

Commentary on MSC Certification Report Of Alaska's Commercial Salmon Fisheries*

Trout Unlimited ? June 2002

I. Introduction

Although Trout Unlimited's (TU) and Marine Stewardship Council's (MSC) programmatic emphases may differ, they complement one another. Where Pacific salmon are concerned, particularly in Alaska, both MSC and TU are working toward the same end of encouraging the assemblage of institutions, organizations, business enterprises, and individuals that affect salmon and their ecosystems to think—and then to act—first and foremost with respect to protecting the biological and ecological web that functions to sustain salmon and their ecosystems.

The issue for both TU and MSC is the sustainability of Alaska's salmon populations. Assessing their sustainability involves analyzing how these fish have fared under the impacts of fishing and other anthropogenic forces throughout their range as well as the adequacy of fisheries management in the face of an uncertain future.

Marine Stewardship Council's labeling program is premised on the efficacy of market-based incentives to improve unsustainable fishery management practices. Presumably, certification of a fishery does not mean that fishery management is perfect—that there is still room for improvement. Indeed, MSC has required certain improvements in fishery management prior to re-certification in five years. Nonetheless, the problem is that the State of Alaska and the salmon industry tout certification as proof of superlative management, hardly, if ever, acknowledging deficiencies that MSC has identified. From TU's perspective, MSC certification has reinforced a false sense of security about Alaska's salmon fishery management.

MSC's certification of Alaska's salmon fisheries as sustainable seems to hinge on three key conclusions: 1) Alaska's salmon fishery management is *theoretically* capable of managing for sustainability; 2) Alaska salmon fishery management performs in accordance with the capacity provided by the relevant statutes, regulations, and policies; and 3) Alaska adequately manages for factors other than fishing that affect the sustainability of Alaska's salmon populations.

This commentary is a critical inquiry into MSC's certification of the Alaska salmon fishery: First, TU takes issue with MSC's interpretation of "sustainability." Next, TU questions whether Alaska's fishery management system is even theoretically capable of managing for sustainability. Then we turn our attention to what we believe to be MSC's unwillingness to probe the efficacy of the abundance-based management approach or the

* Numbers in parentheses refer to the page of MSC's December 2000 Certification Report

veracity of Alaska's assertions and reports, especially with respect to salmon ranching and habitat protection. Finally, TU offers its recommendations for a more meaningful and accurate evaluation of Alaska's salmon management.

II. Managing for Sustainability

Managing for Sustainability Is More than Managing the Fishery

TU would not necessarily dispute that Alaska's salmon fishery management deserves a passing grade, at least relative to the performance of most other salmon fishery management regimes, but it would not agree that its performance warrants an exemplary rating. Salmon fishery management is but a subset of salmon management, which has a broader concern for the fish and their ecosystems. Alaska has a well-developed fishery management system, but it lacks an effective salmon management system. In the absence of an effective salmon management system, it is doubtful that salmon are indeed managed sustainably. Given MSC's Principles and Criteria, it seems that certification must evaluate the strength and weakness of the state's salmon management not merely its fishery management, but the fishery management system is apparently what MSC has indeed certified.

The certification team states that it uncovered not one "weakness" (*qua* "failing") in Alaska's fishery management.⁽⁷⁾ TU suggests that an evaluation that finds no significant weaknesses in organizational structure and performance invites a skeptical, even cynical, reception. Even if one were to grant that MSC is correct about the absence of significant weakness, it would have behooved MSC to acknowledge that ostensibly minor weaknesses today can turn out to be major problems tomorrow as circumstances change.

Alaska may yet be the best of the last of the world's great salmon habitats, but it is not immune to the dynamics that led to the destruction of salmon in the Pacific Northwest, Canada, and Japan. Undoubtedly, given the decimation of salmon runs elsewhere, Alaska is the greatest reservoir of salmon biodiversity that remains. But this perspective is but the view from one point on the graph in which the trend is heading downward (much as the graph looked for Oregon, Washington, and California Pacific salmon management 70 years ago).

While Alaska may acknowledge its salmon fishery management is not "perfect," it is exhibiting its hubris when it asserts that what has happened in other salmon-producing regions can not and will not happen in Alaska. This is the same claim that overconfident salmon managers in the Pacific Northwest were making even as most of the wild salmon runs were disappearing before their eyes, and as hatcheries propped up salmon abundance. (Indeed, Alaska's ocean-ranching, salmon hatcheries are a like expression that abundance matters more than biodiversity.) It is Alaska's opportunity, indeed Alaska's obligation, to ensure that this fate is not repeated here. TU believes the question of whether Alaska's salmon fisheries are sustainable would be more properly addressed from this perspective.

Defining Sustainability

Managing natural resources in a way that is sustainable begs the question of what it is that society is trying to sustain. Traditionally, commercial fisheries, whether for salmon or cod, have assumed that fishing sustainably means that no more fish than that which are truly surplus to the population are removed from the population, leaving enough fish to spawn and replenish themselves.

The nub of the problem is defining and then, ascertaining, a “population.” There are thousands of populations of Pacific salmon with distinct genetics and complex life histories. Salmon biodiversity is the sum total of the genetics and life-history adaptations of “tens of thousands” of populations among the five species of Pacific salmon. Thus, today’s salmon biodiversity is the outcome of a several thousand year evolutionary process, albeit the evolutionary potential has been reduced given the extirpation of many thousands of salmon populations during the last hundred years. Nonetheless, the salmon biodiversity that remains—since it maintains the temporal and spatial basis for salmon production—is the key to abundance over time. Perhaps, more important, the extant biodiversity is the repository of salmon’s evolutionary potential to survive environmental change.

Consequently, in TU’s opinion, maintaining biodiversity is the gauge by which the sustainability of Alaska’s salmon should be measured and therefore, the standard against which salmon fishery management ought to be judged.

III. Evaluating Alaska’s Fishery Management

As explained above, evaluating the sustainability of Alaska’s salmon populations requires an evaluation of the various ways in which salmon are affected by human activity, of which fishing is only one factor, albeit a primary one. MSC’s certification methodology implicitly recognizes the distinction between salmon management and fishery management, yet relies primarily on an evaluation of fishery management by the Alaska Department of Fish and Game (ADFG) to certify the sustainability of Alaska’s salmon.

The Single-Population Standard

MSC acknowledges that its “principles and criteria for sustainability are largely based on management at the (single) population level.”(60) The danger of failing to manage at the population level is best exemplified by the collapse of the cod stock(s) off the New England and Labrador coasts. The estimates of population abundance that guided fishing effort were premised on the assumption that the cod were one stock—one population. Unfortunately, as the managers were to realize too late, there are (were) discrete populations of cod comprising a metapopulation.

In its certification report of the Alaskan salmon fishery, MSC acknowledges that there may be “tens of thousands of populations,” which are discreet spawning groups that do not interbreed. MSC explains “we could have required that Alaska demonstrate that all individual-fished salmon populations in Alaska were individually monitored and well managed,” but instead MSC concludes that following its own principles and criteria “would essentially be holding Alaska to a higher standard than others.”(60) MSC, however, in the next breath explains that its certification of the Australian western rock lobster fishery was that of a single-population fishery. As if this were not confusing enough, the certification team seems to be grappling with a way the standard can be applied anyway when it states where “populations are managed in groups, we asked how individual populations are accounted for [so that our] assessment of Alaska salmon for sustainability involves judging how many of the individual populations on which data gathering, estimation and stock assessment efforts are focused in the aggregate are managed safely enough to make this ‘fishery’ on five species and tens of thousands of populations sustainable.”(60)

TU sympathizes with MSC’s difficulty in applying the single-population standard to Alaska (especially since little data is available at the population level), but TU does not accept that an evaluation of the Alaska salmon fishery(ies) at the population level would be holding Alaska to a “higher standard.”

Abundance Is Not a Suitable Proxy for Sustainability

Alaska fishery management is abundance-based. The goal of abundance-based management is to maximize exploitation of a particular salmon “stock,” which is usually the aggregation of discrete salmon populations, yet require that enough fish escape to spawn to ensure maximum sustained yield for the fishery over time. Indeed, Alaska’s fishery management has been relatively successful in providing adequate escapements, at least quantitatively and at least for those few stocks where escapement is actually enumerated. Although fisheries managers tend to assume that managing for maximum sustained yield can be a proxy for managing for biodiversity, the truth is that management’s impact on biodiversity is unknown, because success in managing for biodiversity is not a management objective.

Using *abundance* as a proxy or even an index of sustainability of salmon stocks is quite problematic and can even be misleading:

- The abundance of the return is not a sufficient determinant of whether or not a salmon stock is being exploited sustainably. In fact, abundance of the catch is not by itself a measure of the health of individual stocks or of freshwater habitat conditions. Abundance of returning salmon can fluctuate dramatically because many factors affect salmon productivity and mortality. Therefore, high returns may or may not be indicative of good management (during periods of high marine productivity, significant management mistakes would be hard to discern); conversely, low returns are not necessarily indicative of poor management. Moreover, there is evidence that a relatively small part of the breeding population

is the most productive and that this productive segment is both changing and unpredictable. Thus, population dynamics models that only incorporate abundance will fail to predict decreases in stock productivity as a consequence of actions that maintain abundance in the short term, but decrease genetic variability in the longer term.

- Managing for biological escapements may not ensure enough fish escape to ensure optimum ecosystem productivity, which can impair freshwater salmon productivity over the long-term.
- Managing commercial fisheries based on biological escapements determined to produce the greatest sustained yield does not ensure that the temporal and spatial segments of the run (and, hence, the biodiversity of the targeted salmon stocks) will be protected over time. Indeed, even if certain spatial or temporal segments of the run are depleted or even extirpated, which—all other factors being equal—would result in less “surplus” production to harvest, effective management of the fishery would merely require recalculating maximum sustained yield and biological escapement downward. Therefore, given solely abundance-based criteria and analyzing only abundance-based data, management could be deemed successful even as biodiversity declines.

Consequently, abundance and success of managing for maximum sustained yield is not an accurate or reliable measure of sustainability. Indeed, Alaska’s reliance on an extensive salmon ranching program to artificially supplement the fishery underscores the conclusion that maximum yield to the commercial fishery is the principal objective of salmon management. The statute that established the Alaska Department of Fish and Game requires the Commissioner of Fish and Game to

manage, protect, maintain, improve and extend the fish, game and aquatic plant resources of the state in the interest of the economy and general well being of the state . . . through rehabilitation, enhancement and development programs, [ADFG must] do all things necessary to insure perpetual and increasing production and use of the food resources of state waters and continental shelf areas.

The statute embodies the ideological presumption that nature’s productivity can and ought be increased to satisfy human needs, hence the State’s investment in a industrial-scale hatcheries to augment the commercial harvest. The problem is that artificially increasing abundance has adverse impacts on wild salmon biodiversity. The extent to which the certification team has uncritically accepted the general equivalence between abundance and sustainability is reflected in its relative lack of concern with the impacts of salmon ranching on biodiversity.

Evaluating Management Performance

Although TU disputes MSC’s contention that abundance-based management is at least theoretically capable of ensuring sustainability of salmon populations, TU would

nonetheless expect MSC to agree that sustaining salmon populations is not likely to be achieved unless managers demonstrate exemplary performance and avoid risk. In other words, TU would expect MSC to carefully evaluate whether the managers hew to the statutes, regulations and policies that provide protection to wild salmon and that management interpret these rules in a way most favorable to protecting wild salmon.

MSC, however, does not seem to require exemplary performance, but rather accepts less—an 80% score is the threshold. TU is also concerned that MSC has presumed that what is going on in the field actually implements what is “on the books”—statutes, regulations and policies—without an independent investigation to determine if this is so. The failure of MSC’s certification methodology to in this regard is apparent in the uncritical, cursory review that MSC has given to hatcheries and habitat, perhaps the two most significant forces affecting wild salmon biodiversity other than fishing. (Since regulating Alaska’s industrial-scale salmon hatcheries is the responsibility of the fishery managers, management performance regulating the hatchery system is discussed in this section, while habitat management, which is not under the sole purview of ADFG, will be discussed in the subsequent section—“Evaluating Salmon Management.”)

The certification report acknowledges there are risks associated with salmon hatcheries, but states that there is “no evidence of irreversible impact on wild stock and natural spawning.” (116) MSC thereby accepts the State’s contention that the hatchery program is compatible with protecting wild stocks (as is required by statute), and that impacts, if any, can be and have been held to an “acceptable level.”(117) Yet, MSC does not explain what is meant by an “acceptable” genetic or ecological impact nor does it provide evidence that impacts have been maintained at or below whatever defined as the acceptable level.

In fact, the State has no explicit standards by which to evaluate whether impacts are “acceptable,” with the exception of impact from disease, where it can be presumed that an unacceptable impact would be high mortality of wild fish from diseases transmitted by hatchery fish. Such a logical inference is much harder for other genetic and ecological impacts that cannot be pegged to increased mortality. For example how much introgression due to straying is acceptable? How much competition between juvenile hatchery fish and wild juveniles is acceptable? How much increased predation due to increased hatchery fish is acceptable? Nonetheless, TU believes it is reasonable to presume that an unacceptable impact would be any genetic or ecological effect due to salmon ranching that reduces the evolutionary potential of wild salmon to adapt to future change. In other words, an “unacceptable” impact would be a reduction in biodiversity.

The MSC evaluation team appears to skirt this conclusion by accepting the proposition “the need is not to avoid all genetic change, but to allow for the long-term retention of natural communities under conditions that would provide for continuing evolution.”(117) This postulate begs the question of what degree of genetic change is allowable and does not impinge on “continuing” evolution. This proposition further presupposes that it is possible to predict which genetic change will and which one will not materially alter the evolutionary potential of a population. This would require complete knowledge not only

of the relationship of genetics to behavior, but also complete knowledge of the evolutionary potential of the current genotypes and phenotypes. Moreover, it presumes the ability to accurately measure the genetic change caused by hatchery fish and to measure the precise effect on fitness over generations as well as the relation between reduced fitness and environmental change of over time. In other words, the increment of change adjudged to be acceptable at present may have cascading, eventually unacceptable effects over time. Further, what of the possibility that a number of acceptable impacts in the aggregate or synergistically will result in an unacceptable impact? Not to acknowledge that the cumulative effects of a series of seemingly minor insults can compromise the health of a fishery is folly. Thus, the postulate that the State is capable of “reducing impacts to an acceptable level” seems preposterous—a case of wishful thinking, essentially unscientific nonsense.

Judging from the certainty with which the certification team dismisses that hatchery program as a threat to sustaining wild salmon populations, TU is left to infer that MSC agrees that the state genetics and disease policies, the Regional Planning Team (RPT) oversight of hatchery production, and management of mixed hatchery/wild stock fisheries has succeeded in preventing unacceptable impacts from hatchery production. TU questions whether management has performed so well and even whether the regulations and policies are adequate enough to prevent unacceptable impacts from hatchery production. The following illustrates TU’s doubt:

- The genetics policy did not take effect until several years after hatchery production began and after there had been significant numbers of fish transported from one watershed to another. (Even after the policy went into effect, it is incorrect to assume that there have not been exemptions to the fish transport and other provisions of the genetics policy.) Knowledge of salmon genetics has increased, but the genetics policy has not been revised for nearly 20 years; thus, for instance, it is unlikely the watershed restriction (as watershed is defined in policy) provides the level of protection that had been warranted.
- ADFG presumes a priori that its disease and genetics policies preclude the worst-case scenario of impacts from hatchery fish on wild fish. How can ADFG be certain about this in the absence of extensive monitoring and evaluation? Yet, apparently, the department was either so confident in its policies that it did not require the necessary monitoring and evaluation of hatchery releases to determine the nature and effects of impacts, genetic and ecological, or else it did not want to know. For example, there has been no systematic study of straying. Because ADFG failed to develop information on the genetic stock structure of those many wild stocks that were most likely to be affected by hatchery releases, it has no basis for assessing subsequent genetic impacts. (The extensive database of genetic surveys to which MSC’s certification report refers has mostly been collected in the 1990s, some 20 years after hatchery production began.)
- Regional Planning Teams are advocates for hatchery production. Monitoring of hatchery practices and operations is the duty and responsibility of the RPTs. Yet,

because the primary concern of the RPTs is developing hatchery-production plans and evaluating the resulting contribution to the fisheries, the RPT has little incentive to critically evaluate hatchery operations for compliance with relevant statutes and policies, especially the Sustainable Salmon Fisheries Policy. Although department biologists are members of the RPT, the RPT is not staffed to investigate the scientific soundness of ocean ranching nor are they required to consider the wider ecological, biological or genetic consequences of large-scale hatchery production.

- Mixed wild/hatchery stock fisheries can create significant difficulty for fishery management in regulating exploitation rates on the strong hatchery component without overexploiting the wild component. Even if the desirable exploitation rate on the wild stock in a mixed stock fishery is realized, the risk of overexploiting temporal and, especially spatial, segments of the run are greater in mixed wild/hatchery stock fisheries. Moreover, on occasion fishery managers have not been able to ensure the full harvest of returning hatchery fish, which has resulted in high stray rates.

Most troubling of all concerns is the conclusion of peer-reviewed analysis of the Prince William Sound aquaculture program that hatchery production of pink salmon has replaced wild production. It is also known that straying rates of hatchery fish into wild spawning areas there has exceeded 97% for some locations. Yet, given such data, which surely constitutes a modicum of evidence, the certification team still concludes “at present, the fishery is sustainable and although there is concern, there is no evidence of irreversible impact on wild stock and natural spawning.”(116) Before MSC agrees with the department’s contention that there is an “absence of evidence” regarding the impact of hatchery-produced pink salmon on wild salmon in Prince William Sound, it should determine that an adequate monitoring and evaluation program is in place to provide reliable information and analysis about the presence or absence of adverse impacts.

While there may be no *proof* that the replacement of wild fish by hatchery fish has extirpated wild populations nor that hatchery salmon have actually spawned with wild salmon and reduced the genetic fitness, there is evidence that the Prince William Sound aquaculture program has created the conditions in which extirpation and genetic introgression are entirely plausible, even likely, outcomes. The fact that management chooses to deny the possibility of unacceptable impacts to wild stocks is at odds with a precautionary interpretation of the wild stock priority statute. Given the inherent vagueness of the wild stock statute, management has the discretion to interpret it. It could be construed to defend biodiversity—where an unacceptable impact would be the potential for genetic introgression due to straying, or the statute could be interpreted in the context of abundance-based management—where an unacceptable impact would have to be of sufficient magnitude to threaten a wild stock with extinction. Finally, that the certification team agrees with the ADFG that there is “no evidence of irreversible impact on wild stock” flies in the face of the precautionary principle as embodied in the Sustainable Salmon Fisheries Policy. Clearly, by the time there were to be evidence of irreversible impact on the wild stock the damage [to the wild stock] would be done.

Given that the MSC's only requirement with respect to the hatchery program for continued certification is that the department has defined a research plan and provides documentation of its adherence to the (outdated) Genetics Policy, TU concludes that MSC significantly underrates the significance of this indicator. The disparity between MSC evaluation of the hatchery program and other fishery management practices is disturbing. For instance, when provided with "anecdotal" information that the bycatch of birds in some drift gill net fisheries may be substantial (93), the certification committee scores the Performance Indicator (2A) as not passing and requires that within 3 years the state must implement a sampling program. TU cannot but help but note the incongruity of the scoring between this indicator and indicator pertaining to salmon ranching (3B). Why would anecdotal information about seabird bycatch carry greater weight than peer-reviewed analysis of the impact of hatchery salmon on wild salmon? How could it be that seabird bycatch, as important as reducing bycatch is, be of greater weight with respect to the question of the sustainability of Alaska salmon?

IV. Evaluating Alaska's Salmon Management

It's the Habitat

Fishery management is a major component of a salmon management system. Alaska's fishery management is codified, but it has no formal salmon management system. A salmon management system could be expected to integrate fishery management, ecosystem management, habitat protection, and scientific research to protect wild salmon biodiversity. Therefore, the first point to be made when evaluating Alaska's salmon management is that no formal system exists. Nonetheless, Alaska's constitution, article VIII, requires the "fish, forests, wildlife, grasslands, and all other replenishable resources belonging to the State shall be utilized, developed, and maintained on the sustained yield principle, subject to preferences among beneficial uses." When it comes to the replenishable salmon resource, habitat is the bedrock of salmon productivity and, hence, habitat is, undeniably and unequivocally, the basis for sustained yield of salmon. Indeed, salmon habitat itself should be considered a replenishable resource. Therefore, the responsibility of government is to ensure that the habitat conditions that maximize the yield of fish are maintained, not degraded. Moreover, this responsibility is not discretionary, not optional, and certainly not conditional on other factors, be they cultural, social, political, or economic. The sustained-yield mandate forbids any action that would reduce the sustained yield of any renewable resource. On the other hand, Article VIII does not preclude development; presumably, economic activity and development are intrinsic to the utilization of replenishable resources.

TU observes that the State of Alaska has failed in many cases to prevent habitat degradation, and, by so failing, has not fulfilled its constitutional responsibility. Unfortunately, the overall impact of degraded habitat on salmon productivity has not been assessed. Moreover, because habitat degradation is incremental and cumulative, because the impact on salmon productivity and production can lag years behind, and

because the requisite monitoring system and analysis is absent, it is difficult to detect the loss in salmon production (as with losses in salmon biodiversity) until it becomes significant. When the loss of production becomes significant, it is likely that a temporal or spatial segment of the run has been extirpated. At this point, restoring the extinct population is impossible and habitat restoration is often problematic. In many cases, restoration, even if technically feasible, is simply not attempted due to expense, or to social and political opposition, or both. In practice and contrary to MSC's assertion, Alaska gives short shrift to habitat protection.

In its evaluation of habitat protection, MSC, in TU's opinion, is far too sanguine in its assessment of the State's performance. TU is startled by the brevity of the certification team's analysis of the habitat issue and by its hurried conclusion that "there is compelling evidence that the state's efforts are more than adequate to pass this performance criteria." The "compelling evidence" seems to be one report prepared by the department. In fact, the record of habitat protection in Alaska is a mixed one. Much of Alaska is pristine because of the absence of development—more than 125 million acres are managed for conservation values by the federal government, while the state has manages 6 million acres of its land for conservation purposes. In areas where development and human activities occur, there has been significant habitat damage. In urban areas, such as Anchorage and Juneau, much salmon habitat has been lost and some salmon populations have been extirpated.

The certification committee erroneously ascribes the greatest responsibility for habitat protection to the Department of Fish and Game. In reality, ADFG has statutory responsibility for habitat *only* between the ordinary high water marks on the banks or shores of non-tidal waters. Generally speaking, ADFG has the power to prevent or to stop any activity in the stream that would interfere with the spawning, rearing, or migration of salmon. Despite this authority, the U.S. Forest and state Department of Transportation have disputed ADFG's authority to permit instream construction. Extrapolating from some completed road surveys in the Tongass National Forest and private forest roads in the Kenai Peninsula, there are probably hundreds if not thousands of culverts, some illegally constructed, that are in some way impeding fish passage. In any event, ADFG's habitat protection record is decidedly mixed.

Authority for habitat protection on the uplands is fragmented among federal, state, and local governments, whose land-use decisions often do not place a premium on salmon habitat. As a result, important riparian vegetation is lost due to various development activities in the riparian area on federal, state, local government, and private lands; wetlands are filled and drainage patterns are affected; land clearing associated with every type of industrial, commercial, and residential activity have had irreversible impacts on the watershed with indirect and direct impacts on anadromous water bodies. Alaska's Forest Practices Act does not require buffer zones in most private lands and, in most cases, the prescribed buffer zone is not adequate to insure long-term protection. Moreover, the Forest Practices Act does not regulate the logging or roading practices outside the buffer zone, which can create mass wasting, sedimentation, disrupt drainage

and alter the hydrology of the watershed, all of which can significantly impact the productivity of freshwater salmon and near shore marine waters.

On paper, the statutes, regulations, and policies that guide and inform the decision making about development activities that impact salmon production certainly create the impression that the decision-making process is cooperative and coordinated, but in reality it is often acrimonious. The fact is that the developer is favored over salmon, because it is politically expedient to do so and that expedience is rationalized as unwritten policy: unless harm to the salmon can be conclusively demonstrated, development can proceed. Therefore, the assertion by the certification team that agencies cooperate to protect habitat is simply not true in most cases.

Unfortunately, there is a pervasive, if misplaced, sense of security about the status of Alaska's salmon, which engenders a less than precautionary approach to salmon habitat management. For instance, the Federal Energy Regulatory Commission (FERC) declares many small-scale hydro electric projects exempt from FERC jurisdiction because the potential damage to a few salmon populations among several thousand is insignificant as to be negligible. By and large, the harm to Alaska's salmon populations is insidiously incremental, not readily discernable, yet cumulative over space and time. Each time the decision is made that the damage that may be inflicted to a particular salmon population is so small as to be insignificant, yet another nick is inflicted on the body of Alaska's salmon resource. Eventually, these nicks become a gaping wound; a gaping wound, however, usually triggers a response, as happened in the Pacific Northwest with the imposition of the Endangered Species Act.

Managing in the Face of Uncertainty

Because TU believes that Alaska's salmon management does not manage explicitly for salmon biodiversity, any evaluation of Alaska's success in sustaining salmon biodiversity is extremely problematic. Even if the current salmon management system were to have been inadvertently successful in sustaining salmon biodiversity, the question that would, nonetheless, loom large about the management system's ability and capacity to manage in the face of future uncertainty. The certification report states "*the most significant question regarding sustainability of Alaska salmon fisheries, therefore, is not how much has catch increased over the past twenty years, but rather how well would the management system respond to a downturn in ocean conditions?*"(62) In TU's opinion, the prognosis is not encouraging.

Apart from a natural cataclysm, the threats to the future survival of salmon are all anthropogenic (of course human activities, such as burning of fossil fuels, pave the way for natural calamities). Apart from the issue of whether there is *proof* that hatchery fish have adverse genetic and ecologic impacts on wild fish, the evidence of increasing sea temperatures and the certainty of the biological effect of environmental change necessarily calls the wisdom of industrial-scale ocean ranching into question. During the past decade, salmon biologists have gained a much better understanding of the oceanographic underpinnings of salmon productivity. During the next 20 years, scientists

expect carrying-capacity of the North Pacific Ocean for salmon to decrease and sea-surface temperature to increase beyond its long-term historical average because of global warming, further depressing salmon abundance.

Given the likelihood of even more adverse conditions in salmon's North Pacific pastures, the fact that the Department of Fish and Game not only insists that concerns about the impact of hatchery fish on wild populations are paranoiac, but also has authorized increased hatchery production and is financially subsidizing that production, belies the certification of management for sustainability. Continued production of hatchery fish in the face of a less productive and highly uncertain oceanic regime—and on top of the inherent difficulty of managing purely wild fisheries to protect genetic diversity—does not appear warranted. From the perspective of conservation of wild salmon biodiversity, there is no biological justification for releasing 1.6 billion hatchery juveniles annually into Alaska waters.

V. Recommendations for a Re-Evaluation of Alaska's Salmon Management

Evaluating the success of management in sustaining salmon populations depends in large measure upon management's ability and capacity to ensure conservation of biodiversity—conserving genetically unique and locally adapted populations. The critical biological variable for maximizing salmon appears to be salmon biodiversity and the critical ecological variable is habitat. The two variables are interdependent, going hand-in-hand—the more habitat, the more potential production; the more biodiversity, the more habitat that can be potentially utilized. In practical terms, an effective salmon management system would maintain the ecological and biological conditions for salmon survival and production and ensure that they are not impaired by human activities, whether fishing, timbering, etc.

The performance indicators that are the most critical for assessing the sustainability of Alaska's salmon fisheries are those that provide evidence for the transformation from salmon fishery management to salmon management. Ostensibly, this is the approach MSC certification promises by requiring “that any assessment of a fishery or fisheries move *beyond* a management verification program that simply provides third-party assurances that a company's stated management policies are being implemented (emphasis added).”(26) Unfortunately, as discussed above, the certification team appears not to have moved beyond “management verification” in its investigation.

TU suggests that the examination into the sustainability of Alaska's salmon should be framed, at a minimum, by the following questions, the answers to which would be the evidence as to whether Alaska has the ability, capacity, and desire to create an effective salmon management system:

Institution/Management

- ◇ Does management anticipate uncertainty in its decision-making process?

- ◇ How is the “precautionary principle” interpreted and implemented? Specifically, how is “burden of proof” conceived?
- ◇ Are management decisions based on watersheds or other relevant ecological boundaries?
- ◇ Are the agencies structured around ecological/biological divisions or economic/political constituencies?
- ◇ To what extent is scientific effort coordinated among research institutions and guided by a strategic plan, which itself evolves in response to an open iterative process involving scientists, managers, and the public?

Habitat

- ◇ To what extent are habitat protection and restoration duties and responsibilities fragmented among agencies and governments?
- ◇ To what extent do political boundaries trump ecological boundaries?
- ◇ To what degree do these agencies coordinate and cooperate to protect and restore habitat?
- ◇ What are the practices and protocols for defining, identifying, considering and controlling cumulative impacts on habitat?
- ◇ What level of training and experience does staff have?
- ◇ What mandates and directives does agency management provide to staff?
- ◇ Do the agencies have the resources to implement the requisite statutes, policies, and regulations?
- ◇ What information and analysis about habitat condition is conveyed to elected officials and the general public?
- ◇ Is there accountability for habitat protection and restoration efforts?

VI. Conclusion

Given the failed fishery management regimes throughout the Pacific Rim, coupled with increasing knowledge about the factors that affect salmon productivity, it is no longer sufficient to manage “just” the fishery; rather the salmon fisheries must be managed in the context of preserving both salmon biodiversity and whole ecosystems. This is a tall order, since it requires a degree of intergovernmental and interagency planning, coordination, and cooperation to achieve an integrative transformation in the exercise of authority—currently fragmented among agencies and jurisdictions—in order to manage for the major factors that affect salmon and their ecosystem. Without such a transformation in the institutional function and structure of Alaska’s fishery management system, it will continue pell-mell along the same path as other once abundant salmon-producing regimes. MSC is in a key position to encourage and facilitate this transformation to a holistic salmon management system and TU welcomes the opportunity to work with MSC in this endeavor.