Resolving Conflict and Building Cooperation in the National Estuary Program

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Abstract: Since its beginning in 1987, researchers and policy-makers have touted the US Environmental Protection Agency National Estuary Program as one of the leading examples of collaborative institutions designed to resolve conflict and build cooperation at the watershed level. Using the NEP as an example, I summarize the advantages and disadvantages of collaborative institutions. Using data gathered from focused surveys of policy elites in 22 estuaries, I estimate statistical models that show the NEP does a better job of resolving conflict and building project-level cooperation than similar estuaries without the NEP. I also describe the activities of the NEP mentioned by respondents as contributing to this outcome.

Keywords: Cooperation, conflict, watershed management, estuary, environmental policy

Resolving Conflict and Building Cooperation in the National Estuary Program

In 1987, Congress authorized the National Estuary Program (NEP) in Section 320 of the Clean Water Act Amendments. Based on the popular Chesapeake Bay and Great Lakes Programs, the NEP is a "collaborative institution" designed to resolve conflict and facilitate cooperation between the diverse stakeholders in a particular estuary, while at the same time making environmental policy with a watershed focus. States (multiple states in some cases) nominate estuaries for inclusion into the NEP, and those estuaries that meet EPA criteria are authorized to form a Management Conference consisting of private and public stakeholders from all levels of the federal system. The Management Conference is a 3-5 year collaborative planning process that produces a Comprehensive Conservation Management Plan outlining action items for addressing estuary problems. Implementation of specific action items is voluntary and normally left to specific public and private organizations, often using existing statutory authority and programs. There are currently 28 NEP estuaries.

As a collaborative institution, the NEP is a prominent national example of an alternative to the command-and-control approach of traditional environmental regulation. J. Charles Fox, then Assistant Administrator of the EPA Office of Water, captured the spirit of the NEP in a 1999 Senate hearing:

> Unlike traditional approaches to environmental protection, the NEP acknowledges that pollution problems of estuaries are exacerbated by combined and cumulative impacts of many individual activities throughout the coastal watershed. In order to address watershed-wide concerns, the NEP encourages the use of a combination of traditional and nontraditional water quality control measures available through Federal, State and local authorities as well as private sector initiatives. The NEP has strongly influenced our evolution toward watershed management, including the focus on watershed restoration and protection in the Clean Water Action Plan. A cornerstone of

> the NEP is that management decisions are made through an inclusive process involving multiple stakeholders.

The collaborative governance style of the NEP has been incorporated into evolving Federal water policy, and collaboration is a hot topic in many other environmental agencies, as well as other national and international policy arenas. However, despite the many success stories from NEP programs themselves and other similar watershed partnerships (Leach and others 2002; Kenney and others 2000; Weber 1998; Yaffee and others 1996), the academic community has not yet assessed whether or not collaborative institutions do a better job of resolving conflict and building cooperation than traditional environmental policies (Born and Genskow 2001). The goal of this paper is to start filling this gap in the literature by quantitatively comparing the level of conflict resolution and cooperation in estuaries with and without the NEP.

The political contracting framework formulated by Libecap (1989), Ostrom (1990; 1999) and Lubell and others (2002), and more generally rooted in the literature on institutional rational choice (Eggertsson 1990; North 1990), provides the theoretical basis. The political contracting framework assumes estuaries face collective-action problems similar to those suffered by other common-pool resources, namely overexploitation of ecosystem services and undersupply of natural capital. Policy solutions to these collective-action problems emerge from a political contracting process that takes place in a particular institutional setting, in this case the National Estuary Program. However, the political contracting process will only be successful if stakeholders are able to overcome the transaction costs of searching for mutually beneficial policies, bargaining over which policies should be implemented, and then monitoring and enforcing the resulting agreement (Heckathorn and Maser 1987). From the political contracting perspective, the main advantage of a collaborative institution like the NEP is the ability to reduce the transaction costs of political contracting relative to command-and-control institutions.

To assess the effectiveness of the NEP, I use data gathered from focused interviews of policy elites in twelve NEP estuaries matched with ten neighboring estuaries without the NEP. Focused interviews are a compromise between case-study methods and traditional structured surveys with sets of close-ended questions. Focused interviews are based on an interviewer coding form, but the interviewer has discretion to ask the subjects for more details to quantify specific aspects of the situation under study. In each estuary, my research team gathered data on specific conflicts and their resolution, and the level of cooperation on major estuary restoration projects. Taken together, the interviews identified 112 major conflicts and 102 estuary restoration projects, which constitute the units of analysis.

The quasi-experimental design compares the NEP estuaries as the experimental group and the non-NEP estuaries as the control group, allowing me to test the hypotheses that NEP conflicts are more likely to be resolved and that NEP projects have higher levels of cooperation than similar conflicts/projects in non-NEP estuaries. Thus, the analysis looks at both sides of the collective-action coin: building cooperation and resolving conflict as mutually reinforcing processes (Margerum and Born 2000). A comparative analysis of this type is critical for environmental managers who are looking for interim measures of success that can be used to justify continuing the collaborative experiment, with the ultimate goal of evaluating environmental outcomes.

Assessing the Promise of Collaborative Institutions

Humans use estuaries for many different purposes, including resource consumption, navigation, pollution sink, recreation, and others. These multiple uses make estuaries one of the most valuable and abundant sources of natural capital and ecosystem services (Costanza and

others 1997). At the same time, estuaries face a wide range of environmental problems, and these problems are likely to become worse in the face of growing coastal populations.

Estuary resources have the characteristics of common-pool resources (CPR) described by Ostrom (1990), and are subject to the same types of problems. In the absence of physical or legal barriers (i.e., open access) to entry, estuary resources are non-excludable and rivalrous in consumption. Non-excludability means it is costly to prevent others from using a particular CPR; rivalrous consumption means that what one actor consumes cannot be consumed by another. Hence, use of estuary resources for consumption or as a sink for wastes often entails marginal social costs in excess of social benefits. When these social costs are ignored, estuaries suffer the tragedy of the commons (Hardin 1968; Ostrom 1990): estuary resources are likely to be overexploited, and investments in the maintenance of the natural system too low. Continued overexploitation of CPR can often lead to the destruction of the resource system itself, as seen in the crash of fishery populations and the destruction of aquifers from overpumping.

At the same time, estuaries and other watersheds are complex biophysical systems that feature interconnected ecological processes unfolding over space and time, which are poorly understood, chaotic, and unpredictable. Management prescriptions made today often have unintended future consequences, which suggests the need for adaptive management. Furthermore, estuary processes generally ignore human social constructs like administrative and political boundaries, making it very difficult to assign responsibility for estuary protection to a single institution. This is especially true for non-point source pollution (e.g., urban and agricultural runoff) and habitat destruction, both of which come from multiple, dispersed sources and have serious cumulative effects on estuary conditions.

Consequently, estuary management presents a major challenge to traditional, command-and-control policies based on standardized regulations administered by a central agency. Command-and-control policies have had substantial success in controlling point sources of pollution from factories, publicly owned treatment works, and other discrete conveyances that are fairly easy to monitor and assign responsibility (Davies and Mazurek 1998; John 1994). But the major remaining problems in estuaries stem mainly from non-point source pollution and habitat destruction, which feature very high transaction costs for command-and-control policies (John 1994; Marsh and Lallas 1994; Weber 1999). The geographic scope of estuary problems leads to redundant and conflicting policies between different agencies and levels of government. Media-specific policies overlook the interconnectedness of ecosystem processes, and standardized policies have difficulty taking into account the idiosyncratic nature of problems in a particular area. Command-and-control regulations place a greater emphasis on standardized, "one-size-fits-all" rules that are difficult to adjust to changing circumstances (Sabel, Fung, and Karrkainen 2000). Many uses of estuary resources, such as land-use decisions by private landowners, are outside the scope of coercive regulations and thus require a voluntary approach.

In short, command-and-control institutions are not really a good fit for many estuary-wide problems. With its focus on comparative institutional analysis, the political contracting framework is ideally suited to understanding exactly this situation. Transaction costs are reduced when the structure of the governance institution is congruent with the structure of the collective-action problem at hand. Hence, an important part of the solution to estuary problems is changing the structure of governance institutions (Margerum and Born 2000). Proponents argue a collaborative institution like the NEP is an excellent remedy. If collaborative institutions are a better fit to estuary problems, they should do a better job of resolving conflict and building

cooperation. The next two sections compare the advantages and disadvantages of the NEP as a collaborative institution in more detail.

The Advantages of the National Estuary Program as a Collaborative Institution

Collaborative institutions feature a distinct style of governance; Table 1 summarizes the main characteristics. Collaborative institutions are inclusive in the sense of attempting to bring all interested parties to the negotiation table to make decisions according to some agreed-upon collective choice process, such as consensus. Collaborative institutions generally produce specialized management plans that customize new and existing policy tools to idiosyncratic watershed problems. Collaborative institutions also emphasize voluntary cooperation based on norms of reciprocity instead of standards backed by penalties for non-compliance. Voluntary cooperation has the advantage of engendering less resistance from the regulated community and can address problems outside the jurisdiction of regulatory policies like urban land-use (e.g., fertilizers on private homes). A key ingredient of the collaborative structure is building trust, networks, and other forms of social capital between the involved stakeholders (Putnam 1993; Schneider and others 2003). The inclusive nature of collaborative institutions combined with the emphasis on building trust and relationships are key ingredients in rebuilding of civic community at the bioregional level (McGinnis, Woolley, and Gamman 1999). Overall, collaborative institutions have many of the features identified by Ostrom (1990) as characteristics of long-enduring CPR institutions.

[Table 1 about here]

Particularly in the environmental policy domain, collaborative institutions like the NEP attempt to pursue adaptive ecosystem management. The complex dynamics of estuary processes require a governance style where the rules can change in response to new information or

changing conditions. By comparison, command-and-control institutions often appear calcified, unable to change from their original format without major political upheaval. Many NEP programs, on the other hand, envision an ongoing process of policy learning. At the same time, NEP programs espouse ecosystem management philosophies that recognize the interconnected nature of estuary processes and try to integrate policies across different environmental media like air, water, and living resources. Hence, part of the inclusiveness of the NEP involves bringing together different resource users and agencies together to promote an ecosystem view.

From the political contracting perspective, the NEP is a better fit to the characteristics of estuary collective-action problems than command-and-control institutions. To the extent this is true, the governance style of the NEP reduces the transaction costs of searching, bargaining, and monitoring/enforcing mutually beneficial policy agreements. The direct grant funding from EPA and other involved agencies also provides resources for absorbing transaction costs. While I do not directly measure transaction costs in this analysis, if the NEP does reduce transaction costs, then conflict resolution and cooperation should be easier to achieve in NEP estuaries in comparison to estuaries without the program.

The Disadvantages of the National Estuary Program as a Collaborative Institution

Like any policy, the NEP and collaborative institutions are not without their critics. One criticism is that instead of reducing transaction costs, the NEP actually increases transaction costs by expanding the scope of conflict (Baumgartner and Jones 1993; Schattschneider 1960). A direct result of the inclusiveness of the NEP is that many people are interacting with new agencies or interest groups, and being asked to take the views of those people into account. These new interactions often lead to demands for changes in standard operating procedures, which is always costly to an organization or individual. More simply, many NEP participants

often complain that their participation demands extra time for which they are uncompensated. This additional workload alone often discourages long-term commitment.

A second criticism of collaborative institutions is that they are all talk and no action, or just produce plans to gather dust on the shelves and never get implemented (Lubell 2002). Edelman (1971) would call these plans "symbolic policy." Symbolic policy allows government agencies to placate agitated interest groups by offering symbolic progress. For example, the NEP provides a forum for local watershed groups to voice their interests, which in turn may reduce the demand for government action. Even if the government makes no clear substantive policy changes, voice may be enough for some groups to become complacent. Symbolic policy makes political and organizational sense to government agencies, which can use the NEP to simultaneously build a political constituency and protect their core standard operating procedures from outside interference.

Lastly, and related to symbolic policy, is the criticism typically heard from environmental groups that collaborative institutions are essentially "captured" by business interests, and provide an outlet to escape further regulation (Coggins 1999; McCloskey 1996; Savitz 2000). Some environmentalists are particularly suspicious of voluntary measures that do not coerce compliance by making the polluter pay for negative externalities. While economic interests become involved in the planning process to ostensibly pursue environmental goals, they continue with environmentally harmful business practices and simultaneously earn a reputation for being environmentally sensitive. This "greenwashing" provides them a convenient political excuse for arguing against new coercive policies (for example, Total Maximum Daily Load)—why do we need new policies, when we are already involved in this collaborative planning process?

These criticisms are not limited to the NEP, but also other collaborative institutions like negotiated rulemaking. For example, Coglianese (1997) finds that negotiated rulemaking at EPA reduces delays only modestly if at all, and may even be subject to more litigation than conventional rulemaking. If the criticisms of collaborative institutions like the NEP are accurate, then NEP estuaries should not exhibit higher levels of conflict resolution or cooperation than non-NEP estuaries. Even more troublesome, if the NEP increases transaction costs or facilitates symbolic policy, levels of cooperation and conflict resolution could be lower in NEP estuaries.

Analyzing the Structure of the Estuary Action Arena

The NEP and other watershed management institutions do not operate in a vacuum. They operate in the context of an estuary "action arena", which has attributes that may influence the likelihood of conflict resolution and project-level cooperation. Ostrom (1999, p. 42) defines the action arena as the "social space where individuals interact, exchange goods and services, solve problems, dominate one another, or fight." Broadly speaking, the structure of any given action arena for CPR is determined by the physical characteristics of the resource, the operational governance institutions, and the nature of the community of actors involved.

The political contracting framework argues these dimensions of the action arena combine to determine the benefits and transaction costs of cooperation. Features of the action arena that increase (decrease) the transaction costs of political contracting should reduce (increase) the likelihood of conflict resolution and cooperation. North (1990; see also Heckathorn and Maser 1987) argues that transaction costs are rooted in uncertainty, which in turn is related to the complexity of the action arena under consideration. Features of the action arena that may act to reduce or increase complexity should have concomitant effects on transaction costs. These

factors can be described as they apply to a particular conflict or project, and must be controlled for to isolate the effect of the NEP.

The *scope* of a project or conflict significantly contributes to complexity. Issue scope refers to the number of environmental issues under consideration, such as critical species, toxics, or non-point source pollution. Some estuary conflicts/projects address many issues, while others focus on only one issue. Geographic scope refers to the percentage of an estuary watershed that is involved with a particular activity. For example, non-point source pollution will often involve an entire watershed, while a point source problem may focus on a single sewage treatment plant or factory discharge. As either issue scope or geographic scope increases, the conflicts or projects become more complex because more variables and uncertainty come into play. Hence, increasing scope reduces the likelihood of resolving conflict or building cooperation.

Scientific research is one of the most important methods for reducing the uncertainty associated with complex problems. Research creates models that simplify complex situations and elucidate the relationships between key variables, which allows greater predictability for different policy options. Many of the NEP programs utilize some type of hydrodynamic models to illustrate different management options, and these models often become the centerpiece for negotiations. Other common NEP strategies include creating systematic monitoring networks to collect data about priority problems, and hiring university scientists to develop applied research projects. Better scientific information should reduce transaction costs and increase the likelihood of cooperation.

Ostrom (1999) describes how local institutions like the NEP are nested in higher levels of institutions. Many times, changes in federal policies upset existing patterns of behavior by reshaping the incentives facing local actors. Even when these changes are designed to help local

actors, the change itself may increase uncertainty about outcomes. At other times, policy change may decrease transaction costs by funneling new resources or information towards a local action arena. Changes in elected officials may also increase or decrease transaction costs, depending on whether or not that official supports the goals of a local institution like the NEP. For example, an environmentally friendly legislator or governor can use political appointments or budget decisions to pressure government agencies to support the NEP, while an environmentally unfriendly legislator or governor could use the same tools to thwart the NEP.

In terms of actor characteristics, projects and conflicts that involve many competing coalitions are often more difficult to manage than those involving just a few actors. Large numbers of actors increase the heterogeneity of preferences involved, which significantly raises bargaining costs (Libecap 1989). However, high levels of trust among actors may mitigate the disadvantages of complex coalition structures. The literature on social capital demonstrates the value of trust for reducing transaction costs in a variety of cooperation problems and public policy domains (Coleman 1990; Putnam 1993; Scheberle 1997). Trust facilitates cooperation by helping stakeholders make credible commitments to one another in terms of implementing policies or engaging in specific types of behavior.

Research Design and Analysis

The data for this research is based on focused interviews of policy elites in twelve NEP and ten non-NEP estuaries conducted between July 2000 and January 2001. I chose the NEP estuaries to receive good geographic representation, and also cover the five cohorts (called "Tiers" by EPA) of the NEP. I then matched each NEP estuary with a geographically proximate estuary without the NEP, and also tried to choose estuaries with similar levels of economic development and environmental problems. Unfortunately for experimental purposes, NEP

estuaries tend to include most of the better-developed estuaries with more severe environmental problems, leaving the less developed estuaries for comparison. Table 2 compares NEP and non-NEP estuaries along a variety of geographic, demographic, and institutional characteristics. Previous analyses (Lubell 2003; Schneider et al. 2003) have tested whether or not this non-random selection of the NEP creates biased estimates of statistical parameters. For example, the NEP could be appearing in estuaries that already have high levels of cooperation and conflict resolution; the NEP could be the consequence instead of the cause of effective collaboration. The results of these tests have largely suggested non-random selection is not a significant problem, so I do not consider it explicitly in the data analysis here.

[Table 2 about here]

The first stage of the data collection involved identifying 2-5 "informants" in each estuary (20 non-NEP informants, 36 NEP), and then asking them a series of factual questions to construct an estuary "profile". The informants mainly come from the NEP programs, involved government agencies, or university researchers. Members of the research team asked each informant to identify up to three conflicts they had experienced in the estuary, and to describe several facts about the nature of the conflict, including the level of conflict resolution they perceived had been reached. The informants identified a total of 112 (44 non-NEP, 68 NEP) conflicts, so a single informant may provide information about multiple conflicts, depending on how many that informant mentions.

In addition, each informant identified up to four environmental protection projects in the estuary, and the best people to speak to about those projects. The second stage of data collection involved contacting each "project coordinator" and asking them to describe the outlines of the project according to a standardized set of questions. The protocol identified 102 total projects (43 non-NEP, 59 NEP) and a single project coordinator provides information for each project.

Although Leach (2002) shows project coordinators may overestimate effectiveness, this optimism is likely to apply equally to both NEP and non-NEP projects, and thus should not affect the comparison. Throughout the data analysis, the reader should remain clear about the difference between estuary informants, who provide information about multiple conflicts, and project coordinators, who provide information solely about individual projects.

It is also important to be clear about different levels of data aggregation used. The conflict analyses are based on a database where individual conflicts are the unit of analysis, while the project analyses use individual projects as the unit of analysis. However, both the conflict and project databases also include "estuary-level" variables that represent measurements applicable to every conflict/project from a specific estuary. These estuary-level variables are constructed by aggregating the responses of all individual informants from a particular estuary according to a specific aggregation rule. These estuary-level variables should be thought of as contextual variables, which serve the purpose of describing the structure of the estuary action arena and controlling for other key factors that may influence the levels of conflict resolution and cooperation. Thus, any analysis will have variables at both the individual conflict/project and estuary levels of analysis.

The next sections describe the measurement of key variables and report the results of multivariate analyses to see if the NEP has a statistically significant impact on the level of conflict resolution and project cooperation. Italics indicate variable names, and Appendix A reports all question wording.

Measuring Conflict Resolution, Cooperation, and Action Arena Characteristics

To test whether or not the NEP actually increases the level of conflict resolution and project cooperation, I estimate a set of regression models where the dependent variables are the

level of conflict resolution reached for each of the 112 conflicts, and the number of cooperative activities reported for each of the 102 projects. The measure of *conflict resolution* sums the number of "yes" answers to a series of seven questions reflecting different stages of resolution, ranging from agreeing on causes of a problem to full resolution of the problem. The measure of project *cooperation* sums the number of "yes" answers to fifteen possible cooperative activities, ranging from simple activities like regional meetings to more complex forms of cooperation like creating a new non-profit organization. A dummy variable (an indicator variables that takes on the value of 0 or 1) in each regression model indicates whether or not the conflict or project occurs in an NEP estuary. If the NEP is an effective collaborative institution, the dummy variable should be positive and statistically significant in all models.

The measures of action arena characteristics are slightly different for conflicts and projects; all are based on reports from estuary informants or project coordinators, respectively. *Geographic scope* of conflicts is measured with two dummy variables, one that indicates a conflict that affects several areas of the estuary, and one that indicates a conflict that affects most of the estuary. The baseline category is conflicts that affect a small area of the estuary. For projects, *geographic scope* is an estuary-level variable that measures scope as the percentage of conflicts mentioned that are in the "several" or "most" categories. Since we don't have a separate measure of geographic scope for a particular project, the project measure of geographic scope assumes projects and conflicts are linked. *Issue scope* for conflicts is a count of the number of reported sources of conflict, while for projects it is the number of substantive issues addressed (e.g., habitat destruction, etc.).

Scientific knowledge is measured in two different ways. For projects, the interview protocol asked coordinators whether or not the project engages in five different types of

scientific research activities; the variable *project science* sums the number of "yes" answers. As part of the broader NEP study, a survey of multiple stakeholders in each NEP (a much broader set of respondents than the informants considered here; see Lubell 2000, 2002, 2003 for more details) included a question of whether or not scientific knowledge about estuary problems was adequate, measured on a 0-10 scale (rescaled 0-1 for the analysis) where high responses equal better scientific knowledge. *Estuary science* is an estuary-level variable that averages the responses to this question for each estuary. *Estuary science* is included in both the project and conflict analyses, while *project science* is analyzed only for the project analysis.

The measure of *political change* asks each estuary informant whether or not there was an important change in Federal policies or Federal elected officials in the last year. For each conflict, two separate dummy variables (i.e., one for policies, one for officials) indicate "yes" answers to either of these questions. State and local political changes were also examined, but these were not significant in any analysis and caused some problems with multicollinearity, and were dropped from the analysis. Since a single informant usually mentions multiple conflicts, the political change measures from a single informant are spread over multiple conflicts (but are not estuary-level variables in the conflict database). The situation for projects is somewhat more complex because only the estuary informants received the questions about political change, not the project coordinators. Because each estuary has multiple informants, constructing an estuary-level variable to apply to each project required aggregating responses. I use the aggregation rule that says if *any* of the informants from a specific estuary mentions a policy or elected official change, then that entire estuary has experienced the change. Hence, political change for projects is also represented as two separate dummy variables for policy and elected official changes.

Stakeholder involvement is a three-category variable that measures whether estuary informants perceive the conflict as limited to a few stakeholders; involves several but not all stakeholders; or involves all major stakeholders. The conflict analysis includes dummy variables for moderate and full conflicts, making limited stakeholder involvement the baseline category. For projects, stakeholder involvement is an estuary-level variable that measures the percentage of conflicts with moderate or full stakeholder involvement. If greater numbers of stakeholders increase transaction costs, these coefficient estimates should be negative. *Trust* is measured using the same survey data as estuary science, and averages the mean response to a trust question on a 0-1 scale where high values indicate greater levels of trust between stakeholders.

Regression Results: The NEP Increases Levels of Conflict Resolution and Cooperation

[Tables 3 and 4 about here]

Tables 3 and 4 report regression results using conflict resolution and project cooperation as the dependent variables, respectively. The first column of each table reports an unrestricted model with all variables, while the second column reports a model that drops the estuary science variable. Because it is positively correlated with the presence of the NEP, including estuary science in the analysis disguises the full impact of the NEP. However, this statistical issue does have an important substantive meaning. The perceived level of scientific knowledge is slightly higher in NEP estuaries (using survey data mean perceived science in NEP= .60; non-NEP=.55), which suggests that one of the main successes of the NEP is its ability to facilitate the creation of applied scientific expertise in a particular estuary. I will limit the following discussion to the results in the second column of each table, unless otherwise indicated.

The most important result in both tables is that the regression coefficients for the NEP dummy variables are positive and significant. In comparison to estuaries without the NEP,

estuaries increase the level of conflict resolution by 1.25 points and the level of cooperation by 2.2 activities. Relative to the range of each scale, these effects translate into a 17% increase in the level of conflict resolution and a 14.6% increase in the level of cooperation. Hence, the magnitude of the effect is fairly similar for both dependent variables. The consistent positive effects in both models suggest that the NEP is indeed making concrete progress on behavioral measures of success.

The models also show how certain aspects of the action arena increase or decrease the likelihood of conflict resolution and cooperation. Conflicts with broader geographic scope are less likely to be resolved, and the magnitudes of the negative effects rival the positive effects of the NEP. Geographic scope does not appear to affect the level of project cooperation, and issue scope has no effect in either model. It is likely that using estuary-level variables derived from descriptions of conflicts is not a sufficient method for measuring the scope of *projects*; a more project-specific measure is needed. Hence, more research is needed to ascertain the influence of geographic scope on project cooperation and overall feasibility.

However, both models show that scientific knowledge is a major catalyst for the success of watershed management. In the unrestricted model in Table 3, estuary science has a huge positive effect on conflict resolution. Because estuary science is measured on a 0-1 scale, one must interpret the regression coefficient as the change in conflict resolution moving from an estuary where all stakeholders think science is completely inadequate to an estuary where stakeholders view science as very adequate. Moving from an estuary science value of zero to the maximum observed value of .73 increases the level of conflict resolution by 6.57 points. Estuary science does not have a significant effect on the level of cooperation (although the coefficient is still very large, despite being statistically insignificant). However, each additional research

activity associated with a particular project increases the number of cooperative activities by .58 (e.g., just over one-half activity), as shown by the coefficient for project science. Both models are consistent with the hypothesis that the ability of scientific research to reduce uncertainty and transaction costs translates into higher levels of conflict resolution and cooperation.

The findings regarding other aspects of the action arena are less consistent, but there are two that deserve more discussion. First, in Table 3, a moderate level of stakeholder involvement significantly decreases the level of conflict resolution, but conflicts with full stakeholder involvement are no less likely to be resolved than those featuring minimal stakeholder involvement. Personal interviews with NEP stakeholders suggest a possible explanation for this result, which runs counter to the expectation of political contracting theory that transaction costs are higher in large, diverse groups (Libecap 1989). Interview respondents were often disappointed when the NEP process did not include major classes of stakeholders, like agencies with important statutory authority or heavy resource users. When these types of stakeholders are not included, they can often destroy any progress made by a more limited group, usually by creating policies or engaging in resource use inconsistent with the goals and policies of the collaborative institution. These inconsistent behaviors could be intentional sabotage, but more often results from stakeholders failing to change environmentally harmful, habitual behaviors because they were not engaged in the collaborative process. These results suggest that the inclusive aspect of collaborative institutions cannot be taken half-heartedly—either include as many stakeholders as possible to resolve major conflicts, or deal with only minor controversies, because a middle level of involvement is detrimental. In the case of major ecosystems like estuaries, dealing with only minor controversies will probably not lead to long-term

environmental improvements, hence maximizing the scope of participation may be necessary for success.

Second, in the project model (Table 4), political changes appear to be a mixed blessing for building cooperation. Projects that occur in a watershed where informants report a policy change have 1.68 fewer cooperative activities, while a change in elected officials increases the number of cooperative activities by more than four. There is some difficulty in interpreting these statistics because the interview protocol did not differentiate political changes that were "good" for estuary management from those that were "bad" for estuary management; the questions merely asked informants whether or not an important political change occurred at all. However, the findings suggest some intriguing speculations. The fact that policy change reduces the level of cooperation implies that structural stability in the rules of the game is an important basis for cooperation, and changing the rules of the game in higher-level institutions may create considerable transaction costs at the local level. But a change in the people who *play* the game may improve the likelihood of cooperation, because good players know how to use the available rules and policy tools to facilitate local action (of course, a skilled player who opposes a local program could also substantially reduce management effectiveness). While these hypotheses are interesting, they await future research for confirmation.

To summarize, the regression results suggest the NEP is successful in resolving conflict and building cooperation, even when other important action arena characteristics are taken into account. In fact, given the small sample and the qualitative nature of some of the data, the models do a remarkably good job of explaining variance in the dependent variables. There is clearly still a need for more systematic research along these lines, but I suspect the effects of the NEP would continue to be apparent in a larger sample, and in the presence of further control

variables. In the next section, I describe characteristics of the NEP that might account for these results.

Profiles of Conflict and Cooperation

The regression results support advocates of collaborative institutions by showing that conflicts in NEP estuaries have higher levels of conflict resolution and cooperation. But the regression results provide no details about how the NEP accomplishes these goals. This section examines a variety of data from estuary informants and project coordinators to provide insights into the mechanics of collaborative institutions, including descriptions of the types of conflicts/projects they deal with and strategies for successful management. Hopefully, these analyses will prove useful as a basis for specific policy recommendations regarding how to build effective collaborative institutions. To foreshadow, the take home message of these analyses is that collaborative institutions must work as a mediator between the competing stakeholders in a particular watershed.

Conflict and the NEP as Policy Broker

[Table 5 about here]

Table 5 compares the sources and patterns of conflicts for NEP and non-NEP estuaries by reporting the percentage of conflicts that informants characterized as having a particular attribute. As one might expect given their multiple-use nature, all estuaries seem to be experiencing conflict over similar types of issues, even though the priority given to those issues may vary between estuaries. Many of these conflicts are beyond the control of human institutions, for example, environmental crises. Others are endemic to human institutions and can be expected in almost any collective action setting, such as political and personnel changes.

However, most estuaries report facing long-standing problems that most likely occur as a consequence of enduring patterns of resource use and management.

Patterns of conflict refer to the structure of coalitions; some conflicts may have no clear battle lines, some may have two opposing sides, while others may have many different factions. For example, Sabatier and Jenkin-Smith's (1993) Advocacy Coalition Framework generally portrays environmental conflicts in terms of a struggle between environmental and economic interests. Interestingly, the data does suggest the patterns of conflict are different in NEP and non-NEP estuaries. Non-NEP estuaries are more likely to have no clear coalitions formed, or two opposing coalitions as often portrayed by the Advocacy Coalition Framework. NEP estuaries report a high percentage of conflict involving multiple coalitions arrayed among several dimensions. The inclusive nature of the NEP does appear to expand the range of conflict, and thus a key challenge of the NEP is to manage conflict between actors previously isolated to their own subsystems. However, as noted in the regression analysis, it is probably preferable to have all stakeholders involved in a conflict rather than limit it to just a subset, because excluded stakeholders will often undermine (intentionally or not) any limited solution.

[Table 6 about here]

Table 6 reports the percentage of NEP estuaries that mention using various types of conflict resolution strategies, and the level of conflict resolution reached for each type of strategy. Table 6 focuses only on NEP estuaries because the interview protocol did not ask about conflict resolution strategies in non-NEP estuaries—by design, there are no collaborative institutions comparable to the NEP in those estuaries. Clearly, the NEP informants see themselves acting as policy brokers, whose main goal is to find some reasonable compromise that will reduce intense conflict among coalitions (Sabatier and Jenkins-Smith 1993). They do

not want to appear to be taking sides on either side of the dispute. Furthermore, they appear to marshal the expertise and resources available from the subcommittees of the Management Committee and the leadership skills of the NEP director. Expansion of conflict may increase transaction costs, but a counter-balancing benefit of inclusiveness may be expanding the knowledge base available to solve policy problems (see also Schneider and others 2003 on how NEP policy networks integrate scientists and span conflicting coalitions). The ability to marshal expertise is consistent with the importance of science reported in the regression analyses. And the increased complexity of coalition patterns may not be so detrimental after all; the levels of conflict resolution are much higher when the NEP committees and directors are heavily involved as mediators. When the NEP is involved as a combatant on one or both sides of the dispute, the level of conflict resolution is significantly lower.

The lesson to be taken from these results is that respondents perceive the NEP as similar to a "United Nations" of watershed management, providing a neutral forum and skilled diplomats to mediate conflict. The estuary informants are explicitly advocating mediation and marshalling of NEP expertise as strategies for conflict resolution. Of course, since the NEP respondents consist exclusively of people directly involved in the Management Conferences, they may be adhering to a myth of administrative neutrality not subscribed to by other NEP stakeholders, or stakeholders who are not active participants. However, Schneider and others (2003) show NEP stakeholders are more likely to perceive estuary policies as fair and not dominated by a particular interest. Lubell's (2003) survey of a broader section of estuary stakeholders shows that stakeholders who believe estuary decision-making is not dominated by a particular interest group are more likely to believe estuary policies are effective. These previous analyses suggest a connection between the mediator strategies and fairness perceptions, and that

perceptions of neutrality have a payoff in terms of support for estuary policies. Hence, it is likely that NEP administrators who succeed in cultivating a myth of neutral competence are likely to be more effective at mediating conflict between diverse interests.

Cooperation and the NEP as Project Facilitator

[Table 7 about here]

While resolving conflict between diverse interests is a crucial function of democratic institutions, environmental protection requires cooperation and on-the-ground projects. Table 7 compares the percentage of projects in NEP and non-NEP estuaries that address the key estuary management challenges identified by EPA. In accordance with the ecosystem management philosophy, NEP projects appear to be broader in scope. NEP project leaders reported their projects considered 2.6 issues on average (90% of NEP projects address seven or fewer issues), while non-NEP projects considered only 1.9 (90% of non-NEP projects address three or fewer issues). NEP projects place a higher priority on issues like habitat preservation, wildlife, and non-point source pollution, which are issues generally under appreciated by command-and-control regulations like the Clean Water Act (John 1994). Yet at the same time, the NEP projects still emphasize many of the traditional issues like pathogens, toxics, and point sources of pollution. The overall increase in project scope reflects the role of the NEP in not only bringing important new issues to the forefront, but also coordinating existing regulatory tools to focus on the watershed scale.

[Table 8 about here]

What strategies does the NEP use to facilitate these projects? For the 59 NEP projects, Table 8 reports the percentage of project informants who mentioned the NEP played a specific type of role. Loosely speaking, these project roles can be separated into project development and implementation stages. On average, NEP projects utilize seven different facilitation strategies,

indicating the NEP is involved in every aspect of project management to some degree, with the exception of lobbying for legislative support. An appearance of political neutrality most likely helps the NEP deal with the many conflicting coalitions with which they must contend. But the data does reveal a heavier emphasis on project development activities like building public awareness, supporting preliminary research, legitimization, and communication, and less emphasis on implementation activities.

There are two possible reasons for this pattern of emphasis. First, the pattern may reflect the nature of collaborative institutions as a forum for building cooperation instead of a new, stand-alone authoritative structure. As a forum for building cooperation, the main role of the NEP is to cajole stakeholders to target existing policy tools and behaviors towards common goals rather than trying to create new sets of policy tools. The individual stakeholders are like musicians who specialize in certain instruments, and the NEP serves as a conductor to coordinate movements. Second, the pattern may be a matter of resource availability and reflect the original intent of the program, which was funded as a short-term planning process where the participating agencies were expected to bear the brunt of implementation responsibility and costs under their existing programmatic authority. But the ecosystem focus of the NEP often asks agencies and private organizations to broaden their scope of activities, and hence the lack of implementation funding was a frequent complaint during the early stages of the program. Partly in response to this criticism, Congress passed the Estuaries and Clean Water Act of 2000, which authorized project funding for estuaries with completed management plans. If the pattern of project facilitation observed in this data is something inherent to the nature of collaborative institutions, the NEP should not increase participation in implementation by a significant amount in response

to this new funding. If resource availability is the main issue, then the NEP should use the new funding to become more involved in implementation over time.

Conclusion

My analyses demonstrate the collaborative governance style of the NEP is effective at resolving conflict and increasing the level of cooperation on estuary restoration projects. These measures of effectiveness are a considerable improvement over existing studies, which tend to focus mostly on belief change or do not utilize a comparative perspective. These results are the strongest quantitative evidence to date that substantiate the hypothesized advantages of collaborative institutions.

NEP informants describe a fairly specific set of strategies that facilitate the success of the program. For resolving conflict, it is important for the NEP to act as a mediator and not take the side of a particular advocacy coalition. The inclusive nature of the NEP does indeed expand the scope of conflict, which has benefits in terms of addressing estuary problems on a wider scale and preventing interference from excluded stakeholders, but requires the NEP to act as a policy broker to reduce transaction costs. For projects, the main role of the NEP is in project development, and NEP stakeholders appear to pay less attention to implementation. However, the NEP may take a more central role in implementation since the passage of the Estuaries and Clean Water Act of 2000.

Importantly, one of the keys to cooperation and conflict resolution is perceptions of adequate scientific knowledge. Conflicts are more likely to be resolved if they occur in estuaries where many stakeholders perceive scientific knowledge to be adequate. Projects that invest in applied scientific activities also encourage higher levels of cooperation. Scientific knowledge reduces transaction costs by clarifying the causal relationships between human behaviors and

environmental outcomes. Hence, it is much easier to design effective projects with demonstrable results, and hold various actors accountable for the responsibilities they agree to in the context of political contracting.

Collaborative institutions may be one of the main entry points for science in the policy process, and perhaps provide a mechanism for reducing the frustration of scientists who believe the political process generally ignores their research. Schneider et al. (2003) demonstrate that policy networks in NEP estuaries are more likely than non-NEP estuaries to integrate scientists in to estuary decision-making. Woolley, McGinnis, and Kellner (2002) find watershed activists have a high degree of exposure to scientific knowledge; for example, 84% of their respondents had read a scientific article about their watershed. Although their study does not examine activists in watersheds without partnerships, clearly science is an important part of the collaborative process. Furthermore, they find no differences between self-identified "scientists" and other watershed activists in terms of social values and faith in the scientific enterprise. Hence, even though many of the estuary respondents would probably call themselves scientists, it is unlikely the positive relationship between science and cooperation/conflict resolution is overstated in comparison to other types of stakeholders. Indeed, Lubell (2003) finds a strong influence between perceptions of science and policy effectiveness among all types of estuary stakeholders.

While these behavioral results should be encouraging to proponents of collaborative institutions, the research on these policy experiments should not stop here. Like any study, there are limits to the data collection techniques. For example, the measure of political change is agnostic with respect to whether the change is good or bad for local collaboration, and there are no measures of geographic scope and stakeholder involvement that are specific to individual

projects. Furthermore, the study certainly does not examine the full range of collaborative institutions that exist. For example, the Watershed Partnership Project at University of California, Davis, identified 155 partnerships in California alone, and Kenney et al. (2002) identify 346 partnerships in the Western states. And collaborative institutions are not just limited to water policy; they are common in many environmental policy venues, and also in entirely different policy arenas like urban planning and health care. More research is needed just to reflect the breadth of the collaborative institution phenomena, with an eye towards understanding both the universal features of collaborative institutions and how they operate in different contexts. Research should also be expanded to international collaborative institutions, where many countries attempt to cooperate to protect a regional resource like the Mediterranean Sea or the Nile River, with the help of international institutions like the World Bank or the United Nations.

But most importantly for collaborative institutions in environmental policy, the behavioral consequences reported here and the belief changes reported in other papers are only *necessary* steps to actually improving environmental outcomes. These behavioral improvements can at least be used as short-term indictors that collaborative institutions are moving along the road to outcome effectiveness (Born and Genskow 2001). However, conflict resolution and cooperation are not *sufficient* conditions for effectiveness, because the causal relationships between behavior and environmental outcomes are very complex. Even the most cooperative stakeholders may put well-designed projects on the ground that end up having no long-term effect on environmental conditions. Serious research effort needs to be invested in examining the *environmental* consequences of collaborative institutions before the verdict of "success" can be completely justified.

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Appendix A: Focused Interview Protocol

The following sections describe the basic structure of the focused interview protocol used to construct the majority of variables used in this analysis. Note that the questions are not in the traditional format of more structured surveys because the interviewers were given some discretion in trying to help estuary informants provide as many details as possible. Hence, the protocol procedure should really be thought of as a dialogue instead of a question-answer format survey. The advantage of this format is that interviewers can probe respondents for more detail and thus get a better grasp of each individual situation. The disadvantage is that issues of question wording are not as precisely controlled.

Dependent Variables

Conflict Resolution

Seven possible outcomes of conflict; variable sums number of "yes" answers:

- Agreed on causes of problem for estuary
- Agreed on importance/severity of problem
- Agreed on consequences of problem for estuary
- Agreed on studies/data needed
- Agreed on one or more implementation actions/solutions
- Program in place to solve problem
- Problem fully resolved

Project Cooperation

Fifteen possible types of cooperation; variable sums number of "yes" answers:

- Provide data/expertise/information to another organization
- Train people from another organization

- Share/reassign personnel
- Joint research/data collection project
- Joint grant/funding proposal
- Joint conferences/meetings
- Joint monitoring of estuary conditions
- Joint identification of priority sites for ecological restoration
- Joint identification of priority sites for economic development
- Create an interagency taskforce or partnership
- Sign a Memorandum of Understanding/Agreement
- Create a new non-profit organization
- Create a new intergovernmental organization
- Delegate permitting or regulatory activities
- Develop common regulations

Independent Variables

Geographic Scope (three possible categories)

- Small area of estuary affected
- Several areas or very important area affected
- Most of estuary affected

Conflict Issue Scope (nine possible sources of conflict)

- Environmental crisis
- Natural catastrophe
- New study/data/knowledge
- Actions external to estuary

- Actions internal to estuary
- Unexpected/surprise event
- Predictable/longstanding problem
- Political events
- Personnel changes

Project Issue Scope

What type of environmental issues was this project addressing (eight possible targeted issues)?

- Habitat destruction
- Declines in fish and wildlife
- Non-point source pollution (agricultural or urban runoff)
- Point source pollution
- Atmospheric deposition
- Hydrologic modification
- Toxic substances
- Pathogens

Project Science

What efforts, if any, has the project undertaken to improve scientific understanding of the project's impact on these problems?

- Ecological/hydrodynamic models or simulations
- Environmental monitoring/sampling programs
- Review of existing academic or agency research reports
- Commissioning of new academic or agency research projects
- Hiring of environmental consultants to assess environmental conditions

Estuary Science (taken from larger estuary stakeholder survey)

On average, do you perceive the level of scientific understanding about the causes and causes of problems in your estuary to be very inadequate, very adequate, or somewhere in between? 0 = Scientific understanding is very inadequate, 1= Scientific understanding is very adequate.

Political Change

What major events affected estuary policies this past year? Were there changes in critical elected/appointed officials at the Federal, state, or local level? Yes/No

Stakeholder Involvement

In terms of stakeholder involvement, would you say this conflict had:

- Limited conflict involving small number of stakeholders in each estuary.
- Moderate conflict involving several, but not all, major stakeholders.
- Full conflict involving all major stakeholders taking sides.

Trust (taken from larger estuary stakeholder survey)

Thinking about the range of contacts you have had with other stakeholders, do you completely trust these stakeholders to fulfill the promises and obligations made on each issue in the context of the partnership, completely distrust them, or somewhere in between? 0= Completely distrust, 1= Completely trust.

Table 1: Common Features of Collaborative Institutions

Inclusive participation	Encourage participation from the broad range of private and public actors with any political or economic interest in estuary resources.
Specialized rules	Produce sets of policy rules and management actions customized to the idiosyncratic nature of local estuary problems.
Consensual decision-making	Utilize decision processes that emphasize consensus, or at least some clear and generally accepted collective-decision rule.
Voluntary implementation	Implementation of management plans relies mainly on voluntary implementation under existing programmatic authority, and usually does not involve creation of a new set of legal requirements.
Civic Community	Invest in trust, norms of reciprocity, and networks to build the social basis for ongoing cooperation.
Adaptive management	Decision-making process includes mechanisms for policy learning and adjusting management recommendations in light of new information.

Table 2. Comparison of NEP and Non-NEP Estuaries

	NEP Estuaries	Non-NEP Estuaries
Geographic Factors		
Problem Severity^	.577 (.065)	.438 (.044)
Estuary Area (1000 mi^2)	7.773 (2.354)	7.147 (5.156)
Population Density 1990 (1000/mi^2)^	.728 (.216)	.311 (.095)
Log Population**	13.664 (.395)	11.201 (.241)
Demographic Factors		
Proportion African-American	.107 (.017)	.127 (.017)
Farm/Non-Farm Ratio**	.007 (.002)	.015 (.002)
Median Income ($1000)**	31.731 (1.227)	26.702 (.725)
Proportion Republican Voters	.446 (.014)	.445 (.009)
Institutional Factors		
Soil and Water Conservation District*	.395 (.155)	.033 (.018)

Notes: Data extracted from NOAA's Coastal Assessment and Data Synthesis System (http://cads.nos.noaa.gov/). Contact author for more details. Cells contain mean values in each estuary, with standard error in parentheses. T-tests of differences in means =0, with unequal variances assumed: ^p< .10, *p< .05, **p< .01.

Table 3: Regression Models for Conflict Resolution

	Full Model	Restricted Model
NEP Institution	.59 (.76)	1.25(.46)*
Moderate Geographic Scope	-2.20 (.73)*	-2.12(.78)*
Full Geographic Scope	-1.90 (.58)*	-1.76 (.75)*
Issue Scope	-.27 (.24)	-.24 (.25)
Estuary Science	9.14 (3.69)*	---
Policy Change	.15 (.47)	.04 (.48)
Elected Official Change	.27 (.79)	.59 (.81)
Moderate Stakeholder Involvement	-1.55 (.58)*	-1.29 (.59)*
Full Stakeholder Involvement	-.39 (.64)	-.25 (.65)
Estuary Trust	.35 (4.41)	.08 (4.52)
Model Fit	Adj. R^2= .21; F= 3.74*	Adj. R^2= .16; F= 3.29*

Note: Table entries are unstandardized regression coefficients, standard errors in parentheses. N= 106. *Test of null hypothesis that parameter estimate is zero, $p<.05$.

Table 4: Regression Models for Project Cooperation

	Full Model	Restricted Model
NEP Institution	1.79 (.73)*	2.20 (.66)*
Geographic Scope	-3.96 (2.43)	-3.08 (2.34)
Issue Scope	-.24 (.16)	-.25 (.16)
Project Science	.57 (.21)*	.58 (.21)*
Estuary Science	6.54 (5.12)	---
Policy Change	-1.68 (.66)*	-1.63 (.66)*
Elected Official Change	4.38 (1.18)*	4.36 (1.18)*
Stakeholder Involvement	.13 (.30)	.07 (.30)
Estuary Trust	-9.02 (5.74)	-8.42 (5.74)
Model Fit	Adj. R^2= .18; F= 3.53*	R^2= .18; F= 3.74*

Note: Table entries are unstandardized regression coefficients, standard errors in parentheses. N= 102. *Test of null hypothesis that parameter estimate is zero, $p<.05$.

Table 5: Profiles of Conflict

Source of Conflict	*Non-NEP*	*NEP*
Environmental Crisis	13%	9%
Natural Catastrophe	0%	1%
Scientific Study	20%	14%
Unexpected Policy Event	7%	11%
Longstanding Problem	59%	64%
Political Change*	34%	13%
Personnel Change	4%	2%
Patterns of Conflict	*Non-NEP*	*NEP*
No Clear Coalitions	18%	10%
Two Conflicting Coalitions	45%	38%
Several Conflicting Coalitions*	36%	51%

*Z-test rejects null hypothesis of no difference in proportions at p=.05.

Table 6: Conflict Resolution Strategies in the NEP

NEP Strategies	*Percentage of Conflicts*	*Average Level of Resolution*
NEP on One Side	14%	2.1
NEP on Both Sides	10%	2.3
NEP as Mediator	45%	3.5
NEP Director Involved	87%	3.1
NEP Committees Involved	95%	3.1

Table 7: Profiles of Projects

Issue	*NEP*	*Non-NEP*
Habitat Preservation	42%	40%
Wildlife Protection*	44%	28%
Non-point Source Pollution*	58%	42%
Point Source Pollution*	36%	19%
Atmospheric Deposition	20%	21%
Toxic Substances*	25%	5%
Pathogens	25%	14%
Hydrological Modification	17%	23%
*Average Number of Issues**	2.7	1.9

*Z-test rejects null hypothesis of no difference in proportions at p=.05. T-test for average number of issues.

Table 8: Project Facilitation Strategies in the NEP

Type of Facilitation Strategy	*Percent of Projects*
Develop Public Awareness	86%
Support Preliminary Research	71%
Justify Importance	83%
Facilitate Communication	83%
Facilitate Interagency Cooperation	85%
Lobby for Legislative Support	13%
Develop Grant Applications	61%
Coordinate Implementation	51%
Monitor Implementation	59%
Provide Direct Funding	63%
Provide Project Oversight	53%
Average Number of Facilitation Strategies	7.0