

The promise and perils of building a co-management regime: An institutional assessment of New Zealand fisheries management between 1999 and 2005

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Abstract

This article uses a longitudinal survey (1999–2005) of commercial stakeholder organizations (CSOs) to assess the development, strengths and weaknesses of New Zealand's fisheries co-management over its first six years. After presenting the current characteristics and activities of CSOs, the institutional analysis and development (IAD) Framework is used to examine the regime. Results show a pattern of strengths and weaknesses with some areas substantially improved since earlier waves of the survey, while other areas have experienced surprising setbacks. These results suggest that in 2005 the regime remained fragile. Finally, New Zealand's recent move towards inshore "Shared Fisheries" management is explored in light of these findings.

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1. Introduction

Within the fisheries economics and natural resource management community, there is a well-established discussion of the role that co-management can play in the sustainable use of a natural resource such as a fishery. A lively discussion also surrounds the development of these regimes and the role that property rights plays in this development; as well as how to assess the strengths and weaknesses of this approach as an institutional arrangement.

After providing both theoretical and case background, this article extends the result of a previous study [1] to assess the development of co-management in New Zealand fisheries management between 1999 and 2005. Institutional analysis in the form of the Institutional Analysis and Development (IAD) Framework (e.g., [2–7]) is used to assess the current status of co-management, and possible implications for future co-management development in New Zealand. This analysis shows a pattern of strengths and weaknesses with some areas substantially improved

since earlier waves of the survey (notably monitoring, congruence, and adaptability), while other areas (such as boundaries, right to organize, collective choice, and transaction cost) have experienced surprising setbacks or continued to experience difficulties. These results suggest that in 2005 the co-management regime remained fragile. The implications of these findings in light of the 2006 Shared Fisheries initiative are also discussed.

2. Theoretical background

Co-management is a concept dating to nearly 20 years when Sven Jentoft first coined the term, and defined co-management as "a meeting point between overall government concerns for efficient resource utilization and protection, and local concern for equal opportunity, self-determination, and self-control." [8, p. 144]. The literature on co-management as a means of managing natural resources is now well-established (e.g., [8–14]), and draws upon several themes including: variation in degrees of co-management [9]; the importance of matching local conditions and management regimes [10,13]; co-management as a means of decentralization and democratization [11];

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success of co-management for localized resource [12]. However, there are also many critics of co-management [15,16]. For example, Townsend and Pooley note that definitions of co-management are “so broad as to cover essentially any form of distributed governance. Such a definition is also so broad as to be almost meaningless” [16, p. 50].

Partially in response to these critiques, some researchers are grounding analysis of co-management regimes in broader theoretical tools such as property rights, social capital, and institutional analysis [1,7,9,11,13,17,18]. In this analysis, the Institutional Analysis and Development (IAD) Framework ([3–7]) is used to systematically assess the strengths and weaknesses of New Zealand’s co-management regime in 2005. Specifically, three aspects of the IAD framework are used. These are: the design principles for long-lived institutions ([2]), transaction costs [6], and institutional performance [6].

Ostrom’s design principles for long-lived institutions [2] were used in the previous analysis of New Zealand’s fisheries co-management regime [1]. The design principles provide guidance for analyzing to what extent there are sufficient incentives and social capital to support the difficult and ongoing work of maintaining an institution capable of managing a common pool resource. These design principles are: clearly defined boundaries; congruence between rules and local conditions; collective choice arrangements; monitoring; graduated sanctions; conflict-resolution mechanisms; and minimal recognition of rights to organize. Furthermore, for institutions that are part of a larger system, nested enterprises enhance performance.

The IAD framework identifies three different types of transaction costs: information costs, coordination costs, and strategic costs [6]. Information costs are costs incurred by gathering, organizing, and interpreting information; as well as the costs of errors resulting in ineffective scientific and “time and place” information. These costs are particularly important in fisheries management because managers need “an effective blend of both scientific and time and place information. Fisheries managers need to understand the species and its population dynamics. They also need accurate information about breeding populations and changing local conditions.” [7, p. 504] Coordination costs are incurred by negotiating, monitoring and enforcing agreements (in this case, management decisions). Finally, strategic costs “result from asymmetries in information, power, or other resources such that some obtain benefit at the expense of others. Common strategic costs include free riding, rent seeking, corruption, collusion, and turf guarding.” [7, p. 504] Strategic costs are important because high strategic costs will reduce fisheries participants’ willingness to participate in cooperative relationships.

Institutional performance is designed to assess how well an institutional arrangement is functioning. The IAD framework identifies four criteria for assessing institutional

performance: efficiency, equity, accountability, and adaptability [6].¹ Policy outcomes can also be added to this list [7]. Efficiency is measured two ways: economic efficiency which is benefits relative to the expenditure or allocation of resources; and administrative efficiency which examines the costs associated with maintaining institutional arrangements [7]. Under the IAD framework, equity is divided into two linked concepts: fiscal equity (those who benefit from a bear the cost); and redistributive equity (distribution according to need). Accountability is the principle that governing institutions should be held responsible for their actions. This can be accomplished formally through open meeting laws, oversight, etc.; or more informally through social sanctioning. Adaptability refers to the ability of an institution to respond to change over time. Finally, policy outcomes refer to how successful institutions are in achieving policy outcomes.

It should be noted that it would be an extremely rare institution that would perform well on most or all of these criteria since they are often contradictory. For example, within the institutional performance criteria, consider fiscal equity versus redistributive equity; administrative efficiency versus accountability. Similarly, there may be tradeoffs between lowering the various types of transaction costs. Finally, since the institutional arrangement being assessed in this study is a co-management regime, the assessment must examine both the CSOs and the government. Below, background information on this case is presented.

3. The evolution of New Zealand fisheries management

New Zealand’s fisheries management system addresses the country’s extensive economic exclusion zone (EEZ), which covers an area of 1.3 million square nautical miles. There are 130 species commercially fished (95 under quota management) with a landed catch in the 2005–6 season of 517,000 tonnes with an export value of NZ\$1.351 billion in the same period. In 2006, the most valuable export species were hoki, squid, rock lobster, and orange roughy.² Direct and indirect employment associated with the seafood industry is 26,000 FTE. With the exception of rock lobster, these are all mid to deep-water species requiring large-scale fishing operations [19].

The New Zealand fishing industry is also rather unusual among emerging co-management regimes in several other ways.³ The industry is composed of two sectors: the deepwater industry (orange roughy, dorries, etc.) is dominated by a small number of vertically integrated companies; while the inshore industry (snapper, flounder, rock lobster, etc.) is fished by a mixture of small-scale fishers and vertically integrated companies.

¹These four criteria are quite complex, and are described only briefly here. See [6,7] for a detailed discussion.

²Mussel was the most valuable export, but is an aquaculture species.

³For detailed description of the industry and its development see [1,13,20,21].

New Zealand differs from many historically based co-management regimes (such as Maine lobster [12]) because many fishing sectors lack the traditional grounding in local community or (in the case of the deepwater industry) extended historical roots. An important exception to this is the Maori community, which has strong historical and cultural ties to fishing [22,23]. Instead, industry organizations are sector-based and coordinate with an umbrella organization—the Seafood Industry Council (SeaFIC). As discussed below, these sector-based organizations form the backbone of the co-management regime.

The roots of the present co-management regime are in the 1986 adoption of market-based regulation when New Zealand instituted its quota management system (QMS), a regime based on individual tradable quotas (ITQs) [24–26]. However, over time, the property rights associated with the ownership of ITQs expanded so that ITQs went from representing a simple catching right to a more complete bundle of property rights providing incentives for ITQ owners to begin participating in management [1,13,27,28]. During the 1990s, such a movement did indeed occur, culminating in the passage of the 1999 Fisheries Amendment Act.

This act delegates certain management responsibilities to “approved service delivery organizations,” more commonly referred to as “commercial stakeholder organizations” (CSOs) or “stakeholder groups.”⁴ These organizations are usually composed of ITQ owners, who take on responsibility for managing the commercial fishery in which their members own ITQs. As envisioned by the enabling legislation, management by the CSOs is not a replacement of QMS, but rather an additional institutional layer that supplements it. Essentially, CSOs are authorized to carry out selected management activities such as research, while the Ministry maintains responsibility for setting standards, enforcement, and auditing CSO activity. A more detailed description of current CSO composition and management activities is provided below as part of the analysis of research results.

4. Methods

This study is an extension of previous research tracking the development of co-management in New Zealand fisheries [1]. The primary data source is a longitudinal study of CSOs started in 1999 when the legislation enabling co-management was passed, and a follow-up survey was conducted in 2001. This study presents the results of a third wave of this survey conducted in 2005. For each study, SeaFIC provided a list of member organizations. For the 1999 survey, all member organizations were surveyed. But for subsequent rounds (2001 and 2005), only groups that

⁴The terms CSOs are used here because these groups do not fully meet the broader definition of what many in public management or public policy would consider stakeholders or stakeholder groups. Specifically, all interests in the fishery (such as recreational fishers, environmental interests or customary Maori interests) are not members of the CSOs, but the decisions made by the CSOs have significant impacts on their interests.

Table 1
Longitudinal survey responses

	1999	2001	2005 ^a
Surveys distributed	32	33	32 or 29
Surveys returned	18	19	15
Response rate	56%	58%	47% or 52%

^aIn 2005, three CSOs did not respond because they were merging with other CSOs. Response rates are presented including and excluding these CSOs (which effectively ceased to exist between the beginning and end of the 2005 survey).

could be defined as CSOs were included.⁵ This change fits with the clearer vision of what constitutes as CSO that developed among the Ministry and fishing industry between 1999 and 2001. Surveys were conducted by mail, and addressed areas such as group characteristics, organization, management, interactions with other groups, and their vision of the future.

Table 1, below, provides summary information about the three rounds of the CSO surveys. Each round of the survey had a high response rate (over 50%), but a low absolute number of responses. Unfortunately, in 2005 the absolute number of responses was low enough that while statistical testing (Fisher exact test) was used in previous analysis, it cannot be used with the 2005 data. This drop in the number of responses was largely due to the fact that during the period that the survey was conducted, several CSOs were in the process of merging and as a result declined to participate since they were no longer functioning as on-going entities. In Table 1, response rates are presented both including and excluding these CSOs. Thus, results presented here are descriptive only. Finally, a brief comparison of responding and non-responding groups in all three survey rounds showed no significant difference between responders and non-responders, so the survey may be considered representative.

5. Characteristics of CSOs

Survey results from 2005 show that CSOs are almost always single-species (88%) and that regional groups slightly outnumber national groups. (However, these regional groups will in some cases also be a member of a national group) [13]. On average, CSOs are 8.27 years old, meaning that many of these groups began prior to the legal recognition of co-management and then transformed into

⁵A CSO is defined as “a group that focuses on promoting the interests of fishers or working on the management of a specific fishery or group of fisheries. These groups usually focus on a single species or multiple species within a single geographic area.” Aquaculture groups were included as the line between aquaculture and fishing is becoming blurred—however, these groups often self-selected out of the surveys stating that they did not see themselves as CSOs. Groups focusing on specific aspects of the industry (e.g., vessel owners, independent fishers) are not CSOs.

CSOs. Groups vary in size, with a few having hundreds of members, but a median membership of 40 members.

Turning to management structure, CSOs are almost universally under QMS,⁶ an increase from the previous survey where 72% reported being under quota management. Not surprisingly, ITQs form the basis for CSO governance, with most groups using ITQs. Among species under ITQ management, 72% quota ownership is a criterion for voting. However, unlike the previous surveys, more complex forms of voting are developing. For example, voting on “fisheries issues” is restricted to ITQ owners, but voting on CSO governance is open to all. Similarly and continuing the pattern observed in 2001, many CSOs continue to report using formal decision rules of 75% of catch total (with 1 ton = one vote rules); while in practice decisions are made by consensus.

A key aspect of assessing CSOs is understanding the responsibilities that these organizations take on, and how this has changed over time. Current responsibilities and changes are detailed in Table 2 (below). These results show that over time, there has been a consistent increase in activities undertaken by CSOs over time. All but one activity (enhancement) has an increase in the number of activities reported as “do it now” between 1999 and 2005 and between 2001 and 2005, and five out of eight activities increased reporting as “do it now” at each survey interval. Similarly, for the activities with lower participation rates for “do it now” (such as imposing penalties for breaking CSO rules, imposing penalties for breaking laws) there has been an increase in CSOs planning to undertake the activity in the next year. Thus, the patterns of activity reported over the three waves of the survey show a consistent increase in activity between 1999 and 2005.

Furthermore, there is a change in the pattern of activities CSOs report. Analysis of the previous surveys noted:

[CSOs] are avoiding the most complex and contentious management activities such as imposing penalties on members for breaking group rules or fishing law. ... This pattern of embracing some, but not all management activities is important because it provides insights into groups’ interests and capacity. y... Thus, low interest in penalties both now and in the future raises concerns about moving further in the direction of co-management ... ([1, p. 184]).

However, in the 2005 survey, there is a notable trend of more CSOs taking on these activities presently; and even more planning to participate in these activities within a year. Fifty percent of CSOs are imposing or plan within a year to impose penalties on rule-breakers; and 35.72% of CSOs are imposing or plan within a year to impose penalties on law-breakers. Furthermore, monitoring fishery conditions is now an almost universal activity (92.86%) and monitoring fisher activities is also extremely well-established, with 71.43% engaging in the activity. Based on

⁶All but two CSOs reported being managed under QMS.

Table 2
Reporting of activities undertaken by CSOs 1999–2005

	Do it now			Plan in 1 year			Plan 2–5 years			No plan in future		
	1999	2001	2005	1999	2001	2005	1999	2001	2005	1999	2001	2005
Encourage communication in CSO	100%	100%	100%	0	0	0	0	0	0	0	0	0
Provide unified voice for CSO	82.35%	88.89%	92.86%	17.65%	11.11%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Provide harvest or sale rules for CSO	55.56%	58.82%	64.29%	11.11%	17.65%	7.14%	5.56%	0.00%	7.14%	5.56%	7.14%	7.14%
Undertake fishery enhancement	58.82%	38.89%	35.71%	11.76%	16.67%	0.00%	0.00%	11.11%	7.14%	5.88%	11.11%	0.00%
Monitor fishery conditions	68.75%	76.47%	92.86%	12.50%	23.53%	0.00%	6.25%	0.00%	7.14%	0.00%	0.00%	0.00%
Monitor fishing activity	47.06%	66.67%	71.43%	23.53%	11.11%	0.00%	0.00%	5.56%	0.00%	5.88%	0.00%	7.14%
Impose penalties on CSO rule breakers	17.65%	23.53%	28.57%	11.76%	0.00%	21.43%	5.88%	17.65%	0.00%	0.00%	29.41%	28.57%
Impose penalties on law breakers	16.67%	11.76%	21.43%	5.56%	0.00%	14.29%	11.11%	5.88%	0.00%	5.56%	23.53%	21.43%
Provide dispute resolution	72.22%	58.82%	76.92%	0.00%	17.65%	15.38%	0.00%	5.88%	0.00%	0.00%	5.88%	7.69%
Provide education for the public			50.00%			21.43%						0.00%

Bold = increase in activity between survey.

Table 3
Types of relationships between CSOs and fishery interests 2005

	% of CSOs allowing interests to participate in internal discussions	% of CSOs engaging in negotiations with interests
Recreational fishers	21.43	64.29
Environmental interests	14.29	64.29
Customary Maori interests	64.29	92.31

Table 4
Trust between CSOs and fishery actors 2005

	Mean trust score ^a
Ministry of Fisheries (MFish)	2.72
Seafood Industry Council (SeaFIC)	1.93
Recreational fishers	2.77
Environmentalists	2.29
Customary Maori	2.54
General public	2.83

^aTrust scores are scaled 1 = always “trust to do what is right,” 4 = never “trust ...”, 2.5 = neutral.

these findings, it appears that between 2001 and 2005 CSO made substantial (but not universal) strides towards engaging in the more complex activities of co-management.

Because CSOs are groups that are engaged in co-management activities, but themselves are composed only of commercial fishing interests, a key issue for CSOs is their relationships with other fishery actors and interests⁷ such as the Ministry of Fisheries, recreational fishers, environmentalists, customary Maori interests, the general public, and SeaFIC. The 2005 survey examined these relationships from three different perspectives: interactions between CSO and fisheries interests; quality of relationship; and trust. In 2005, CSOs reported fishery interests participating in internal CSO discussions, and external negotiations between CSOs and interests is reported in Table 3. Table 4 shows the degree to which 2005 CSO leaders trust other fishery interests to “do what is right.” Table 5 (below) summarizes the change in relationships reported by CSOs between 2001 and 2005.

These responses show a mixed but promising pattern in the relationships between CSOs and other fishery interests. Focusing first on the 2005 data, Table 3 examines the relationships between CSOs and fishery interests. It shows considerable interaction in the form on negotiations, with nearly 65% of CSOs reporting they negotiate with

⁷The term “actors” is used to refer to all parties that may participate in fisheries management: Ministry of Fisheries, SeaFIC, recreational fishers, environmentalists, customary Maori interests, and the general public. The term “interests” refers to the subgroup of actors who, like to commercial fishing industry, seek to influence the size of fishing catch and/or how that catch is distributed among sectors.

Table 5
Strength of relationships between CSOs and fishery actors 2005 versus 2001

	Mean relationship score 2001 ^a	Mean relationship score 2005 ^a
Ministry of Fisheries (MFish)	2.28	2.50
Seafood Industry Council (SeaFIC)	2.22	1.43
Recreational fishers	2.72	2.1
Environmentalists	3.5	3.39
Customary Maori	2.28	2.25
General public		2.75

Bold = improved relationship between 2001 and 2005.

^aRelationship scores are scaled 1 = very positive, 5 = very negative. Thus 3 = neutral score.

recreational and environmental interests, and negotiations with customary Maori being nearly universal. Since CSOs are commercial-fisher organizations, it is interesting to note that CSOs allow fishery interest some participation in internal discussions. Customary Maori have the greatest access (nearly 65% of CSOs), while recreational fishers and environmental interests have considerably less access (21% and 14%, respectively) Furthermore, the type of access interests have varied widely between groups from a seat on the board of directors to informal conversations with a group’s executive officer. Table 4 results indicate trust levels between neutral and slightly negative for most actors. The two exceptions to this are SeaFIC, which scored the best trust rating (1.93 on a four point scale), and environmentalists who scored a 2.29—a positive and somewhat surprising score given the long history of animosity between these two groups. The worst trust score was held by the general public (2.83) followed by recreational fishers (2.77) and the Ministry of Fisheries (2.72). These results suggest that while CSOs are clearly not the broad-based “stakeholder groups” sometimes discussed in the literature [10,11] there is more interaction between CSOs and other interests than initially appears. It is possible that this heightened interaction may explain the trust scores reported by CSO leaders, which while not extremely positive, are more positive that would be expected given the heightened conflict between many fishery interests in the time leading up to this study [13].

A longitudinal perspective on these relationships is available by examining Table 5. Analysis of this table provides further evidence supporting the promising pattern discussed above. Here, CSO leaders’ assessment of relationships with fisheries actors shows 2005 relationships as positive for all but one interest (environmentalists).⁸ Between 2001 and 2005, relationships improving for three actors (SeaFIC, recreational fishers, and environmentalists);

⁸However, Table 4 shows that environmentalists also have the second-highest trust scores, suggesting a relationship that is complex, to say the least.

worsened slightly with one interest (Ministry of Fisheries); and worsened considerably for one (environmentalists). Thus, there is a mixed but overall positive pattern with current relationships positive for all but one actor, and relationships with some key actors improving over time. When combined with the information presented above, it appears that CSOs are indeed engaged with other fishery actors, and believe that they are working to build relationship with other actors and engage with these actors on fishery management issues.

Finally, insights into the status of CSOs can be gained by comparing CSOs leaders' assessments of their organizations' successes and challenges over time. As was previously noted [1], the 1999 discussion of challenges and successes reflected groups that were struggling with initial organization and group development, while the 2001 discussion reflected a shift towards specific management issues—suggesting that groups were moving beyond internal organization and addressing fishery issues. This trend continued in the 2005 survey. Some CSO leaders listed specific management programs described as successes (e.g., rebuilding stock, creating logbook programs, etc.) and others listing engagement with other fishery interests as successes. Similarly, specific fishery management issues also continued to appear as challenges (e.g., addressing needs of migratory species within ITQ system), however two themes emerged as challenges that were not extensively discussed previously: loss of spatial access (access to fishing grounds) due to marine reserves or Mātaitai,⁹ and the difficulties of working with the Ministry of Fisheries to develop fishery management plans—the next logical step in co-management. As with the quantitative survey data, these qualitative comments illustrate a pattern of CSOs continuing to develop, but struggling with complex management issues and a perceived lack of support from the government that does not bode well for future developments.

6. Institutional assessment

The section above describes the current characteristics of CSOs and their relationships with other fishery actors based on the results of a longitudinal series of CSO leader surveys. While providing a rich picture of these organizations and the environment in which they operate, this is not enough to assess the current strengths and weaknesses of this approach as a co-management regime. For this, an analysis grounded in a consistent set of criteria such as that provided by the previously described IAD framework is necessary. Below, the current regime is assessed using three sets of criteria from the IAD framework: design principles, transaction costs, and institutional performance. Information on each set of criteria are provided in the theoretical background section above.

6.1. Design principles

Ostrom's design principles [2] for long-lived institutions provide a well-researched basis for assessing the degree to which an institution has the characteristics associated with long-lived self-governing natural resource management regimes. Because co-management involves both government and CSOs must be examined. Furthermore, this assessment presents an aggregate analysis for all CSOs; but there is considerable variation, with some CSOs clearly having all or nearly all design principles present, while others are weak in many design principles. Table 6 presents this analysis. Results show a mixed performance with both positive and negative changes since the 2001 survey. Co-management performance in 2005 based on the design principles can be summarized as follows:

- *Clearly defined boundaries*: A few more CSOs are defining smaller geographic units, but QMAs remain the primary geographic boundary. Significant spatial conflict has grown (particularly in inshore fisheries) between commercial and other fishery and marine interests. Performance for this design principle has weakened since 2001, and is weak to mixed.
- *Congruence*: Ministry performance remains weak, however, CSOs have significantly increased rulemaking strengthening performance in this design principle.
- *Collective choice*: Except for deepwater industry, all parties are not adequately included. Voice of small ITQ holders and ACE holders remains weak. Modest movement toward engagement with other fishery interests.
- *Monitoring*: Combination of Ministry and CSO appears to be strong for monitoring conditions, and strengthening for monitoring fisher activities. This is an improvement from 2001 results.
- *Right to organize*: Remains legally recognized, however, concerns over lack of coordination and progress on developing fisheries management plans may undermine the value of this right in the long-term.
- *Nested enterprises*: There has been little change in this design principle since 2001. While some degree of nesting exists, it is not developed or localized enough for long-term success.

Analysis shows that some surprising changes have occurred in the design principles since the last survey in 2001. Perhaps the most remarkable change is the status of the right to organize, which was clearly the strongest design principle in 2001. While this right was still legally recognized in 2005, there were significant concerns that the perceived lack of support for CSOs developing management plans was foreshadowing a weakening of this right over time. To a certain extent, the recent shift in policy towards fisheries management plan developed by the government with significant input from all fishery interests [20] seem to support the validity of these concerns, as the right of CSOs to organize remains, but their scope of

⁹An issue recently discussed by Bess and Rappaludi [20].

Table 6
Change in ministry and CSO design principle performance 2001–2005

Design principle	Ministry of Fisheries	Commercial Stakeholder Organization (CSO)	Change since 2001
Clearly defined boundaries	ITQs define commercial rights. QMAs are the geographic boundaries, but these can be too large. Customary Maori rights increasingly defined through Mataitai and Taipure. Recreational rights poorly defined.	CSOs represent only commercial interests, unable to address cross-sector boundary issues internally. Some CSOs are defining more appropriate smaller management areas within QMAs.	Definition of customary Maori right improved. increasing Spatial conflict (customary Maori, aquaculture, marine reserves), suggesting problems with boundary definition are higher.
Congruence	Ministry makes few rules on input controls, and many of these are limited to national or regional scope. This results in low congruence between rules and local conditions.	64% of CSOs make harvest rules, and 14% plan to in the future. 28% of CSOs impose penalties on rule breakers and 21% plan to within one year. Most CSO rules are more localized than Ministry laws.	More CSOs are engaging in rule-making and rule enforcement, suggesting congruence is improving.
Collective choice	Ministry appears to be the default voice for non-commercial interests. Customary Maori developing more independent voice.	Voting rules appropriate for homogenous fisheries, but troubling for heterogeneous fisheries. Some provide voice for non-commercial fishers within CSOs	Voice of non-commercial interests strengthened, voice of small-scale fishers remains weak
Monitoring	Ministry is historical provider of monitoring for conditions and activities, with mixed success in these activities.	93% of CSOs engaged in monitoring fishery conditions and 71% engaged in monitoring fishing activities.	A substantial increase in CSO monitoring occurred between 2001 and 2005.
Graduated sanctions	Ministry has legal authority for sanctioning, but sanctioning is not graduated.	29% of CSO sanction rule preachers, and 21% plan to in the future; 21% sanction law breakers, and 14% plan to in the future. It is unclear how graduated these sanctions are.	CSOs slightly increased rule breaker sanctioning, and experienced a larger increase in law breaking sanctioning.
Conflict resolution	Under law, Ministry provides conflict resolution mechanism, but it appears to be unused	76% of CSOs provide conflict resolution for members. CSOs express increased interest in resolving conflict with other fishery interests.	Interest in conflict resolution with other interests is new. Internal dispute resolution increased.
Right to organize	Right to organize is recognized under 1999 legislation	Right to organize is recognized under 1999 legislation, but CSOs complain lack of support for CSOs developing fisheries management plans undermines implementation of this right.	Concern over management plans and erosion of rights developed between 2001 and 2005 survey.
Nested enterprises	Stakeholder groups represent nesting of Ministry's national responsibility.	15% of CSOs report having sub-groups, however, some respondents were sub-group of a larger national CSO, and all CSOs could be interpreted as being members of SeaFIC. But this is not CSO's perception.	Few groups are actively engaged in nesting. Little or no change since 2001.

activity appears limited compared to what the industry initially believed it would be. (However, many within the government would argue that the CSOs initial expectations were unrealistic.)

Other design principles that have seen significant changes are clearly defined boundaries, where an improvement was the better definition of customary Maori rights by 2005. However, this change in conjunction with developments surrounding marine reserves and aquaculture has led to significant spatial conflict [13,20]. Other

design principles such as monitoring and conflict resolution were substantially strengthened. Thus, the assessment based on design principles remained mixed. Some design principles were strengthened, while others experienced surprising setbacks. Previous analysis warned that “the use of CSOs in a co-management regime at this stage of development is fragile, and needs support if this approach is to take on the responsibilities envisioned for it” [1, p. 190]. The regime appeared quite vulnerable in 2005, and may be even more vulnerable now.

6.2. Transaction costs

As described above, in the IAD framework, transaction costs refer to three different types of costs: information costs, coordination costs, and strategic costs. As with the design principles, since this is a co-management regime, transaction costs need to be examined from the perspective of both the Ministry of Fisheries and the CSOs.

Information costs: Historically, scientific information costs were viewed as a cost primarily borne by the government. However, over time, in New Zealand these and other management costs have been substantially shifted towards a shared model [21]. Indeed, there is considerable evidence that this shifting helped drive the move towards co-management [1,13]. Under co-management, scientific costs are partially shifted from government to CSOs. However, because CSOs are industry organizations, and thus (presumably) trusted by fishers, CSOs are better able to engage fishers in cost research programs such as logbook or tagging program, the overall scientific information costs may be lowered. Furthermore, for the same reasons, CSOs are in a better position than government to effectively access time and place information. Thus, it appears that co-management may both lower the overall information costs, and shift some of these costs from the Ministry to CSOs.

Coordination costs: The initial coordination costs of a co-management regime (setting up the CSOs, negotiations, agreeing on policy, etc.) are undoubtedly extremely high for both CSOs and the Ministry. (In contrast, it could be argued to traditional management regimes, which would impose high coordination costs on the government and lower costs—but less influence—on the commercial sector.) Indeed, these high costs are reflected in the difficulty CSOs and the Ministry faced in 2005 with moving forward on fisheries management plans, since these represent a concrete piece of public policy development. However, if these initial “set-up” coordination costs are addressed, there should be lower enforcement costs later [6].

Strategic costs: Costs resulting from asymmetries in information and power clearly exist in this CSO-based co-management regime. They are within CSOs (in the form of voting rights differences between large and small ITQ holders, and between ITQ holders and ACE holders); and between the commercial sector and other fisheries interests who are not members of CSOs. As is discussed above, there are efforts to reducing the latter of these asymmetries, both by the CSOs and the Ministry. Finally, while there are the high strategic costs described above, strategic costs between commercial fishing interests and the Ministry may have been lowered by the co-management, since to a certain extent it was created with the goal of creating shared responsibility.

This analysis illustrates a pattern of high transaction costs throughout this fisheries co-management regime. This is a pattern typical of co-management regimes—indeed:

A co-management approach ... is associated with high program design costs as effective participation is

time-consuming and therefore costly. However, co-management is likely to lead to lower implementation, monitoring, and enforcement costs as the legitimacy of the regime is greater. [29, p. 45].

Thus, many of these high transaction costs that the Ministry and CSOs were struggling with in 2005 were typical of the very high costs associated with regime start-up. However, some of the strategic costs appear to be a more fundamental issue. Together, in 2005, these transaction costs presented a substantial threat to the co-management regime.

6.3. Institutional performance

Institutional performance consists of four interrelated criteria: efficiency, equity, accountability, and adaptability. Policy outcomes are not assessed in this analysis due to the relatively young age of this regime. For institutional performance, co-management is examined as a single institution, rather than its components. Details about each criteria are discussed in the theoretical background section above.

Efficiency: Since this co-management regime is based on an ITQ system with its efficient allocation of resources [30], this regime’s economic efficiency should also be high. Furthermore, long-lived co-management regimes are associated with higher administrative efficiency. However, as the discussion of transaction costs (above) illustrates, administrative efficiency was quite low in 2005.

Equity: Two types of equities are used in the IAD framework. This regime performs well from the perspective of fiscal equivalence since fees are assessed based on ITQ ownership, and thus high system users contribute the most. Conversely, this arrangement performs poorly on redistributive equity since it is not structured around differential ability to pay.

Accountability: Accountability is problematic, largely because of the nature of CSO organizations. Internal accountability for CSO members may be high; but there are transparency and accountability issues for other interests. Furthermore, in the survey, many CSO leaders expressed concerns about a lack of accountability on the part of the Ministry. Thus overall, there appears to be a substantial problem with oversight and accountability in this approach.

Adaptability: This regime appears to be very adaptable. CSOs listed rapid responses to possibility stock declines (e.g., quota shelving, voluntary agreements to not fish certain areas) as one of their successes.

As with other criteria in this assessment, the analysis of institutional performance in 2005 shows a mixed pattern. However, there are considerable strengths in this assessment, particularly considering the relative newness of this institutional arrangement.

7. Conclusions

This article presents the results of a longitudinal study of New Zealand’s fisheries co-management regime using

surveys of CSO leaders conducted in 1999, 2001, and 2005. A description of the co-management regime in 2005 is presented, as well an institutional analysis of the regime. A summary of this analysis is presented in Table 7. These results show that in 2005 there was a pattern of mixed results. Some areas (monitoring, congruence, information costs, fiscal equity, economic efficiency, and adaptability) are improving and performing well. Other areas (notably, clearly defined boundaries, right to organize) experienced surprising setbacks; or continued a pattern of weaker performance (collective choice, coordination costs, strategic costs, accountability).

As a result, in 2005, this regime remains best described as it was in 2001—a fragile regime that needed support by both the industry and government if it was to develop into a long-lived resource governance institution [1]. Signs of progress include the increased willingness of CSOs to take

Table 7
Summary of 2005 institutional analysis of the performance of New Zealand's fisheries co-management regime

Criteria	Analysis
<i>Design principles</i>	
Clearly defined boundaries	Boundaries and catching rights are clearly defined. These are weakened by inshore spatial conflict and boundaries that are sometimes inappropriately large.
Congruence	While weak in earlier surveys, this is improving as CSO activity increases.
Collective choice	A lack of voice for small-scale fishers and other fishery interests weakens collective choice.
Monitoring	Combined actions of Ministry and CSOs result in strong monitoring of fishery conditions and fisher activities.
Right to organize	This right is clearly legally recognized, but the ability to fully implement this right may be undermined by Shared Fisheries initiative.
Nested Enterprises	Some nesting exists, but it is not developed or localized enough for long-term success.
<i>Transaction costs</i>	
Information costs	Some costs have shifted from Ministry to CSOs, but combination seems to reduce overall costs.
Coordination costs	Costs were high in 2005, largely due to "set-up" costs. This should drop in the future.
Strategic costs	A pattern of high costs from information and power asymmetries appears to exist.
<i>Institutional performance</i>	
Efficiency—economic	Economic efficiency is presumed to be strong because this approach is grounded in an ITQ regime.
Efficiency—administrative	The high transaction costs described above substantially reduce administrative efficiency
Equity—fiscal equivalence	As a "user pays" approach, this is a model of fiscal equity.
Equity—redistributional	Performance is low, but this not a goal of this regime as it focuses on fiscal equivalence.
Accountability	Internal accountability is high within CSOs, but this issue is problematic for outside interests concerned about CSOs. CSOs also report concerns about Ministry accountability.
Adaptability	CSOs report responding rapidly to stock changes, indicating rapid adaptability.

on more complex governance tasks such as monitoring and enforcement, as well as improved congruence. However, escalation in problems such as inshore spatial conflict, and ongoing weaknesses (such as collective choice arrangements and accountability issues) raise fundamental concerns about this regime as it existed in 2005. Furthermore, it is unclear how much longer the CSO and the Ministry will be willing or able to continue paying the high transaction costs associated with setting up a co-management regime. This is unfortunate given the substantial progress made in many areas, and the relatively short time (slightly less than 6 years) that this regime has existed when this research was conducted.

This analysis shows how applying a theoretical lens (in this case the IAD framework) can provide specific and valuable analysis of the strengths and weaknesses of an institutional arrangement. As described above, this analysis raised fundamental concerns about CSO-based co-management in New Zealand fisheries. Given these concerns, the Ministry's recent move (announced in late 2006) towards a new "Shared Fisheries" [31] program is, perhaps, not surprising. This approach was recently described as

[A] more integrated approach ... through the development of fisheries plans. Fisheries plans could also facilitate commercial and non-commercial fishers putting toward specific management proposals that better meet the needs of particular fisheries ... [20, p. 8].

This new strategy represents a shift away from the CSO-based co-management towards a very different regime. As this policy is still developing, it is unclear how this regime will function. It could be a move towards a more administrative approach, with input from all interests (what Pomeroy and Berkes [9] might describe as a consultation arrangement) or a step towards the much more difficult task of re-developing a co-management regime in which all fisheries interests share management responsibility. The future of CSO-based co-management is unclear; however, this analysis clearly illustrates the value of a theoretically grounded analysis of institutional arrangements, as well as the value of continued analysis and monitoring of New Zealand's fisheries management regime.

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