Closing the Circle: Restoring the Seasonal Round to the Ceded Territories

George R. Spangler*

Abstract

For thousands of years, the original inhabitants of North America met their needs for sustenance from the lands and waters stretching from the Gulf of Mexico, north to the Arctic Ocean. The multitude of cultural adaptations manifest in the land masses of the New World would change dramatically in the half-millennium after 1492 as the Columbian Exchange precipitated broadly disparate flows of mineral and biological resources, diseases, and technologies, rupturing the temporal and material foundations of cultures that had developed over thousands of years. Native cultures that had evolved in northerly latitudes a seasonal round of activities, traditions and technologies to cope with the climate and physical geographies of their environments, found themselves immersed in rapidly changing social, economic and political structures with no demonstrated histories of long-term sustainability. In this brief retrospective, we examine resource management in the ceded territories over the past quarter-century to see if implementation of the treaty-guaranteed rights in the upper Great Lakes region is on track to restoring the seasonal round essential to the cultural awareness of the Chippewa. We do this by evaluating changes in the status of renewable resources in the region, and identifying how Chippewa harvest relates to the sustainability of these resources.

Keywords: Seasonal round, sustainable use, treaty rights, Treaty of 1837, Ojibwe traditions

* Dept. Fisheries, Wildlife, and Conservation Biology, University of Minnesota, 200 Hodson Hall, 1980 Folwell Ave., St. Paul, MN 55108. Email address for correspondence: spang001@tc.umn.edu

Introduction

In July, 2009, “Minwaajimo”, an Ojibwe treaty symposium was held on the Bad River Indian Reservation, at Odanah, Wisconsin, to celebrate the continuing exercise of Ojibwe treaty rights and the Twenty-Fifth Anniversary of the founding of the Great Lakes Indian Fish and Wildlife Commission (GLIFWC). Purposes of the symposium included celebratory community events, educational outreach for the participants, and prospective/retrospective reflection upon the status of natural resource management in the ceded territories. This paper was conceived as a background document for a panel discussion of the state of tribal resource management in the upper midwest. Much of the history is well-known, but it is reiterated here to provide a framework by which recent accomplishments and disappointments can be contrasted with the past. The text is burdened with detailed examination of statistics, and this is necessary to judge whether or not we are succeeding in our management efforts. But it is not enough to simply report the annual harvest among those sharing these resources. Each of us must judge the merits of diversified resource use in contrast to concepts of maximum or optimum sustained yield. We must judge for ourselves, and lend our voices to our communities to decide if each passing year will be better than the last.

In the Ojibwe language, the symposium name, Minwaajimo, means “telling a good story”. It remains for the reader to decide if this is, indeed, a good story, or merely a suggestion that “the best is yet to come.”

A World New to Europeans

A written history of resource utilization in the Great Lakes region began with the notes, logbooks and correspondence of early European explorers and, subsequently, the Jesuit missionaries. But long before the first dispatch reached European shores it was evident that the original inhabitants of North America had succeeded, over thousands of years, in meeting their needs for sustenance from the lands and waters stretching from the Gulf of Mexico, to the Arctic Ocean. Life in the Americas was almost universally perceived by its human residents as an emergent property of a sacred circle of creation encompassing all animate and inanimate elements interacting to produce “all that is” (Vecsey and Venables 1980). Ethnohistorians have come to understand that the original peoples had a wide spectrum of life-styles, ranging in mobility from semi-nomadic to highly sedentary. Cultures occupying the length and breadth of the continent waxed and waned in rhythms imposed by climate, physical geography, and their own adaptations to their environments.

Across territories now occupied by the northern tier of these United States, native people moved with the seasons, occupying semi-permanent sites and temporary encampments, as necessary, to participate in a seasonal round of hunting, fishing, and gathering food and medicinal herbs (McClurken, et al. 2000). This round included, in the Great Lakes area, fishing for whitefish at points of seasonal aggregation, spearing walleye and suckers in spring spawning runs, hunting deer, bear, pigeons and waterfowl, making maple sugar in spring sugar camps, gathering tubers, nuts, and berries during the summer, harvesting wild rice in late summer, and trapping furbearers and hunting during fall and winter. Handicrafts to accompany the seasonal round produced a rich

array of cedar bark bags, bullrush mats, tanned skins and furs, cordage from sinew and plant fibers and a multitude of other items from a cultural knowledge of the plains, woodlands and waters of the region (Lyford 1982). An abundance of arts, oral histories, seasonal shelters, tools, and transportation corridors along major waterways have endured into modern times to attest to the vibrancy of this dynamic culture (Treuer 2003; Cleland 1992). Just as the circle of life in native spiritual traditions conveyed an all-encompassing relationship between the landscape and animate beings, so too did the succession of seasons and activities come full circle each year in a rhythm providing adequate time for advance preparation, and marked by the "counting sticks" of the heads of Ojibwe households (Frances Densmore's narrative by Nodinens, Ojibwe woman at Mille Lacs, cited by Cleland, 2000).[1] Nor was the seasonal round an isolated characteristic of the Great Lakes people. The distinguished anthropologist Alfred L. Kroeber (cited by Jacobs, 1980), "in testifying for the Indians in a court case made the point that the California Indians, living in small triblets, moved from area to area according to the seasons, fishing during winter and springtime, hunting in the fall."

The cadence of these seasonal and annual fluctuations changed dramatically with the European awareness of the "New World" in 1492. Thus began the "Columbian Exchange" (Cosby 1972), an enormous trans-oceanic extraction of mineral and biological resources, and injection of disease and technologies that intensified as post-revolutionary America undertook an industrial and agricultural expansion of unprecedented proportions. For nearly half a millennium, the circle of life in the New World was breached by disease, death and displacement of native populations, clearing of forests, breaking the sod, fencing the grasslands, impounding the waters, and extracting mineral resources at rates governed only by the prices of commodities.

Breaching the Seasonal Round

Between Columbus' arrival in the western hemisphere and the "closing of the American frontier" at the turn of the Twentieth Century (Turner 1893),[2] extractive resource utilization was the hallmark of Euro-American westward expansion. Starting with the Norsemen's discovery of the codfish of the Grand Banks, and followed by the export of furs, minerals, lumber, whale oil, cane sugar, and tobacco (Magra 2009), the resources of the Americas (including the continental shelf) were re-distributed to the Old World.

The exchange was neither uni-directional, nor limited to material goods, but included cultural contributions of information and technologies. The most disparate of these exchanges included the introduction of European diseases, metallurgical technologies and written language. The first of these destroyed Native American lives by the millions and countless human cultures. The second facilitated ecological transformations on a continental scale, and the third provided a

[1]Among the beings traditionally hunted by the Ojibwe, Nodinens enumerated what were undoubtedly passenger pigeons: "In the spring we had pigeons to eat. They came in flocks and the men put up long fish nets on poles, just the same as in the water, and caught the pigeons in that way. We boiled them with potatoes and with meat."

[2]As national historians must, F. J. Turner revealed the limits of his temporal window, at once dismissing pre-Columbian history, while begging the question of what would follow: "And now, four centuries from the discovery of America, at the end of a hundred years of life under the Constitution, the frontier has gone, and with its going has closed the first period of American history."

mechanism for recording actions of the past and promises for the future that will not play out for centuries to come.

The magnitude of Native American mortality from European diseases remains an article of debate among historians, but clear records exist of complete extermination of native communities, loss of linguistic dialects,[3] and forced assimilation of disparate cultures through dispossession of ancestral lands (Hauptman 1980, Venables 1980). Among the most conspicuous ecological changes in North America resulting from this exchange were the decimation or extinction of passenger pigeons, beaver and plains bison, and the re-introduction of the horse after an absence of millennia and progressive evolution in Eurasia.

Westward expansion since the American Revolution, cloaked in the romantic prose of "Manifest Destiny" has spawned innumerable political, economic, social and historical analyses. None has adequately explained either the rapidity or rapaciousness of that movement. Perhaps the dawn of the Industrial Revolution in Britain in the middle Eighteenth Century, coupled with the apparent "inexhaustibility"[4] of North America natural resources (Mace 1997), unleashed intrinsic human tendencies of avarice. Whatever the reasons, European colonists in the New World possessed a seemingly unstoppable proclivity for impermanence in their settlement. Vecsey (1980) quotes the Royal Governor of Virginia, Lord Dunmore, as saying, in 1774, "I have learnt from experience that the established Authority of any government in America, and the policy of Government at home [Britain], are both insufficient to restrain the Americans: and that they do and will remove as their avidity and restlessness invite them. They acquire no attachment to Place: But wandering about seems engrafted to their Nature." Little did he know that it would be over two hundred years before America would collectively begin to recognize the age-old importance of place in the scheme of human experience (Berry 1977). From a resource exploitation perspective in the Great Lakes region, historian Robert Doherty (Doherty 1990) encapsulates the Euro-American westward march most succinctly: "Faced with an abundance seemingly without limit, hoping to subdue the continent and civilize an untamed wilderness, lumbermen, fishermen, fur traders, and their Chippewa and Ottawa associates trapped animals for furs and slaughtered them for meat; they cut trees, exhausted land and used up resources. Once the resources were depleted, non-Indians typically moved on, while Native Americans stayed behind, making a precarious living. Self-interest and market forces dictated exploitation. Conservation, seemingly unnecessary, made no economic sense."

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[3]Theodora Kroeber (1961), in recounting the life of Ishi, last of the Yahi in California, provided this glimpse of the diversity of languages among Native Americans: "There were..., for the whole of Indian North America, six great linguistic superfamilies, each made up of numbers of separate...stocks or families of speech. Each family... usually consists of several languages...; the superfamilies are even more varied than the large Indo-European stock or family with its Romance and Germanic and Slavic and Hindi divisions. Of the six superfamilies, five were represented in California, and contained among them twenty-one basic languages which were..., as mutually unintelligible as are German and French... But this is not yet the whole of the story, since the twenty-one languages further separated and elaborated themselves into a hundred and thirteen known dialects. Or, to demonstrate the congestion of tongues another way, there are twice as many Indian languages on record as there are counties in California [58] today."

[4] This is the notion based upon "arguments of astonishment" (Haddon 2011) that human activities can have little or no impact upon the natural world because of the sheer abundance of the resources. Note that is "inexhaustibility paradigm" (Mace 1997) persists today with respect to climate change and atmospheric resources, as does the cupidity of executives and financial officers in global corporations.

Across the Great Lakes region, resource extraction was unrelenting from the earliest European contact until the middle of the Twentieth Century. Beginning with the fur trade in the Sixteenth Century along aboriginal transportation corridors, the economy was transformed over three centuries from a condition of limited trade between proximate human populations (a self-sufficient or autarkic economy) to an economic base increasingly reliant upon importation of goods and technologies paid for by trans-oceanic export of biological and non-renewable natural resources. Early in the westward expansion bison and beaver were extirpated east of the Mississippi (Taylor 2008; Carlos and Lewis 1993). The Great Lakes forests of red and white pine stretching from Ontario west to Minnesota were felled to supply building materials for the boundless growth, and frequent incineration of cities such as Detroit, Cleveland, Chicago and Minneapolis (Twining 1983). In addition to the early plundering of meso-American gold and silver, the purest grades of copper from the Keewenaw and iron ore from the Mesabi supplied an incessant demand for industrial metals. Each advance of technology and human population fed upon the last in a positive feedback loop that pushed settlers onto the prairie, lumbermen into the forest, miners into the pits and shafts, and native people onto reservations.

This transformation of the Midwest and Great Plains from quasi-autarkic Native American economies to trans-national agricultural and industrial economies accelerated rapidly with penetration of the American West by railroads and development of steam and internal-combustion engines. In the century preceding Frederick Jackson Turner's declaration of the closing of the frontier in 1893, the western bison had followed the beaver to near extinction, the red and white pine forests were gone, replaced by aspen and mixed hardwoods (Ahlgren and Ahlgren 1983), apex (or, climax) species of Great Lakes fish communities had passed their peaks of production (Spangler and Peters 1995), and ecological havoc was being wrought by soil erosion and invasion or deliberate introduction of exotic species (Gates, et al. 1983). In a creative simulation of the demise of the plains bison, Canadian author M. Scott Taylor (2008) argues that the bison were exterminated not by recreational shooting from railways, Indian hunting, or U.S. Army policy, but by increased European demand for buffalo leather after an innovative tanning process was invented.[5] This analysis led one journalist [6] to suggest that a globalized economy was beginning to impact North American resources. If Taylor's simulations explain the demise of the bison, so too does the loss of autarky for the continent as a whole apply to the unlimited extraction of other natural resources, Atlantic cod and beaver joining the bison as victims of globalization. Also lost during this rapacious history of exploitation was the seasonal round in all of its manifestations across the continent. No longer would Native Americans have a land base sufficiently large among the various reservations to support the seasonal movement so vital to these ancient cultures.

We will not dwell further on the tragic human, ecological and cultural losses of the past except to regret the finality of extinction. For cultures wrought by Lamarckian evolution (Wilson 1978), and species emerging through Darwinian evolution, it is the timeline of their own renewal, relative to the evolving systems around them, that influences their prognosis for survival. Thus,

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[5]The slaughter of 10-15 million bison took place from the end of the Civil War until fewer than 100 animals remained in 1880. This reinforces the "positive feedback loop" idea posited earlier as the buffalo leather, being extremely durable, was in great demand for engine drive belts in Europe.

[6]Walton, Dawn. 2007. Were bison one of globalization's first victims? Globe and Mail, July 31.

Amerind peoples survived the extinction of mastodons and other Pleistocene fauna in ancient times, and passenger pigeons in modern times, even as these species were significant food resources for them. Incidents of this kind, including cultural appropriation of the horse by plains people, illustrate the importance of preserving processes of cultural adaptation, as well as the physical entities of place if we are to ensure opportunities for continuing cultural adaptation (Overholt and Callicott 1982).[7] It is in this context that restoration and protection of the seasonal round is materially important to the cultural evolution of the Ojibwe. It is now appropriate to ask, "have our recent efforts in resource management met the challenge of sustainable use and contributed to closing the breach in the seasonal round?"

Conservation of Renewable Resources

We turn now to examine the outcomes of renewable natural resource management in the ceded territories of the Great Lakes region over the past quarter-century. Our purpose is to determine if the current management regimes have succeeded in providing continuing access to these resources, as required by Nineteenth Century treaties, without jeopardizing the long-term survival of the species harvested under the current provisions of the law. The treaties at issue include those negotiated between native people ceding territory in the midwestern region to the U. S. government for purposes of agricultural and industrial "development" in the European sense of social progress.[8] Principal among these were the treaties of 1836, 1837, and 1842, litigated primarily in *United States* v. *Michigan* (1979 Fox decision), *Lac Courte Oreilles* v. *Wisconsin* (1991 Crabb decision), and *Minnesota* v. *Mille Lacs Band of Chippewa Indians* (1997 Davis decision).[9] Each of these was pivotal in the sense that conditions and qualifications were specified by the court for future management of the resources to ensure that both public safety and the conservation of resources would be served.

Central to our argument are the complementary concepts of cycles, and "conservation". The former includes the somewhat ambiguous notion of a sequence of events, regularly repeated in

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[7]In discussing mechanisms of cultural evolution, Overholt and Callicott (op. cit. 1982) note: "Cultural adaptation, material as well as ideational, to new environments proceeded rapidly and resulted in highly differentiated and diversified cultures, while genetic information remained relatively stable and uniform, partly due to the natural pace of Darwinian evolution and partly because the selective stress of new climates and eco-systems was largely absorbed through cultural adjustment, thereby relieving adaptive pressure on the gene pool."

[8]F. J. Turner, op. cit., describes the social evolution concept embraced at the time by literate society: "The United States lies like a huge page in the history of society. Line by line as we read this continental page from West to East we find the record of social evolution. It begins with the Indian and the hunter; it goes on to tell of the disintegration of savagery by the entrance of the trader, the pathfinder of civilization; we read the annals of the pastoral stage in ranch life; the exploitation of the soil by the raising of unrotated crops of corn and wheat in sparsely settled farming communities; the intensive culture of the denser farm settlement; and finally the manufacturing organization with city and factory system." Left to the imagination are the unstated consequences of such a narrow view of progress. What would sustain this pinnacle of social progress?

[9]These cases were argued in a number of stages and as each stage was settled the names of the jurists starting or finishing the case have been used to refer to them. In *Lac Courte Oreilles v. Wisconsin*, for example, Judge Voigt made the original decision in district court. This was reversed on appeal and remanded back to the court for further consideration. Subsequently, the case was commonly referred to as LCO, sometimes with a numeral to specify the stage of the proceedings. Judge Barbara Crabb made the concluding decision in this case in 1991, hence her name is often used to designate this case. The *Mille Lacs* case was finally settled by the U.S. Supreme Court, but Judge Murphy's name is often attached in identifying the original judgment at issue.

the same order. Or, more explicit considerations of a single element moving through the rock, atmosphere, water or biota of the earth, such as the carbon or nitrogen cycles, or water itself in its gaseous, liquid or solid states. In these senses we generally envision closed loops with little or no net gains or losses, and it is this closure that assures indefinite repetition of the cycle. Conservation is a term that has been very broadly interpreted in its usage. For legal purposes, the United States District Court for the Western District of Washington ruled in the *Boldt* decision (1974) that "However broadly the word may be used and applied in the theory and practice of fisheries science and management, "conservation" as used in Supreme Court decisions and herein is limited to those measures which are reasonable and necessary to the perpetuation of a particular run or species of fish."[10] This is further elaborated in the findings of fact in that case: "From a broad biological and managerial standpoint, conservation of fish resources means to protect and improve the habitat that produces the resource, to manipulate stocks of fish to achieve necessary spawning escapement so as to maintain, perpetuate and enhance the resource, and to put the harvestable portion of the resource to beneficial use." Common to both these interpretations of the concept is the notion of perpetuation of a species or resource. It is reasonable to assume that a similar concept of conservation applies equally to furbearers, terrestrial plants and animals, and the physical environments that produce them.

Since the earliest "environmental" writing in North America[11] (Lowenthal 2000), natural resource managers, preservationists, and, most recently, conservation biologists, have been seeking an unambiguous interpretation of what is meant by the term "conservation". Inevitably the semantic arguments surround the question of what, exactly, is to be "conserved". The limited definitions of the courts, cited above, make it clear, that in some cases, it is individual stocks or species (for which we frequently have tidy binomial Latin names) that must be protected in perpetuity. For biologists, this immediately raises the paradox that Darwinian evolution is dynamic, and that species recognized today are the incipient species for those that will be recognized in the millennia that follow our own ephemeral existence on the planet. Further, it is clear to modern ecologists, since G. Evelyn Hutchinson's (1957) exposition of the term, that the fundamental niche occupied by a species, the "hypervolume, or multidimensional space of resources used by that species", is the physical complement of that species, co-evolving with it through time. Thus, it is clear that to conserve a species at any moment in time dictates that we protect the "*opportunity for the stock or species to continue to evolve*." I leave it to sociologists or other disciplinarians to decide whether or not this is analogous to the "opportunity for cultural evolution" sought by Native Americans in their negotiations with the U.S. government in the multitude of treaties negotiated during the Nineteenth Century.

[10]384 Federal Supplement 312 (1974).

[11]David Lowenthal, among others, has persuasively credited the beginnings of the American environmental movement to the writings of George Perkins Marsh who lived from 1801-1882. Marsh's 1864 paper "The Earth as Modified by Human Action" is seen as a seminal call for protection of the American forests, and a proscription for wise use by contemporary citizens for their own benefit and that of future generations. The entire text of Perkins' paper is now available in the public domain as E-Text-No. 6019 of Project Gutenberg (http://www.gutenberg.org/etext/6019).

Biological Attributes of Conservation

Resource managers concern themselves with a limited set of biological properties in deciding what to do to maintain or rehabilitate renewable resources, while putting "the harvestable portion of the resources to beneficial use." This usually begins by defining the resources in question in terms of specific populations and geographic locations. The key, of course, is to focus upon things that can be controlled through permits or licenses, such that the results of the control materially influence the status of the populations being managed. These select (biological or ecological) features are then woven together with other considerations of economics, tradition and polity to produce a fabric of laws and regulations that dictate the conditions of consumptive or non-consumptive use of public resources. Management then enters into a cycle of its own in monitoring the implementation of its rules, measuring the results, and providing feedback to the regulators so that the rules may be adjusted for additional use or constraint in order to assure renewal of the resource.

There is a very short list of critical population attributes that are useful from a management perspective. Among these are population size and age structure, reproductive rate, total mortality of the population at successive stages or ages, the fractions of mortality ascribable to human predation and other causes (frequently called "natural mortality", as though human predation ere somehow "unnatural"), and individual health or body growth (Ricker 1975). The latter properties, although manifest in individual organisms, often reflect upon the population density in a given environment. For example, most of the world's species of fish utilized by humans exhibit density-dependent growth, and among various species of deer, the frequency of multiple births may be cited as an indicator of the overall "health" of the herd. It is often these individual traits of members of the populations being managed that reveal the "health" of their respective environments, albeit indirectly.

The most critical concern for sustainable resource management is to prevent an overharvest that would precipitate the extermination of the stock being exploited. An example would be taking so many animals that those left for reproduction are too few to replace those taken. This is known in fisheries management as "recruitment overfishing". In managing terrestrial species, as soon as such an event is known to have occurred, managers either shut down the taking of that species or otherwise severely limit the take in succeeding years until the brood stock has recovered to more sustainable levels. Less critical, but still significant to fishery resource users is the notion of "growth overfishing". This occurs when the removal of the stock is too intense early in the life history of the fish, preventing significant numbers of fish from living through the age of maximum rate of body growth. In other words, the fishery would have extracted more yield from the stock if the onset of fishing had been delayed somewhat, even though a few fish would have died from natural causes. This is the "fisherman's dilemma," knowing that the overall return from fishing will decline if fishing begins too soon, but also recognizing that, by delaying too much, he will be deprived of the opportunity to catch those fish that would die naturally before growing large enough to reach the minimum size of vulnerability to the gear. Modern resource managers have the capability of calculating the size and age appropriate to maximizing the catch, but this concept, known in fishery science as "maximum sustainable yield", or MSY, has long been known to be insufficient to guarantee a truly sustainable fishery (Larkin 1977). The notion of growth overfishing is thus more of an economic consideration for the fishermen than a

conservation issue, and it explains why a fishery can fail (go bankrupt) even though the stock has not been exterminated.

Just as MSY is a myth once believed by the world's fishery managers, and many fishermen, so too are there plausible myths surrounding other ideas about timing the harvest of animal resources. One of these, the idea that conservation will not be served if animals are killed during the breeding season, figured prominently in the public mind during the years of treaty litigation in the upper midwest. Two aspects of this question are immediately obvious, one ethical, the other biological. The ethical issue is whether or not it is somehow unfair to take advantage of the breeding behavior of animals in human efforts to catch or kill them. Each of us can decide for ourselves whether or not this violates notions of fair chase, as may also be the case for using baits or decoys in hunting birds or mammals, but tens of thousands of people annually engage in sprinkling doe urine near buck scrapes, and in imitating elk bugles, or, turkey sounds to attract strutting gobblers. The biological facts are that the hunting or fishing is *more efficient* during breeding seasons because the animals may be less wary during this time. Certainly, the breeding aggregations of schooling fish and spawning runs, and the aggressive nest guarding of species such as bass and sunfish make them more vulnerable to interception or entrapment than would be the case at other times of the year. What is the difference whether you catch a northern pike in August, or kill it with a spear two days before it would have spawned the following spring?

A related myth is the idea that certain methods of capture are intrinsically evil. Thus, the practice of gill-netting was pilloried in the popular press by the recreational fishing fraternity during the litigation of the Treaty of 1836 (Doherty 1990). Public dis-information campaigns asserted that gillnets were unselective in the species that they killed, were easily lost, thus creating the spectre of "ghost nets",[12] and were the method of choice for poachers because they could be so easily moved and deployed. The deliberately subliminal mixing of widely held views of wastage and lawlessness with the legitimate issues of allocation, legal entitlement and rational resource management would surface repeatedly before the treaty rights issues were quieted by the Supreme Court in 1999.

Rate of reproduction is also clearly one of the most useful biological statistics to estimate if we are to know the likelihood of continuing stock renewal. In contrast to many of our hunted birds and mammals, fisheries frequently exploit adult stocks or, those age-classes soon to mature. This means that there is usually a gap of several years between the time a year-class is spawned, and the onset of earliest fishing-induced mortality. Estimating the numbers of young produced in any given spawning season is difficult enough, but it is vastly more uncertain to attempt to estimate the actual recruitment of a year-class to a fishery several years removed. This has caused many biologists to simply forego attempts to estimate the "stock-recruitment" relationship, and to spend their efforts and limited assessment budgets on more reliably estimable statistics.

Mortality, then, is the single most critical of the biological statistics, from a conservation perspective, that might be calculated for an exploited population. It may be expressed as an actual number of deaths from a particular population (seldom known, except that catch is sometimes measured with great precision), or as a rate over a specified interval, frequently

[12]The idea is that buoys might be torn off the nets by storms or currents, leaving the nets "set on the bottom" where they would continue to fish, eventually becoming saturated with a catch that could not be retrieved.

assumed to be one year. The proportion of the population removed as catch by the fishery is then an estimate of the exploitation rate for that fishery. If we are to be able to set limits in support of conservation objectives, clearly it is important to know the mortality and exploitation rates, or to know the magnitudes of factors closely related to these biological parameters. A related statistic, for example, might be the catch-per-unit-of-effort, or, CPUE. If it were known, say, that this year's fishing yielded twice the poundage of usable fish than did last years', even though we fished the same amount of gear for a comparable number of day's effort, then, we might conclude that the abundance of the fish this year (before fishing) was approximately twice what it had been the year before.

Reasoning of this kind is straightforward and broadly embraced by fishermen and fishery managers alike. In accepting it however, we must be mindful that environmental and biological conditions vary considerably from year-to-year, and this influences not only the target populations themselves, but the efficiency of the fishery too. The result is that monitoring of the fisheries (both fish populations, and those who fish them) is likely to be a long-term commitment by the management agencies. Further, the estimates obtained will almost always have accuracy and precision commensurate with the time and effort put into the surveillance.

There are several useful features of management by mortality rates that have emerged in fishery management over the past century. One of these is that the broad base of experience over the world's oceans and fresh waters has shown that it is seldom a sustainable fishing policy for the fishing-induced mortality to exceed the magnitude of mortality from all other factors (the so called "natural mortality"). While there are exceptions to this "rule of thumb", it has frequently been shown that exceeding this ratio has commonly presaged a decline in future abundance or productivity of the target stocks. Another opportunity for management by controlling mortality is that one might place direct limits upon removal of the stock if estimates are available about the overall abundance of the fishable population. These are often called quotas, or, "allowable catch" in today's fisheries, and it is these methods that have been adopted by the management agencies for controlling the fishery extractions from the ceded territories of the Great Lakes region.

Biologists, hunters, and fishermen alike understand that the "overharvesting" phenomenon in its broadest sense refers to a repeated excessive extraction from a resource that will, if continued, result in a permanent or long-term loss of the stock or species. Certainly the passenger pigeons, bison and beaver resources previously mentioned can be said to have been "overharvested". Dozens of the world's great fisheries have gone the same way, but for the largest and longest-lived species, it is interesting to note that the demise of the stocks have taken long enough that conspicuous environmental changes may also have occurred in the meantime. This means that any given over-exploitation story is likely to be seriously confounded by "other" factors that can be said to be causative (or, collaborative) agents in the ultimate destruction of the stock in question. The result of these uncertainties has been that resource managers today seek to set exploitation limits which, if met, will assure that the stocks in question will not progressively diminish in overall productivity. This is not to say that individual instances of "over-exploitation" may not occur from time-to-time, but prudent management will always attempt to severely limit the likelihood that such individual events will occur.

Fisheries Management Ensuing Under the Crabb Decision

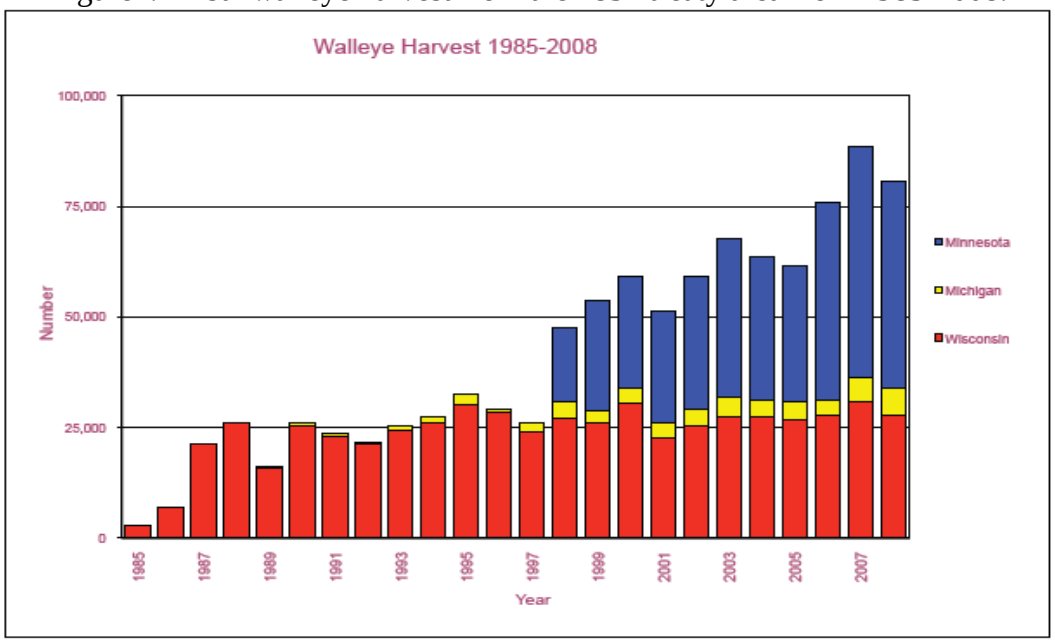
The *Voigt* case finally emerging from Barbara Crabb's court provided a mechanism to do what the appellate court had told Judge Voigt to do, i.e. to provide mechanisms to ensure that the Ojibwe successors of treaty signatories would have opportunities to continue to hunt, fish, and gather, in perpetuity, on public lands within the ceded territories. Because spearing walleye at night during spring spawning aggregations was seen by the court to be a highly efficient method of taking walleye,[13] it would be necessary to control very carefully the number of fish to be taken.

The mechanism for this management in Wisconsin is particularly explicit and has been amply described (Hansen, et al. 1991) in the professional fisheries literature and in regularly issued assessment documents. To encapsulate briefly, the Tribal and State management authorities would meet annually to determine which lakes would be speared during the coming spring season. Estimates of the walleye population would be made by one or more of several methods, based upon the information available for those lakes. An "allowable catch" would then be established, based upon estimates of the sustainable total mortality that walleye are thought to be capable of enduring over long periods of time (this figure is thought to be about 35 percent of the fishable stock, age 3-5 walleye). The allowable catch number would then be reduced by a percentage commensurate with the confidence that the biologists had in their population estimates. This would become that year's "safe harvest level" for the specified waters. The Indian community would then declare their intent to take a specific proportion of their court-determined allotment. Multiplying this proportion by the safe harvest level would determine the maximum number of walleye that could be taken by tribal spearers. The State would then determine what bag limits should be imposed upon those waters for the recreational fishery, taking into account the number of fish remaining in the safe harvest level after the tribal spearing season (Anon. 1991).

The safe harvest level methods have now been in place for nearly two decades, preceded by a period of spearing allowed under the earlier *Voigt* judgment. In addition to the Wisconsin fishing, judgments in the Michigan and Minnesota treaty litigation have resulted in additional walleye being taken by tribal fishers. The results of these fisheries are summarized graphically (courtesy of Jenny Krueger, GLIFWC) in Figure 1. Minnesota currently negotiates the Indian and non-Indian allocations for Mille Lacs Lake through use of several statistical models, including a safe harvest estimation procedure based upon a statistical kill at age model (Drake, et al. 2009).

[13]Spearing by torchlight for taking walleye is an excellent example of cultural evolution adapting to the characteristics of the plants and animals in their environment. The reflective layer behind the retina in the walleye eye, known to biologists as a *tapeta lucidum*, makes the fish extremely visible when illuminated from above. This makes it possible to take walleye very efficiently in shallow water during their spawning season.

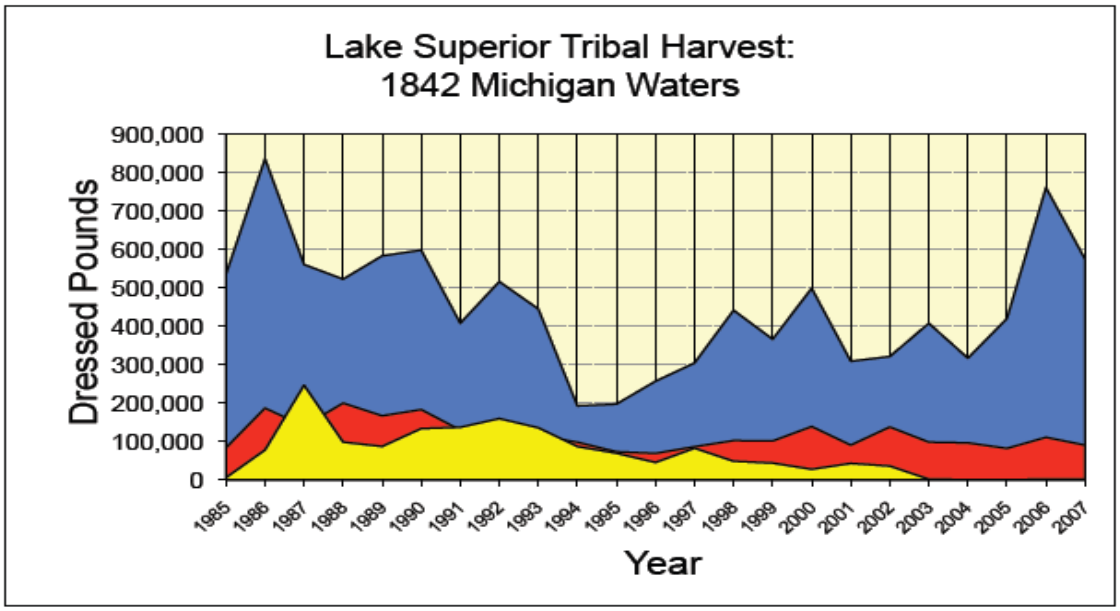
Figure1. Tribal walleye harvest from the 1837 treaty area from 1985-2008.



The tribal walleye harvest in Wisconsin has fluctuated at the level of approximately 25,000 fish for nearly two decades, contrary to the fears expressed by many citizens soon after the appeal of the earliest District Court decision. The Indian fishery has not destroyed the walleye populations, nor deprived non-Indians of the opportunity to pursue recreational fishing. Instances of exceeding the safe harvest level in any of the managed waters have been exceedingly rare, and never repeated at those few sites in succeeding years. In an analysis of the first decade of treaty fishing, Spangler and Nega (2009) showed that the preponderance (approximately 94 percent) of the Wisconsin walleye resource was still being taken by the non-Indian fishery. In more recent years, while tribal harvest has been relatively stable, walleye catch in the recreational fishery, including those caught and released alive, has fluctuated at levels approaching a million fish (Anon. 1991). These figures suggest that walleye fishing throughout the ceded territories has steadily improved for all participants since the restoration of off-reservation tribal fishing. If these resources are diminished in the future, it will be clear that the causative agent could not have been treaty fishing, but must be the collective failure of all of us to exercise due diligence and restraint in our stewardship of these resources. The challenge for us all is to maintain these resources into the future, so that we may confidently state that this is among the best-managed fisheries in the modern world.

While walleye have frequently been at the heart of the public discussion over treaty fishing, it is clear that fishing opportunities on the Great Lakes have also been protected under treaty rights and a significant proportion of food fish production from these waters is now being produced by Indian fishers. Figure 2 (courtesy of Bill Mattes, GLIFWC) shows the whitefish (blue area), lake trout (red) and siscowet (yellow) production by tribal fishers in the Michigan waters of Lake Superior within the area ceded in 1842. Although whitefish production continues to fluctuate widely, as it has in other areas of the upper Great Lakes, lake trout continue to yield nearly 100,000 pounds of marketable fish annually.

Figure 2. Lake Superior fish catch from Michigan waters of the 1842 treaty area.



Treaty litigation has resulted in much more resource management activity than is evident in the summary statistics of fish catches. For wildlife populations, waterfowl habitat enhancement has proceeded apace on tribal lands through programs like Circle of Flight (Anon. 2009). Restoration of previously productive wild rice beds, reintroduction and enhancement of once prominent wildlife, furbearers and fish stocks, and renewed attention to environmental quality as a prerequisite for continuing productivity have all enhanced our opportunities for better resource utilization and stewardship in the future.

Conclusions

This analysis clearly demonstrates that tribal entities and their agencies have now emerged as key actors in determining resource management in the future. Although tribal harvests are small relative to non-Indian society, tribal needs, as an article of Constitutional law, *must be taken into consideration in any formulation of renewable resource use on public lands*. What greater tribute can be paid to the principle of an inclusive diversity of traditions, than to have better resource management in the future?

The single most conspicuous benefit of the acknowledgement and restoration of tribal rights to hunt, fish, and gather resources in the ceded territories has been the recognition that Indians and non-Indians can work effectively in concert to preserve and protect these resources for future generations. We have shown how an increase in knowing how these fisheries, and ecosystems operate, has led to greater understanding of how to manage in the future. It is surely optimistic at this juncture to say that we will duly succeed in our future efforts to restore and manage wild resources, but a powerful example has been set, and all of us should continue to raise our expectations for better management in the future.

Just as Neil Armstrong proclaimed that his first step on the moon 30 years ago constituted "...one giant leap for mankind" it seems reasonable to acknowledge that the Tribble brothers in stepping forward on the ice of Chief Lake in 1974, forged a pathway toward finally closing the breach in the seasonal round.

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I would like to acknowledge the GLIFWC staff for their tireless efforts to gather the cultural and biological information that has made this paper possible. Undaunted by the enormity of the task of tracking the status of populations of numerous species of plants, fish and wildlife, and cognizant of the urgency inherent in recording essential cultural experiences, these people have assembled a body of information that testifies to the significance of the seasonal round in the daily lives of the people of the Great Lakes region.

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