it should be kept as a tool in the toolbox of managers and decision makers.

Ultimately, I believe that when using collaboration, or any tool, in the hopes to resolve either the salmon recovery issue or any other wicked problem, it would behoove agencies and managers to spend some time investigating whether or not an approach is likely to be effective and appropriate for the problem at hand by using evaluations such as the factors and lessons learned described above. Grasping at and applying the most popular theory on problem solving or resource management, as has commonly been done in the past, may be costing more time and resources than would ever be necessary. As we face these old problems with new complications, such as population increases and climate change, management agencies, organizations and the public are going to have to make difficult decisions that will not appease all in our pluralistic society (Lackey 2006). Promoting guidelines such as the factors discussed above could be valuable when evaluating collaboration tools. What is needed is an approach that accepts the limitations of the issue and takes advantage of possibilities as they arise. Combining efforts at various scales into an overall cohesive management effort is also necessary. All too often, it is

promised that the newest solution will provide the answers everyone is looking for and it is perceived that a win-win solution is possible. Collaborative work can be very advantageous for individual projects that are well defined on both the geographic and temporal scales but not as effective for ill-defined problems at incredibly large scales if not careful evaluated and implemented. Managers and decision makers need to be careful in using these tools and agencies should carefully consider dictating a one-size fits all approach to those that are implementing management plans. As the scale, again geographic and temporal, grows, flexibility and adaptability are lost and wicked problems could be worse off than when they started.

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