THE KLAMATH BASIN
AND
"THE BEST AVAILABLE SCIENCE"

Anne K. Ruggles, MS, JD
Center for Science and Technology Policy Research
University of Colorado
Boulder, Colorado
aruggles@igc.org

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Get your facts first, and then you can distort them as much as you please.
-Mark Twain-

ABSTRACT

Increasingly, science plays a role, not in facilitating resolution of natural resource allocation controversies by providing information that can be used by policy-makers, but as a way for politicians and policy-makers to avoid making difficult decisions, and for stakeholders to retard implementation of management decisions. The rationale increasingly invoked is that the science is unclear, or wrong, or lacking—in effect the science is uncertain. The result has been crisis-driven scientific assessments that may distort or overshadow the underlying policy conflict and that may exacerbate the conflict by implying that science can resolve the policy issue. This then leads to endless debate and even endless research[1], no consensus on the underlying science, and a commensurate loss of public and political respect for science. It is important for all of the players, but especially the scientists, to recognize the limited capacity of science to resolve inherently policy-driven issues. Scientists should be wary of assuming science can resolve the issue because the result is likely to be accusations of "junk science," a loss of respect for what science can contribute to the debate, and ultimately efforts to change the way science is used in making natural resource management decisions.[2]

In 2001 reduced water supplies stemming from the drought of 2000-2001, the needs of three fish species and the bald eagle listed under the Endangered Species Act (ESA), and United States treaty obligations with four Indian Tribes, resulted in an announcement by the Bureau of Reclamation that there would be no deliveries of water from the Klamath Project to contract water irrigators during the 2001 growing season. Protests, civil disobedience, and aid packages from Congress ensued.

In the fall of 2001 the Secretary of the Interior asked the National Research Council (NRC) to review the science used by United States Fish and Wildlife Service (FWS), National Marine Fisheries Service (NMFS), and the Bureau of Reclamation (BOR) to justify higher lake levels in Upper Klamath Lake and higher flow rates in the Klamath River to protect endangered fish. The NRC committee's draft report found that there was substantial scientific support in all parts of the Biological Opinions on the suckers and coho *except* for the recommendations concerning minimum lake levels for Upper Klamath Lake and minimum flow levels in Klamath River. This changed the "best available science" used by FWS and NMFS for determining whether BOR's operation of the Link River Dam would jeopardize the listed fish and a change in operations plans for the lake and river in 2002 — another dry year. Irrigators received water.

What followed was a firestorm of publicity – most of it critical of FWS and NMFS and specifically of the scientists working for the agencies. Press releases from congressmen and interest groups trumpeted the use of "junk science" by the federal scientists, implying either that they were incompetent or at best had an illicit agenda.

In September of 2002, approximately 33,000 fish died in the Klamath River. Analyses by the California Fish and Game Department and the FWS pointed to low river flows, consequent crowding of fish, and ultimate infection of the fish by naturally occurring protozoa and bacteria as the cause of the die-off.[3] An uneasy calm settled over the Klamath Basin as everyone waited for the NRC's final report. In the meantime, everyone hoped for lots of winter precipitation.

Now, throughout the west – most notably Idaho and New Mexico where the Rio Grande Silvery Minnow is in competition with Santa Fe for water – the cry of "Remember the Klamath" rings.

Parts I through IV of this paper establish the context in which the allocation of water in the Klamath Basin occurs. Part I describes the elements of the controversy over water allocation in the Klamath Basin. Part II describes the physical context of the Klamath Basin. Part III outlines the historical context for water allocation in the Klamath Basin. Part IV discusses the legal context for water allocation in the Klamath Basin. Federal trust responsibility to Native Americans, reserved water rights, and treaties with affected Tribes are integral to understanding the legal context. Equally as important are state water law, the contract water rights of Klamath Project participants, and the Endangered Species Act.

Part V explores the nexus of science and the Endangered Species Act (ESA). It observes that scientific information is the basis for actions taken pursuant to the ESA but that comprehensive, definitive scientific information is not necessary and is in fact counterproductive to the goals of the ESA. The role of uncertainty of science in regulatory decision-making is explored and finally, part V analyzes the scientific charge given to the NRC by Secretary of the Interior Norton, how that differs from the scientific requirements made of agencies under ESA, and the scientific conflict that resulted.

Part VI asks whether science can resolve the stalemate that exists in allocating water in the Klamath Basin and presents several possible solutions. However, developing a solution is dependent on honesty about the underlying cause of the problem.

INTRODUCTION

The Klamath River Basin has been identified as one of three freshwater biodiversity hotspots in North America.[4] Three fish in the Basin, coho salmon *(Oncorhynchus kisutch),* shortnose sucker *(Chasmistes brevirostris),* and the Lost River sucker *(Deltistes luxatus)* have been listed under the Endangered Species Act (ESA)[5]. Legitimate claims for Klamath Basin water have been made by Indian Tribes, contract water irrigators, state-appropriative water right[6] irrigators, coastal commercial fisherman, four National Wildlife Refuges (to protect waterfowl and bald eagles *(Haliaeetus leucocephalus*[7]*)*), and the public—to ensure the persistence of the three endangered fish. There is not enough water to meet all of these demands at the time and in the quantities they are claimed. According to Oregon Governor, John Kitzhaber, "the current water crisis in the Klamath Basin has been 150 years in the making and serves as a reminder to us all that we are stretching our natural resources beyond their limits . . . Even in a normal year, the water in the Klamath Basin cannot meet the current, and growing demands for tribal, agriculture, industrial, municipal, and fish and wildlife needs."[8]

We arrived at this state of affairs very deliberately. From the mid-nineteenth century through the mid-twentieth century the land-use history of the west was characterized by extraction and development of natural resources and growth of human populations. [9] Coincident with this was the development of an ethic of sustainable use—conservation of resources, exemplified by the efforts of Gifford Pinchot, Stephen Mather, John Muir, and President Theodore Roosevelt[10]. This concept evolved throughout the twentieth century as wildlife biologists—notably Aldo Leopold[11] —and ecologists explored and learned about the complexities of natural systems. Sustainability as a guiding concept for resource use was enunciated in the Brundtland Report[12] in 1987 and has matured today to consist of three interdependent components: ecological, economic and social.[13] The Committee of Scientists, appointed by the U.S. Forest Service to advise the Service, defined sustainability and prioritized its three components by explaining that ecological sustainability is essential to the realization of the social and economic components.[14]

At its core, this is what the "crisis" in the Klamath Basin is about, the need for humans to exist in the Klamath Basin in a sustainable manner. There are important social components to a sustainable existence in the Klamath Basin: Tribes, the agricultural community, the commercial fishing community, and towns. There are also important economic components to a sustainable Klamath Basin community: agriculture, commercial fishing, and recreation. But for all of these elements to survive into the future, the ecological integrity of the Klamath Basin must also be sustained.

I. THE PROBLEM

The Klamath Basin crisis is portrayed in the news media as "fish vs. farmers." The truth is far more complex. This is a problem with water at its center—and five general groups of stakeholders: tribes, irrigators, commercial fishers, wildlife refuges and endangered species, all claiming water either directly or indirectly in an arid setting—a part of North America averaging less than 14 inches of precipitation a year (Hathaway and Welch 2001). The problem in its simplest form is that Klamath Basin water is over-appropriated[15] — there is not enough water for all of the legitimate claimants. Until 2001 there was little incentive to address the issue of over-appropriation as there had been either enough rain and snow in the Basin to provide everyone's needs, or not all of those needs had been claimed. But in 2001 reduced water supplies stemming from the drought of 2000-2001, the needs of three fish species listed under the ESA[16], United States treaty obligations with four Indian Tribes, and the principle of preemption[17] resulted in an announcement by the Bureau of Reclamation (BOR) that there would be no deliveries of water from Upper Klamath Lake to irrigators during the 2001 growing season.[18] Protests, civil disobedience, and aid packages from Congress ensued (Service 2003).

But farmers and fish are not the only parties that have been injured. Native Americans depended on the coho salmon in the Klamath River and on the suckers in Upper Klamath Lake. There was once a thriving commercial fishery of coho salmon off the coast of California and Oregon.[19] Its decline was gradual, there were no headlines trumpeting the loss, Congress didn't announce aid packages—the fishing industry on this part of the coast just quietly slipped away. As a nation we still identify and sympathize with

farmers. We think in terms of the "family farm" though most agriculture is corporate agriculture. There is not a similar public empathy for commercial fisheries. So when water was allowed to stay in the lake and river to benefit fish, what the public heard about was the loss to farmers and not the gain to fishermen, Tribes, or the recreation industry that has developed on the Klamath River (Douglas and Sleeper 2002).

The Secretary of Interior disliked the outcome of an enraged agriculture lobby. In the fall of 2001 she called for a review[20] of the science used by U.S. Fish and Wildlife Service (FWS), National Marine Fisheries Service (NMFS) and BOR to justify higher lake levels in Upper Klamath Lake and higher flow rates in the Klamath River to protect endangered fish. The review resulted in a change of the "best available science" used by FWS and NMFS for determining whether BOR's operation of the Link River Dam would jeopardize the listed fish. The result was a change in operations plans for the lake and river in 2002— another dry year. Irrigators received water. In September of 2002, approximately 33,000 fish including cohos, died in the Klamath River. An analysis by the California Fish and Game Department (CF&G) pointed to low river flows, consequent crowding of fish, and ultimate infection of the fish by naturally occurring protozoa and bacteria as the cause of the die-off (CF&G 2003).

The media "war" over Klamath Basin water was won by the agriculture industry (Barcott 2003). But that doesn't solve the problem at the heart of all of this: there is not enough water, especially during dry periods to meet all of the demands made on Klamath water. One day policy makers and politicians will have to make a decision about how water is to be allocated in the Klamath Basin, or they can continue to react to conditions, reinterpret what is the "best available science," or hope that it snows and rains sufficiently that the decision can be avoided. The forecast for 2003 is drought (BOR 2003).

II. PHYSICAL CONTEXT

The Klamath Basin is arid country. It receives about 14 inches of precipitation a year (Hathaway and Welch 2001). Because, the Basin, which is in the rain shadow east of the Cascade Mountains (Cooperman and Markle 2003), is a large, fairly flat, contained area, water from the mountains to the north and east collect and once formed a series of shallow lakes and broad marshes (Oregon Water Resources Department 2003). The

Basin, (Figure 1)[21] encompasses portions of south-central Oregon and northern California and has its origins in the Cascades at Crater Lake. Today, the area comprises about 350,000 acres of wetlands and 233,625 irrigable acres. The irrigation season runs form April through September.

Figure 1. Map of the Klamath River Basin showing pertinent features.

Upper Klamath Lake is fed by the Williamson and Wood Rivers and several springs. Water exits at Link River. Completion of the Link River Dam in 1919 and cutting through the rock reef at the outlet of Upper Klamath Lake in 1921 make it possible to

expand the range of possible lake elevations[22] (Oregon Water Resources Department 1999; Cooperman and Markle 2003). Depending on elevation, the lake occupies 60,000 to 90,000 acres (Gearhart et al. 1995) and has an average depth of seven feet with an hydraulic residence time of about one half year (Rykbost and Todd 2002). The lake becomes eutrophic during the summer in response to high water temperature and nutrient input (Cooperman and Markle 2003). Approximately 20.4 percent of the water leaving Upper Klamath Lake is lost to evaporation while discharges to the Link River and A-Canal account for 78 percent of water leaving the Lake (Rykbost and Todd 2002).

The Link River flows into the remnants of Lower Klamath Lake and Lake Ewauna. From there, it is joined by the Lost River and becomes the Klamath River. The Lost River is a naturally closed sub-basin of the Klamath Basin that heads up at Clear Lake in California, acquires water from Gerber Reservoir as it flows 90 miles north and west through Oregon and back to California into Tule Lake—nine miles from its source at Clear Lake. Lost River is now a series of canals, dams, and diversion canals that control its flow and prevent it from flooding reclaimed agriculture lands in Tule Lake.

The water of Lost Lake is eventually routed through a diversion canal into the Klamath River above Keno Dam. There are six dams on the Klamath River from Upper Klamath Lake to Iron Gate Dam. The Upper Basin[23] is a high-elevation, short-growing season area that depends on snowmelt that occurs at higher elevations, for recharging of groundwater and stream- flows (Hathaway and Welch 2002) and in which dry conditions are normal (Rykbost and Todd 2002).

Before European settlement of the area, the Upper Basin consisted of a complex of approximately 185,000 acres of shallow lakes and freshwater marshes and their associated streams (USFWS 2003). The area attracted peak fall concentrations of over 6 million waterfowl (Laycock 1973) and supported abundant populations of other water birds including American white pelican, double crested cormorant, and several heron species (USFWS 2003). However, more than half of the wetlands in the Upper Klamath Basin have been drained (Jarvis 2002); most of what is left is now included in National Wildlife Refuges within the boundaries of the existing 1905 Klamath reclamation project.[24] A significant amount of the National Wildlife Refuge lands in the Upper Klamath Basin (about 25,000 acres) are used for agriculture.[25] Some of the crops are

grown for waterfowl food, in an attempt to delay southward migration and therefore to decrease crop depredation in the Central and Imperial Valleys of California (Snyder-Conn et al. 1999:18; Rykbost and Todd 2002:71). The crops benefit dabbling ducks and geese but disadvantaging diving ducks (Jarvis 2002). Maintenance of many of the permanent wetlands is dependent on water deliveries thus if summer delivery is not made the wetlands are dry by the September migration (Jarvis 2002).

III. HISTORICAL CONTEXT

A. NATIVE AMERICANS

Several Native American Tribes call this region home. The Klamath, Hoopa, Yurok, and Karuk all have water rights in the area and most have tribal lands. They all depended on the natural resources, particularly fish, for their subsistence (Hathaway and Welch 2002). The Yurok have depended on the Klamath River's anadromous fishery for food, commercial trading activities, and cultural needs (Masten 2000). This is reflected in the Reservation boundaries that extend a mile out from either side of the Klamath River, from the ocean to its confluence with the Trinity River. The Reservation was created in 1855[26] to provide a territory in which the Tribe's fishing-based culture and way of life could thrive (Matsen 2000). This has been repeatedly recognized by the courts.[27]

The Klamath have hunted, fished, and foraged in the Klamath Basin for generations and in 1864 entered into a treaty with the United States for a reservation in the Upper Basin[28] that gave the Tribes the exclusive right to hunt, fish, and gather on the reservation.[29] The tribe was terminated in 1954[30] and the federal government purchased most of the Klamath reservation lands (Marbut 2002). However, termination did not extinguish treaty hunting and fishing rights.[31]

The United States has a trust responsibility to protect tribal trust resources[32] that generally requires that the federal government must protect tribal fishing and water rights held in trust for the tribes.[33]

B. KLAMATH PROJECT

Congress authorized construction and development of the Klamath Project (Project) in 1905.[34] The Project was designed to convert a large proportion of the lakes

and marshes of the Upper Klamath Basin to irrigated agricultural lands. To accomplish this, the BOR negotiated with California and Oregon to cede the land underlying Lower Klamath and Tule lakes to the federal government and received approval from Congress to destroy the navigability of Lower Klamath and Tule Lakes by draining them (Stene 1994). One hundred eighty five miles of main canals, 680 miles of lateral canals, and 728 miles of drain ditches with depths ranging from a few feet to 10 feet were subsequently constructed, effectively re-plumbing the Klamath Basin (Oregon Water Resources Department 1999:18; Rykbost and Todd 2002:57). By 1957 500,000 acre-feet of water "which formerly were entirely wasted" was being successfully conserved (USDOI 1957) by being applied to irrigated agriculture.

BOR filed a notice of intent to appropriate all of the unappropriated water of the Klamath Basin to support the project and purchased some water rights and facilities existing before the Project (Stene 1994). BOR has an obligation to deliver water to Project water users pursuant to Project water rights and contracts between BOR and the water user—subject to the availability of water.[35] Homesteading opened in 1908 and continued through the Second World War. More than 600 veterans settled in the Project (Oregon Water Resources Department 1999:18).[36]

The Project irrigates about 200,000 acres of land and provides water (when available)[37] to about 86,000 of National Wildlife Refuge lands. Water is diverted from the Klamath River and Lost River systems for irrigation and use on the refuges. The primary storage facility for the Klamath River system is Upper Klamath Lake and for the Lost River system storage is in Gerber and Clear Lakes.

IV. LEGAL CONTEXT

The doctrine of reserved rights was created to insure that lands set aside (reserved) for Indians and the public (for a specific purpose) would have sufficient water to realize the purpose of the reservation (Tarlock, et al. 2002). While most water in the western United States derives a priority determined by when the water was first put to beneficial use, rights on federal reserved lands have a priority that is derived from the date the

reservation was established (Tarlock et al. 2002). Reserved rights are based in decisions of the Supreme Court that recognize reserved rights both to Indian reservations and to other federal lands.[38] In quantifying these rights, Congress has consented to joining the United States as a party in comprehensive state court stream adjudications.[39]

A. TRIBES

The foundation of Indian water rights lies in the Supreme Court decision in *Winters*. The Court held that when the United States sets aside a reservation, by implication, it also reserves sufficient water to fulfill the purposes of the reservation. It also held that the priority date does not depend on when the rights are put to beneficial use but rather on when the reservation was established.

In *Kandra v. United States,*[40] the court found that Klamath Project irrigator's water rights are subservient to the government's trust responsibilities for protecting Indian treaty fishing rights. *Winters* rights are subject only to private appropriative rights which have vested prior to the establishment of the reservation, and which have not been subsequently lost through abandonment or non-use.[41] The federal government's right to reserve rights for Indians in conjunction with reservations may be exercised through treaty, statute, or executive actions pursuant to statutory authority.[42] With respect to fishing rights and executive order reservations the courts have found no reason why they should be treated differently from other reservations.[43]

The courts in *United States v. Adair*[44]confirmed to the Klamath Tribes "a quantity of water flowing through the reservation not only for the purpose of supporting Klamath agriculture, but also for the purpose of maintaining the Tribe's treaty right to hunt and fish on reservation lands.[45] The court left quantification of the right to Oregon state water adjudication process. However, the court in a later action added specificity to the right. In *Adair III* the District Court found that the Klamath Tribe's water rights include enough water to support the resources that the Tribes gather in addition to what they hunt, fish, and gather (ie. enough water to support plants that the Tribes gather for food and other uses).[46] The court also stated that the Klamath Basin Adjudication process should "in no event . . . reduce the Tribal water right to a level below that which is necessary to support

productive habitat."[47] To quantify this right the court instructed the parties to allow the Oregon State Adjudication process quantify the right and then apply the "moderate living standard" of Adair II[48] to adjust the quantification if needed.[49]

The Lower Basin Tribes, the Yurok and Hoopa are Executive Order Tribes and thus have a water right on the Klamath River, with a senior priority date. However their right has not been quantified. The purpose of their treaties with the United States includes fishing rights to take anadromous fish within their reservations in California.[50] The fishing rights of the Yurok and Hoopa entitle them to take fish for ceremonial, subsistence, and commercial purposes.[51] The executive orders establishing the Yurok and Hoopa Reservations reserved rights to instream water flow sufficient to protect the Tribe's rights to take fish within their reservations.[52] The Tribes' water rights also include the right to water quality and flow rates to support all life stages of the fish.[53]

B. KLAMATH PROJECT WATER USERS

Water rights of the Project water users stem from contracts between an individual and BOR or a water district and BOR pursuant to the Reclamation Act of 1902. The Reclamation Act[54] requires that BOR obtain and administer its water pursuant to state water law, unless the state laws are inconsistent with express or clearly implied congressional directives. BOR filed notice of intent to appropriate all of the available water in the Klamath and Lost Rivers and their tributaries in Oregon and California in 1905 (Rykbost and Todd 2002). Water is made available subject to its availability and thus may not be available due to drought, the need to satisfy prior existing rights or compliance with other federal laws.[55]

C. NATIONAL WILDLIFE REFUGES

The Wildlife Refuges have federal reserved water rights to the amount of water that was unappropirated at the time of their creation, needed to fulfill the purpose of the refuges.[56] The priority date for each refuge is the date of the executive order that created

the refuge.[57] The refuges are all junior to the Project irrigators. When they are in priority and there is sufficient water the Refuges do get water from the Project. The Lower Klamath and Tule Lake refuges also get significant water as return flows from Project irrigators. However, these flows contain added nutrients, and other agricultural residue (USBOR 2001a).

D. State Water Rights Adjudication Process

All of these rights must be reconciled among themselves and with all state water rights that have been issued in the Basin. Since February 24,1909 Oregon has issued state water rights permits[58] that establish how much water may be used for what purpose. Water use predating 1909 is considered to be vested, subject to adjudication. During adjudication water rights are verified, documented, and quantified with the right-holder receiving a decree for a specific amount of water with a specific priority date. The Oregon State Engineer initiated the Klamath Basin adjudication in 1975. Anyone claiming a pre-1909 water right in the Klamath Basin had to file a claim. The Oregon Water Resources Department made a preliminary evaluation of all claims and that was followed by filing of 5,600 contests (Marbut 2002:79) including federal claims.[59]

E. Priority of Use of Water in the Klamath Basin

Adjudication of water rights in Oregon began in 1975 and is ongoing. Associated with the adjudication were several suits to exempt the federal government from the process. These culminated in the federal government having to honor its trust obligations under ESA and to the Tribes. BOR had to regulate the water level in Upper Klamath Lake to protect the endangered suckers and the flow rates in the Klamath River to provide suitable flowing water habitat in the Klamath River for the threatened cohos.

The courts have consistently found that Congress intended the ESA to "halt and reverse the trend toward species extinction, whatever the cost."[60] This principle underlies opinions rendered on Klamath Basin water allocation issues. The Ninth circuit ruled in *Klamath Waster Users Association v. Patterson*[61] that BOR is legally obligated to operate

the Project "to meet the requirements of the ESA, requirements that override the water rights of the Irrigators." The court relied on the principal that "contractual arrangements can be altered by subsequent Congressional legislation" even when the legislation was passed after the contracts were made.[62] A year later, in *Kandra v. United States,*[63] the federal district court rejected arguments that RPAs benefiting listed fish were illegal because they are inconsistent with the primary irrigation of the Project and found that Project water rights were subservient to the government's ESA requirements. Thus, the priority of purposes for which the federal government must manage water in the Klamath Basin is: species listed under the ESA, Tribal trust responsibilities, contract irrigation water, and the National Wildlife Refuges.

F. ENDANGERED SPECIES ACT

Listing under ESA sets into motion a cascade of legal steps designed to promote a species' survival and recovery. When a species is listed, "critical habitat," [64] should be listed and a "recovery plan"[65] promulgated. The ESA also authorizes the purchase of habitat,[66] prohibits federal agencies from engaging in actions that might jeopardize a listed species,[67] and prohibits individuals from "taking" the species.[68]

Listing triggers three substantive duties. First Section 4 provides that a recovery plan " . . . shall be develop[ed] and implement[ed] . . . unless . . .[it] will not promote the conservation of the species."[69] Second, Section 7 prohibits federal agencies from engaging in any activity that will "jeopardize" the continued existence of a species and requires agencies to consult with either the FWS or NMFS if jeopardy might occur.[70] The Supreme Court has held that the ESA is substantive and the duty to prevent jeopardy is absolute.[71]

In the Klamath Basin there are four species listed on the ESA that must be considered whenever the federal government undertakes an action that might adversely affect them; the coho salmon in the Klamath River below Iron Gate Dam, the shortnose and Lost River suckers in the Upper Klamath Basin, and the bald eagle that nests and winters in the National Wildlife Refuges.

1. ESA section 7 (Consultation)

Section 7 of the ESA directs all federal agencies to utilize their authorities in furtherance of the purposes of the Act by carrying out programs for the conservation of threatened and endangered species (16 U.S.C. §1536(a)(1)). It also directs agencies to ensure that their actions are not likely to jeopardize the continued existence of threatened and endangered species or their habitat (16 U.S.C. §1536(a)(2)), and requires federal agencies and departments to consult with the Secretary of Interior or of Commerce if an authorized action is likely to affect listed or proposed species or their habitat (16 U.S.C. §1536(a)(3)).

A Biological Assessment (BA) is required for the "Section 7" process (16 U.S.C. §1536(c)(1)) and pursuant to the National Environmental Policy Act (NEPA) to determine whether a proposed "major construction activit(y)" under the authority of a federal action agency is likely to adversely affect listed or proposed species or designated critical habitat (42 U.S.C. 4321 et seq. and 50 CFR 402.12). The Endangered Species Consultation Handbook (Handbook) (USFWS 1998) states that " . . . if both proposed and listed species are present, a biological assessment is required and must address both proposed and listed species." The outcome of a BA determines whether formal consultation or conferencing is necessary with FWS (50 CFR §402.02, 50 CFR §402.12). FWS evaluates the BA and issues a Biological Opinion (BiOp). The BiOp must include a cumulative impacts analysis.[72]

Section 7 of the ESA requires that when the Services (FWS and NMFS) issue an Incidental Taking Statement (ITS) (incidental take is the take—actual harm to an individual **or** adverse modification of habitat essential to a listed species—that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by a Federal agency or applicant) that a specific number or level of disturbance to habitat must be described.

Issuance of an ITS requires that if the Service finds that the take would result in *jeopardy* to the species or result in adverse modification of listed critical habitat, then the Service must issue *Reasonably Prudent Alternatives* (RPA) to the proposed action that minimize the impact of the incidental take. The Service then lists *terms and conditions* (which are NOT discretionary) to the methods by which the RPA are to be carried out

and these must include reporting and monitoring requirements that assure adequate action agency oversight of any incidental take.[73] "The monitoring must be sufficient to determine if the amount or extent of take is approached or exceeded, and the reporting must assure that the Services will know when that happens."[74]

b. ESA and the "Best Science Available"

Decisions with respect to endangered species are often characterized by insufficient data, probabilistic predictions about future events, considerable uncertainty regarding the accuracy of the predictions, conflicting management objectives, disagreement about the best course of action, and the need to justify whatever decision is made (NRC 1995:123). The federal Government is required to use "the best scientific and commercial information available" when making decisions under ESA.[75] But this is not defined in the ESA. Rather one must look to legislative history, policy, and guidelines published by FWS and NMFS,[76] and case history.

In creating two categories of listed status, endangered and threatened, Congress impliedly intended that FWS and NMFS take preventive action.[77] The separate threatened category seems to intend that the agencies should take action before a species is conclusively headed toward extinction. The Conference Committee Report to the 1979 amendments to the ESA points out that § 7 "continues to give the benefit of the doubt to the species . . .").[78]

Administrative interpretation of the "best science available" standard consistently recognizes that information is often meager at best and that to preclude harm, the agencies should carefully and impartially consider all of the information (published and unpublished alike) available, and to ensure that any information used is "reliable, credible, and represents the best scientific and commercial data available."[79] The FWS Consultation Handbook reiterates this definition, specifically in the context of section 7 consultations (USFWS & NMFS 1998:xi). The Consultation Handbook also states that if a BiOp must be given in the face of insufficient data that the Services are expected to provide the benefit of the doubt to the species pursuant to Congressional direction given in 1979[80] (USFWS & NMFS 1998:1-6). The Conference Report stated that the "best information available" language was intended to allow FWS to issue BiOps even when

inadequate information was available, rather than being forced to issue negative opinions, thereby unduly impeding proposed actions. The report goes on to state that the proposing agency had the duty to show that its actions would not jeopardize the species.

Judicial interpretation has also for the most part interpreted the "best available data" standard to require less than conclusive evidence, giving the benefit of the doubt to the species. The Supreme Court has found that this requirement serves to ensure that the ESA is not implemented haphazardly, on the basis of speculation or surmise and to avoid needless economic dislocation resulting from agency decisions.[81] Judicial review has helped refine this concept, ensuring that decisions made by agencies using the "best available information" are not "arbitrary or capricious" and that resulting regulations are rationally related to the problems causing decline of a listed species. "Best available," however does not require that the agencies have all of the data or "perfect" data before making a decision,[82] [83] but neither can agencies ignore available scientific information.[84] The courts have also found that when there are competing expert opinions or the scientific data are equivocal, it is the agency's prerogative "to weigh those opinions and make a policy judgment based on the scientific data.[85]

However, the courts have not been consistent or precise in their application and definition of the "best available science." Some seem to focus on the "available" part of the phrase[86] others have held that the Services must conduct a detailed and "comprehensive" discussion of the effects of the proposed action.[87] Though in each case the courts seem to require that the Services err in favor of the species.[88] In short "the Service must utilize the best scientific . . . data available, not the best scientific data possible."[89]

Under the current approach taken in applying the "best available information" the National Research Council has found that, "the structure of hypothesis testing related to listing and jeopardy decisions can make it more likely for an endangered species to be denied needed protection than for a non-endangered species to be protected unnecessarily. . . ." (NRC 1995:15). The problem is that science doesn't yield absolute answers; it gives contingencies. But the role of science in today's society is one of legitimization and thus its "ownership" can and often is highly contested (Jasanoff 1990; Tarlock 2002). This has been underscored in a memorandum written by Frank Luntz for

the Republican Party in which he advises in a section titled *Winning the Global Warming Debate* that the public will change its view toward global warming if a scientific consensus is achieved, therefore he recommends the Republican Party "continue to make the lack of scientific certainty a primary issue" (Lee 2003). He goes on to advise that, "people are more willing to trust scientists than politicians."

V. SCIENCE AND THE ENDANGERED SPECIES ACT

At the time of the BOR decisions to withhold water from irrigators in 2001, the "best available science" required lake levels of 4,140 feet (USBOR 2001). Because of the requirements of ESA and federal trust obligations to the Tribes, the Secretary was in no position to change the outcome of contract water being managed by BOR to fulfill the federal government's trust responsibilities to the Tribes and under ESA. BOR abided by the RPAs outlined in the BOs for the suckers and the coho; very little irrigation water was diverted to the Project irrigators but was, instead, left in the Klamath system. The agriculture community in the Klamath Basin was galvanized, as were their Congressional representatives (Service 2003).

Several representatives of the Bush Administration traveled to the Klamath Basin to hear about the drought and its effects on the Basin (Wooldridge 2001). In her comments to the House Resources Committee, Deputy Chief of Staff, DOI, Wooldridge stated that she was greatly moved by the "stories of distress of many people here" (Wooldridge 2001:2).[90] She continued by saying that she was, "equally moved by a desire to do as much as we can to . . . renew some degree of certainty to lives" in the region and further that she was "painfully aware of limitations brought by a very limited resource and the multiple demands on it, and be the multiple responsibilities of the Department (Wooldridge 2001:2). She went on to describe the federal responsibilities in the Basin and lists the federal governments list of priorities with respect to water in the Basin Wooldridge 2001:5).[91]

Ms. Wooldridge pointed out that the Administration had received a great deal of criticism, from the agriculture community, of the science available to make the operating decisions for Upper Klamath Lake and stated that "it is beyond question that where Federal resource decisions are made, the scientific basis of those decisions should be

unassailable as biased or less than the best available science" (Wooldridge 2001: 3). At this meeting she announced that the Secretary would have the science on which the FWS BiOp and NMFS BiOp were based reviewed. The review would specifically assess among other things, "the degree to which the determinations . . . were based on best existing knowledge and best available scientific information . . . . (Wooldrige 2001:9).

On October 2, 2001, Secretary Norton announced that she had signed an agreement with the National Academy of Sciences to review the scientific information used by BOR, FWS, and NMFS and the way in which it was applied in the BiOps and operating plans for the BOR Klamath Basin Project (USDOI 2001). On October 23, 2001, the National Academy of Sciences announced that a team of scientists had been named to complete the review and that they would meet on November 6-8 and complete their task by January 31, 2002 (Barnard 2001). The project director for the review, Suzanne van Drunick commented on the timeline given the Academy by Secretary Norton saying, "I think we're breaking records here. The agencies gave us that deadline. The reason is they need to make their 2002 water allocation decisions" (Barnard 2001).

A. THE CHARGE TO THE NRC COMMITTEE

The National Academy of Sciences, National Research Council was established by congress to provide scientific advice for the nation (NAS 1998). Members of committees serve as volunteers while continuing to work at their regular job and are to give unbiased advice to the federal government in the form of consensus reports, conference proceedings, or policy "white papers" (NAS 1998).

The committee was assigned a two-part task (NAS 2001). The first was to be completed by 31 January 2002 before the next irrigating season began (NAS 2001) was very narrow and specific. The panel was to provide a "preliminary assessment of the scientific information used by the Bureau of Reclamation, the Fish and Wildlife Service and National Marine Fisheries Service regarding the effects of operations of he Bureau of Reclamation's Klamath Project on listed species. . . . and consider to what degree the analysis of effects in the biological opinions . . .is consistent with that scientific information." Dr. Bill Lewis, chairman of the committee, has stated that the task given the committee both "guided and constrained" its work (Lewis 2003). The constraint lay in

the very narrow charge it was given for the first of its two tasks. Lewis points out that their charge was to evaluate the "quality of the scientific information available to support certain conclusions in the Biological Assessment (USBOR 2001) and Biological Opinion (USFWS 2001)" (Lewis 2003:2).

B. THE NRC REPORT

The committee's report found that there was substantial scientific support in all parts of the BoOps on the suckers and coho *except* for the recommendations concerning minimum lake levels for Upper Klamath Lake and minimum flow levels in Klamath River (NRC 2002:21). This is what Secretary Norton was interested in. As a good attorney, she knows that the best questions to ask an expert witness are narrowly constructed and do not allow the witness to equivocate.

The committee reported that, "there is no substantial scientific foundation at this time for changing the operation of the Klamath Project to maintain higher water levels in Upper Klamath Lake for the endangered sucker populations or higher minimum flows in the Klamath main stem for the threatened coho population" (NRC 2002:3). The very next sentence states that "the USBR[92] proposals also are unjustified, . . . because they leave open the possibility that water levels in Upper Klamath Lake and minimum flows in the Klamath main stem could be lower than those occurring over the past 10 years for specific kinds of climactic conditions. Thus the committee finds no substantial scientific evidence supporting changes in the operating practices that have produced the observed levels in Upper Klamath Lake and the observed mainstem flows over the past 10 years" (NRC 2002:3-4).

The DOI now had the "best available science" that it wanted, and the reaction was electric. There were pronouncements that FWS, NMFS, and BOR had used "junk science" and "bogus science," that this was "one more nail in the coffin of that broken law" ––ESA (Herger 2002, Hansen 2002). Sue Ellen Wooldridge, Deputy Chief of Staff for the DOI announced that FWS and NMFS would consider the conclusions of the Interim Report during section 7 consultation with BOR, and while preparing their BOs for operation of the Klamath Project for 2002-2012 (Wooldridge 2002). Through negotiations, NMFS and BOR agreed on summertime Klamath flow rates that were

below the minimum recommended in the 2001 BiOp and that BOR would make up the deficit by establishing a water bank that would restore the minimum flow 9 years later (Service 2003).[93] The headgates at the "A" Canal were opened with great ceremony by Secretaries Norton and Veneman on March 29, 2002 "as a first step in delivering water to Klamath Basin irrigators for the 2002 growing season" (USDA et al. 2002a). In an accompanying press release the departments state that the Bas from BOR "follow the recommendations from the National Academy of Sciences national Research Council to operate the water regime as it has operated in the previous 10 years (USDA et al. 2002b). A spokesperson for BOR stated that in developing the 10 year operating plan, BOR relied on the NRC report because it represented the "best available science" (Service 2003).

C. Fish Kill on the Klamath River

In September 2002, 33,000 fish died in the lower Klamath river. An analysis of effects completed by the California Department of Fish and Game (CF&G) concluded that "The September 2002 fish kill was caused by a combination of high densities of adult fish in the lower Klamath River (due to low flows and possibly inadequate fish passage) and war water temperature conditions which are typical for this time of year. These conditions were favorable for a disease outbreak by *ICH* and *columnari*[94]*s* which are commonly present in the aquatic environment" (CF&G 2003:57). The report goes on to warn of substantial risk of future kills given the flow rates called for by BOR in its operations plan for the Project (CF&G 2003:57).

A number of scientists have criticized the NRC committee for stating that the science underpinning the services' opinions were "not sound science" (Cooperman and Markle 2003; Service 2003). Their criticisms derive from the complex nature of managing for endangered species, the uncertainty of the information available, and the mandate of the ESA consultation requirement to assess the risk an action may pose to listed species and to err on the side of the listed species. The NRC committee was not asked to assess risk, nor were they asked (for the first part of their task) to do more than to determine whether there was a clear link between water levels and fish health. Their conclusion (that there was none) resulted in a change of management at the Link Dam. It now appears that the

administration requires verifiable harm before protective measures can be applied. This was a change from the precautionary manner in which ESA has been applied

D. Uncertainty and the Endangered Species Act

Dr. Lewis recognized that the tasks of the NRC and FWS/NMFS are quite different. He has pointed out that the FWS in its 2001 BiOp acknowledged that there was no direct cause and effect relationship between lake level in Upper Klamath Lake and fish mortality, but that because of FWS' obligations under ESA is to reduce risk, the Service had to make conclusions based on its "professional judgment involving risks that were not quantified or that involve harmful effects not yet mechanistically connected to water level" (Lewis 2003:3). On the other hand he characterized the Committee's mission as being very narrow; "an assessment of risk was not part of the committee's charge," rather it was to evaluate the scientific basis for the RPAs, and thus the committee viewed recommendations based on "professional judgment" as weakly supported (Lewis 2003:4). He went on to point out that because "the committee was merely following its task, . . it was not constructing an indictment against use of professional judgment. Indeed professional judgment is the constant companion of applied science" (Lewis 2003:4).

The probabilistic nature of the natural world is incongruent with the degree of certainty demanded by our legal system. The National Academy of Sciences, in its evaluation of science and the ESA, pointed out that, "for even the best-studied endangered species, essential pieces of information might be lacking, yet decisions must be made" (NRC 1995:125). Such situations call for the use of judgment (Hammond 1996; Stewart 2000). In the face of uncertainty agencies have to exercise considerable discretion while interpreting inconsistent facts, balancing competing interests, and making what is ultimately a subjective policy choice that has real economic, ecological, and political ramifications. In this context an agency can expect opposition to its decisions (Susskind and McMahon 1985). This leads to efforts to "capture' the science. One tactic is to, as has been done in the Klamath Basin, mount a "junk science" attack (Tarlock 2002). This usually takes the form of attacking the science underlying a decision that incorporated the precautionary choices (which is embedded in the ESA) in response to uncertain data.

This is exactly what happened in the Klamath Basin. One group of stakeholders was asked to absorb the entire burden of regulatory decisions made using uncertain science but applying scientific judgment in a cautious way as required by ESA. The effected group questioned the underlying science, found a willing audience in the Secretary of Interior, and succeeded in having the legal "best available science" changed to favor their desired outcome. This is neither a satisfactory nor a productuve use of science.

VI. CAN SCIENCE RESOLVE THE STALEMATE?

Ecological and biological science involve too many parameters to know, describe, and control. Even so policy and law ask for more certainty than science can deliver. When this occurs no decision is tenable and the law breaks down (Houck 1997 at 877). Schaller noted that conservation problems are largely social and economic, not scientific, yet biologists are expected to solve them (1992:47). The more strongly a particular outcome in any conservation-related issue is desired, the more likely it is that the science that underlies the policy decision will be subject to "enhanced" interpretation, ignored, or rebutted depending on what the science implies (Faigman 1999:175) When science is uncertain then those who advocate a point of view not reflected in the resulting regulations are likely to question the underlying science.

It has been argued that once an environmental issue becomes a high profile political issue, the most appropriate role for science is *not* to resolve the issue but to help design a resolution *after* political consensus has been reached (Herrick and Sarewitz 2000). In other words the job of science is not to make policy, but to make sure that the biological consequences of alternate policies are clear (Ruckelshaus et al. 2002). Science is no substitute for good planning and decision-making. When decision-makers to rely on "science" for decision-making they are not doing their jobs. And scientists who assume that science can make the policy decisions are either arrogant or naive and risk calls by politicians and the adversely affected public to curtail the use of "junk" science.

A. SOLUTIONS

Is there a way to resolve the 'crisis" in the Klamath Basin? Before that can happen the problem or crisis needs to be defined. This may be the most challenging part of the issue. Problem definition includes, at the very least, an understanding of the "cause and consequences of undesirable circumstances and a theory about how to improve them" (Weiss 1989:97). This is a political, not a scientific problem. Symptoms of problems in the Basin, including fisheries collapse, algal blooms, fish kills, overallocation of water, were all observed more than a decade ago—but politicians paid no heed. There was no attempt to develop basin-wide management plans. The legal and political institutions and infrastructure that exist in the Klamath Basin developed during a period when per-capita income was low and natural resources were "relatively" abundant. These institutions no longer satisfy the needs of the Basin. Lack of adjudicated water rights and a lack of water metering devices (OWRD:15)[95] make it difficult to institute conservation measures. There are no water markets or other transfer mechanisms in place thus users can not move water around in the most economical way.[96]

Resolution can only come about if there is the political will to admit that there is not enough water to meet all of the claims in the Klamath Basin and there is the political leadership to develop a process that defines Basin-wide goals and measurable objectives that benefit the entire basin and not just specific user-groups.[97] This process must seek out ways to conserve water across all user groups implementing market solutions including water banks, willing sellers, etc. Secretary Norton is on record supporting market-oriented solutions when there are polarized resource conflicts (Norton 2001). This will also include allowing flexibility of state water law in the Basin to allow for transfers among users, regardless of priority, to most efficiently use irrigation water.[98] In the context of water law, the ESA protects species with relatively little consideration given to economic impacts[99] while prior appropriation water law protects economic uses of water with very little consideration for ecological impacts. And finally the Secretaries and states must develop a process through which all federal and state agencies involved in the upper and the lower basin can coordinate their efforts. The federal government is working at cross-purposes to itself: it has trust obligations to the Tribes, legal obligations to endangered species, and contractual obligations to the irrigators in the Klamath Basin.

B. CONCLUSION

Natural resource management is controversial and has increasingly involved more and diverse stakeholders who have increasingly polarized perspectives (Clark, et al. 1988). Societal values have, since the inception of the regulatory state, changed from advocating settlement, development, and use of natural resources to also advocating conservation and protection of natural resources (Bates et al. 1993; Wilkinson 1992). Policy makers have responded with broader policy mandates, changed management programs, and recognition that they need a stronger knowledge base (Clark et al. 1998). The response of stakeholders has also been to demand increased scientific scrutiny and involvement in resource allocation.

The failure to integrate science and policy is reflected in the number of unresolved conflicts that end up working their way through the legal and political systems, often halting attempts at fair resolution. Increasingly, science plays a role, not in facilitating resolution by providing information that can be used by policy-makers, but as a way for politicians and policy-makers to avoid making difficult decisions and for stakeholders to retard implementation of management decisions (Brunner 1998: 130-131; Faigman 1990). The hook most often used is that the science is unclear, or wrong, or lacking—in effect the science is uncertain.

Uncertainty is an integral part of science–it is impossible to completely describe any system, thus there are often sharp differences about the implications of a management strategy or policy decision. Whether the uncertainty can be meaningfully quantified or not, managers are required to act in spite of it (Thompson 1986). What science offers to the decision-makers is a "broad template for organizing the principles, prejudices, and passions" surrounding the issue at hand (Faigman 1999:172).

Because of the increased reliance on science to inform policy decisions the distinction between the roles of science and policy have become increasingly blurred and difficult to define (Clark et al. 1998). The increasing use of National Research Council committees to "resolve" difficult policy issues reflects this. Formal assessments may add technical information to the debate but, as in the NRC Klamath report, the sides are likely to use the information selectively, and in any case attention remains focused on technical and

scientific issues rather than turning to the political issues underlying the problem (Brunner et al. 1998). Such crisis-driven scientific assessments may distort or overshadow the underlying conflict, and can polarize the policy debate as competing interests contend for political or legal favor (Clark et al. 1998).

Others have found that scientific advances do not predictably correlate with reductions in policy conflict (Graham et al. 1988). Collingridge and Reeve (1986) even argue that science is unsuited to the process of policy because policy tends to be either "under-critical" or "over-critical" of the science. This is exacerbated by promises or at least intimations by scientists, or perceptions by the public and politicians, that science can resolve the issue. In an "over-critical" policy environment, such as exists in the Klamath Basin, the result is endless debate, no general consensus on the underlying science, and a commensurate loss of public and political respect for science (Clark et al. 1998).

To successfully integrate science and policy there must be clear policy and goals, and measurable objectives. There must also be an admission that better science will not solve inherently political, legal, or values issues. In fact turning to "better science" can be an admission that the political and regulatory processes have failed. It is important for all of the players, but especially the scientists, to recognize the limited capacity of science to resolve inherently policy issues and to be wary of becoming involved because they risk calls of "junk science," a loss of respect for what science can contribute to the debate, and ultimately efforts to change the way science is used in making natural resource management decisions (Paul 2002).[100]

Ultimately science cannot resolve any policy issue. The combination of complex natural resources issues, controversial decisions, and incomplete information on which to base decisions and evaluate outcomes requires that these decisions comprise an evolving blend of biology, sociology, law and politics. The success of such decisions (measured in their acceptance by the public) is dependent on the ability of decision-makers to obtain high-quality information and to integrate that information into the political and legal processes.

[1] The issue of snow machine use in Yellowstone and Grand Teton National Parks is an example of the endless research that may result. *See Mike Stark, Park's Snowmobile Study cost: $6 Million and Rising*, Billings Gazette, June 23, 2004 at www.billingsgazette.com/index.php?id=1&display=rednews/2004/06/23/build/state/20-snowmobile-study.inc.

[3] California Department of Fish and Game. 2003. September 2002 Klamath River Fish Kill: Preliminary Analysis of Contributing Factors. Northern California-North Coast Region, CDF&G, Redding, CA.; Guillen, G. 2003. Klamath River fish die-off, September 2002; causative factors of mortality. Report No. AFWO-F-03. United States Fish and Wildlife Service. Arcata, California.

[4] At the 2003 meeting of the American Association for the Advancement of Science in Denver one symposium focused on identifying those regions of lakes, streams and wetlands of the world with the highest number of endemic species and that are threatened by human activity. Dr. Gerald R. Smith identified the Klamath River Basin as an area of high endemism and a high degree of habitat destruction (University of Michigan 2003).

[5] *See* Listing decision for shortnose and Lost River suckers 53 FR 27,130-27,134 (2001) and listing decision for Southern Oregon/Northern California Coast coho salmon (a population that includes Klamath River coho) at 62 F.R. 24,588 (May 6, 1997).

[6] The prior appropriation doctrine begins with the intent to apply water to a beneficial use. This is then demonstrated by diverting water from its natural source and applying it to a beneficial use within a reasonable time. The date of appropriation determines priority of use, with the earliest user having the superior (senior) right. The measure of an appropriative right is the quantity that can be beneficially used within a reasonable time using reasonable diligence (see generally Tarlock et al. 2002).

[7] Listed as threatened under ESA.

[8] Kitzhaber, J.A. 2001. Governor John A. Kitzhaber, Klamath solution takes cooperation by all: there are no easy answers in this drought year for the future (June 1, 2001).

[9] *See generally* Wilkinson, C.F. 1992. Crossing the Next Meridian: Land, Water, and the Future of the West. Island Press, Washington, D.C.

[10] *id*.

[11] Leopold, A. 1949. A Sand County Almanac and Sketches Here and There. Oxford Univ. Press, NY.

[12] The Brundtland Report defined the goal of sustainability as "to meet the needs of the present without compromising the ability of future generations to meet their need" (Brundtland 1987:208).

[13] The social objectives of sustainability include the intangible values of beauty and wonder (Committee of Scientists Report: 175).

[14] Wilkinson, C.F. 2000. A case study in the intersection of law and science: the 1999 report of the committee of scientists. Arizona Law Review 42:307-318 at 313.

[15] Demand for water exceeds supply by more than 100,000 acre feet each year (Thompson 2003).

[16] 16 U.S.C. §§ 1531-1544.

[17]Generally preemption is a doctrine of the Supreme Court that says that some matters are of such national, as opposed to local, importance that federal laws take precedence over state laws. The doctrine evolved with respect to Tribes evolved from an 1832 Supreme Court decision, *Worcester v. Georgia*, 31 U.S. (6 Pet.) 515. *See also, Cherokee Nation v. Georgia*, 30 U.S. (5 Pet.) 1, 8 L. Ed. 25 (1931); *Johnson v. McIntosh*, 21 U.S. (8 Wheat) 543, 5 L. Ed. 681 (1823). In 1980, the Supreme Court in *White Mountain Apache Tribe v. Bracker*, 448 U.S. 136, 100 S. Ct. 2578, 65 L. Ed. 2d 665 (1980), laid down a specific rule for analyzing pre-emption claims in Indian cases generally.

[18] In 2001 irrigation water to Klamath Project farmers was only curtailed for water from Upper Klamath Lake. Water from the Lost River-Clear Lake-Gerber Reservoir portion of the Klamath Project was made available. On July 24, 2001 the Department of the Interior did release approximately 75,000 af of water from Upper Klamath Lake for irrigation. Water deliveries to non-Project irrigators were not affected (Cooperman and Markle 2003).

[19] Northwest Coast Federation of Fisherman's Associations estimates that with the "demise" of the Klamath River salmon fishery, 3700 jobs and an $80 million / year commercial fishery have been lost (Grader 2001).

[20] The Secretary requested a review by the National Research Council that has produced an Interim Report that was used by BOR in writing its operations plans for 2002 and 2003 (NRC 2002).
[21] (California Department of Fish and Game 2003).
[22] Lake elevations from 1904-1921 (before the Irrigation Project was completed) ranged from 4,139.9-4,143.1 ft mean lea level (MSL). The mean elevation after completion of the Project has been 4,136.8-4,143.3 msl (Rykbost and Todd 2002). The lowest the lake can go is 4,136 msl—the bottom of the Link River Dam (Rykbost and Todd 2002:48).
[23] The Upper Basin comprises the area upstream of Iron Gate Dam, essentially upstream of the border of Oregon and California (Hathaway and Welch 2002).
[24] Upper Klamath Lake, Tule Lake [created by E.O. No. 4975 (Oct. 28, 1928)], Clear Lake, and Lower Klamath Lake [created by E.O. No. 924 (Aug. 8, 1908)], Bear Valley, and Klamath Marsh National Wildlife Refuges.
[25] Although the establishment of Lower Klamath and Tule Lake NWRs provided for the conservation of wildlife within the refuges, the lands also remained subject to reclamation uses. After decades of debate, the future of farmland within the Tule Lake and Lower Klamath NWRs was finally settled with passage of the Kuchel Act in 1964 16 U.S.C. §§695k-695r) which dedicated the refuge lands to wildlife conservation and provided that they be managed for the "major purpose of waterfowl management, but with full consideration to optimum agricultural use" of certain refuge lands (so-called "lease lands") consistent with that purpose " (16 USC § 695l).
[26] 19th cent. EO and confirmed by 1988 Hoopa-Yurok Settlement Act (HYSA), 25 U.S.C. § 1300i *et seq*.
[27] *Crichton v. Shelton,* 33 I.D. 205, 217 (1904*); Donnelly v. United States,* 228 U.S. 243, 259 (1913); *Mattz v. Arnett,* 412 U.S. 481, 487 (1973); *Parravano v. Masten,* 70 F.3d 539, 545-546 (9th Cir. 1981), *cert. denied*, 116 S.Ct. 2546 (1996).
[28] Klamath Treaty October 14, 1864, 10 Stat. 238.
[29] Kimball v. Callahan, 493 F.2d 564 (9th Cir.), cert. denied, 419 U.S. 1019 (1974).
[30] 25 U.S.C. §§ 564-564w.
[31] Kimball v. Callahan, 590 F.2d 768 (9th Cir.), cert. denied, 444 U.S. 826 (1979).
[32] *Pyramid Lake Paiute v. Department of the Navy,* 898 F.2d 1410, 1420 (9th Cir. 1990).
[33] *See Mitchell v. United States,* 463 U.S. 206, 224-226 (1982); *Ft. Mojave Tribe v. United States,* 23 Cl. Ct. 417, 425-426 (1991); *Joint Board of Control of the Flathead Mission and Jocko Irr. Dist. v. United States,* 862 F.2d 195 (1988).
[34] The Klamath Project was authorized pursuant to the Act of February 9, 1905, ch. 567, 33 Stat. 714 which is part of the Reclamation Act of 1902, 43 U.S.C. § 372 *et seq*. The Secretary DOI was authorized to change the level of several lakes—drain them—and to dispose of certain land in the area that would become the Klamath Project. Project construction was authorized by the Secretary DOI, May 15, 1905 under the Reclamation Act to drain and fill the lakebeds of the Lower Klamath and Tule Lakes, for storage of water from the Klamath and Lost rivers, to construct infrastructure needed to divert water, and to control flooding on "reclaimed" lands. Project costs were to be repaid by beneficiaries on the "reclaimed" lands.
[35] *Peterson v. United States Department of Interior,* 899 F.2d 799 (9th Cir. 1990).
[36] Project irrigators pay operation and maintenance fees to the irrigation districts that deliver water ($12 - $70 /acre which is due regardless of water delivery; there is no charge for the water 9Rykbost and Todd 2000:61-62). Electricity for running the irrigation pumps is charged at reduced rates –about 10 times less than current rates--due to a 50 year contract that expires in 2006 (Rykbost and Todd 2002:62). Power is provided by PacifiCorp from the Link River Dam which is operated for Project needs ((Rykbost and Todd 2002:72).
[37] Because the Refuges have junior priority dates to Project lands they only get water if there is surplus.
[38] *See Winters v. United States,* 207 U.S. 564 (1908) applying reserved rights to Indian reservations and *Arizona v. California,* 373 U.S. 546 (1963) recognizing reserved water rights for other federal lands.
[39] See the McCarran Amendment (43 U.S.C. § 666).
[40] 145 F.Supp2d 1192 (D.C. Or. 2001).
[41] *See Arizona v. California*, 373 U.S. 546, (1963); *United States v. Ahtanum Irrigation District*, 236 F.2d 321 (9th Cir.1956), *cert. denied*, 352 U.S. 988, (1957).
[42] *Parravano v. Babbitt,* 70 F.3d 539, 545 (U.S. App. 1995); cert. Denied 518 U.S. 1016 (1996) *quoting* William C. Canby, *American Indian Law* 17-18 (2d ed. 1988).

[43] *Id*.
[44] *U.S. v. Adair*, 723 F.2d 1394 (9th Ci.r 1983), *cert. denied* Oregon v. United States, 467 U.S. 1252 (1984) (*Adair II*).
[45] 723F.2d 1394, 1410.
[46] U.S. v. Adair, 187 F.Supp. 2d 1273, 1275 (D.Or. 2002) (*Adair III*).
[47] *Id*.
[48] *Adair II* at 1406 n.11
[49] "*Step One--Quantifying the Water Right*
Adair I announced the legal standard for quantifying the Tribes' water rights by holding: The Indians are still entitled to as much water on the Reservation lands as they need to protect their hunting and fishing rights. If the preservation of these rights requires that the Marsh be maintained as wetlands and that the forest be maintained on a sustained-yield basis, then the Indians are entitled to whatever water is necessary to achieve those results. U.S. v. *Adair I,* 478 F.Supp. at 345-46.
Adair II and the "moderate living" standard did not change this threshold quantification standard. . . . *Adair II* held that there were two primary purposes of the reservation and accompanying implied water rights. One was to support Klamath agriculture, and the other, which is at issue here, was "for the purpose of maintaining the Tribe's treaty right to hunt and fish on reservation lands." *Adair II,* 723 F.2d at 1409. In order to provide the Tribe an opportunity to continue hunting and fishing on the reservation lands, it is axiomatic that there be sufficient water to support productive habitat so there may be game to hunt, and fish to fish, as well as edible plants to gather. . . .Quantifying the reserved water right so that productive habitat can be supported is the only meaningful way to measure the water requirements to meet the goal of fulfilling the purpose of the reservation. *Adair III* at 1276.
[50] Memorandum from the Solicitor to the Secretary, Fishing Rights of the Yurok and Hoopa Tribes, M-36979, Oct. 4, 1993. (Sol. Op.). The rights were secured through the 1988 Hoopa-Yurok Settlement Act, 25 U.S.C. § 1300i *et seq*.
[51] United States v. Eberhardt, 789 F.2d 1353 (9th Cir. 1986).
[52] *See Colville Confederated Tribes v. Walton,* 647 F.2d 42 (9th Cir. 1981), *cert. denied* 454 U.S. 1092 (1981).
[53] *United States v. Anderson,* 591 F.Supp. 1, 7 ((E.D. Wash. 1982).
[54] 43 U.S.C. § 383.
[55] Sol. Op. to Regional Director, BOR, Mid-Pacific Region from Regional Solicitor, Pacific Southwest Region on Certain Legal Rights and Obligations Related to the U.S. Bureau of Reclamation, Klamath Project for Use in Preparation of the Klamath Project Operations Plan (KPOP). July 25, 1995.
[56] *See United States v. New Mexico,* 438 U.S. 696 (1978).
[57] *See Cappaert v. United States,* 426 U.S. 128, 138 (1976).
[58] ORS 537.110-537.270.
[59] These claims have been made by the US Forest Service (214 claims), U.S. Bureau of Land Management (52 claims), National Park Service (21 claims for Crate Lake NP), FWS (22 claims for rights in the Refuges), U.S. Bureau of Indian Affairs (393 claims on behalf of the Klamath Tribes), Klamath Tribes (5 claims incorporating all BIA claims and in effect duplicating the BIA claims), and BOR (7 consolidated claims for the Klamath Project) (Marbut 2002:87).
[60] *T.V.A. v. Hill,* 437 U.S. 182, 184 (1978).
[61] 204 F.3d 1206, 1213 (9th Cir. 1999), *cert. denied,* 531 U.S. 812 (2000).
[62] *Id*. However, the irrigators may have a claim for money damages against the United States for losses resulting from non-delivery of contract water. In *Tulare Lake Basin Water Storage District, et al. v. U.S,* 49 Fed.Cl. 313 (2001) the U.S. Court of Federal Claims held that the United States had taken plaintiff's property without just compensation. The plaintiff had contracts to receive specified amounts of water from federal water projects. BOR reduced the amount of water it delivered to the plaintiff in compliance with ESA for winter-run Chinook salmon and delta smelt. The suit was brought in response to BOR's adopted RPAs requiring BOR to decrease water flow to contract irrigators. The court found that the contracts conferred on the irrigators a right to use some quantity of water and that the exclusive use of those rights for a listed species resulted in a physical taking of property by the government (*Id* at 316).
[63] 145 F.Supp 2d 1192 (D.C. Or. 2001).
[64] 16 U.S.C. 1533(c).

[65] 16 U.S.C. 1533(f).
[66] 16 U.S.C. 1534.
[67] 16 U.S.C. 1536(2).
[68] 16 U.S.C. 1538(a)(1)(B).
[69] 16 U.S.C. 1533(f)(1).
[70] 16 U.S.C. 1538(3)(4).
[71] *Tennessee Valley Authority v. Hill,* 437 U.S. 153 (1978).
[72] *Pacific Coast Federation of Fisherman's Associations v. Nat'l Marine Fisheries Service,* 265 F.3d 1028 (9th Cir. 2001) (finding that biological opinion was inadequate because it failed to consider and explain cumulative effects and short-term impact of actions).
[73] 50 CFR §402.14(i)(1)(iv) and (i)(3).
[74]Section 7 Consultation Handbook, p. 4-5.
[75] Section 4 (listing)16 U.S.C. § 1533(b)(1)(A), Section 4 (critical habitat) 16 U.S.C. § 1533(b)(2), and Section 7 (consultation) 16 U.S.C. § 1536(a) all require the use of 'the best scientific and commercial data available."
[76] *See* notes 66 and 67 and accompanying text.
[77] "Endangered" in defined in ESA as any species in danger of extinction throughout all or a significant portion of its range [16 U.S.C. § 1532(6)] while "threatened" is defined as any species likely to become endangered within the foreseeable future throughout all or a significant part of its range [16 U.S.C. § 1532(20)].
[78] *See* H.R. Conf. Rep. No 96-697, 159 (1979) reprinted in 1979 U.S.C.A.N. 2572, 2576.
[79] 59 FR. 34,271 (1994).
[80] *Id* at note 66.
[81] *Bennett v. Spear*, 520 U.S. 154 (1977).
[82] *National Wildlife Federation v. Babbitt,* 128 F. Supp. 2d 1274 at 1280 (E.D.Cal. 2000).
[83] *Southwest Center for Biological diversity v. Babbitt,* 926 F. Supp. 920 (D.C. Ariz. 1996)
[84] *Connor v. Buford*, 848 F.2d 1441 (9th Cir. 1988).
[85] *Maine v. Norton,* Civ. No. 00-250-B-C, 92 (D.C. ME, April 24, 2003) *quoting Brower v. Daley,* 93 F. Supp. 2d 1071, 1082-83 (N.D. Cal. 2000).
[86] *Greenpeace Action v. Franklin,* 14 F.3d 1324 (9th Cir. 1992) *citing Pyramid Lake Paiute Tribe of Indians v. United States Dep't of Navy,* 898 F.2d 1410,1415 (9th Cir. 1990).
[87] *Defenders of Wildlife v. Babbitt,* 130 F.Supp 2d 121, 130 (D.D.C. 2001) (finding that the Service used an improperly narrow "action area" and ignored many direct and indirect affects).
[88] See especially *Defenders of Wildlife v. Babbitt,* 958 F.Supp. 670, 680 (D.D.C.1997) finding that the ESA, by adopting a standard of the "best scientific and commercial data available," and not a standard of absolute certainty, reflects Congress' intent that the agency take conservative measures before a species is "conclusively" headed for extinction.
[89] Building Industry Ass'n of Sup. Cal. V. Norton, 247F.ed 1241, 1246-1267 (D.C. Cir 2001), cert. denied.
[90] Ms. Wooldridge specifically mentioned the effects to people in the agriculture community but did not mention commercial fishers or Native Tribes, or endangered species.
[91] The priority is: species listed under ESA, Tribal trust responsibilities, irrigation contracts, and National Wildlife Refuges.
[92] United States Bureau of Reclamation.
[93] It appears that DOI, using the NRC committee report as justification, requires proof of harm before an action can be taken to protect a listed species, thus no longer giving "the benefit of the doubt" to the species.

[94] *Ichthyopthirius multifilis* (ICH) is a ciliated protozoan and columnaris *(Flavocacter columnare)* is a bacterial pathogen.
[95] Without metering devices there is little incentive to develop water conservation methods.
[96] (OSU report @ 389)
[97] Congressman Thompson of California has proposed a bill that could begin this process (Thompson 2003).
[98] (OSU report @ 389)

[99] Only section 4(b)(2) [designation of critical habitat] specifically directs the Secretary to consider economics in his/her decision pursuant to the ESA 16 U.S.C. § 1533(b)(2).

[100] In direct response to the findings of the NRC Interim Report, Oregon's Congressman Hansen introduced a bill (H.R. 4840) to greatly constrict the science that can be used in making ESA decisions. In the introduction to the Bill, Rep. Hansen cites the "Sloppy science" used by FWS to justify limiting water to Project irrigators in 2001 and went on to say that "This latest travesty in the enforcement of the Endangered Species Act should be one more nail in the coffin of that broken law" (Hansen 2002).
Rep. Herger of California responded to the NRC report by stating in a House Resources Committee hearing, that the "NAS study tells us that the science is bogus" and insisting that the ESA needs to be changed to make certain that similar results don't occur again (Herger 2002).