The cause of ineffective management often lies with institutional deficiencies expressed both in terms of functions and assemblage.

United Nations Food and Agriculture Organization [1]
…whenever any Form of Government becomes destructive …, it is the Right of the People to alter or abolish it, and to institute a new government…
Jefferson et al. [2]

1. Introduction

There is widespread agreement that fisheries and marine ecosystems are in a state of crisis throughout the world [3–14]. Strong warnings from scientists and the emergence of common knowledge about the plight of fisheries and marine ecosystems are stimulating notable and ongoing reforms to fisheries management systems and practices.

These reforms include re-examination of technical approaches to assessment and management by re-thinking the erroneous assumptions that underpin contemporary fisheries biology. Dubious assumptions include independence of stocks, populations, and life stages from each other and from habitat characteristics; regularity (spatial and temporal homogeneity) of environmental forces; universality of ‘recruitment compensation’ at lowered stock sizes (i.e., disproportionately high recruitment); and the ecologically narrow notion of ‘surplus production’ (unutilized biological production). Fisheries management problems also stem from failures to account for inherent uncertainties throughout the fisheries assessment and management process [15]. Reform initiatives also reflect the recognition that a variety of socio-economic factors, i.e., overcapacity and ‘over-dependence on fisheries’...
resulting from taxpayer subsidies is the most challenging and fundamental cause of fisheries degradation and associated ecosystem degradation [11,15–17].

Direct participation of fishing people and organizations in management decisions (‘co-management’) is recognized as crucial because of the knowledge and preferences that fishing people bring to the process, and the tendency for them to cooperate in resulting management regimes [18,19]. However, scrutiny of the compositions and organizational structures of decision-making bodies is increasing because of the recognition that inherent conflicts of interest and the institutional exclusion of broader public interests might be a more fundamental cause of management and government system failures, particularly in fisheries [20,21].

The issue of representation of (general) public interests in fisheries management has remained largely taboo within the subculture of United States (US) fisheries management, in spite of perceptive early warnings by Pontecorvo [22] and other emerging criticisms e.g., [20]. This issue can no longer be ignored since conflicts of interest, big money lobbying, disproportionate representation, and vote trading have come to the forefront of public debate in the US and around the world due to several highly visible manifestations. These include domestic and global protests of the World Trade Organization, voting irregularities in the 2000 US presidential election, the far-reaching Enron scandal, campaign finance reform debates in the US, and even the recent judging scandal at the 2002 Winter Olympics in Salt Lake City, Utah. The pervasive corruption illuminated by these issues, or at least the perception of institutional contempt for the public interest, has compelled citizens to begin scrutinizing a variety of governmental and civic decision-making systems. Similarly, the tragedy of September 11th, and the rise of global terrorism have arguably increased public awareness and scrutiny of domestic and global policymaking systems in regards to issues of fairness, equity, and justice—even while mainstream public discourse has focused on retribution.

Nations and states around the world are attempting to institute equitable, effective, and sometimes adaptive forms of fisheries management or co-management [23–25]. Democratic and participatory management structures that represent the interests of “all legitimate interest groups” and “the majority of stakeholders or the country” [11] are thought to be the best models for successfully achieving stated fisheries objectives. The federal fisheries management model in the US is touted as an attempt to implement a fair and effective system [26]. Democratic ideals have always been a source of pride in the US, including the notion that individual rights and interests are protected, and that the interests of the general public are represented in decisions regarding public resources. The purpose of the present study was to examine the central components of the US fishery management system to determine whether it has been fair and effective relative to American ideals and fisheries policy objectives, and whether institutional reforms would improve US fishery management performance.

US fisheries management decisions are currently deliberated by eight Regional Fishery Management Councils, each comprised of a federal representative, state representatives, and appointed members that have ‘knowledge’ of fisheries management and conservation. The councils are constituted based on the premise that participation of fishing industries in fisheries management decisions is crucial for successful allocation and conservation of living marine resources, and for increasing the likelihood of compliance with fishery regulations. Fishing industries have a collective interest in sustaining fisheries, and they sometimes support conservative and responsible fishing strategies [23]. However, a natural tendency of capital-minded fisheries sectors is to maximize short-term profit at the expense of sustainability (and social and ecological considerations) thereby degrading the public value of the exploited resources [15,19,22]. This has been identified as “the fundamental cause of over-exploitation” in fisheries [11].

Almost two decades ago, the Director of the Office of Fisheries Management of the National Marine Fisheries Service (NMFS) conceded that US fisheries are managed through industry lobbying, but he made it sound like this is a functional aspect of fishery management [27]. It is now recognized that too much influence by the regulated industry in policy and management decisions can lead to unsustainable fishing, degraded marine ecosystems, and impoverished fishing communities simply because management systems tend to favor big money interests when they are structured (designed) to be influenced by those interests [3,11,20,28]. This occurs because public agencies depend on the support of legislators who, in turn, depend on the support of constituents, whose interests are often strongly distorted because industry lobbyists are usually the most influential of all constituents [29]. The direct and indirect influence industry has on agencies charged with regulating them leads to adverse impacts not only on marine ecosystems and industry sectors, but also on the opportunities and well being of a nation’s general public, which is effectively not represented in fisheries decision making [22,30]. The general pattern in the US is that councils dominated by industry (user group) representatives make the decisions about exploitation of public (marine fishery) resources. This has been referred to as ‘capture’ of the regulatory or management process by industry [19,29]. Representatives of broader public interests continue to have only token representation, though some industry representatives subdue
criticism by arguing that the general welfare is the same as their personal business interests [Wilson in 20, and author’s personal observations].

Given the notion that institutionalized favoritism in decision making is the fundamental cause of fisheries overexploitation (and related degradation of marine ecosystems), rigorous independent audits of the composition and organizational structures of federal fishery management systems in the US are warranted, especially in light of the current fisheries crisis. The first such analysis was conducted by Pontecorvo [22] at the time of the original enactment of the Fishery Conservation and Management Act. He concluded that “…the act does not favor the general welfare” because the legislation and the resulting council organizational structure was designed to focus on the needs and interests of the domestic producers [industry], who thereby naturally dominated the council system and the management decisions relative to broader [consumer or conservation] interests. At that time, he found that commercial interests made up 57% of appointed council membership, while recreational fishing interests and ‘general’ interests made up 22% and 21% respectively. Congressional hearings and investigations into allegations of conflicts of interest leading to performance failure of US fisheries management exposed some fundamental problems with the system—serious abuses of the public interest were uncovered and the effective immunity of council members from federal conflict of interest laws were revealed [20]. Since 1992, the NMFS has reported the apportionment of interests on these councils to the US Congress [31–40]. The limited analysis presented here was designed to stimulate a more rigorous review and external auditing process for this failing management system 25 years after its implementation, and to suggest new institutional structures to test in the grand experiment of US fisheries management.

Any analysis and discussion of representation needs to address the following general questions: Who are the true ‘owners’ of natural ‘resources’? Are the stakeholders and the trustees the same as the ‘owners’? Who can best represent the interests of the true owners? What is the best system for representing those interests? These questions have been posed by Jentoft and McCay [19] and others, and they deserve lengthy dissertations (see [41–43]), which I will avoid except to make two suggestions related to wild marine organisms: First, no person or group of people can own wild marine organisms, but if these organisms could be owned, the true owners can only be the general populace of a nation or state (or the world) [44,45] including future generations [46]. Fisheries are a ‘common property’ natural resource [47], though ownership or access often arguably belongs to ‘first nations.’ Second, ‘fisheries management’ can achieve conservation objectives only if its organizational structure adequately ensures representation of the interests of the more general ‘owners,’ whose main vested interests are restoration and sustainability. This is consistent with the notion that participation of those with more immediate interests in the fishery resource (immediate user groups) is also crucial for success. This second pair of suggestions relies on the assertion that the immediate user groups are more knowledgeable about key aspects of the fisheries, but less capable of making sustainable decisions than the more general ‘owners.’

Management by ‘immediate’ stakeholders is bound to fail because they have vested interests that maximize short-term returns for themselves at the expense of long-term sustainability for the general public [15,22]. This seems to occur even when broad spectrums of technical and legal safeguards are in place, as in the complex regulatory matrix of US Fisheries Management [48]. Of course, all stakeholders are legitimate ‘owners,’ but the ‘immediate’ stakeholder decision-makers are either a small subset of the total pool of ‘owners,’ or they are altogether different than the true and rightful ‘owners’ (in cases of traditional rights). Ultimately, it is the responsibility of the trustees of such resources to achieve the goals of the true resource ‘owners.’ It is only logical then that the trustees should primarily represent the interests of the general public (or local indigenous people). Furthermore, it is reasonable to argue that, since the main goals of the general public are restoration and sustainability, industry interests would fare better in the long run if decisions were primarily made by trustees of the general public interest, especially considering the modern failure of user-dominated fisheries management.

With these general issues in mind, the goal of this study was to evaluate the structure and representation of interests in the current system of US fisheries management relative to the stated objectives and performance of US fisheries management. The main pragmatic questions of the study were: (1) are the categories of interest groups equally (or equitably) represented on Regional Fishery Management Councils? and (2) is the fishery management system structured in a way that should reasonably achieve equal or fair representation of the various interests? A deeper question that emerged during this investigation is, ‘can human-created systems, in this case a government system for resource management, persist at a sub-optimal ‘stable’ state with regards to achieving identified objectives?’ If so, what types of characteristics would indicate such a sub-optimal stable state? A related question posed by Ponticorvo [22] is, “Will the Act tend to favor one type of structure over another? Or will the Act be neutral towards structure?” Finally, three examples of other fishery management systems around the world are also examined with respect to their progress in re-inventing their systems of interest group representation and participation.
2. Methods

The present analysis consisted of five components: (1) a review of the stated objectives of the Magnuson–Stevens Fisheries Conservation and Management Act of 1996 (MSA), the National Marine Fisheries Service (NMFS), and the US Department of Commerce (DOC); (2) a brief review of the status of US Fisheries; (3) an examination of the apportionment of interests on Regional Fishery Management Councils in the US; (4) a general examination of the organizational structure of US federal fisheries management; and (5) a review of the structure, composition, and reported success of three alternative fishery management systems.

The stated objectives of the MSA and the NMFS were taken directly from the Act [49] and the National Oceanic and Atmospheric Administration (NOAA) Fisheries web site (www.nmfs.noaa.gov). The US federal fisheries management system was described using a combination of legal, regulatory, and descriptive documentation including the MSA [49, 16 USC 1852], its associated US regulations (50 CFR 600.215), other interpretive descriptions [26, 44] and direct experiences with the Regional Fishery Management Council process.

The NMFS categorizes the appointed voting members of the eight Regional Fishery Management Councils in the US into three ‘interest’ groups: (1) commercial fishing, (2) recreational fishing, and (3) ‘other.’ The ‘other’ category includes members with expertise in “biological, economic, or social sciences; environmental or ecological matters; consumer affairs; and associated fields” as well as one tribal member [31–40].

Two types of analysis of variance (ANOVA) provided more rigorous comparison of the representation of these three ‘interest’ categories on the eight Regional Fishery Management Councils. Two-factor ANOVA (with repeated measures on one factor) was performed using StatView version 5 [50] to test the (null) hypothesis that each of the three interest categories (factor 1) were equally represented during the 12 years (factor 2) for which apportionment of interests has been reported (1990–2001). One-factor ANOVA was performed using WINKS version 4.62 [51] to test the (null) hypothesis that the three interest categories were equally represented in the year 2001. Student-Newman-Keuls multiple comparison tests were preformed in both cases using SuperANOVA [52] and WINKS [51] respectively. The two-factor repeated measures ANOVA was performed on raw data because homogeneity of variances was indicated by an $F_{\text{max}}$ ratio (largest to smallest variance) of 1.9. The one-factor ANOVA (on 2001 data only) was performed after homogeneity of variances was achieved using log($x + 0.1$) transformations resulting in an $F_{\text{max}}$ ratio (largest to smallest variance) of 4.3, which was within the critical $F_{\text{max}}$ value of 6.94 (df = 3, 7; $\alpha = 0.05$). Normality was evaluated using histograms, even though ANOVA is robust to departures from normality [53].

The review of alternate fishery management systems was limited mostly to the published literature. Discussion of the California Marine Life Management and Protection Acts are based on the texts of the respective laws and partly on the author’s experiences during early stages of designing those systems.

Combinations of approaches were used to evaluate whether the present system of representation persists at a sub-optimal stable state. First, ‘stability’ was evaluated using the statistical approaches described above. Second, in the present context, ‘sub-optimal’ was evaluated only with respect to the status of US fisheries relative to US fisheries objectives, though it would also be reasonable to apply value-based approaches to this question relating to group equity. Third, I examined criteria including the existence of positive feedback mechanisms that would maintain ‘stable regimes,’ and the existence of repeated shifts to ‘stable regimes.’ Such positive feedbacks are a central criterion for determining the presence of sub-optimal stable states [54].

3. Results

3.1. US fisheries goals

The NMFS is the agency responsible for managing the fisheries under US jurisdiction. The NMFS is an agency of NOAA, which is an administration within the US Department of Commerce (DOC). The Secretary of the DOC is appointed by the President of the United States of America. The mission of NMFS is expressed as the three goals of the NOAA Fisheries Strategic Plan (www.nmfs.noaa.gov): (1) rebuild and maintain sustainable fisheries, (2) promote the recovery of protected species, and (3) protect and maintain the health of coastal marine habitats.

The mission of the DOC is to “…[improve] living standards for all Americans by working in partnership with business, universities, communities and workers to (1) build for the future and promote US competitiveness in the global marketplace by strengthening and safeguarding the Nation’s economic infrastructure, (2) keep America competitive with cutting-edge science and technology and an unrivaled information base, and (3) provide effective management and stewardship of the nation’s resources and assets to ensure sustainable economic opportunities.”

The goals of the National Fishery Management Program in the US, as listed in the MSA Section 2(a)(6), are to (1) prevent overfishing, (2) rebuild overfished stocks, (3) ensure conservation, (4) facilitate long-term protection of essential fish habitats; and
3.2. Directions for apportionment of interests on councils

The MSA [49, 16 USC 1852] mandated the following directions for apportioning interests on Regional Fishery Management Councils:

- Each council shall reflect the expertise and interest of the several constituent States in the ocean area over which such Council is granted authority (MSA Section 302(a)(2)).
- The [appointed members of each council] must be individuals who, by reason of their occupational or other experience, scientific expertise, or training, are knowledgeable regarding the conservation and management, or the commercial or recreational harvest, of the fishery resources of the geographical area concerned (MSA Section 302(b)(2)(A)).
- The Secretary, in making appointments under this section, shall, to the extent practicable, ensure a fair and balanced apportionment, on a rotating or other basis, of the active participants (or their representatives) in the commercial and recreational fisheries under the jurisdiction of the Council (MSA Section 302(b)(2)(B)).
- The secretary shall appoint the members of each council from a list of individuals submitted by the Governor of each applicable constituent State (MSA Section 302(a)(2)(C)).
- Each affected individual [Council member] must disclose any financial interest...[in any fishery activity in the council jurisdiction] (MSA Section 302(j)(2)).
- [These council members] shall not vote on a Council decision that would have a significant and predictable effect on such financial interest (MSA Section 302(j)(7)(A)).

3.3. Status of US fisheries

In 1999, 46% of the 158 federally managed ‘fish’ stocks in US waters (for which the status is ‘known’) were estimated to have stock levels below those that would produce ‘Long Term Potential Yield’ (LTPY), and 36% were estimated to be over-utilized [55]. LYPY is the “maximum long-term average catch that can be achieved...” and ‘over-utilized’ means the existing fishing effort is too high to achieve LTPY. Of the stocks for which the status was known in 2000, 38% were in an overfished condition (“the stock size was below a prescribed threshold”), and 26% were being overfished (“the harvest rate was above a prescribed threshold”) [12]. In 1990, Anthony [56] pointed out that “Under FMC management, the abundance of New England groundfish declined by 65% from 1977 to 1987.”

3.4. The US participatory model

The marine fisheries under federal jurisdiction of the USA (generally those occurring between 3 and 200 nautical miles offshore) are managed by Regional Fishery Management Councils consisting of voting and non-voting members including the regional director of the National Marine Fisheries Service, representatives of state fisheries agencies, representatives of commercial and recreational fishing interests, and others with expertise in “biological, economic, or social sciences; environmental or ecological matters; consumer affairs; and associated fields” [40]. The Regional Fishery Management Council process was designed as part of a National Fishery Management Program “to exercise sound judgment in the stewardship of fishery resources [by enabling] the States, the fishing industry, consumer and environmental organizations, and other interested persons to participate in, and advise on, the establishment and administration of [fishery management] plans” [49]. To achieve this theoretically well-informed judgment, the MSA requires a “fair and balanced apportionment” of recreational and commercial fisheries interests on the councils, but no guidance or standards are provided to apportion or ensure the representation of ‘other’ interests or expertise on the councils [40,49]. Despite the lack of a mechanism to ensure broader inclusion, McCay and Creed [26] interpreted the Magnuson–Stevens legislative guidelines as encouraging “local level participation and representative democracy.”

The Secretary of the DOC selects the (appointed) voting council members from a list of nominees submitted by the Governor of each State in the region (aside from agency representatives). If the list includes only commercial or recreational fishing interests, the secretary must choose Council members from that pool. Fig. 1 shows the various interest groups, agencies, and individuals that influence the composition and decisions of the Regional Fishery Management Councils. These eight regional councils make virtually all decisions involving the management of US federal fisheries.

3.5. Actual representation of interests on regional councils

Commercial fishing interests were the most numerous of the three categories comprising the appointed voting membership on the regional councils for every year that apportionment of interests was reported (1990–2001). The ‘other’ category was consistently least represented (Fig. 2). The overall average number of council members representing commercial fishing
interests on councils was 4.3, while those from recreational fishing and ‘other’ interests were 2.9 and 1.5, respectively. Statistically significant differences were detected among the three interest categories when all years were included in the analysis (two-factor repeated measures ANOVA; \( p = 0.008 \)) and when the most recent year (2001) was examined (one factor ANOVA; \( p = 0.038 \)). This apportionment of interests remained constant during the 11 years of reporting (two-factor repeated measures ANOVA; \( p = 0.99 \)). In 2001, the average number of commercial, recreational, and ‘other’ interests on Regional Fishery Management Councils was 3.9, 3.4, and 1.6, respectively (also see Fig. 2) and commercial interests were significantly more represented on councils than ‘other’ interests over all years and in 2001 (Student-Newman-Keuls, \( z = 0.05 \)). The frequency distributions of the interest categories on the eight Regional Councils (Fig. 3) provide an additional view of interest representation on councils, in addition to indicating normality in the data.

Exceptions to the overall trend are apparent in individual councils. Two members of the Caribbean
Fishery Management Council represent the ‘other’ category while the commercial and recreational fishing categories each have one representative. This notable exception emerged recently. The ‘South Atlantic’ Fishery Management Council (waters adjacent to the Atlantic coast of the southeastern US) has four members currently representing recreational interests, three representing commercial, and one ‘other’ member. Recreational interests also currently dominate the Gulf of Mexico Council (7, 3, and 1 respectively). All three interest groups were equally represented on the Pacific Fishery Management Council (waters off California, Oregon, and Washington) from 1998 until 2000 because the mandated tribal representative on that council is categorized by the NMFS [40] as ‘other.’ However, the ‘other’ group again fell below both commercial and recreational groups on the Pacific Council in 2001.

Although ‘commercial interests’ generally dominate the appointed council seats, the interests within this category are generally skewed towards the larger corporate interests that support larger sized vessels, whereas the small-scale vessel fleets that are the traditional core of coastal communities (and more likely to have conservation interests) are often less represented, and many other sectors of fishing-dependent communities are poorly represented [45, p. 62]. In 1999, only one of the 71 appointed members of Regional Fishery Management Councils represented the ‘conservation community’ [45, pp. 63–64].

The apportionment of interests on Regional Fishery Management Councils appears to persist at a sub-optimal stable state. First, stability (i.e., persistence) of the unequal apportionment was established by the statistical analysis described above (also see Fig. 2). Second, the sub-optimal nature of the system of apportionment of interests is apparent because the overall status of US fisheries resources is poor despite objectives that seek to ensure healthy resources. Third, the influence of the fishing industry throughout the system (Fig. 1) represents a positive feedback (mechanism) that would be expected to stabilize the system at such a sub-optimal level of representation.

4. Representation in other systems

4.1. The Australian and New Zealand models

The Australian Fisheries Management Authority (AFMA) uses an adaptive approach to fisheries management and policy-making within its ‘partnership’ model of co-management [23]. The organizational structure of this partnership model is similar to that of US federal fisheries management in that the main decision making body is a council (AFMA Board) with a staff and advisory panels, but the selection of board members (Directors) is made by a Selection Committee of six representatives with broad interests and expertise. The adaptive aspect of the Australian partnership model included federal audits [57,58], which concluded that the fishing industry had captured AFMA’s decision-making process. This led to reforms such that a maximum of 2 of 8 the board members (25%) could be actively involved in the fishing industry, while 3 other members should have expertise in fisheries science, marine ecology, natural resource management, and business management (the remaining 3 board members are the Chair, the Government Director, and the Managing Director). The fishery management process still includes crucial contributions and participation by the fishing industry, and the participants agreed that the system is much improved from the time of ‘industry capture’ (see [23] for a broader discussion of this example).

Bathgate and Memon [59] proposed that four equally represented interest groups should make New Zealand Fisheries management decisions: commercial fishing, recreational fishing, aboriginal ‘iwi customary’ interests, and environmental interests (also see [24]). This system is currently under development.

4.2. The California example

The State of California recently promulgated two participatory and adaptive programs to manage and protect the marine life under its jurisdiction: the California Marine Life Management Act [25,60] and the California Marine Life Protection Act [61].

The MLMA is designed “…to ensure the conservation, sustainable use, and, where feasible, restoration of California’s marine living resources for the benefit of all the citizens of the state.” The paraphrased objectives of this general policy are to (1) prevent overfishing; (2) allow only sustainable uses; (3) recognize the importance of non-consumptive uses; (4) recognize the importance of fisheries and aquaculture economies and cultures; (5) promote scientific research on marine ecosystems; (6) use the best available scientific information to manage marine living resources; (7) involve all interested parties; (8) disseminate accurate information; and (9) coordinate with adjacent states and countries (CA Codes (fgc:7050)). The more specific objectives of California’s fisheries policy, also elucidated in the MLMA, are to (1) prevent overfishing; (2) facilitate long-term protection; (3) restore marine fish habitats; and (4) achieve sustainable use of marine fisheries. These objectives were designed to achieve realization of broad values of California’s marine ecosystems including “…long-term economic, recreational, ecological, cultural, and social benefits…” (CA Codes (fgc:7055)). The MLMA emphasizes collaboration with a broad range of participants, experts, and other interested parties; periodic expert peer review of the management process;
and an adaptive overall approach to ensure that the system becomes effective. The California Fish and Game Commission and Department of Fish and Game (DFG) are charged with developing an effective system for participatory fisheries conservation and management that features both Annual Fisheries Status Reports and Fishery Management Plans. Approaches for public involvement, such as announcements, public meetings, workshops, advisory committees, panels, and dispute resolution, are discussed along with basic public involvement principles in the MLMA master plan [62]. However, little explicit direction was given to DFG for development of that participatory system. Thus, although the California legislature delegated more decision-making power to the Commission, the basic structure of that decision making body has gone unchanged (discussed below).

The MLPA established an adaptive and participatory program to protect the marine life in its jurisdiction using Marine Protected Areas (MPAs; limited extractive uses) and Marine Life Reserves (MLRs; no extractive uses). In this program, the DFG develops a Master Plan by convening a Master Plan Team that features expertise in marine life protection, underwater ecosystems, species’ habitat requirements and biology, and water quality. The composition of this team includes staff from the DFG and five to seven scientists (one with economic and cultural expertise). The Master Plan for Marine Life Protection in California is prepared by the Master Plan Team after consultation with federal and state agencies and trustees, local community members, marine conservationists, marine scientists and other experts, divers, participants in the various fisheries, and independent peer reviewers. The DFG will submit the draft Master Plan to the California’s Fish and Game Commission (‘the Commission’) in January of 2003 and again in April of 2003 after a public review. The Commission is required to adopt a final Master Plan in December of 2003 with accompanying regulations, at which time the California Legislative’s Joint Committee on Fisheries and Aquaculture (‘the Joint Committee’) will review the program and may recommend changes (this schedule might be delayed for 12 months).

California has chosen to set up a ‘Marine Life Protection Master Plan Team’ made up entirely of scientists and managers. This Master Plan Team will shape the first explicit framework for marine life protection in California with the help of consulted participants, stakeholders, and independent peer reviewers. This team was conceived with the intent of optimizing the use of (presumably unbiased) scientific and expert knowledge as well as equalizing the disproportionate influences of extractive and special interests. This structure will theoretically balance constituent and stakeholder concerns with a design intended to sustain marine life into the future. However, potential conflicts of interest persist within the overall decision-making system. The Commission and the DFG receive much of their operational funding from hunting and fishing licenses. The Governor of California appoints up to five Commission members, who are then approved by the Senate. A high percentage of members are typically hunters or fishers, or both. Thus, it is reasonable to expect, and part of California tradition, that hunting and fishing interests have had considerably more influence on these trustees than general public interests. Notwithstanding this history, the Commission has stated that it is shifting its focus toward broader values [63]. It remains to be seen whether the Commission, or even the Joint Committee, will weaken protective measures developed in the MLPA Master Plan and Marine Life Protection Program as the result of special (extractive) interest lobbies. This concern also applies to the participatory fisheries conservation and management system required by the MLMA.

Ensuring broad involvement and representation of interests during the development and operation of these new programs will prove profoundly challenging, especially if the ultimate decision making body remains dominated by fishing groups. Notwithstanding this fundamental problem of ultimate representation, California has made substantial progress towards protection and management of living marine resources and ecosystems. Whether or not the current decision making body in California can represent the interests of the general public is an experiment in progress.

4.3. The South African model

The South African pelagic fishery is managed using a participatory approach in which fisheries decisions by the Minister of Environmental Affairs and Tourism are based on recommendations by the Sea Fisheries Advisory Committee (SFAC), which is made up of nominated representatives of a range of fishery interests. The SFAC is advised by the Chief Director of Sea Fisheries and the Sea Fisheries Research Institute (SFRI; i.e., scientists and managers), which is in turn advised by the Sea Fisheries Forum (industry) and the SFRI Pelagic Working Group (scientists). The commercial fishing industry dominates the SFAC and influences the process at all levels [64]. The fishery managers and scientists developed and implemented a systematic and well designed set of management procedures in an attempt to achieve sustainable management of the South African pelagic fishery by attempting to address known potential problems using explicit decision rules. These management procedures failed, in general, because the recommendations resulting from these decision rules were usually overruled or adjusted by the SFAC [64]. This failure was attributed mainly to the dominant influence of extractive interests and the lack of
representation of public interests, to conflicting objectives, and to the absence of a long-term strategy.

5. Discussion

5.1. Conflicts of interest and poor representation

A cursory examination of the goals, objectives, and missions of the NMFS, the Department of Commerce (DOC), and the Magnuson–Stevens Act (MSA) reveals fundamental conflicts of interests, particularly between the NMFS and the DOC. Goals of the latter (DOC) should reasonably be expected to eclipse those of the subordinate agency (NMFS). Both agencies must uphold legal mandates as well as implement policies, but as apparent in the MSA, the US congress effectively gives priority to DOC goals by using weak language in the directions for apportionment of representative interests on the Councils, thus effectively weakening the stated goals of their own National Fishery Management Program. Weber [16] also partially blames the failure of management on unresolved fundamental conflicts between conservation and exploitation goals within and among management agencies, though he focuses on the relationship between the NMFS and the Councils. The existing legal structure was presumably an attempt to optimize the economic competitiveness of the United States by ensuring the domination of direct user groups on the Councils. Irrespective of the intent of US Congressional architects, it is well known that participatory democracy is often “exploited for private rather than common interests” [19], and “Actors in key institutions realize considerable gains from those institutions” (Powell and DiMaggio 1991 in [19]). Those that benefit directly from the present US fishery management system can, and do, provide considerable incentives and feedbacks to insure an institutional structure that benefits themselves (Fig. 1), often at the expense of the common good [65–67]. Thus congressional representatives, although intending to bolster economic ‘competitiveness,’ might have unwittingly participated in re-enforcing a sub optimal (dysfunctional) institutional system.

In retrospect, this strategy of structurally weakened implementation of conservation goals probably prevented optimal achievement of commerce goals. It is clear that Ponticorvo’s [22] main concern with the system is born out—that domination of the Councils by fishing interests is inconsistent with the maximization of the general welfare because it leads naturally to a management policy that protects vested capital interests by reducing natural capital and employed labor. The policy failure highlighted in the present paper underscores the principle that a nation cannot sustain economic competitiveness without giving priority to truly effective policies and unequivocally robust structures for protecting natural resources.

Section 302 (b)(2)(B)(i) of the MSA requires a comparison of council representation with landings, summarized by gear type and region. This required analysis automatically implies that allocation of representation among fishing industry sectors should be somewhat proportional to the relative landings among sectors. However, this ignores the question of representation by members of the general public, or other public interests in public resources. A formula for determining representation of whole regional councils is not explicitly stated in the legislation, or probably anywhere. Rather, representation is the result of a political and economic process that contains strong incentives and feedbacks for maintaining the power of the well connected corporate interests and very weak incentives for establishing a logically grounded and well-designed system of trusteeship and representation of public interests for achieving the stated goals and objectives US federal fisheries management.

The MSA states that Councils should reflect the expertise and general interest of constituent states, and that some appointed Council members should have scientific and conservation expertise. However, the most explicit mandate of the Secretary of Commerce regarding representation of interests on Councils is that apportionments between the extractive user groups be fair and balanced. Representation of all other interests (e.g., scientific, conservation, non-extractive) is discussed as optional and is not explicitly mandated. This leads to numerical domination of commercial and recreational fishing interests on the Regional Fishery Management Councils because extractive group lobbies put considerable pressure on the governors of constituent states to nominate individuals from these powerful interest groups (Fig. 1).

This domination of the regulatory process by extractive interests can ultimately lead to the degradation of resources and ecosystems despite rules for financial disclosure and recusal (MSA Section 302(j)), and despite national standards for fishery conservation and management (MSA Section 301). Because contemporary markets produce inherently short-term economic strategies, it is natural that domination of regulatory decision-making bodies by extractive interests would produce management patterns that undermine well-intentioned (long-term) conservation strategies, especially because “Council members are now allowed to participate in decisions in which they have financial interests upon mere disclosure of that interest” [20]. Explicitly mandating a mechanism for ensuring representation of other interests (e.g., scientific experts, general public, and conservation groups) could end the ‘capture’ of federal fisheries management decision-making by industry in the US. The problem stems from
the nonsensical assumption that balance and fairness between commercial and recreational fishing sectors will automatically result in balanced and fair outcomes for the general public (Section 302(a)(2)(B) of the MSA).

The National Marine Fisheries Service appears to recognize this problem when they suggest that, “An equally important consideration, however, is the stewardship responsibilities of RFMCs and the appointment of individuals who can work collectively with members to achieve the conservation standards...Successful nominees, therefore, are those who not only are qualified in accordance with the provisions located at 50 CFR 600.215, but [who] will also best contribute to the stewardship of marine fishery resources.” [40]. Unfortunately, this nice consideration is not mandated, and is therefore not a required consideration when the membership of regional councils is decided. The NMFS [40] points to the problem when they state, “...the Secretary’s appointments are constrained by the nominations submitted by RFMC governors.”

It appears that NOAA Fisheries has acted in good faith given their legislated constraints to enable the type of balanced apportionment that would achieve needed conservation and sustainability goals. The conspicuous problem is the lack of language in the MSA (Section 302(a)(2)(B)) that would establish a broader fairness and equity in terms of public interest. As suggested by Cloutier [20], a provision aimed at requiring governors to nominate representatives of broader public interests (scientific, conservation, consumer) should accompany provisions requiring the Secretary of Commerce to appoint such interests.

Healey and Hennessey [48] attributed the failure of modern fisheries management to increasing complexity, and the issue has been further explored by Cochrane [68] and discussed by the NMFS [69]. Increasing complexity can seriously hamper compliance, enforcement, and the logistics of management, but not necessarily council decision-making. The human brain is exceedingly well designed to enable intelligent decision-making in complex situations [70]. Thus, the problem with complexity in fisheries is not complexity in itself, but rather the way in which Council members with a particular set of interests integrate complex information and make decisions based on their own sensibilities. A more balanced representation of interests on the Councils (e.g., more general public members and more scientists) might well solve the wicked problems [sensus 29] related to the increasing complexity of regulations. This might also help shift Council deliberations away from sector allocation issues, which take up the bulk of time and effort by the Councils, and which can be partly accomplished through industry cooperatives. The present thesis of attributing the failure of modern fisheries management to the domination of commercial fishing interests on the Councils fits much better with the “Ludwig’s Ratchet” mechanism that was used to explain the collapse of New England Groundfish [15,71].

5.2. Sub-optimal system state

Evidence that the Regional Fishery Management Councils in the United States operate at sub-optimal system states include (1) the statistical stability and persistence of the characteristically unequal representation of interests during the 12 years of reporting by the NMFS, (2) the poor performance of US fisheries management relative to agency and programmatic objectives (based on the current status of stocks), and (3) the positive feedbacks of industry lobbying interests and perverse incentives in management institutions (regarding the general welfare) that would keep representation stabilized at the sub-optimal state. Furthermore, apportionment of interests was essentially the same at the outset of the MSA experiment as it was during the period 1990–2001 [22], indicating longer-term stability.

5.3. The next experiment

The statistical analysis preformed in the present contribution pre-supposes that all three interest categories ‘ought to’ be equivalent. This pre-supposition, however, is intended only as an analytical convenience. Commercial fishing, recreational fishing, and ‘other’ are default categories used by the NMFS. It would be more useful to dis-aggregate the ‘other’ category so that representation of other interests can be accounted for, reported, and characterized. Dis-aggregation of the ‘other’ category would, however, only accentuate the present demonstration that commercial fishing interests are significantly more represented than ‘other’ interests, and that corporate interests strongly dominate the decision-making process. De-segregation of the ‘commercial’ category would also help to evaluate the supposition used here.

The status of US fisheries can be considered the legitimate measurement endpoint of a grand management experiment [22,72], if it is reasonable to assume that status of stocks is linked to management structure. The sole treatment of this experiment has been a fishery management system wherein commercial fishing interests dominate decision-making. The status of US fisheries indicates that, in general, the treatment failed to achieve conservation, economic, or social objectives (also see [56]). Fullerton [72] suggested that the “noble experiment” of the Magnuson Fishery Conservation and Management Act is not bound to fail, but rather it needs “time to age and for operational problems to be smoothed out.” He was representing the US federal view when he encouraged extensive abdication of federal trusteeship of fishery resources to the fishing industry.
while extolling the hopeful virtues of industry ‘self regulation.’ He appears to have been too hopeful.

While participation of fishing sectors in management decision-making is a crucial element for success (especially if it includes all fishing sectors), I suggest that the present system is bound to fail unless the immediate interests of fishing sectors are more effectively checked and balanced with the broader interests of the general public (i.e., conservation interests), irrespective of whether the management system is simple or complex. In retrospect, Fullerton’s noble experiment appears to have been informative, but ill advised with regards to fish stocks and marine ecosystems.

In spite of the poor performance of US fisheries after two decades of an industry dominated system, Townsend [73] advocated for ‘corporate governance’—a potentially even more extreme scheme of industry domination of public resource decisions. Few still deny that fisheries management in the US needs re-inventing, but I suggest such schemes are (1) fundamentally unsustainable because of the perpetually limited scope of modern economics (e.g., inability to fully consider, evaluate, or protect the value of natural, human, and cultural capital); (2) broadly unpalatable due to their exclusionary nature; and (3) not logical because they begin with the assumption of corporate or user ownership of public resources (granted that some ‘property rights’ schemes are workable). Furthermore, the notion that “superior access to debt financing” is a benefit of corporate governance structures portends failure because there is no obvious reason that investors would choose monetary debt over natural capital debt (over-exploited resources). It is not reasonable to assume that corporate governance structures would place a realistic value on the future (or on any resource that is not easy to apply a monetary value to) due to the culturally engrained economic practice of discounting the future [46].

Such extreme corporate governance schemes inherently leave the public out of the democratic process, and are thus absurd in the public context of fisheries management. Indeed, disastrous results of the corporate governance recipe should be expected in cases where public subsidies artificially bolster fisheries [17]. Lane and Stephenson [74] argued that troubled fisheries in Canada could be saved by increasing the participation and responsibility of the fishing industry, which they say has been “generally excluded from management.” Their suggestions might well improve Canadian fisheries management, this author does not know, but US experiences are not consistent with that conclusion [56,71], and the results presented here indicate that participation of the fishing industry that is not balanced with broader representation is likely to fail in the long run. Accordingly, it appears that newly implemented industry self-regulation in New Zealand will require broader stakeholder participation to balance interests [24].

The alternative experiment (alternate treatment) in the US fishery management system could include domination the present Council system by broader interests (as in the Australian example); domination by recreational fishing interests; or equal representation among interests (as in the New Zealand example). An even better design for such an experiment in the US would be to further dis-aggregate the ‘interest’ categories and develop alternative hypotheses about the effects of representation by various combinations of categories. Testing such hypotheses would be informative if the treatments were sufficiently different from each other.

5.4. Deliberate democratic designs

Jentoft [75] urges us to recognize that human systems must be deliberately [and explicitly] designed to function as intended, and that co-management, by itself, will not automatically lead to success. Pontecorvo [22] joined the likes of Adam Smith in suggesting “No regional or local body, no matter how constructed or how constituted, is likely to move effectively and efficiently to enhance the general [national] welfare.” One could conclude from this precept that Regional Fishery Management Councils should be more broadly comprised with respects to both interests and geography (Pontecorvo [22] pointed out that the public in non-coastal states go entirely un-represented in the Council process). The assertion of McCay and Creed [26] that the Magnuson–Stevens act encourages representative democracy appears incorrect in light of the present examination of the underlying (legislative, political, and structural) causes of the skewed representation of interests on Regional Fishery Management Councils in the United States.

Global security hinges on the stewardship, responsible use, and equitable distribution of natural resources e.g., [76,77]. Indeed, all conflicts are ultimately natural resource conflicts, and history has shown that nations crumble when natural resources are depleted e.g., [78].

6. Conclusions

The dominant representation of special interests and self-interests on Regional Fishery Management Councils (i.e., the composition and organizational structure of decision-making bodies) is likely to be a fundamental cause of the failure of modern fisheries management and the subsequent degradation of common property resources in marine ecosystems.

I argue that the simplest solution to the present dilemma is to mandate the incorporation of broader (scientific, environmental, consumer) interests on
Regional Fishery Management Councils. Explicit formulas could be added to fisheries management legislation to ensure a broader and more equitable representation of interests with the goals of preventing ‘regulatory capture’ by industry while still encouraging participatory co-management. The provisions containing explicit formulas for apportionment of interests should be aimed at State Governors in addition to the Secretary of Commerce, but legislative mechanisms should also be enacted to ensure representation of even broader public interests (e.g., national public interests or inland state public interests).

It is reasonable to conclude that efforts to increase public participation and broaden the representation of interests have failed without the types of explicit formulas suggested here. A compelling argument for re-structuring the Council system to include broader interests is a logical one: it is reasonable to expect more success from such a re-structured system. Also, such re-structuring has not been tested.

This suggested reform experiment is logical, simple, more democratic, and presumably more likely to succeed. It is also not only free of additional implementation costs, it could easily save US taxpayers hundreds of millions of dollars annually in revenue, food, and indirect benefits of healthier ecosystems that are currently lost due to overfishing and resource damage [79].

If legislators are unwilling to conscientiously and successfully incorporate broader public interests into this system of public resource stewardship, or if democratic functionality is impaired because of problems with increased scales of democratic representation [19], the federal government (i.e., the NMFS) is theoretically in a better position to protect the general welfare of the nation than corporate or regional interests, but only if major conflicts of interests within the nesting and staffing of federal agencies can be eliminated. Regulatory capture by industry has already been evaluated, so either broader representation, or central control (in a re-organized agency hierarchy), or both should make up the next grand experiment.

The Regional Fishery Management Councils have been aptly described as “a new form of government” [80]. If this new form of government fails to represent the interests of the general public, it is American tradition to change that system into one that improves representation of the broadest public interests [2].

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References


