

# The Fishery Conservation and Management Act of 1976

## Organizational structure and conceptual framework

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The author introduces a theoretical context for discussing the organizational structure and conceptual framework of the Fishery Conservation and Management Act of 1976. He applies this to the Regional Fishery Management Councils established under the Act in order to assess the trends in their evolution and, in particular, to examine the balance between federal and regional authority over fisheries management. He concludes that structural and conceptual dichotomies within the Act provide a desirable flexibility, but could be counterproductive if the Regional Fishery Management Councils do not take specific action to commission the data that they require to fulfil the roles authorized by the Act. Without such action an imbalance could arise which would lead to their demise or subservience to federal authority and advice.

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The Fishery Conservation and Management Act of 1976 (FCMA)<sup>1</sup> extended US jurisdiction from 12 to 200 miles and initiated a comprehensive national programme of fishery management. The programme is based on the concepts of maximum sustainable yield (MSY) and optimum yield (OY), and the Act establishes a new organizational structure in the form of eight Regional Fishery Management Councils to carry out the programme. The conceptual framework and the organizational structure envisaged in the Act are both complex. The relationship between them is not easily determined without some theoretical context based on the study of framework analysis as applied to organizations. Generally, the degree of congruity between the formal and the perceived organizational structure and conceptual frameworks determines the effectiveness of an organization.

### Formal and informal organizational structures

There is an important distinction to be made between formal and informal organizational structures. The formal structure is written and displays clearly defined levels of authority and areas of responsibility. The informal structure is perpetuated by an oral tradition within the organization and by the actual performance of tasks: lines of responsibility are blurred. The formal structure is supported by a set of rules governing the various roles in the organization. The informal structure evolves with the continuous and consistent breaking or bending of rules. While the rules give a sense of permanence if not intransigence to the organization, informal violation of the rules enables it to adapt to changing circumstances, the exigencies of day-to-day activity, and the various levels of competence displayed by its members.

Formal structuring marks the birth of an organization and can be a means of rejuvenation and renewal. When an organization falters in its purpose, the problem is often seen in structural terms: the formal structure on paper no longer resembles the informal structure of reality. Organizational charts are then redrawn to resemble more

closely the way things are really being done. Formal restructuring is thus a means of regaining control of the organization by adjusting appearance to reality. In this sense, the informal structure and the oral tradition which perpetuates it are more enduring than the formal structure and its documentation.

Reorganization, however, only temporarily aligns the formal and informal structures. As people exceed in formal authority their levels of competence, the informal structure develops as a means of circumventing incompetence. As the environment of the organization changes, the informal structure adapts to new conditions. As the exigencies of day-to-day activity strain the formal structure, the informal structure provides a more efficient means of accomplishing the goals of the organization. Old age and decay of the formal structure follow rejuvenation and renewal.

Another element of an organization is the conceptual framework in which its members conceive of their roles as well as the goals of the organization as a whole. The conceptual framework is defined by the terminology used to describe what the organization does and each member's role in it. The concepts are more or less obscure depending on the peculiarity and complexity of the organization's activity.<sup>2</sup>

The conceptual framework is related to structure, both formal and informal: the terminology of the conceptual framework is used to describe the formal organization in written documents, and the way people conceive of their activities is directly related to the way they perform tasks. There are, then, two conceptual frameworks: one formal and one informal, and they may be more or less congruent, depending the congruence of the formal and informal organizational structures.<sup>3</sup> Generally, the more congruent the formal and informal organizational structures and conceptual frameworks, the more efficient the organization.<sup>4</sup>

Considered in this context, the Regional Fishery Management Councils appear to have prematurely aged. Although little more than one year old, the formal and informal organizational structures of the councils and the conceptual frameworks employed in their activity have already diverged considerably. The structural and conceptual diversity is already impeding the flow of information within the organization. As the activities of the councils impinge on fishermen and state, local, and federal governments, the problem is likely to increase.

### Structural and conceptual dichotomies

The eight Regional Fishery Management Councils and the Commerce Department are the pre-eminent units of the organizational structure of the FCMA. The regional councils formulate management plans which serve as the basis for regulations promulgated by the Secretary of Commerce. Management plans and regulations are thus the primary units of the formal conceptual framework of the Act, and at this level the organizational structure and conceptual framework are congruent. The lines of authority and responsibility are clearly drawn, and the terminology is adequately defined.<sup>5</sup>

The dichotomy in structure and framework at this level reflects an underlying principle of the Act. *Management* is conceived as a task most effectively performed at the regional level while *regulation* is

<sup>1</sup> Public Law 94-265, 94th Congress, 2nd Session, 13 April 1976, 16 USC 1801 *et seq* (Supp 1977). Hereafter, FCMA.

<sup>2</sup> In a sales organization, for example, such concepts as 'customer relations' and 'profit margin' are rather obvious even to an outsider, but in a scientific research institution such concepts as 'baseline study' and 'regression analysis' are less obvious to the layman. Acronyms further obscure the conceptual framework, and in science and government the superfluous use of acronyms has reduced communication to a series of letters spoken with such fluidity as to be quite incomprehensible to an outsider.

<sup>3</sup> This article is itself a conceptual framework constructed for the purpose of discussing an organization, namely, the Regional Fishery Management Councils. This framework is distinguished from that of the regional councils as a secondary framework from a primary one, the difference being that a secondary framework reformulates activity conceived in a primary framework in order to reveal its structure and the premises on which it is based. (Erving Goffman, *Frame Analysis*, Harper and Row, 1974, is at least partly responsible for the concept of primary and secondary frameworks).

<sup>4</sup> When people are certain of their responsibilities and authority and when the terminology they use to discuss their actions is shared by everyone in the organization, the possibility of misunderstanding is decreased. Furthermore, the organization appears to outsiders as a unified system with which they can work: it can therefore function effectively within its environment. Congruence facilitates the flow of information both within the organization and between the organization and its environment.

<sup>5</sup> For a general discussion of the organizational structure of the regional councils, see the preceding companion article by H. Gary Knight on 'Management procedures in the US fishery conservation zone'.

<sup>6</sup> Personal communication with Lucy Sloan of the National Federation of Fishermen. Ms Sloan was one of the authors of the final version of the Act.

<sup>7</sup> Knight, *op cit*, Ref 5.

<sup>8</sup> In fact, the Ford administration opposed extended jurisdiction until public opinion and political pressure together with the faltering Law of the Sea negotiations commanded its support. Only then did a federal representative from the National Marine Fisheries Service join the Congressional staff and representatives of the fishing industry who drafted the final versions of the bill (Personal communication with Kip Robinson, Legislative Representative of the NMFS, who was one of the authors of the final version of the Act).

<sup>9</sup> Samuel P. Hays, *Conservation and the Gospel of Efficiency*, Antheneum, 1975.

<sup>10</sup> According to this view, each species occupies a crucial niche in the natural system, and its elimination threatens the balance of nature. This argument originates with Darwin's conception of diversity of species (Charles Darwin, *The Origin of the Species*, 1859, Oxford University Press, Oxford, 1956), and draws upon recent scientific debates on the relationship of diversity and stability of ecosystems (Eugene P. Odum, *Ecology*, Holt, Rhinehart and Winston, 1963, p 34). The Endangered Species Act of 1973 reflects this view (16 USC 1531 *et seq* (Supp IV 1974)). In a more extreme form, the preservationist view argues that every individual as well as every species must be protected. There is a degree of anthropomorphism underlying this position, and it is reflected in the Marine Mammal Protection Act of 1972 (16 USC 1361 *et seq* (Supp IV 1974)).

<sup>11</sup> Hays, *op cit*, Ref 9.

<sup>12</sup> 16 USC 473 *et seq* (1970).

<sup>13</sup> According to this view, man is part of nature and is charged with responsibility for rationally managing his activities to achieve the most efficient use of nature's productivity. Richard Walker places Eugene Odum's *Zoning According to Ecosystem Principles* and Walter Isard's *Ecologic Economic System* within this tradition (Richard A. Walker, 'Wetlands preservation and management on Chesapeake Bay: the role of science in natural resource policy', *Coastal Zone Management Journal*, 1973, Vol 1, No 1, pp 75-163). Walker also argues that 'the basic flaw of scientific management is that it is founded on an understanding of the natural system and not the human system' (*ibid*, p 92). In the management of natural resources, Walker contends that 'the economic system, not the physical system, is controlling' and that 'one must be aware that the critical decisions affecting natural resources are generated by the private market system and the political process, not by science' (*ibid*, p 93). The scientist's role in the decision making process is therefore

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most efficiently executed at the federal level. The regional councils are defined territorially in rough correspondence to biological regimes: a correspondence which assists the construction of management plans. Regulation, however, entails negotiation with foreign fishing nations whose fleets cross the territories of regional councils.<sup>6</sup>

The regional-federal dichotomy also provides for a balance of local and national interests. The Act sets national standards for management plans, and yet gives the regional councils considerable leeway to meet local needs. In addition, both the federal and state governments are formally represented on the regional councils.<sup>7</sup>

The balance of state and federal power reflects the origins of the Act. Most federal legislation is basically written by federal government. The FCMA, on the other hand, was primarily a Congressional bill with strong industry and federal agency input.<sup>8</sup>

Another underlying principle of the Act - the dichotomy of conservation and management - is manifested in its title. This dichotomy reflects a basic historical conflict between preservation and exploitation of natural resources which has continually rent the conservation movement in the USA.<sup>9</sup> Such conservationists as Thoreau, Emerson, and Muir represent the preservationist element of the movement. This element views nature as ideal when least affected by man.<sup>10</sup>

The other element advocates scientific management of natural resources and subscribes to what Samuel Hays calls the 'gospel of efficiency'.<sup>11</sup> Its most famous spokesman was Roosevelt, and it provided the conceptual basis for the Organic Act of 1897<sup>12</sup> which established the national forests.<sup>13</sup>

Although the title of the FCMA reflects both these traditions the intent is clearly biased towards scientific management of the fisheries.<sup>14</sup> The preservationist point of view, however, is maintained in the FCMA provision that 'irreversible or long-term adverse effects on fishery resources and the marine environment are avoided'.<sup>15</sup> Furthermore, the FCMA does not modify the jurisdiction of the Endangered Species Act, and it amends the Marine Mammal Protection Act to encompass the 200-mile zone.<sup>16</sup>

### Maximum sustainable yield and optimum yield

The dichotomy of conservation and management is further manifested in the formal conceptual framework of the Act. The terminology in which the Act prescribes the content of management plans draws a distinction between MSY and OY.<sup>17</sup> These terms are the secondary units of the formal framework and reflect Walker's distinction between the physical human systems involved in the management of natural resources.<sup>18</sup> It is also at this level that ambiguity in the conceptual framework of the Act is evident and the formal organizational structure begins to break down into informal structures designed to circumvent the conceptual weakness.

MSY and OY pertain to how many fish can be harvested, and every management plan must stipulate the MSY and OY for the fishery to which it applies.<sup>19</sup> Though crucial to the conceptual framework, MSY is not formally defined in the Act: OY is nevertheless formally defined in terms of MSY. According to the Act,

The term 'optimum', with respect to the yield from a fishery, means the amount of fish

which will provide the greatest overall benefit to the Nation, with particular reference to food production and recreational opportunities; and which is prescribed as such on the basis of the maximum sustainable yield from such fishery, as modified by any relevant economic, social, or ecological factor.<sup>20</sup>

MSY is thus a measure of the physical system, and OY takes into account the human system.

The reason for the implicit rather than explicit definition of MSY is historical. According to Wallace,<sup>21</sup> the concept of MSY developed in the 1940s when resource managers came to understand that the fisheries were a renewable but not inexhaustible resource. While concerned with overexploitation of the resource, 'biologists tended to regard any unused surplus as waste', and MSY thus evolved as 'a sort of average of the highest potential surplus that is likely to be produced by a given fishery stock'.<sup>22</sup> The concept worked fairly well, especially when applied to inshore fisheries, and 'MSY came to be considered a relevant and non-controversial objective of conservation – just about the final word in terms of management'.<sup>23</sup>

In the 1950s, however, MSY came under heavy attack on economic as well as biological grounds.<sup>24</sup> In ignoring social and economic factors, it epitomizes the tradition of scientific management and its flaws as described by Walker.<sup>25</sup> MSY is also based on a number of biological assumptions and convenient fictions. Among these are a constant catchability coefficient as stocks diminish and constant recruitment and natural mortality levels regardless of stock size.<sup>26</sup> Furthermore, there are several competing MSY models, each of which produces a different effort–yield curve. No consensus exists on which model best approximates reality.<sup>27</sup> Biologists seem either to choose the model which best fits their data or to fit their data to the model of their choice.<sup>28</sup>

Since OY is defined in terms of MSY, the tenuity of MSY obviates the specification of OY in management plans. Even if MSY were clearly defined, OY would be difficult to specify. The Act calls for modification of MSY by 'any relevant economic, social, or ecological factor',<sup>29</sup> but it is left to the regional councils to determine the relevant factors. This places the councils in an essentially political position of having, for example, to weigh the economic interests of commercial fishermen against the social needs of recreational fishermen.

### Structural incongruity

There is no formal organizational counterpart to the conceptual dichotomy of MSY and OY. The Act provides that each regional council appoint a staff, a scientific and statistical committee (SSC), and advisory panels to assist in the development of management plans. These support groups are the secondary units of the organizational structure, but there is no clear delineation of responsibility in terms of specifying MSY and OY (the secondary units of the conceptual framework). According to the Act, the staff performs administrative functions; the SSC assists 'in the development, collection, and evaluation of such statistical, biological, economic, social and other scientific information as is relevant'; and the advisory panels provide general assistance.<sup>30</sup> However, each regional council, as entitled by the Act, has delegated responsibility and authority to its support groups in a different fashion depending on its particular needs and capabilities.<sup>31</sup> That is, informal

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bound to be political in many respects rather than purely objective or scientific (*ibid*, p 92).

<sup>14</sup> FCMA, Sec 2(b).

<sup>15</sup> *Ibid*, Sec 3 (2)(B)(iii).

<sup>16</sup> *Ibid*, Sec 404.

<sup>17</sup> *Ibid*, Sec 303(a)(3).

<sup>18</sup> See Ref 13.

<sup>19</sup> *Op cit*, Ref 17.

<sup>20</sup> *Ibid*, Sec 3(18)(A,B).

<sup>21</sup> David H. Wallace, Keynote Address to 104th Annual Meeting of the American Fisheries Society, 1974, in *Optimum Sustainable Yield as a Concept in Fisheries Management*, ed Philip M. Roedel, American Fisheries Society, 1975, pp 5-8.

<sup>22</sup> *Ibid*, p 5.

<sup>23</sup> *Ibid*.

<sup>24</sup> *Ibid*.

<sup>25</sup> Walker, *op cit*, Ref 13.

<sup>26</sup> John Radovich, 'Application of optimum sustainable yield to marine fisheries', in *Optimum Sustainable Yield as a Concept in Fisheries Management*, *op cit*, Ref 21, pp 21-27.

<sup>27</sup> *Ibid*, p 23.

<sup>28</sup> The arbitrary nature of this competing set of models and the assumptions on which it is based makes the definition of MSY all but impossible. At a recent meeting of the New England Regional Council, Richard Hennemuth, Assistant Director of the Northeast Fisheries Center of the NMFS, even went so far as to say that, for all practical purposes, MSY no longer exists (Peabody, Mass, 10 March 1977).

<sup>29</sup> FCMA, Sec 3 (18)(B).

<sup>30</sup> *Ibid*, Sec 302 (f,g).

<sup>31</sup> See Knight, *op cit*, Ref 5, for the informal structure of the Gulf Council.

organizational structures have developed in each region to meet the needs of the councils.

Given the weaknesses of MSY and the ambiguity of OY, this lack of formal organizational-conceptual congruity may be fortunate, but it nevertheless threatens the balance of power between the regional and federal levels in their respective managerial and regulatory roles. The National Marine Fisheries Service (NMFS), which is represented on the regional councils and is also part of the National Oceanic and Atmospheric Administration (NOAA) in the Commerce Department, is in a strategically advantageous position to become the primary source of data which the regional councils need to establish MSY. Under previous fishery management organizations, such as the International Commission for the Northwest Atlantic Fisheries (ICNAF), the NMFS has been collecting the biological data for MSY for some time,<sup>32</sup> and it has the facilities and personnel on hand to continue the task. In the short term, the regional councils are thus largely dependent on the NMFS for the data base if not the actual specification of MSY.<sup>33</sup> In the long term, however, the councils may let contracts for gathering these data, but given the expense of this type of research, the NMFS is likely to remain the primary source of MSY.

Informally, the NMFS, a federal agency, is thus aligned with MSY, and the support groups for the regional councils may be delegated the task of modifying MSY with relevant social, economic, and ecological factors to produce OY. Of course, this distinction will not be so clear-cut in reality, but this informal structure seems to have been produced by the conceptual dichotomy of MSY-OY and the NMFS's capacity, willingness, and desire to supply the councils with MSY data.<sup>34</sup> For the NMFS, MSY is a mode of input to the management process which is at once effective and seemingly objective. The Act requires that every management plan specify MSY, which unlike OY seems immune from political considerations but rather susceptible to only scientific debate – value-free and wholly objective. The weaknesses of MSY are conveniently overlooked.

The value attributed to MSY is further supported by the concept of 'public trust'. This doctrine, together with the federal mandate to conserve and manage fisheries under the FCMA, places the NMFS, as part of NOAA, in the position of trustee of fisheries as a natural resource.<sup>35</sup> To this effect, Dr Robert L. Edwards, Center Director for the NMFS Northeast Fisheries Center, has described its role as that of 'trustee for the American people.'<sup>36</sup> This sense of public trust aligns the NMFS with the conservation aspect of the conservation-management dichotomy described above, and its focus on MSY aligns it with the physical system in Walker's physical-human system dichotomy.<sup>37</sup> The regional councils and their support groups, on the other hand, are aligned with the management aspect and human system which figures so prominently in OY. The informal structure fostered by the formal distinction between MSY and OY thus pervades the underlying conceptual framework of the Act.

The NMFS is not complacent about the problems of MSY. The *Operations Manual*,<sup>38</sup> which it prepared for the regional councils, contains numerous references to the shortcomings of the system and to the need for interspecies MSY models which remedy the deficiencies of current single-species calculations. The NMFS advocates more research in fishery biology to substantiate the

<sup>32</sup> 16 USC 981 *et seq.* (1970).

<sup>33</sup> Personal communication with Dr Leah J. Smith, Chairman of the Scientific and Statistical Committee for the New England Council.

<sup>34</sup> Dr Robert L. Edwards, Director of Northeast Fisheries Center of NMFS, at a meeting with the Marine Policy Fellows of the Woods Hole Oceanographic Institution, 23 September 1976.

<sup>35</sup> See, for example, Joseph L. Sax, 'The public trust doctrine in natural resource law', 68 *Michigan Law Review*, 471, 1970.

<sup>36</sup> Personal communication.

<sup>37</sup> Walker, *op cit.*, Ref 13.

<sup>38</sup> *Operations Manual, Regional Fisheries Management Councils, Initial Draft, 11 June 1976*, National Marine Fisheries Service, 1976, Part III.

assumptions and improve the data on which MSY is based. It also has underway several mathematical modelling projects which encompass the human as well as the physical system involved in fishery management.<sup>39</sup> These models are designed to provide more accurate and complete information about the interaction of biological and socioeconomic factors. The NMFS clearly intends to expand its capacity to provide the councils with OY as well as MSY data. If the human rather than the physical system is the controlling factor in resource management, this seems wise, but the expanded influence of the NMFS in planning could subvert the structural balance between regional and federal levels.

The NMFS modelling projects do not seem to address the immediate problems facing the regional councils. At a conference on optimum yield in June 1977, council members appeared to be uncertain as to the meaning of optimum yield.<sup>40</sup> The conceptual framework of the Act seemed confusing to them, and many responded by retreating to the terminology used in previous fishery management organizations, such as Total Allowable Catch (TAC) which was used in ICNAF. Others responded by focusing on specific problems endemic to their regions. Few seemed to believe that the modelling project presented by the NMFS would be of any use in the near, or even distant, future.<sup>41</sup>

The problem with the NMFS approach to modelling stems from the degree of completeness, accuracy, and predictive capacity for which the models are striving.<sup>42</sup> Though this may be an appropriate goal for the long term, the councils face the problem of formulating goals and objectives for management plans for the coming year. They need decision making models which may be less complete and less accurate than those being constructed by the NMFS but which nevertheless give them some sense of how the physical and human systems work. Such decision making models may not be able to predict precisely how the systems will behave but they can give the councils a sense of the trade-offs between alternative goals and objectives. Most importantly, such models could be built with existing data and made available to the regional councils in the near future.<sup>43</sup>

### Threatened imbalance of federal and regional influences

One of the most critical factors in the planning process is time. The regional councils are under a great deal of pressure to prepare management plans for the coming year, and they need data on which to base these plans. There is, however, a time delay between submission and implementation of management plans which may make obsolete the data on which the plans are based.<sup>44</sup>

In addition to preparing current management plans, the regional councils must plan for the future by directing research which will supply them with better data. While the NMFS assumes it will coordinate fishery research,<sup>45</sup> it is not clear that its research programme will be effective in meeting the needs of the councils. The councils, with the assistance of the support groups, should therefore let contracts for research to meet their present and future needs. This would also decrease the dependence of the councils on the NMFS and restore the balance between regional and federal levels.

Fishery management is a complex task, and the regional councils are, for good reason, uncertain how to fulfill their obligation under the

<sup>39</sup> Personal communication with Dr Brian Rothschild, Director, Office of Policy Development and Long Range Planning, National Marine Fisheries Service, 3 March 1977.

<sup>40</sup> Personal Observation of the Optimum Yield Workshop conducted by the National Marine Fisheries Service, 6-10 June 1977, in Houston, Texas.

<sup>41</sup> My research indicates that the modelling projects are far from completion and that the councils should not expect to have these models available in any useful form for several years.

<sup>42</sup> For example, Edison Tse's 'Model of fisheries management system' Department of Mathematics, Stanford University, Stanford, CA.

<sup>43</sup> Personal communication with Berrien Moore III, Professor of Mathematics, University of New Hampshire.

<sup>44</sup> The federal review process alone requires 285 days, and legal action by an affected party, such as commercial fishermen, could delay implementation of management plans even longer. The figure of 285 days is taken from the official NMFS position stated at the Houston Workshop in June 1977. Since then, hearsay has it that the horseblanket - the coloured flow diagram representing the federal review process - has been reduced to 170 days. This would, if true, ameliorate but not eliminate the problem.

<sup>45</sup> Personal communication with Brian Rothschild, *op cit*, Ref 39.

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Act. The conceptual framework of MSY-OY is ambiguous, and the incongruous organizational structure further complicates the situation. It would be easy to let the informal structure, in which the NMFS plays a central role, prevail over the intended balance between federal and regional interests which is manifested in the Act. But this would further erode the balance between conservation and management which is the underlying principle of the legislation. The councils seem aware of this, but it remains to be seen whether they can assert their duly constituted authority under the Act and assume responsibility for directing research to meet their needs.