Title

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Collaboration in Federal Hydropower Licensing:

Impacts on Process, Outputs, and Outcomes

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Abstract

This study explores the outcomes of collaboration in the Federal Energy Regulatory Commission's hydropower licensing process. A survey gauged 270 participants' opinions of process and outcomes. Process variables include principled engagement, shared motivation, and capacity for joint action. Dependent variables measure perceived impacts on decision-making and participants (process outcomes), the license's perceived quality, and predicted environmental and economic changes. Linear mixed-effects models tested the influence of process variables on each outcome. Collaboration is associated with all four outcomes, although influences process outcomes the most and predicted economic outcomes the least. Principled engagement influences every outcome variable, shared motivation influences process outcomes, and capacity for joint action influences license and predicted environmental outcomes. Respondent affiliation and project size also affect perceived outcomes. Results suggest that collaboration influences a range of outputs and outcomes, but a growing number of non-process factors mediate the relationship for outcomes further from the collaborative process.

Keywords: collaborative governance, water management, environmental outcomes, FERC hydropower relicensing

Introduction

Collaborative governance is popular in environmental management. It occurs at all levels of government and across the public and private sector (Bingham, O'Leary, & Carlson, 2008), and has been used in processes to manage diverse resources, including forests (Wondolleck & Yaffee, 2000), watersheds (Leach & Pelkey, 2001), estuaries (Mandarano, 2008), and oceans (Weible, Sabatier, & Lubell, 2004). President Obama even issued a directive for federal agencies to "collaborate… among themselves, across all levels of Government, and with nonprofit organizations, businesses, and individuals in the private sector" (Obama, 2009).

Despite this popularity, empirical research on collaboration's performance—to what extent or in what settings collaboration delivers its supposed benefits—remains inconclusive. Many studies of collaborative decision-making are single case, in-depth descriptions (O'Leary & Bingham, 2003), which describe collaboration, but not what may have occurred absent that collaboration, providing limited causal evidence of collaboration's impacts. Most studies of outcomes focus on procedural and social impacts, like capacity to collaborate (Rogers & Weber, 2010) and institutional resilience (Booher & Innes, 2010; Goldstein, 2012; Innes & Booher, 2010). Studies evaluating impacts to the actual system being managed are almost nonexistent (Kelman, Hong, & Turbitt, 2013). In the environmental sector, whether collaboration influences the environmental quality or the effectiveness of decision-making outcomes remains uncertain (Brogden, 2003; Koontz & Thomas, 2006; Thomas & Koontz, 2011).

This study explores the performance of collaborative governance[1] in the context of environmental management, specifically the Federal Energy Regulatory Commission's process for licensing hydropower facilities. The FERC oversees five-year processes in which a power utility, federal and state agencies, tribes, local governments, and non-governmental organizations

(NGOs) work jointly to develop the terms and conditions of a license. I explore whether variations in the components of collaboration influence differences in efficiency of and satisfaction with the decision-making process, quality of the issued licenses, and participants' predictions of changes in the local environment and economy. FERC licensing processes operate under a prescribed multiparty rulemaking, and have very similar players and resource concerns, yet individual projects play out differently both in terms of level of collaboration and in outcomes achieved. By comparing variations in collaboration and variations in outcomes in an otherwise standardized process, I tease out the effects of individual ingredients of collaboration on multiple performance measures.

The Outcomes of Collaborative Governance: Existing Literature

According to Thomson and Perry's review of the term, "Collaboration is a process in which autonomous or semi-autonomous actors interact through formal and informal negotiation, jointly creating rules and structures governing their relationships and ways to act or decide on the issues that brought them together; it is a process involving shared norms and mutually beneficial interactions" (2006, p. 23). Collaboration requires more cross-sectoral action than consultation, coordination, or cooperation (Thomson & Perry, 2006), as it involves working together, or 'co-laboring' (Bingham et al., 2008, p. 3) to achieve a common goal. Importantly, collaborative decision-making leads to changes in the world: the outcomes of collaboration. However, understanding what those impacts are and how collaboration caused them is difficult. For this reason, outcomes are the least studied aspect of collaborative governance (Kelman et al., 2013; Koontz & Thomas, 2006; Thomas & Koontz, 2011).

Impacts on the Process

Of collaboration's many potential outcomes, the direct effects on the decision-making process and its participants are well studied. Through a collaborative process, the working relationship among participants is often improved (d' Estree & Colby, 2004; Emerson, Orr, Keyes, & McKnight, 2009; Thomson, Perry, & Miller, 2008) and conflict is reduced (Frame, Gunton, & Day, 2004). "Beliefs conducive to collective action" are enhanced by collaboration (Lubell, 2005, p. 201). Participants also have improved ability to work through subsequent disputes (d' Estree & Colby, 2004).

The social, political, and intellectual capital of participants improves with a collaborative process (Connick & Innes, 2003; d' Estree & Colby, 2004; Frame et al., 2004; Leach & Sabatier, 2005a; Mandarano, 2008). Participants gain knowledge and skills (Frame et al., 2004), and learning can extend beyond the original stakeholders (Connick & Innes, 2003). Collaboration builds new "collaborative capacity" (Bardach, 1998, p. 20; Rogers & Weber, 2010) and generally improves "public problem-solving capacity" by enabling citizens to better draw on collaborative resources (Rogers & Weber, 2010, p. 3; also d' Estree & Colby, 2004). And collaboration enhances the democracy of decision-making bodies (Leach, 2006).

At an institutional scale, collaborative processes produce institutions and practices that are flexible (Connick & Innes, 2003) and potentially improve adaptability and resilience (Booher & Innes, 2010; Goldstein, 2012; Innes & Booher, 2010). Collaborative processes have been shown to lead to institutional learning and restructuring (Mandarano, 2008), and have enhanced "public agencies' programmatic effectiveness for existing mandates" (Rogers & Weber, 2010, p. 3). "Second-order effects" (Innes, 1999, p. 652) have also been observed, including "spin-off partnerships" (Frame et al., 2004, p. 69), and "changes in attitudes, behaviors and actions" (Connick & Innes, 2003, p. 181).

Impacts Beyond the Process

When considering the wider-ranging effects of collaboration, it is necessary to distinguish between outputs—agreements reached, plans drafted, programs implemented—and outcomes—the long-term impacts those outputs have on the resource or problem at hand (Koontz & Thomas, 2012; Sabatier et al., 2005). Many studies of collaboration focus on outputs as a proxy for outcomes (Thomas & Koontz, 2011), under the assumption that high quality outputs that align with desired goals are necessary to attribute outcomes to a process (Sabatier et al., 2005).

Of the potential outcomes of collaborative processes, we know the least about environmental impacts (Koontz & Thomas, 2006). This is partly due to the challenges of measuring change in the environment and attributing that change to a trigger. While there are promising research designs to assess collaboration's impacts on a system, they are difficult to carry out in practice (Thomas & Koontz, 2011). The systems of interest tend to be complex, and there are many more drivers affecting the quality of a resource than just the management program in place (Brogden, 2003). Depending on the situation, meaningful or measurable change in the resource may not occur on timescales that correspond to the management intervention (Thomas & Koontz, 2011).

A few recent efforts at using objective, third party data to measure performance show promise in linking the quality of collaboration to outcomes (Campbell, Koontz, & Bonnell, 2011; Mandarano, 2008). However, given the challenges of finding such data and attributing change in the environment to a collaborative process, a commonly used measure of environmental impacts is stakeholder opinion—whether signatories or experts predict that an agreement or policy will lead to improved environmental outcomes (d' Estree & Colby, 2004; Emerson et al., 2009; Leach & Sabatier, 2005a; MacNeil & Cinner, 2013; Pollnac & Pomeroy, 2005). A concern with stakeholder opinion is of potential biases whereby participants who buy into the process may overestimate the success of that project (Christie, 2005; Leach & Sabatier, 2005a). However, it is useful as a "second-best approximation" (Leach & Sabatier, 2005a, p. 241) in instances where the environment is too complex to meaningfully measure change, as is the case in this study.[2]

Study Context: FERC Hydropower Licensing

The Federal Energy Regulatory Commission's (FERC) process for licensing hydropower facilities provides a promising context for exploring the nature and outcomes of collaboration in environmental management. FERC regulates all non-federally-owned or -operated hydropower facilities in the US. To limit private exploitation of public rivers, FERC grants utilities 30-50 year licenses. Before the license expires, the utility must reapply for permission to operate the project. The so-called *relicensing process* allows the expected future costs and benefits of the project to be re-evaluated.

In a Traditional Licensing Process (TLP), a hydropower utility develops an application for a new license and submits it to FERC, at which point interested resources agencies, tribes, and the public can comment on the application and the subsequent National Environmental Policy Act review. Realizing that this segmented process creates significant delays due to stakeholder disagreements, and owing to new regulation that mandated FERC to balance power and non-power interests in relicensings, FERC has shaped its regulatory proceedings to encourage licensees to more formally involve agencies with regulatory authority over affected resources and other interested stakeholders in the pre-application stage, increasing the potential for collaboration. In 1992, FERC introduced the Alternative Licensing Process (ALP), which encourages multi-party settlements in lieu of the traditional application. The ALP did not alleviate concerns about lengthy (sometimes 10+ year) relicensings. Seeking a process that both raised stakeholder concerns early in the relicensing and provided more structured deadlines, in 2003 FERC initiated the Integrated Licensing Process (ILP). In the ILP, the licensee, resource agencies, tribes, and NGOs work jointly throughout the five-year licensing process. Their work ranges from determining what studies are needed to evaluate project impacts, to weighing the results of those studies, to drafting the actual license application.

Recalling Thomson and Perry's definition of collaboration (2006, p. 23) cited above, both the ALP and ILP provide the possibility for collaboration. All FERC relicensings involve consultation: at minimum, a utility must seek approval from FERC, one or more fish, wildlife, and land management resource agencies, and a state water agency before a new license is granted. Therefore, the parties in a relicensing are all "semi-autonomous", as no single entity has the final say over the contents of a license. However, consultation is not collaboration. While there is cross-party consultation in the TLP, it is shifted until after the licensee has developed an application—after the utility has already made many important decisions—limiting the opportunity for true joint decision-making. The parties in a collaborative process "jointly creat[e] rules and structures governing their relationships and ways to act or decide on the issues that brought them together" (Thomson & Perry, 2006, p. 23), so collaboration cannot happen after key decisions have been made. The ALP and ILP have slightly different timelines and regulatory requirements, but both encourage the utility to work with other stakeholders in developing the license application and conducting the NEPA scoping process, creating the opportunity for collaboration without requiring it. Moreover, interviews with participants in relicensing processes across the country suggest that participants experienced highly varying levels of collaboration in FERC processes, and that variation did not map onto whether a relicensing used the ALP or the ILP. In this study, I therefore analyze collaboration and outcomes in both the

ALP and ILP, but not the TLP.

Because all ALPs and ILPs use a similar process—similar players, decision-making stages, resource considerations, and outputs—but have substantial variation in collaborative dynamics across individual processes, it is possible to measure differences in collaboration and then assess whether those differences are associated with differences in outcomes.

Research Methods

Delineating and Inviting the Population

The data for this study are drawn from a survey of participants in recent FERC relicensing processes. The target population is participants in relicensing processes using the ALP or ILP and completed between 2007 and 2012, which includes 24 licenses in 12 states. The number of participants in any relicensing is relatively small, so I aimed for a complete census of the 24 relicensings. Lists of participants were derived from the official FERC "Service List" of parties who formally intervened in a relicensing, mailing lists of interested parties maintained by the utility, signatories to settlement agreements, and lists of meeting attendees. 1600 names were identified. Email addresses were located using Google, PeopleFinders.com, and the Leadership Library, yielding contact information for 85.1% of the names. To avoid response bias from missing contacts, I ran a chi-squared test to see whether the percentage of missing contact information for any organization type was significantly different than the overall percentage. The χ^2 statistic was 11.4, with 6 degrees of freedom. This corresponds to a p-value of 0.075, so any variation was not significantly different than random at a 95% confidence interval.

The survey was conducted online using Qualtrics Survey Software, and participants were invited via email; the survey took place between February and May 2013. Online surveys have been shown to yield lower (up to 20%) response rates than mail surveys (Kwak & Radler, 2002).

However, my population is accustomed to conducting business online via email, and email addresses were more readily available than mailing addresses in multiple instances, so I opted for email. Following Dillman and others (2009), to increase responses, participants were sent the initial invitation and two reminders, and all communications were individualized using participants' names and the specific relicensing they were associated with.

As the list of names compiled may have included people who were listed on a mailing list but never actively participated in a relicensing, the first survey question asked, "Do you consider yourself a participant in the [Project X] relicensing?" 172 people replied that they were not participants, and therefore not the appropriate audience for my survey. Because these individuals were ineligible, they can be excluded from the overall target population (Groves et al., 2004). Under this assumption, one estimated sample size is 1600-172 = 1428. The non-eligible proportion could also be assumed to exist in the pool of nonrespondents[3] (Groves et al., 2004), which yields a second estimate of the sample size at 1162.

275 eligible people responded to the survey, for a response rate between 19% (estimate 1) and 24% (estimate 2). Response rates varied by organization type, from 10%/12% for interested public to 23%/27% for utilities, federal agencies, and state agencies. While these are somewhat low response rates, they are in the range of similar studies utilizing online surveys (Grosso & Van Ryzin, 2011; Kapucu, Garayev, & Wang, 2013; Poister, Thomas, & Berryman, 2013; Williamson, 2011). The data do underreport the nonaffiliated public relative to established organizations; however, I have no basis on which to assume that those interested public who did not respond would be qualitatively different than those who did. Response rates were in a similar range for all 24 relicensings, so I am likely not over- or underreporting any geographic variation that might bias my findings.

Measuring Collaboration and Outcomes: Survey Development

To operationalize collaborative governance, I use Emerson, Nabatchi and Balogh's Integrative Framework for Collaborative Governance (2012). This framework incorporates concepts from an array of fields, including public administration, planning, conflict resolution, environmental management, and common-pool natural resources management. While many frameworks tend to operate at the "species rather than the genus" level of collaboration (Ansell & Gash, 2008, p. 544), this framework is designed to be generalizable to a variety of situations. Despite its broadness, the framework offers specific enough recommendations to be operationalized by concrete metrics, a necessary requirement for empirical study.

In Emerson and others' framework, the heart of collaboration is the "collaborative governance regime" (CGR): a process that emphasizes cross boundary collaboration (Emerson et al., 2012, p. 6). Two components comprise this CGR: a set of "collaborative dynamics" leading to a series of "collaborative actions" (Emerson et al., 2012, p. 10). The collaborative actions are specific to a case: they comprise the actions taken by members of the collaborative to further the shared purpose of the CGR. For example, if a CGR is designed to reduce crime in a city, the actions taken might include securing funding for a community-monitoring program or building a community center to provide programming for at-risk youth. These actions are very different for a CGR aiming to reduce, say, air pollution, which may include lobbying for more stringent vehicle emission standards or working with industry groups to develop new manufacturing methods. Collaborative actions are therefore specific to both the policy area and the scale of the CGR, so there is no predefined set of actions that correspond to higher or lower collaboration. For this study, I therefore focus on collaborative dynamics, as they are more generalizable.

Emerson and others characterize the collaborative dynamics as three gears whose interaction comprises collaboration. *Principled engagement*, the first collaborative dynamic, refers to involvement of appropriate participants in the collaborative, and the use of techniques from interest-based negotiation and authentic deliberation to allow these diverse participants to work together. Emerson and others write, “Through principled engagement, people with differing content, relational, and identity goals work across their respective institutional, sectoral, or jurisdictional boundaries to solve problems, resolve conflicts, or create value” (Emerson et al., 2012, p. 10). The next component of collaborative dynamics, *shared motivation*, is defined as “a self-reinforcing cycle consisting of four elements: mutual trust, understanding, internal legitimacy, and commitment” (Emerson et al., 2012, p. 13). Finally, *capacity for joint action* refers to the institutional arrangements, leadership, knowledge, and resources to sustain the collaboration, and in particular the ability for principled engagement, through its duration (Emerson et al., 2012, p. 14). Further detail on each dynamic and the survey questions used to measure each are included in Table 1.

[Insert Table 1 approximately here]

Four levels of outcomes are also explored. *Process outcomes* considers several dimensions of impacts on the decision-making process and participants, including overall process efficiency, growth in relationships between participants, and participant learning. *License outcomes* considers participants’ opinions of the main process output, including the diversity of interests it meets and whether it is implementable and adaptable. *Predicted environmental outcomes* explores participants’ predictions of the license’s impacts on resources including habitat, fish populations, and recreation. *Predicted economic outcomes* entails participants’ predictions of license impacts on power production and the local economy. These measures reflect mandates to consider multiple dimensions for evaluation (Gray, 2000) and distinguish outputs (the licenses) from the outcomes they're meant to produce (Koontz & Thomas, 2006). Further details on the outcome measures are in Table 2.

[Insert Table 2 approximately here]

Some survey questions were adapted from Frame and others' study of collaborative planning in British Columbia (2004, p. 69), Thomson, Perry, and Miller's survey on collaboration in AmeriCorps (2008, p. 101; 2009), and Emerson and others' evaluation of environmental conflict resolution (2009, p. 34). Other survey questions were developed for this research. All questions use a 5- or 7-point Likert scale (see footnotes on Tables 1 and 2). Likert scales, although ordinal, are robust to standard parametric statistical procedures and therefore allow ordinal data to be treated as interval (Norman, 2010). Multiple Likert items combined into a scale (as these data were), behave even more like an interval variable (Boone & Boone, 2012).

Survey questions were piloted through interviews with participants in an ongoing California relicensing, to ensure that the language used was specific to the relicensing process and that their interpretation of the questions aligned with the intended interpretation. The web-based survey distribution was pre-tested via a pilot survey with participants in a recently completed relicensing process that was outside the population frame.

To ensure that the questions employed in the collaboration and outcome scales were appropriate for use as statistical measures, I assessed the unidimensionality and reliability of each scale. I first ran an unrotated factor analysis for the questions comprising each scale using principle components as the method of extraction, which confirmed that all variables could be described by a single component. The collaboration scales and outcome scales were then tested for reliability using Cronbach's alpha (Cronbach, 1951), which are reported in Tables 1 and 2. Apart from two-item predicted economic outcomes ($\alpha = 0.559$), all alphas are above 0.8, confirming that the individual questions are well correlated.

Data Cleaning and Analysis

One survey question (labeled "Reverse Coded" in Table 1) was worded so a low "disagree" response indicated higher collaboration. Data cleaning entailed first recoding responses for this question so a high response was more collaborative. Second, a few respondents marked several options for "What is your organizational affiliation?" always with a mix of Interested Public and another category (Utility, NGO, or Local Government). In order to have discrete organizational categories, I dropped these individuals' Interested Public response and left the more specific organization type. Finally, three of the questions in *process outcomes* used a five-point Likert scale. These questions were rescaled to match the range of a 7-point scale, so that the potential minimum and maximum values were identical for every question.[4]

Analysis was completed using the Statistics Package for Social Science (SPSS) v. 21. Before beginning analysis, I checked for potential biases arising from missing responses arising from "Not sure" responses. First, I eliminated those cases ($n = 5$) that were missing more than 50% of all values. Next, I ran a multivariate regression of *PercentMissing* (the percentage of responses that were missing) on a series of respondent- and project-level control variables. The only variables found to significantly influence percent missing were Meeting Frequency ($B = -1.0$, $p = 0.013$) and Total FERC Experience ($B = 0.02$, $p < 0.001$). These results make sense—a person who attended meetings more frequently knows more about the process, and is therefore less likely to be uncertain of responses (a negative coefficient). Likewise, someone who is a career participant in FERC relicensing, participating in upwards of 100 relicensings, will have more trouble remembering the specifics of any particular relicensing. Beside these two easily explained deviations, the results show that even though there are missing values in the data, any single demographic or project-level group is not missing a significantly higher or lower number of questions, and the data are therefore unlikely to reflect a substantial bias. The final analysis conducted for missing values bias was Little's missing completely at random (MCAR) test (Little, 1988). For the survey questions with a "Not sure" response option, Little's test results in a χ^2 statistic of 2752, with 2729 degrees of freedom. This corresponds to a significance of 0.377; under a standard alpha of either 0.05 or 0.1, the test is not significant, so there are no systematic patterns of missing data within the survey responses themselves.

Having determined that missing values were unlikely to bias my findings, I used the full dataset for analysis, eliminating cases listwise. The number of observations for each model therefore varies (as reported in Tables 4-7).

A number of respondent-level and project-level controls were considered in the study, ranging from use of ALP vs. ILP, to type of hydropower facility, to whether the project was located on federal land. The models were built top-down, whereby all potential control variables were included, and then only those that significantly improved model fit for one or more of the outcome variables were retained to avoid overfitting (West, Welch, & Galecki, 2006).

Organizational affiliation is the only respondent-level control retained in the final models. *OrgType* captures whether an individual represented a utility, federal agency, state agency, local government, NGO, tribe, or interested public in the relicensing. The one project-level control found to have a significant impact is the licensed generating capacity of the hydropower facility in megawatts. *lnProjCapacity*, the variable used in the analysis, is the log-transformed capacity.

Linear mixed-effects models were used to assess the relative importance of each collaborative dynamic scale on each outcome. In my data, the individual respondents within a single relicensing are clustered, so their responses cannot be assumed to be independent of one another. To address this, a standard approach would be to assign a fixed-effect for each relicensing, to account for differences across cases. However, I have a small number of respondents per case, so estimating a group mean in a fixed-effects model would be problematic. Using project fixed-effects would also preclude using any case-level control variables, as these would be perfectly collinear. I therefore use a mixed-effects model, which includes a random effect to model clustering at the case level alongside fixed effects for the explanatory variables (West et al., 2006). With a random effect, I cannot estimate any differential effects of individual relicensings on outcomes. However, my interest is in the overall relationship between collaboration and outcomes, and these regression coefficients should not be biased by a small *n* per cluster if I use a random effect (Raudenbush, 2008).

For each outcome variable, four models were developed. Here, $Outcome_{ir}$ represents the value of *ProcessOutcome*, *LicenseOutcome*, *EnviroOutcome*, or *EconOutcome* for individual *i* in relicensing *r*. Model 1 includes a fixed-effect for the full collaboration scale (the average of all 20 process questions), relicensing-level random effects (u_r), and an individual-level residual (ϵ_{ir}):

$$Outcome_{ir} = \beta_0 + \beta_1 CollabFull_{ir} + u_r + \epsilon_{ir}$$

Model 2 adds project generating capacity and the vector of *k* organization type dummies:

$$Outcome_{ir} = \beta_0 + \beta_1 CollabFull_{ir} + \beta_2 lnProjCapacity + \sum_k \beta_k OrgType_{ki} + u_r + \epsilon_{ir}$$

Model 3 includes fixed-effects for the three collaborative dynamics, relicensing-level random effects, and an individual residual:

$$Outcome_{ir} = \beta_0 + \beta_1 PrincEngage_{ir} + \beta_2 ShareMotive_{ir} + \beta_3 JointCapacity_{ir} + u_r + \epsilon_{ir}$$

Model 4 is Model 3 plus project generating capacity and organization type:

$$Outcome_{ir} = \beta_0 + \beta_1 PrincEngage_{ir} + \beta_2 ShareMotive_{ir} + \beta_3 JointCapacity_{ir} + \beta_4 lnProjCapacity + \sum_k \beta_k OrgType_{ki} + u_r + \epsilon_{ir}$$

Results

Descriptive statistics for each variable are provided in Table 3. The range of each collaboration and outcome scale approximates the full theoretical range of 1 to 7. While the variables are somewhat left-skewed, having non-normal data does not violate the assumptions necessary for conducting linear regression as the residuals are normally distributed and centered around zero (Stock & Watson, 2011, p. 196).

[Insert Table 3 approximately here]

Tables 4 thru 7 provide parameter estimates and model fit for the four models for each outcome variable. The goodness-of-fit variable is the -2 restricted log-likelihood, the restricted maximum-likelihood estimator of the mixed model. A smaller number indicates a better fit.

For all four outcome variables, CollabFull is significantly associated ($p < 0.001$) in Models 1 and 2. Comparing the results of Model 1 across the four outcomes, perceived process outcomes has a CollabFull coefficient of 0.94, suggesting an almost one-to-one ratio of collaboration and outcomes. For perceived license outcomes, the CollabFull coefficient drops to 0.78, still a fairly strong trend. Predicted environmental outcomes has a CollabFull coefficient of 0.65, while predicted economic outcomes has the weakest signal, with a CollabFull coefficient of 0.28.

For every outcome except predicted environmental outcomes, the models with the three collaborative dynamics scales had better (lower) model fit. This suggests that adding the nuance of the collaborative dynamics better explains variance in the outcomes, and therefore that there is value in breaking collaboration into its component parts for measurement and analysis.

[Insert Table 4 approximately here]

In Models 3 and 4 for perceived process outcomes (Table 4), principled engagement and shared motivation are significantly associated ($p < 0.001$), with and without control variables. Project capacity and organizational affiliations are also significantly associated. An increase in generating capacity corresponds to an increase in process outcomes; utilities and tribes rate process outcomes the lowest, and interested public and federal agencies rate them highest. The effects of organizational affiliation are more significant in Model 2 vs. Model 4. With a -2 REML log-likelihood of 344.9, Model 4 has the best fit.

[Insert Table 5 approximately here]

For perceived license outcomes (Table 5), principled engagement and capacity for joint action are significantly associated ($p < 0.001$) in Models 3 and 4. Organizational affiliation also affects perception of license outcomes. In Model 2, federal agencies, tribes, utilities and state agencies all rate license outcomes higher than the interested public; in Model 4, only federal agencies rate license outcomes significantly higher. Model 3 has the best fit.

[Insert Table 6 approximately here]

The only collaboration dynamic consistently associated with predicted environmental outcomes (Table 6) is principled engagement ($p < 0.01$). When no controls are included, capacity for joint action is also significant ($p < 0.05$). Increased Project Capacity is associated with an increase in predicted environmental outcomes. Organizational affiliation also significantly affects predicted environmental outcomes, with utilities, federal agencies, NGOs, and state agencies all rating predicted environmental outcomes higher than interested public. Model 2 has the best fit.

[Insert Table 7 approximately here]

Principled engagement ($p < 0.01$) is significantly associated with predicted economic outcomes (Table 7). In addition, representatives of utilities report significantly lower predicted economic outcomes compared to other organizational types. Model 4 has the best fit.

Of the four outcome variables, perceived process outcomes have the best (lowest) model fit, with a -2 REML log-likelihood between 344 and 357, followed by perceived license outcomes (425/430), predicted economic outcomes (497/515) and predicted environmental outcomes (476/539).

Discussion

In interpreting these findings, I draw on extensive first-hand experience with FERC relicensing, including interviews with relicensing participants from across the country and over 180 hours observing relicensing stakeholder meetings, as well as a free response "Is there anything else you'd like to share regarding your experience?" question in the survey.

Collaboration Affects Each Outcome, but to Varying Degrees

The full collaboration scale is significantly associated with all four outcome variables, whether or not control variables are included. This is a promising result, as it suggests that higher levels of collaboration do indeed influence a variety of potential desirable outcomes, ranging from more satisfaction and learning with the process, higher quality outputs (licenses), and predicted improvements in the environment and economy. However, collaboration is most strongly associated with those outcomes that are closer to the decision-making process, and much more weakly associated with predicted environmental and economic outcomes.

With each step down the causal chain from process to outputs to outcomes (Thomas & Koontz, 2011), there are additional opportunities for external factors to intervene. Process outcomes are almost a part of the process itself. If a decision-making process has high levels of trust and buy-in to the process, creates equal opportunity for participation, and uses participatory, deliberative decision-making, it follows quite naturally that participants would say the process improved working relationships between parties or was efficient. License outcomes, however, are one step removed—while the ability of the group to reach more satisfactory or effective agreements is likely a result of the collaborative process, there are other factors involved, such as FERC's ruling on the stakeholder-prepared license application. Environmental and economic outcomes are one degree further removed from the process, as they depend on (1) the license being implemented as written and (2) a suite of external factors, like weather patterns and the global economic climate, that level of collaboration cannot possibly affect.

Principled Engagement and Shared Motivation Affect Perceived Process Outcomes

Of the collaborative dynamics, principled engagement and shared motivation have the largest influence on perceived process outcomes. In the Emerson and colleagues framework, principled engagement and shared motivation are the starting point of collaboration—"Principled engagement and shared motivation… generat[e] and sustain… capacity for joint action" (2012, p. 16). By working together, participants develop and maintain the resources necessary for the collaboration. That these two components drive perceptions of process outcomes supports Emerson and colleagues' conceptualized relationship between the three collaborative dynamics.

A process that emphasizes and facilitates interest-based negotiation via deliberation, and develops high levels of trust among participants and with the process, is a strong predictor of process outcomes, more than institutional capacity and resources. These components perhaps feel the most like collaboration for a participant who has experience with a traditional paper-based rulemaking: they are the components where a diverse set of people are negotiating, solving problems jointly, and developing the interpersonal relationships necessary to work together.

To understand the nuances of this relationship, I broke down principled engagement, shared motivation, and process outcomes into their component questions. At this resolution, three process questions (seeking solutions that meet common needs, working together to identify information needs, and working together cooperatively) are strongly correlated (Spearman's $\rho > 0.6$) with four outcome questions (overall effectiveness, quality of relationships, minimizing power differences, and enthusiasm to work with the participants again). This suggests that the driving force between collaboration and process outcomes is working together, so participants who experience joint decision-making are more likely to report positive process outcomes.

Principled Engagement and Capacity for Joint Action Affect Perceived License Outcomes and Predicted Environmental Outcomes

Principled engagement and capacity for joint action most strongly affect both perceived license outcomes and predicted environmental outcomes. In other words, use of deliberation and negotiation, combined with having the leadership, scientific knowledge, and resources in place to support that negotiation, leads to increased perceptions of license quality and predicted environmental impacts.

The idea behind principled engagement, and its associated elements of deliberation and interest-based negotiation, is that "determinations produced through strong engagement processes will be fairer and more durable, robust, and efficacious" (Emerson et al., 2012, p. 12). Parsing the individual components of license outcomes reveals that principled engagement is most significantly correlated to four items: the license meets my interests, the license meets the interest of other parties, the license will resolve conflict, and the license is in the public interest. A process where people worked together using elements of interest-based negotiation leads to a license perceived to meet an array of interests and resolve conflict: a fair and (likely) more durable decision. That participants predict higher environmental outcomes with higher principled engagement suggests that the efficacy standard is also met. A quote from an interviewee highlights this relationship: "Usually when we all work together we can come up with something…that meets everyone's interests better [than letting FERC decide]." At the same time, I have heard multiple stories of low principled engagement—of processes where the scope of potential interests was limited by the utility, and that later the licenses were challenged in court, so that whatever positive gains might have been agreed on in the license were not yet implemented.

Capacity for joint action affects both perceived license outcomes and predicted environmental outcomes for several potential reasons. First, with high-quality information that accurately predicts how tweaking one component of the environment might affect another disparate piece, a collaborative process is more likely to develop solutions that change the environment in the way intended. Second, a process with more resources—funding, staff, leadership, and time—is likely to have better technical and legal understanding (or be able to contract out that knowledge), and therefore draft a license that is implementable. According to interviews with relicensing participants, good science, whether produced by a consultant or participating academic, or developed through joint fact-finding, is critical to positive outcomes. Interviewees feel that FERC acts as a box checker: it does not care about the quality of studies completed, only that there is enough data to support the license provisions. Therefore, it's the participants' responsibility to ensure that decisions use accurate data and methods.

Finally, a process with a good facilitator and ground rules—tools to resolve conflict and bridge diversity of opinion—is more likely to bring about an agreement that meets an array of interests (higher rating in perceived license outcomes) and therefore have positive impacts on an array of environmental metrics. As one survey respondent wrote, "Adoption of rules of conduct (rules of engagement) at [the] start was important. [It] established confidence [the] group could create a working document… We also utilized a mediator for all meetings. She was well liked and more than anyone else responsible for [a] successful conclusion."

Perceived license outcomes corresponding to principled engagement and capacity for joint action corresponds to Emerson and others' (2009) findings that agreement quality (the same measure as my license outcomes) was significantly associated with having the appropriate parties engaged and engaging them effectively (components of principled engagement) and using high quality information (a component of capacity for joint action).

Collaboration Does Not Strongly Affect Predicted Economic Outcomes

Lastly, the collaboration variables did not have a strong influence on predicted economic outcomes. In hydropower, environmental gains often require shifting water away from power production or generating at less profitable times, so given the positive association between collaboration and predicted environmental outcomes, a weaker trend in predicted economic outcomes is consistent. However, that principled engagement is significantly, positively associated with predicted economic outcomes suggests that through interest-based negotiation and deliberation, stakeholders are able to find solutions that increase (or at least maintain) power production and impacts to the local economy.

Non-Collaboration Factors Influence Each Outcome

The primary control variable found to influence perceived process outcomes is project capacity, which is particularly interesting because project capacity is weakly but negatively correlated with each of the collaborative dynamics. In predicting process outcomes, generating capacity likely serves as a proxy for some other meaningful variable. One option is diversity of participants: a larger project likely has a more complex set of impacts on the environment. If Thomson, Perry, and Miller are correct, however, this explanation is unlikely—they found no statistically significant correlation between number of organizations involved and process outcomes (2008, p. 109). Another option is institutional capacity, as a utility that owns a large project is likely a larger, more sophisticated utility with more access to resources. However, this relationship could work either way, as a better-endowed utility could use its resources either to encourage collaboration or to steamroll the process. Finally, a larger project is often higher-stakes, holding particular interest to certain key stakeholders, such as government agencies, or with the potential for big wins or losses for any party.

Perceived process outcomes are somewhat influenced by organizational affiliation of the respondent. Holding all else equal, utilities and tribes rate process outcomes the lowest. Utilities, perhaps, feel forced to collaborate, leading them to underrate the process overall whether or not it was collaborative. Under the TLP, the utility had primary control over the contents of a license application, whereas now many more parties have a say, and this has made some utility representatives feel a loss of control over "their" hydropower facility. As one utility respondent wrote, "by design, certain parties [federal and state agencies] are 'more equal' than others, even in a collaborative process;" this individual is unlikely to agree that the process leveled the playing field for participants or that he is enthusiastic to go through the relicensing again.

For tribes, this relationship likely stems from a long history of distrust of the federal government. While an extensive tribal consultation process is required for every relicensing, complicated histories of sovereignty might influence the trust that tribal representatives have in the process. For example, one tribal respondent wrote, "The power project appropriated [many] acres of federal Indian land for this project c. 1960 in a 'deal' that was morally indefensible and would never have passed muster under current law... Despite what I believe to have been genuine subjective good will on the part of the licensee, there was no mechanism in the relicensing process for appropriately addressing the injury to/interests of the Indian nation," indicating that he was unsatisfied with the process overall even if the utility worked to be collaborative.

Federal agencies rated perceived license outcomes significantly higher than other organizations. Federal agencies can mandate certain license terms and conditions; they are likely more satisfied with a license because they can require (to some degree) that licenses serve their interest. Federal agencies might also be overestimating the efficacy of their work in developing the licenses. In a study of the US Forest Service and Bureau of Land Management, Koontz and Bodine (2008) found that respondents from the federal agencies rated extent of implementation of ecosystem management practices higher than external stakeholder groups, suggesting that federal employees may be less critical of shortcomings than NGOs and the public.

Project capacity and being a utility representative each significantly increase predicted environmental outcomes. Project capacity likely reflects, firstly, that a larger project has more flexibility in terms of changing operating regimes to provide flows for habitat or recreation. Secondly, a utility with a larger project is making more money, and therefore has more ability to pay for improvements in environmental outcomes. Utilities are responsible for paying for and implementing environmental license conditions; it therefore makes sense that they would report a greater positive impact of those projects. This reflects Leach (2002), who found that the coordinators of collaborative groups were likely to overate the partnership's success in achieving its goals and pro-environmental values compared to other participants in the partnership.

Federal agencies, state agencies and NGOs are also more likely to rate predicted environmental outcomes as high, though to a lesser extent than utilities. These three groups have the strongest mandate to improve environmental outcomes—they are the "environmental interests" at the negotiating table—and therefore might be predisposed to thinking that their goals of environmental protection were achieved relative to other stakeholder types.

Being a utility representative decreases predicted economic outcomes. Just as representatives of a utility were likely to laud the environmental outcomes of a relicensing, they are likely to lament the lost generation capacity, as they are the most directly affected. An element of loss aversion (Tversky & Kahneman, 1991) may be at play, where utilities perceive the loss in generating capacity as greater than an equal gain in another resource.

Conclusions and Suggestions for Future Research

This study found mixed impacts of collaboration on outcomes. Collaboration had a strong influence on participants' perception of the process, and a fairly strong influence on perceived license quality. However, variation in predicted economic and environmental outcomes was explained to a much lower degree by collaboration. Increasing the distance down the causal chain from decision-making process to outcome provides multiple opportunities for other mediating variables outside of whether a process was high or low collaboration to influence outcomes.

That the number of other mediating variables acting in a system interacts with collaboration's effectiveness suggests that collaboration might also variably affect different types of resources depending on their complexity. While this study focused on a fairly complicated socioecological system with management objectives to address a suite of interlinked resources ranging from electrical generation to recreational access to migratory fish, collaboration might have more of an impact in a less complicated system with fewer intervening variables. For instance, in a community-based partnership deciding how to manage a local park, if the collaborative body has relative control over the full resource and that resource is relatively simple, changes in the resource might be more directly linked to level of collaboration. Additional research evaluating collaboration in a range of social and environmental systems would help narrow when and where collaboration is most influential.

Each outcome was most strongly determined by one or two collaborative dynamics, not the whole suite. Different ingredients have a stronger influence on the end result, depending whether that result is process effectiveness and growth of relationships, license implementability, or fish populations. From a process design perspective, a practitioner could emphasize those ingredients that most correlate to the outcome she seeks to maximize. Attention to principled engagement seems particularly important, as it was the only collaborative dynamic significantly associated with all four outcomes. However, each collaborative dynamic relies on the others. Use of deliberative, interest-based negotiation would likely be less effective without attention to developing relationships or the capacity to sustain the negotiation, so a process aiming to be collaborative should address all three components.

The greatest limitation of this study is its reliance on respondent perception. This adds potential bias to my findings, as a "halo effect" may cause individuals who are more satisfied with the process to rate the success of the collaboration higher (Leach & Sabatier, 2005a, p. 255). Triangulating between multiple data sources to measure both collaboration and outcomes would improve the validity of each measure (Yin, 2009); exploring whether observed relationships hold using triangulated measures could assess the magnitude and direction of respondent bias. Other questions to address through further research include analyzing whether varying the interaction between collaborative dynamics changes predicted outcomes, and exploring the relative importance of each collaborative dynamic at different times during the decision-making process.

This study validates the assumption that increased collaboration improves some outcomes of decision-making, but that many other contingencies affect the likelihood that a decision creates the desired environmental and economic improvements. In addition, it suggests that different components of collaboration are more or less important for different outcomes, meaning that deeper understanding of the nuances of collaboration is important for the design and evaluation of collaborative processes.

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Notes

1. For the use of collaboration in public decision-making and government, I use the term *collaborative governance*. While numerous synonyms are in usage, including collaborative public management (Agranoff & McGuire, 2003; Bingham & O'Leary, 2008; Kapucu & Demiroz, 2011; Leach, 2006), collaborative planning (Mandarano, 2008; Scholz & Stiftel, 2005; Selin & Chavez, 1995), and collaborative policy-making (Connick & Innes, 2003; Leach & Sabatier, 2005b), Ansell and Gash select the term collaborative governance, because governance "encompasses various aspects of the governing process, including planning, policy making, and management" (2008, p. 545). I follow this convention. For reviews of the collaborative governance and management literature, see Ansell and Gash (2008), Bryson and colleagues (2006), Emerson and colleagues (2012), Selin and Chavez (1995), and Thomson and Perry (2006).

2. To measure change in electrical production or instream flows (for example) would require a time series of each parameter for each of the 24 cases, as well as a time series of the counterfactual—what the flows or generation would have been absent the new license. Gathering

this data would be feasible but arduous, but a further concern lies in the analysis. The relicensings are in 24 very different watersheds from across the country, and the constraints on each project—how much they could change in an ideal situation—are also diverse. Determining what a "good" environmental outcome would be is incredibly subjective: does a project that had a high fish population under the old license, and decided not to change flows because stakeholders were satisfied have better or worse environmental outcomes than one that had no environmental protections and now has one or two? In this instance, relying on stakeholders to judge outcomes is likely as fruitful as attempting to measure them myself.

3. Fraction ineligible of respondents = 172/(172+275) = 0.38. Approximate number ineligible of nonrespondents = 0.38(1600-447) = 438. Minimum estimated sample size = 1600-438 = 1162.

4. 1→1; 2→2.5; 3→4; 4→5.5; 5→7

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Biography

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Table 1. Measuring Collaborative Dynamics

Variable Overview	*Associated Survey Questions*[a]
Principled Engagement	
Representation of relevant stakeholders (Connick & Innes, 2003; Emerson et al., 2009; Frame et al., 2004; Gray, 1989; Innes & Booher, 2010; Selin & Chavez, 1995) Discovery of individual and shared interests (Connick & Innes, 2003; Emerson et al., 2012) Definition of a shared goal and problem statement (Ansell & Gash, 2008; Selin & Chavez, 1995) Accurate and sincere deliberation, ideally face-to-face (Ansell & Gash, 2008; Emerson et al., 2012; Innes & Booher, 2010) Joint determinations, ideally consensus-based (Ansell & Gash, 2008; Innes & Booher, 2010; Margerum & Whitall, 2004)	All parties with a significant interest in the issues and outcome were involved throughout the process. Participants agreed about the goals of the relicensing. Participants sought solutions that met common needs. Participants worked together to identify information needs. Participants worked together cooperatively. *Cronbach's* $\alpha = 0.906$
Shared Motivation	
Development of trust and managing mistrust (Ansell & Gash, 2008; Emerson et al., 2012; Focht & Trachtenberg, 2005; Getha-Taylor, 2012; Leach & Sabatier, 2005b; Thomson & Perry, 2006) Mutual understanding, appreciation of differences (Emerson et al., 2012; Getha-Taylor, 2012) Legitimacy of the process as stand-alone decision-making forum (Bryson, Crosby, & Stone, 2006) and of all participants (Emerson et al., 2012) Commitment to the process and use of collaboration (Ansell & Gash, 2008; Emerson et al., 2009)	I felt that what I brought to the relicensing was appreciated and respected by other participants. I achieved my goals better working with other participants than working alone. The relicensing process hindered my organization from meeting its own mission.[b] The relicensing process operated on the principle of mutual respect. Other participants took my opinion seriously in the course of discussions. Participants were committed to the process. Other participants were honest and sincere. Other participants were trustworthy. *Cronbach's* $\alpha = 0.897$
Capacity for Joint Action	
Procedural and institutional arrangements (Thomson & Perry, 2006) incl. ground rules (Frame et al., 2004; Innes & Booher, 2010; Susskind, McKearnen, & Thomas-Lamar, 1999) and tools to manage conflict (Bryson et al., 2006; Connick & Innes, 2003) Formal and informal leadership, incl. a convener (Ansell & Gash, 2008; Donahue &	All participants had access to relevant information. The relicensing process operated according to mutually agreed upon ground rules. The process was managed in a neutral manner. The process provided equal opportunity for participation of all parties. The process was managed effectively.

Zeckhauser, 2011; Heikkila & Gerlak, 2005; Koontz et al., 2004) and third-party facilitation (Ansell & Gash, 2008; Emerson et al., 2009; Frame et al., 2004; Gray, 1989; Susskind et al., 1999)	I understood the information used in the relicensing. All participants accepted the validity of information used in the relicensing. *Cronbach's* $\alpha = 0.894$
Use of high-quality information (Connick & Innes, 2003; Frame et al., 2004; Innes, 1999) that is accessible and valid (Emerson et al., 2009; Heikkila & Gerlak, 2005)	
Time, money, and staff (Leach & Pelkey, 2001), and equal access to resources (Ansell & Gash, 2008; Frame et al., 2004)	

[a]Response options use a 7-point Likert scale, 1=Strongly Disagree, 7=Strongly Agree
[b]This question was reverse coded.

Table 2. Measuring Outcomes

Variable Overview	*Associated Survey Questions*
	Perceived Process Outcomes[a]
Good process impacts include efficiency of problem resolution or goal achievement, development of trust, learning, growth of social capital, and sharing of power (Gray, 2000, p. 245; Thomson et al., 2008) Overall satisfaction with the process and relationships built Use of negotiation and collaboration should lead to creative, win-win solutions (Cruikshank & Susskind, 1989; d' Estree & Colby, 2004; Fisher, Ury, & Patton, 2011)	Overall, how effective was the relicensing process in developing a new license? Overall, how would you rate the quality of working relationships that developed between you and other participants? Overall, to what extent did your view of the issue(s)/problem(s) change as a result of listening to other participant's views? Overall, to what extent did the relicensing process help to minimize power differences between participants? How enthusiastic would you be to work with the same group of participants in another relicensing? How enthusiastic would you be to go through the relicensing process for the project again? Overall, to what extent does the license reflect an innovative approach to managing hydropower resources? *Cronbach's* $\alpha = 0.871$
	Perceived License Outcomes[b]
An agreement is good if it: Is achieved (d' Estree & Colby, 2004; Emerson et al., 2009; Frame et al., 2004; Innes & Booher, 2010) Provides a clear, justifiable approach for implementation (Mandarano, 2008) Is feasible economically, socially, and politically (Innes, 1999) Meets diverse interests (Emerson et al., 2009)	I understand the terms of the license. The license meets my interests. The license can be modified if needed. The license meets the interests of the other parties. The license will resolve conflict. The license can be implemented. The license is in the public interest. *Cronbach's* $\alpha = 0.871$
	Predicted Environmental Outcomes[c]
Socioeconomics, power generation, fish habitat, environmental quality, and recreational access reflect the core debates present in many relicensings; I aggregate the measures into environmental and economic	The license will [improve or degrade] fish habitat and populations. The license will ___ recreational opportunities. The license will ___ the area's environment. *Cronbach's* $\alpha = 0.845$
	Predicted Economic Outcomes[c]
	The license will ____ the area's economy. The license will ____ power production. *Cronbach's* $\alpha = 0.559$

[a]Questions 1-4 use a 7-point Likert scale, 1=Low, 7=High. Questions 5-7 use a 5-point Likert scale, 1=Not at all, 5=Extremely, rescaled to a 7-point range
[b]7-point Likert scale, 1=Strongly Disagree, 7=Strongly Agree
[c]7-point Likert scale, in the blank insert 1=Strongly Degrade to 7=Strongly Improve

Table 3. Descriptive Statistics

Variable	*N*	*Min*	*Max*	*Mean*	*SD*
Collaboration Full	233	1.50	7.00	5.35	1.14
Principled Engagement	252	1.20	7.00	5.27	1.28
Shared Motivation	253	1.00	7.00	5.42	1.10
Capacity for Joint Action	252	1.71	7.00	5.39	1.18
Perceived Process Outcomes	212	1.00	6.64	4.27	1.28
Perceived License Outcomes	233	1.43	7.00	5.41	1.09
Predicted Environmental Outcomes	247	1.33	7.00	5.21	1.12
Predicted Economic Outcomes	233	1.50	7.00	4.54	0.96
ln Project Capacity (MW)	24	0	7.92	3.73	2.31

Organizational Affiliation	*Frequency*	*%*	*Cumulative %*
Utility/Hydropower Producer	48	17.8	17.8
Federal Agency	64	23.7	41.5
State Agency	70	25.9	67.4
Municipal or County Government	23	8.5	75.9
Non-governmental Organization	39	14.4	90.4
Tribe	15	5.6	95.9
Interested Public	11	4.1	100.0

Table 4. Model Results for Perceived Process Outcomes

	Model 1		*Model 2*		*Model 3*		*Model 4*	
	B	*SE*	*B*	*SE*	*B*	*SE*	*B*	*SE*
CollabFull	0.94***	0.04	0.98***	0.04				
PrincEngage					0.43***	0.08	0.43***	0.08
SharedMotive					0.48***	0.08	0.45***	0.08
JointCapacity					0.03	0.08	0.09	0.08
OrgUtility			-0.71**	0.21			-0.54*	0.21
OrgFederal			-0.39	0.20			-0.31	0.20
OrgState			-0.55**	0.20			-0.47*	0.20
OrgLocalGov			-0.64**	0.24			-0.47	0.24
OrgNGO			-0.53*	0.20			-0.44*	0.20
OrgTribe			-0.68**	0.24			-0.57*	0.24
lnProjCapacity			0.08***	0.02			0.08***	0.02
Constant	-0.74***	0.20	-4.31***	1.03	-0.71**	0.20	-3.60**	1.04
-2 REML log-likelihood	357.2		348.7		349.3		344.9	

N = 191. **p* < 0.05. ***p* < 0.01. ****p* < 0.001

Table 5. Model Results for Perceived License Outcomes

	Model 1		*Model 2*		*Model 3*		*Model 4*	
	B	*SE*	*B*	*SE*	*B*	*SE*	*B*	*SE*
CollabFull	0.78***	0.04	0.73***	0.04				
PrincEngage					0.39***	0.08	0.37***	0.08
SharedMotive					0.00	0.08	0.01	0.09
JointCapacity					0.36***	0.08	0.33***	0.08
OrgUtility			0.56*	0.23			0.38	0.23
OrgFederal			0.79**	0.22			0.65**	0.22
OrgState			0.56*	0.22			0.43	0.22
OrgLocalGov			0.49	0.25			0.33	0.25
OrgNGO			0.39	0.23			0.27	0.23
OrgTribe			0.62*	0.28			0.48	0.28
lnProjCapacity			0.03	0.02			0.03	0.03
Constant	1.23***	0.21	4.19***	1.14	1.43***	0.22	3.59**	1.14
-2 REML log-likelihood	429.5		430.3		422.4		425.6	

N = 213. *p < 0.05. **p < 0.01. ***p < 0.001

Table 6. Model Results for Predicted Environmental Outcomes

	Model 1		*Model 2*		*Model 3*		*Model 4*	
	B	*SE*	*B*	*SE*	*B*	*SE*	*B*	*SE*
CollabFull	0.65***	0.05	0.55***	0.05				
PrincEngage					0.34**	0.11	0.36**	0.11
SharedMotive					0.07	0.11	0.12	0.11
JointCapacity					0.22*	0.10	0.10	0.11
OrgUtility			0.70*	0.27			0.88**	0.30
OrgFederal			0.63*	0.27			0.67*	0.29
OrgState			0.53*	0.26			0.62*	0.28
OrgLocalGov			0.30	0.29			0.51	0.33
OrgNGO			0.55*	0.27			0.68*	0.29
OrgTribe			0.49	0.33			0.56	0.35
lnProjCapacity			0.12**	0.03			0.12**	0.04
Constant	1.67***	0.30	4.23**	1.35	1.81***	0.30	4.85**	1.48
-2 REML log-likelihood	537.3		476.7		539.1		536.0	

$N = 215$. $^*p < 0.05$. $^{**}p < 0.01$. $^{***}p < 0.001$

Table 7. Model Results for Predicted Economic Outcomes

	Model 1		*Model 2*		*Model 3*		*Model 4*	
	B	*SE*	*B*	*SE*	*B*	*SE*	*B*	*SE*
CollabFull	0.28***	0.05	0.31***	0.05				
PrincEngage					0.38**	0.11	0.36**	0.11
SharedMotive					-0.07	0.11	-0.14	0.11
JointCapacity					-0.06	0.11	0.06	0.11
OrgUtility			-0.70*	0.28			-0.79**	0.29
OrgFederal			0.06	0.28			-0.03	0.29
OrgState			-0.11	0.27			-0.19	0.27
OrgLocalGov			-0.30	0.31			-0.41	0.31
OrgNGO			0.11	0.28			0.04	0.28
OrgTribe			0.06	0.34			-0.04	0.34
lnProjCapacity			0.07	0.05			0.07	0.05
Constant	3.01***	0.30	1.80	1.42	3.19***	0.30	1.50	1.44
-2 REML log-likelihood	515.7		500.7		513.4		497.6	

$N = 205$. *$p < 0.05$. **$p < 0.01$. ***$p < 0.001$