Towards a Solution to the Problem of the Common Anadromous Stocks of the North Pacific

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Towards a Solution to the Problem of the Common Anadromous Stocks of the North Pacific*

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I. INTRODUCTION

North Pacific salmon originate in the rivers of the United States, Canada, Russia, and Japan. From these rivers, young salmon swim downstream to the Pacific Ocean, in which they mature and spend the vast majority of their lives. After the maturation process is complete, salmon return to their native rivers, swim upstream to the same area in which they originated, spawn, and die. Their offspring repeat this cycle.

Salmon stocks are an extremely valuable economic and cultural resource. In 1995, Alaskan commercial fisheries harvested 993.8 million pounds of salmon. In that same year, U.S. salmon exports generated over $850 million in revenue. The value of salmon stocks cannot, however, be measured solely by the potential to generate income. Salmon are also an invaluable cultural resource. As one Native American leader explained, “[h]ow can I tell you what the salmon are worth? The salmon define who I am.”

Because salmon stocks are such a valuable resource, a nation has a strong incentive to protect those stocks that originate in its rivers. More precisely, there is an incentive to manage the resource such that its value to that nation is maximized. And, because there is a present value to potential future revenue, any attempt to manage salmon stocks must account for the effects of present decisions on future stocks. If present stocks are overexploited or under-protected, the value of future stocks is diminished. Therefore, to maximize the value of its salmon stocks, the United States has regulated its fisheries and the use of its rivers. These regulations, deemed necessary by lawmakers to maximize the value of U.S. salmon stocks, are imposed at great economic costs.

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Fish, however, do not recognize political borders. This being the case, salmon stocks that originate in U.S. rivers often migrate into the open ocean and beyond the exclusive economic zone of the United States. Once on the high seas, salmon stocks become a common resource, subject to the international customary law that all nations have the freedom to fish the high seas. Thus, absent any specific agreements that preempt this customary law, fishing vessels from other nations can exploit these salmon stocks in a manner deemed unsustainable by the United States. Such exploitation can undermine the efficacy of U.S. measures designed to promote the maximum sustainable yield of the salmon stock, and can create disincentives to regulate (or even incentives to deregulate) in the United States. In effect, this disparity between regulations that apply within the United States and those that apply on the high seas creates a problem of the commons that, if left unchecked, could lead to the irreversible depletion of the salmon stock.

A. The Tragedy of the Commons

Aristotle observed that "[w]hat is common to the greatest number has the least care bestowed upon it. Everyone thinks chiefly of his own, hardly at all of the common interest." In 1968 Garrett Hardin examined the system of incentives that leads to this "careless" exploitation of a common resource, and coined the phrase "the tragedy of the commons" to describe the overexploitation of that resource.

A tragedy of the commons is characterized by a limited common resource that is exploited by several independent users. In this situation, each user has an incentive to exploit that resource until their short-term profits are maximized. This incentive continues to exist in the face of

6. See id. at 1–2.
7. Cf. id. at 1.
8. See Bryan, supra note 4, at 242 ("Coastal States create and implement conservation plans for their own salmon stocks . . . . Therefore, high seas catches of salmon from different states-of-origin interfere with the management efforts of those states." Id.). See also Jensen, supra note 3, at 371.
diminishing total benefits to society, and even, perhaps, at the expense of personal profits in the long run. The incentive to overexploit is based on the idea that the benefit of using one more unit of the resource will go entirely to its user, while the cost (of depleting the common resource beneath the level of maximum yield) will be dispersed among all users. This incentive operates on all users, and results in a race between those users to exploit the resource until it becomes prohibitively expensive to do so.

The incentive to overexploit is complemented by several factors that deter concerned users of a common stock from unilaterally abstaining from the race to exploit. Because the burden imposed on the common resource by each user is frequently insignificant, the benefit to society of unilateral abstention would be, just as frequently, minimal. Furthermore, the meager benefits of unilateral abstention accrue to all users, but are achieved at costs that fall solely on the individual actor. These factors are compounded by the fear that other users, who are still racing to use as much of the resource as possible, will pick up the slack and thereby negate any societal benefits of abstention.

If left unchecked, this system of incentives tends towards the collapse of the common resource.

B. Privatization as a Solution to the Tragedy of the Commons

One way to alleviate the overexploitation of a common resource is to privatize it, such that one entity has an enforceable right to exclude others from exploiting that resource. If an entity has such a right, and retains the right to exploit the resource, that entity will internalize the costs of mismanagement. Consequently, the externalities and incentives that tend towards the collapse of a common resource will be extinguished, and a tragedy of the commons will be averted.

C. Regulatory Solutions to the Tragedy of the Commons

Regulating the use of a common resource can also obviate the externalities that cause the problem of the commons. The argument in support of a regulatory solution runs in the following way:

12. Thompson, supra note 10, at 242.
13. Id. at 245.
14. See Hardin, supra note 11, at 1244.
15. Id. at 1245 ("The tragedy of the commons as a food basket is averted by private property, or something formally like it. But the air and waters surrounding us cannot readily be fenced, and so the tragedy of the commons as a cesspool must be prevented by different means, by coercive laws or taxing devices." Id.).
If: (1) a governing body sets a limit on the use of a common resource such that, if the limit is adhered to, the total use of the resource would not exceed the value maximizing level, and (2) either: (a) the risk of non-compliance with the regulation exceeds (net benefit of non-compliance), or (b) the regulation is self-enforcing, then, (3) users will not exploit past the level at which the marginal benefit equals the marginal cost.

This argument rests on two main premises. The first premise has to do with the level of exploitation permitted by the regulatory scheme. If, in spite of the regulation, users can legally exploit a resource beyond the value maximizing level, then the regulation cannot, by itself, preclude the overuse of the common resource (hereinafter, this premise will be referred to as the “exploitation condition”).

The second premise has to do with the level of deterrence achieved by the regulation (hereinafter, this premise will be referred to as the “deterrence condition”). Absent sufficient deterrence, the same system of incentives that gives rise to the problem of the commons will also encourage users to disregard the regulations. These incentives will be avoided if the risk of non-compliance outweighs the benefit of exploiting beyond the regulatory mandates. Note also, however, that such regulations may be self-enforcing when each user believes that all other users will adhere to the regulation. If a user either: 1) maximizes her personal profits from the resource in the long-run when she and all other users abstain; or, 2) internalizes the benefit to society of precluding the tragedy of a common resource such that the benefit to the user of avoiding the tragedy outweighs the foregone profits of non-compliance, then the user will adhere to the regulation. However, if a user does not believe that other users will also comply, she will be unwilling to comply unilaterally because the benefits of her unilateral compliance will be outweighed by the opportunity costs of compliance.

16. The risk of non-compliance equals (probability of being caught) multiplied by (the severity of the penalty if caught).
17. The profits that a user would accrue if she did not adhere to the regulation.
18. A regulation aimed at solving a problem of the commons will be self-enforcing if all users believe that other users will adhere to the regulations, and each user either: 1) adheres to the standard out of a fear that, if she does not adhere, other users will not adhere; or, 2) chooses to promote society’s welfare (instead of their immediate personal profit) by adhering to the government’s standard when they believe that all other users will also abstain.
19. But see generally Matt Ridley & Bobbi S. Low, Can Selfishness Save the Environment?, THE ATLANTIC, Sept. 1993, 76, 78 (claiming that a problem of the commons will rarely be solved if it relies upon this idea of abstaining for the “collective interest”. Id.).
The two main premises of this argument constitute necessary conditions for a regulatory solution to the problem of the commons. If either of these conditions is not met, the proposed regulatory solution will not succeed.

D. North Pacific Salmon Stocks and the Tragedy of the Commons

Salmon stocks that are subject to exploitation by more than one nation are victim to the system of incentives that operates on users of common resources on two levels. On the primary level, these incentives encourage individual vessels to race to catch as many fish as possible. Note that on this level, each vessel’s flag state is best situated to mandate or induce that vessel to limit its catch.

However, a flag state has no incentive to create such mandates or inducements. To the contrary, nations with North Pacific salmon fisheries are subject to a secondary level of incentives that reinforces those incentives operating on individual vessels. That is, nations have an incentive to allow their fisheries to exploit the common salmon stock in a manner unimpeded by national regulations. The capture of one ton of fish by a nation’s fisheries benefits that nation, while the cost of depleting the salmon stock is borne by all nations who exploit the resource. Furthermore, a nation’s fear that any unilateral decision to protect the salmon stock will be rendered futile by other nations that pick up the slack tends to prevent any such regulations. Thus, nations that exploit salmon stocks have incentives to allow their fisheries to overexploit that stock, and nations in which salmon stocks originate, or to which they migrate, are discouraged from implementing costly regulations that would protect the stocks.

If nations and vessels act according to these incentives, no nation will protect anadromous fish stocks that migrate into the high seas or between exclusive economic zones, no nation will hinder its fisheries’ ability to exploit such stocks, and each vessel will race to catch as many salmon as is possible. This system of incentives tends inevitably towards the collapse of the resource. To prevent such a tragedy, the incentives that operate on nations and on individual fisherman must be addressed. However, each nation is best situated to remedy the incentives operating on its salmon fisheries, yet no nation acting alone has an incentive to do so. This means that any national attempt to promote the sustainability of


anadromous salmon stocks must be preceded by a solution at the international level.

In fact, the international community has implemented numerous laws that address the problem of common anadromous stocks of the North Pacific. The current body of laws addressing this issue operates within the framework created by the United Nations Convention on the Law of the Sea of 1982 (UNCLOS). In this comment, I will analyze the UNCLOS approach to the problem of common anadromous stocks and those laws that supplement the UNCLOS approach. I will also suggest measures to bridge the ever-narrowing gap to a viable solution.

II. THE UNITED NATIONS CONVENTION ON THE LAW OF THE SEA OF 1982

The system of international laws dealing with anadromous stocks of the North Pacific is built upon the foundation created by the UNCLOS. The UNCLOS provisions that establish this foundation rely upon the privatization and regulation of North Pacific salmon stocks.

A. UNCLOS and the Privatization Approach

The UNCLOS recognizes that a nation has a limited right to exclude other nations from harvesting those anadromous stocks that originate in its rivers. UNCLOS affirms this right in two ways: 1) by codifying a 200-mile “exclusive economic zone” (EEZ) that extends from a nation’s coasts; and, 2) by codifying the “primary interest” principle.

The EEZs codified by UNCLOS extend 200 miles from a coastal nation’s shores. Each coastal state has a right to exclude other nations from exploiting resources found within that 200-mile zone. As a general rule, this means that a nation has exclusive management authority over those resources existing within its EEZ. Consequent to this exclusive management authority, a nation in which salmon originate has an incentive to efficiently manage those stocks that do not migrate beyond its 200-mile EEZ.

Article 66(1) of UNCLOS codifies the principle that a nation in which anadromous stocks originate has the “primary interest” in those stocks,
regardless of where those stocks are located. Exactly what this “primary interest” entails is not unambiguous. However, it is clear that its value as a solution to the problem of common anadromous stocks would be greatest when the right it affords a nation in which such stocks originate is strongest. Read in this manner, the provision would seem to recognize that a nation of origin has an absolute right to exclude other nations from harvesting its salmon stocks. This interpretation is supported by Article 66(2), which states that a state of origin may limit the extent to which other nations can harvest its salmon stocks by establishing a “total allowable catch” for other nations. If applied in this manner, Article 66(1) would privatize anadromous stocks such that the nation of origin would internalize all costs of overexploiting or under-protecting its salmon stocks.

However, Article 66(1) cannot entail an absolute right to exclude. This is true because: 1) salmon that originate in one nation commingle with salmon of the same species that originate in other nations; and, 2) commingling salmon stocks of the same species cannot be distinguished merely by nation of origin. The being the case, the nation in which one salmon stock originates—nation A—cannot exclude another nation—nation B—from harvesting that stock without excluding B from harvesting B’s stocks of the same species. Because it is absurd to say that B has a “primary interest” in those stocks that originate in B, yet A has the power to prohibit B from harvesting those stocks, a nation of origin’s “primary interest” cannot entail an absolute right to exclude.

Although “primary interest” cannot mean an absolute right to exclude, it does give a nation a heightened interest in those fish stocks that originate in its rivers. This heightened interest enables a nation of origin to exclude other states, from which a salmon stock could not have originated, from harvesting stocks that could have originated within its borders. Thus, the “primary interest” recognized by Article 66(1) does enable a nation to exclude, to some extent, other nations from harvesting those salmon stocks that originate in its borders.

Additionally, the “primary interest” principle enables a nation of origin to co-manage the stocks that originated in its rivers while those stocks migrate through the EEZs of other nations. Said another way,

24. UNCLOS, supra note 22, art. 66(1).
25. The more control that a “primary interest” affords to a nation where anadromous stocks originate, the more that nation internalizes the costs of over-exploiting that stock.
26. UNCLOS, supra note 22, art. 66(2). If a nation does not have a right to exclude others from harvesting, it could not impose a “total allowable catch”.
27. Bryan, supra note 4, at 252. For example, because no species of salmon originate in Taiwan, the United States has a right to exclude Taiwan from harvesting any salmon stocks that could have originated in U.S. rivers. Id.
Article 66(1) limits the management authority of a nation over non-native anadromous species found within its EEZ. Article 66(4) seeks to clarify this relationship between the nation from which an anadromous stock originates and those nations to which that stock migrates by mandating that "[i]n cases where anadromous stocks migrate into or through the waters landward of the outer limits of the exclusive economic zone of a State other than the State of origin, such State shall co-operate with the State of origin with regard to the conservation and management of such stocks." Therefore, the primary interest principle gives a nation of origin the authority to jointly manage stocks that originate in its rivers while those stocks migrate through other nations' EEZs.

However, because this "primary interest" cannot entail an absolute right to exclude, it must follow that Article 66(1) does not, by itself, obviate the system of incentives that operates on nations that harvest salmon on the high seas. If a right to exclude is not absolute, then, absent any further enforceable regulations, some users can exploit salmon stocks that originate in other nations. Those users would have an incentive to overexploit because they would not internalize all of the consequential costs. In light of these factors, the nation of origin would have a disincentive to protect the resource. So, by themselves, those UNCLOS provisions that tend towards the privatization of anadromous stocks cannot preclude a tragedy of the commons. In recognition of the limitations of these provisions, UNCLOS supplements them with provisions that regulate the harvest of anadromous stocks.

B. UNCLOS and the Regulatory Approach

UNCLOS Article 66(3) is a regulatory provision designed to supplement those provisions that recognize a nation's limited right to exclude others from harvesting salmon stocks that originate in its borders. Article 66(3) mandates that "[f]isheries for anadromous stocks shall be conducted only in waters landward of the outer limits of

28. UNCLOS, supra note 22, art. 66(4).
29. A user has an incentive to continue exploiting a resource until the marginal costs that accrue to the user equal the marginal benefits of exploiting the resource. If some of the costs of overexploiting a resource are externalized, and the benefits of exploiting the resource are completely internalized, then the user will necessarily have an incentive to exploit beyond the level at which all marginal costs equal the marginal benefit.
exclusive economic zones, except in cases where this provision would result in economic dislocation." Thus, if fully enforced, Article 66(3) would regulate fishing such that no nation could harvest anadromous stocks on the high seas except those in which the cessation of such fishing would result in "economic dislocation."

C. Analysis of UNCLOS

UNCLOS essentially establishes two fronts within which the war to resolve the problem of common anadromous stocks must be waged. The first front is on the high seas; the second is within the EEZs of nations other than the nation of origin.

1. UNCLOS and Anadromous Stocks on the High Seas

Through Article 66(3), UNCLOS employs a regulatory approach towards the problem of the commons on the high seas. Because it calls for an all out ban on high seas salmon fishing, Article 66(3) fulfills the exploitation condition. However, it is unlikely that UNCLOS Article 66(3) fulfills the deterrence condition necessary for the success of its regulatory approach.

Article 66(3) contains no specific enforcement provisions. Without specific enforcement provisions, it is difficult to see how the risks of non-compliance would outweigh the benefits. It could be argued that, by not adhering to the prohibition against harvesting salmon on the high seas, a nation risks retaliatory trade barriers or international stigmatization. However, history suggests that these risks do not outweigh the benefits of non-compliance. In 1989, Taiwanese fisherman illegally harvested at least twenty-four million pounds of salmon on the high seas. In 1989, it was estimated that the costs to society of salmon interceptions on the high seas could be as great as $500 million per year. These facts not only suggest that the risks of non-compliance do not outweigh the benefits, but also that Article 66(3) is not self-enforcing. Consequently, it is unlikely that Article 66(3) meets the deterrence condition necessary to solve the problem of common anadromous stocks on the high seas.

30. UNCLOS, supra note 22, art. 66(3).
31. See Bryan, supra note 4, at 249. The exemption for "economic hardship" initially enabled Japan to continue harvesting salmon on the high seas in spite of the general prohibition against doing so. Subsequently, however, Japan has ceased targeting salmon stocks on the high seas in accordance with the general prohibition, and no other nations have been exempted from that prohibition. Id.
32. Id. at 252.
2. UNCLOS and Salmon Stocks that Migrate Between EEZs

The second front on which externalities tend towards the depletion of North Pacific salmon stocks is within the EEZs of nations other than the nation of origin. The following example illustrates the problem of the commons as it affects salmon stocks that migrate between EEZs:

(1) Canadian salmon stocks regularly migrate through the EEZ of the United States.\textsuperscript{34}

(2) While these Canadian stocks are within the EEZ of the United States, the United States exploits those stocks.

(3) Absent any limits on the United States' management authority within its EEZ, the United States would have an incentive to overexploit Canadian stocks,\textsuperscript{35} and the costs of such overexploitation would, to some extent, be externalized to Canada.\textsuperscript{36}

(4) U.S. overexploitation would undermine the efficacy of Canadian regulations aimed at promoting the sustainability of Canada's stocks,\textsuperscript{37} and this possibility serves as a disincentive for Canada to protect those stocks.\textsuperscript{38}

(5) This system of incentives, based on the externalities existing between multiple parties that share a finite resource, is the essential characteristic of a tragedy of the commons.

Article 66(4) addresses the problem of the commons as it applies to salmon stocks that migrate between EEZs. Article 66(4) states that "in cases where anadromous stocks migrate into or through the waters landward of the outer limits of the exclusive economic zone of a State other than the State of origin, such State shall co-operate with the State of origin with regard to the conservation and management of such stocks."\textsuperscript{39} This article, however, merely calls for cooperation.\textsuperscript{40} It was not intended to be an instrument for extinguishing the bi-national externalities that exist between the nation where a salmon stock

\textsuperscript{34} Jensen, supra note 3, at 370.

\textsuperscript{35} U.S. overexploitation would occur in two situations: 1) U.S. fisheries could target Canadian stocks for overexploitation; or, (2) The United States could negligently manage those stocks within its EEZ. Note also that, if Canadian legislators merely believe that the United States is mismanaging those stocks within its EEZ (whether or not that belief is accurate), Canada will be discouraged from protecting stocks that migrate between the Canadian and U.S. EEZs.

\textsuperscript{36} Jensen, supra note 3, at 370–71.

\textsuperscript{37} Id.

\textsuperscript{38} Id.

\textsuperscript{39} UNCLOS, supra note 22, art. 66(4).

\textsuperscript{40} Constance Sathre, Salmon Interception on the High Seas: A Continuing Controversy Between the United States and Japan, 16 ENVTL. L. 731, 753 (1986).
originates and the nation to which that stock migrates. Instead, Article 66(4) recognizes that both the nation of origin and the nation to which a salmon stock migrates have legitimate interests in that stock, and mandates that those nations work together to manage that stock efficiently.

3. Anadromous Stocks After UNCLOS

UNCLOS, though it does not resolve the problem of common anadromous stocks, created a framework within which the problem can be solved. Success requires that two remaining issues be resolved: 1) the ban on fishing the high seas for anadromous stocks must be adequately enforced; and, 2) nations between which salmon stocks migrate must work together to extinguish the externalities fostered by their shared resource.

III. ENFORCING ARTICLE 66(3): THE CONVENTION FOR THE
CONSERVATION OF ANADROMOUS STOCKS IN THE NORTH PACIFIC

The United States, Canada, Russia, and Japan participated in the 1992 Convention for the Conservation of Anadromous Stocks in the North Pacific (1992 Convention). The 1992 Convention reaffirms UNCLOS article 66(3) by prohibiting Parties to the Convention from harvesting salmon on the high seas.41

To its credit, the 1992 Convention includes specific provisions that move somewhat towards making that prohibition more enforceable than was UNCLOS article 66(3).42 However, these provisions ultimately do not satisfy the deterrence condition necessary for a regulatory solution to the overexploitation of salmon stocks on the high seas.

The first shortcoming of the enforcement provisions of the 1992 Convention is an obvious one—the prohibition against high seas fishing is only binding upon those nations party to the agreement.43 Article IV of the 1992 Convention addresses the issue of non-party nations, but does little to solve the problem. It merely calls for the signatory states to cooperate in dissuading other nations from harvesting salmon in the Convention area.44 As a result, non-signatory nations continue to overexploit

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41. See 1992 Convention, supra note 5, art. I, at 1.
42. See 1992 Convention, supra note 5, art. V, at 3 (enabling the official of any party to the convention to board and arrest any vessel reasonably believed to be harvesting salmon in violation of the Convention). Thus, nations other than a vessel’s flag state, to some extent, can enforce the prohibition against harvesting salmon on the high seas. Id.). See also Bryan, supra note 4, at 252.
43. See Jacobson, supra note 9, at 2.
44. 1992 Convention, supra note 5, art. IV(4), at 3.
salmon stocks and to externalize the costs of doing so, and the nations bound by the 1992 Convention have a consequent disincentive to protect those stocks.

A second impediment to the successful enforcement of the 1992 Convention’s ban on high seas salmon fishing is the vastness of the North Pacific Ocean.45 Both the United States and Russia use sophisticated technology to detect salmon pirates on the high seas.46 However, the effectiveness of these measures is undermined by the size of salmon migratory ranges.47 Because the level of deterrence achieved by the 1992 ban is directly related to the probability of being caught, and because the probability of catching a salmon pirate on the vast expanse of the North Pacific is small, achieving the appropriate deterrence level is a formidable task.

However, the level of deterrence achieved by a regulation is a function of the size of the penalty as well of the probability of being caught. Thus, an appropriate level of deterrence could be achieved in spite of the vastness of the North Pacific. But the enforcement provisions of the 1992 Convention proclaim that no entity, other than a vessel’s flag state, is permitted to penalize that vessel for violating the prohibition against harvesting salmon on the high seas.48 This being the case, a vessel will not be deterred unless its flag state imposes adequate penalties.49 However, nations with salmon fisheries often have an incentive not to deter their vessels from harvesting salmon on the high seas.50 Thus, the Convention’s attempt to indirectly address the primary system of incentives that operates on individual vessels, without first addressing the secondary system of incentives that operates on the flag state of those vessels, is unlikely to succeed.


The bi-national problems associated with salmon stocks that migrate between EEZs are clearly demonstrated by the relationships between the

45. Bryan, supra note 4, at 259.
46. Id. at 257–58.
47. Id. at 258.
49. The prohibition is substantively the same as UNCLOS Article 66(3), which history has proven not to be a self-enforcing regulation. See Walton, supra note 33, at 584.
50. By allowing its fisheries to violate the high seas ban, a nation would reap the benefits of other nations’ compliance, and would externalize any costs of overexploitation.
United States, Canada, and the North American salmon stocks that migrate between these two nations. Over the past 90 years, the United States and Canada have addressed these problems through numerous bilateral agreements. In 1985, and perhaps in response to the appeal for cooperation of UNCLOS Article 66(4), the United States and Canada negotiated the Pacific Salmon Treaty (PST). In response to the shortcomings of the PST, the United States and Canada supplemented the PST with the 1999 Pacific Salmon Agreement (Agreement). These bi-national instruments have approached, yet fallen short of, a lasting resolution to the problem of the commons as it persists between the United States and Canada. Through an analysis of these instruments, however, several potential solutions to the problem become evident.

A. The 1985 Pacific Salmon Treaty

Before examining the PST, it may be helpful to re-examine the externalities that the 1985 treaty was intended to address. Several species of North American salmon migrating between the EEZs of the United States and Canada. Acting as a cohesive unit, the United States and Canada would exploit these salmon stocks such that the value of that resource is maximized. Furthermore, the United States and Canada would regulate the use of those rivers from which salmon originate to the extent that the marginal costs of regulating equal the marginal benefits of a healthier salmon stock. Consequently, the value of North American salmon stocks would be maximized, and both nations would be better off.

Conversely, when the costs or benefits of one nation’s decisions to protect (or not to protect) can be externalized to the other nation, both parties have an incentive to exploit salmon stocks beyond the value-maximizing level. For example, Canada has proscribed the creation of energy generating dams on many rivers in British Columbia. The United States has refused to implement similar restrictions in Washington and Oregon. Consequently, salmon stocks of Canadian origin have flourished while many species of U.S. salmon are endangered. The costs of Canada’s regulations are borne entirely by Canada, but the benefits (of increased harvests) are shared by Canada and the United States. Similarly, the United States externalizes some of the costs of its decision

52. Id. at 606.
53. Id. at 611.
54. Id. at 646-47.
55. Id. at 646.
56. Id.
not to protect, but the benefits of that decision are completely internalized. Consequently, Canada is discouraged from protecting its stocks and both nations have an incentive to overexploit because they can externalize some of the costs of doing so. The inevitable consequence of this game is that everyone is worse off, especially the salmon.

Thus, the challenge facing the drafters of the PST was to create a binding framework within which the United States and Canada would internalize both the costs and benefits of their salmon-oriented decisions. The PST sought to achieve this goal through a regulatory approach that championed the principles of conservation and equity. Through conservation, the parties sought to “prevent overfishing and provide for optimum production.” The equity principle sought to allocate the right to exploit North American salmon such that each party would “receive benefits equivalent to the production of salmon originating in its waters.” Although these principles are vague, their successful implementation would have eliminated the bilateral externalities that undermine an efficient North American salmon fishery. Conservation requires that the total level of exploitation not exceed that which would provide for “optimum production,” and equity would ensure that the costs and benefits of each nation’s regulatory decisions would be internalized.

However, the PST proved ineffective because the equity principle was never implemented according to its plain meaning. The equity principle as defined by the PST builds upon the notion codified in UNCLOS Article 66(1) that a nation of origin has the “primary interest” in its salmon stocks. Accordingly, the PST mandates that each party receive all of the benefits derived from those salmon stocks that originate in its borders.

58. Id.
59. Id.
60. Id. The equity principle, as defined by the PST, is best illustrated by way of an oversimplified example. Assume that there is only one species of salmon—Salmon. Assume further that 100 Salmon will originate in Canadian rivers this year, and that 60 Salmon will originate in U.S. rivers. On the wholesale market, Salmon can be sold for $10/pound, and the average weight of Salmon equals 1 pound. Finally, assume that the Conservation principle requires an escapement of 50% to ensure sustainability. According to the equity principle, Canada is entitled to the value of harvestable Salmon that originate in its rivers (or $500). Now, because Salmon of U.S. origin commingle with Salmon of Canadian origin, the equity principle cannot be effectuated through a mandate that Canada harvest only Canadian Salmon, and that the United States only harvest U.S. Salmon. Canada will inevitably intercept U.S. Salmon, and vice-versa. This being the case, the equity principle can only be achieved in two ways: 1) by
Because the equity principle has never been adequately implemented, the PST has not fulfilled the exploitation condition necessary for a regulatory solution to the problem of the commons. This failure of the PST can be attributed to two factors: 1) insufficient procedural mechanisms; and 2) the tendency for intra-section disputes to impede the creation of harvest limitations.

1. Procedural Mechanisms of the PST

The PST contains both procedural and substantive provisions. The substantive requirements of the PST were created in Annex IV. This annex set short-term limits on the amount of a specific salmon stock that each nation could harvest. Articles II and IV of the PST establish the procedural mechanisms by which Annex IV is to be periodically amended. Article II established the Pacific Salmon Commission (Commission), and Article IV defined the procedure by which the Commission could amend Annex IV. The Commission consists of one Canadian section and one U.S. section. Each section gets one vote and the power to veto, so any recommendations or decisions made by the Committee must be consensual. Each year, the nation in which a specific salmon stock originates must submit estimates concerning the size and management of those stocks for the upcoming year to the Commission. Based on this information, the Commission is required to recommend “fishery regimes”, that, if accepted by the Parties, would supplant those previous regimes defined by Annex IV.

However, the consensus requirement of Article II renders the Commission impotent whenever the two sections of the Commission disagree. This situation is exacerbated by the likelihood that the two sections will be unable to reach an agreement concerning harvest allocations—neither nation wants their ceiling to be reduced relative to the other party’s, and any reallocation necessarily entails this effect. The result has been a perpetual stalemate. Since 1992, the consensus requirement has thwarted all proposed harvest allocations.

Ensuring that there is a balance between the value of Canadian Salmon intercepted by the United States, and the value of U.S. Salmon intercepted by Canada; or, 2) in the case of an imbalance in intercepted Salmon, by requiring the nation who intercepts more Salmon to compensate the other nation for the difference between the other nation’s equitable harvest and its actual harvest.

61. PST, supra note 57, art. II.
62. Id.
63. Id. art. IV.
64. Id.
65. Brown, supra note 51, at 651.
66. Id. at 605.
procedural failure created incentives for each party to overexploit North American salmon stocks. The “lack of agreement led to a free-for-all by each of the parties, as each sought to catch as many fish as possible to prevent the other side from benefiting from the breakdown in talks.” Each nation feared that it would not fully internalize the benefits of unilateral restraint, so neither nation restrained.

Relatedly, the consensus requirement enabled the United States to misinterpret the equity principle to its own advantage. Throughout the 1990’s, Canada alleged that the United States was benefiting from an interception imbalance, and sought to adjust the Annex IV harvest allocations accordingly. The United States was predictably opposed to such a reallocation, and vetoed Canadian proposals to remedy the imbalance. In response to Canada’s accusation that the United States was wielding its veto power in a manner that violated the equity principle, the United States claimed that an interception balance was not required by the equity principle. This assertion was primarily founded on the PST’s recognition of “the desirability . . . of avoiding undue disruption of existing fisheries.” Thus, the Commission could not reach the consensus necessary to amend Annex IV, and the goals of equity and conservation have consequently been left unfulfilled.

An obvious way to mitigate the effects of an inter-section stalemate would be to establish a mechanism for settling disagreements. One option is an arbitration clause, whereby an arbiter would be empowered to render binding decisions in the case of intra-Commission disagreements, thus ensuring the implementation of annual harvest limitations necessary for the twin goals of equity and conservation. Another option is a default rule that limits harvests to a greater extent than would the ceilings to which the parties would likely agree. Such a rule would encourage the parties to negotiate appropriate limits, and would prevent the race to exploit. Both of these alternatives to the mutual consent

67. Id. at 651.
70. PST, supra note 57, art III; McDorman, supra note 69, at 100.
71. Brown, supra note 51, at 674.
72. Id. at 675.
73. Id. at 676.
74. Id.
requirement would materially alter the PST and would likely require the approval of the U.S. Senate, but the system created by the PST is unlikely to be effective as it is written.

2. The Stakeholder's Veto

The requirement that both sections of the Commission consent to any proposal prior to its adoption is exacerbated by the composition of the U.S. section. Each party to the PST appoints up to four commissioners to sit on its section. The Canadian section consists of four representatives, but is headed by a representative of the federal Department of Fisheries and Oceans. The other three representatives can make suggestions to the federal representative, but ultimately the federal representative has the last word.

The U.S. section is comprised of one representative from Washington or Oregon, one from Alaska, one from Native American tribes, and one non-voting representative from the federal government. Unlike the Canadian section, however, the U.S. domestic law implementing the PST mandates that there be a consensus of these U.S. "stakeholders" before the section can act. Because the U.S. section must act before the Commission can act, each U.S. stakeholder holds a power to veto not only intra-section proposals, but also any proposal that comes before the Commission.

Throughout the 1990's, the composition of the U.S. section was a stumbling block for achieving the requisite consensus. One reason is that Alaskan interests are often at odds with the interests of other U.S. stakeholders. This is due in part to the migratory patterns of North American salmon. Salmon that originate in the continental United States and Canada migrate to the Alaskan coast, but salmon from Alaska do not migrate to the south. Consequently, Canada intercepts salmon that originate in Washington and Oregon, and Alaska intercepts both Canadian salmon and salmon from the continental United States. In the late 1980s, there was a rough balance between Canadian interceptions and U.S. interceptions. But, because Canada has protected its western rivers to a greater extent than has the United States, the abundance of

75. Id. at 675.
76. PST, supra note 57, art. II.
77. Brown, supra note 51, at 630.
78. Id.
79. McDorman, supra note 68, at 15.
80. Id. at 15-16.
81. Brown, supra note 51, at 642.
82. Id.
83. Id.
84. McDorman, supra note 68, at 5.
salmon from Washington and Oregon has decreased relative to the
abundance of Canadian salmon. As a result, Alaska's interception of
Canadian salmon has increased relative to Canada's interception of U.S.
salmon. Canada sought to redress this growing imbalance through
Annex IV of the PST. The majority of U.S. stakeholders agreed, in part
to protect the dwindling stocks of Oregon and Washington, that limiting
U.S. interceptions would be an acceptable way to remedy this situation. Alaska, however, has wielded its veto power to reject proposals that
would limit its harvests. Thus, the U.S. domestic law implementing
the PST enables one stakeholder to block an action by the Commission
that would benefit both Parties to the agreement, and has contributed to
the failures of the PST.

The remedy to this problem is simple in theory but may be impossible
to implement. If the U.S. section were headed by its federal representative,
the federal representative would be able to consent to those proposals
that would benefit the United States without the agreement of every
stakeholder. Such an arrangement, however, may not be possible. The
consensus decision-making process "was instrumental in securing
Senate ratification," and efforts by the federal government to increase
its role in fishery management "have met with fierce resistance." Note
also that the problem of intra-section disputes would be remedied if the
requirement of an inter-section consensus were relaxed or if a decision
forcing mechanism were adopted at the Commission level.

B. The 1999 Pacific Salmon Agreement

Frustrations with the failures of the PST culminated in the salmon
wars between the United States and Canada of the mid-1990s. This
period was marked by desperate attempts by Canada to force the
Commission to arrive at new harvest allocations that reflected the goals
of equity and conservation. Finally, in 1999, the two parties reached
an agreement that, for the moment at least, has defused the situation.

85. Brown, supra note 51, at 646.
86. Id. at 640.
87. Brown, supra note 51, at 642.
88. Id.
89. Id. at 632.
90. Id. at 634.
91. For a description of the salmon wars between the United States and Canada,
see id. at 651.
The 1999 Agreement supplements, but does not supplant, the 1985 PST. It does, however, replace Annex IV. Embodied in the substantive replacements to Annex IV are compromises made by both parties that made the Agreement possible. Prior to 1999, Canada firmly held to its belief that the equity principle could not be fulfilled unless there existed a rough equality of interceptions. In the 1999 Agreement, however, Canada accepted terms that do not require such a balance. In return, the United States made three concessions. First, the United States explicitly agreed to reduce its share of the harvest of a few specified Canadian stocks. Second, the United States agreed to harvest limits and allocations that, without explicitly reducing the U.S. share of certain stocks, seem to tend towards that effect. Finally, the United States agreed to spend $140 million to create two funds for the conservation and management of salmon stocks. These concessions by the United States tend toward a more equitable interception balance in the future, and tend to redress Canadian grievances concerning past imbalances.

The concessions by both parties enabled negotiators to replace Annex IV of the PST with new fishery regimes. Wisely, the negotiators took the opportunity to essentially change the nature of those regimes outlined by the original Annex IV so as to prevent the repetition of past problems. The 1999 Agreement effectuates these changes by creating long-term limits based on the abundance of each salmon stock. Instead of requiring a consensus each year to establish harvest allocations and limits, the annual limits under the new regime are a fixed percentage of the estimated size of each stock for that year. These fixed percentage limitations, established in 1999, will last between ten and twelve years. Under this new arrangement, annual harvest allocations depend less on the policy decisions of an ineffective Commission, and more on scientific determinations of stock abundance. Thus, the concessions made by each party allowed for the creation of new harvest allocations, and the revised form of those allocations ensured that, for at least ten years, the North American salmon harvests would be limited in a manner agreed upon by both Canada and the United States.

93. Id.
94. Id. at 5.
95. McDorman, supra note 69, at 101.
96. Id. at 105.
98. Id. at 6.
99. McDorman, supra note 69, at 105.
100. Id.
101. Id. at 103.
The 1999 Agreement may have been the surest way to alleviate the escalating tensions between the United States and Canada, but it does not resolve any of the fundamental problems of the 1985 PST. The 1999 Agreement neither rejected the consensus decision-making procedure of the Commission nor adopted a decision-forcing mechanism. Consequently, the annual stalemate that plagued the Commission is likely to be replaced by a deca-annual stalemate. Additionally, the substantive terms established by the 1999 Agreement do not adequately effectuate the plain meaning of the equity principle. They take a step in the right direction, but they do not preclude the ability of one nation to externalize the costs of overexploiting or under-protecting North American salmon stocks. Thus, the 1999 Agreement, in conjunction with the 1985 PST, differs in degree, but not in kind, from the 1985 PST standing alone. The longer-termed fishery regimes of the 1999 Agreement limit the degree to which success depends upon an ineffective Commission, but they neither extinguish that dependence nor remove the procedural shackles that render the Commission impotent. The concessions made by the United States that enabled the 1999 Agreement to come to fruition may lessen the degree by which the 1999 harvest allocations miss the equitable mark, but they do not require the interception balance necessary for each party to internalize the costs and benefits of their salmon-oriented decisions.

In spite of these shortcomings, the parties need not jettison the legal construct created by the 1985 PST and the 1999 Agreement to fulfill their lofty goals of equity and conservation. Success within the framework of these legal instruments requires that two steps be taken. First, the parties must re-assert the plain meaning of the equity principle. Each nation should, as set forth in Article III of the PST, "receive benefits equivalent to the production of salmon originating in its waters." Second, the Parties must replace the consensual decision-making process required by Article III of the PST; a new process that settles inter-section disputes through binding arbitration or through a default rule would encourage the parties to arrive at appropriate harvest allocations, and would ensure the creation of new harvest allocations when the prior allocations expire.

102. PST, supra note 57, art. III.
V. INDIVIDUAL TRANSFERABLE QUOTAS

The current international laws that address the problem of the commons as it pertains to salmon stocks of the North Pacific operate within the dual-front framework established by UNCLOS, but fall short of a true solution to the problem. The ban on high seas salmon harvests is still inadequately enforced, and the bi-national externalities existing between nations of origin and those nations to which salmon stocks migrate persist. Separate solutions to these issues are achievable within the UNCLOS framework. There is, however, an alternative to working within the current legal regime. A comprehensive system of Individual Transferable Quotas (ITQ) would provide a uniform solution to the problem of the commons associated with salmon stocks on the high seas and with stocks that migrate between exclusive economic zones.

An ITQ is essentially a permit to harvest a pre-determined percentage of the total salmon supply. An owner would be entitled to his ITQ in perpetuity, but could transfer it at will. And only ITQ owners (or lessees) could legally harvest salmon stocks.

For the purposes of this comment, an ITQ system could be implemented in three over-simplified steps: 1) discern the abundance and escapement requirements of each salmon stock; 2) allocate ITQs between the United States, Canada, Russia, and Japan such that the number of ITQs each nation receives reflects the value of the salmon that originate in its rivers minus the escapement goals for its stocks; and, 3) allocate the ITQs intra-nationally among the appropriate stakeholders.

A. An ITQ-Based Solution to the U.S.-Canadian Salmon Disputes

The proper implementation an ITQ system would fulfill both the equity principle and the conservation principle. If the number of ITQs initially allocated to both nations accurately reflected the value of those nations' salmon stocks minus the value of the salmon necessary to achieve appropriate escapement levels, then both nations would derive all of the benefits of their salmon stocks. The value of Canada's harvest would equal the value of all Canadian salmon harvested. The same would be true of the U.S. harvest, and the equity principle would be realized. This being the case, each nation would internalize the effects of its decisions concerning salmon management. If the United States were to decide to build a hydroelectric dam on a salmon producing river,

103. Brown, supra note 51, at 678–79.
104. Id. at 679.
105. Id.
106. See id. at 680.
and the abundance of U.S. salmon consequently diminished, then the resulting costs of a decreased salmon stock would be internalized by the holders of U.S. ITQs. Because neither nation could externalize the costs of salmon mismanagement, both nations would protect their salmon stocks to the level at which the marginal costs of doing so equal the marginal benefits. Furthermore, ITQ owners would serve as conservation watchdogs because the value of their harvest rights depends on the abundance of salmon. ITQ owners would therefore become lobbyists for salmon protection, and would make sure that un-permitted salmon harvests were minimized. Thus, the privatization and conservation principles would be fulfilled by a well-implemented ITQ system.

A further benefit of the ITQ system is that, once properly implemented, its success in fulfilling the goals of equity and conservation would not depend on achieving a consensus of numerous stakeholders with conflicting interests. Assuming that the initial escapement goals are adequate, the only necessary adjustments to annual harvests would be a function of the abundance of specific salmon stocks. Accurate scientific data concerning yearly abundance would be necessary to determine the value of each ITQ, but these factual determinations are unlikely to be as contentious as were the policy issues facing the Commission in the mid-1990s.

Finally, a properly implemented ITQ system would entail all of the benefits of a well functioning market. Each ITQ would eventually go to the person who could harvest that quota most efficiently. Marginal fishermen would, to their benefit, sell their quotas and get out of the industry. The end result would be a net gain in utility for both the United States and Canada.

Despite these benefits, recent history suggests that the United States would be unwilling to accept an ITQ system. The initial implementation of an ITQ system would require the United States to agree to the equitable allocation of ITQs between the United States and Canada. But the equitable allocation of harvest rights is exactly the issue upon which the Commission has been unable to agree. Therefore, unless the United States could pass a new treaty through the Senate that does not require a consensus among all U.S. stakeholders, it is unlikely that the United States would agree to the equitable allocation of ITQs necessary for a successful ITQ system. Note also that if the United States could pass such a treaty through the Senate, then it would also be possible to realize the principles of equity and conservation within the framework of

107. Id. at 684.
the 1985 PST and the 1999 Agreement. However, a well-implemented ITQ system would still be preferable to a solution within the current legal framework because of the efficiencies that inhere in a market based system, and also because an international ITQ system could be used to mitigate the problem of common salmon stocks on the high seas.

B. ITQs and Salmon Piracy on the High Seas

An ITQ regime would help deter nations and vessels from acting upon their incentives to illegally harvest salmon on the high seas in two distinct ways.

First, an ITQ system would give greater incentives for a flag state in which salmon stocks originate to deter its vessels from harvesting salmon on the high seas. Nations where salmon originate would be allocated ITQs according to the value of those salmon that originate in its rivers minus the escapement goals for its stocks. When a stock is under-protected, the value of a nation of origin's ITQs is diminished. Nations where salmon originate will seek to avoid this diminution of the value of their salmon harvests through good management of its salmon stocks. Furthermore, ITQ owners within a nation of origin will encourage their government to maximize the value of national salmon stocks because the value of each ITQ is a function of the size and sustainability of that nation’s salmon supply. Consequently, nations of origin will have a greater incentive to manage their stocks so as to achieve the maximum sustainable harvest level. And, because salmon on the high seas have not yet matured and the capture of these immature fish significantly undermines the value of future salmon stocks, nations where salmon stocks originate will have a greater incentive to deter high seas salmon harvests.

Second, an ITQ regime would entail a ticketing system that prohibits the sale of salmon caught without an ITQ. Under this system, each ITQ owner would be given tickets that correspond to her permitted harvest level for a given year, and would be prohibited from selling her catch to dockside processors without transferring the appropriate number of tickets to the purchaser. These processors would then be required to file those tickets so that enforcement agents would be able to compare the processor’s records with the tickets they have filed. If the system worked perfectly, salmon pirates would be unable to find buyers for their salmon.

108. Walton, supra note 33, at 595 ("It has been estimated that every pound of fish taken on the high seas would produce three to six pounds of fish inshore." Id. Furthermore, "because these fish never have the opportunity to spawn and reproduce, the future productivity of the fishery is threatened." Id.).
110. Id.
111. Id.
illegal harvests because processors would be unwilling to run the risk of being caught marketing salmon without tickets. And even if the system did not work perfectly, it would make harvesting salmon illegally a less profitable endeavor, and salmon pirates on the margin would turn to other pursuits.

VI. CONCLUSION

The problem of the common anadromous stocks of the North Pacific is currently addressed through a legal regime operating within the framework established by the UNCLOS. This legal regime operates on two distinct fronts, but the externalities and incentives that define a problem of the commons continue to exist on both fronts. On the high seas, inadequate enforcement enables vessels and nations to violate the ban against high seas salmon harvests and to externalize the costs of doing so. Within EEZs, ineffectual bi-national treaties enable nations to which salmon stocks migrate to overexploit salmon stocks that originate in other nations, and to externalize the costs of doing so. It may be possible to eliminate these problems within the current legal regime. However, a well-implemented system of ITQs could provide a more cohesive, comprehensive, and efficient mechanism for resolving the externalities and incentives that continue to plague the salmon stocks of the North Pacific.

CHRISTIAN C. POLYCHRON
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