

Endangered Species UPDATE

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Letter from the Editor

For the last 15 years, the *Endangered Species UPDATE* has been the primary forum for discussion and dialogue on current, sometimes contentious, endangered species issues. In order to be a forum for discussion, however, we need to hear from you. The *UPDATE* often publishes opinion pieces, such as John Kostyak's *The Need for HCP Reform: Five Points of Concensus* (this issue), that represent one person's or organization's analysis of endangered species policy or science.

Such pieces can be catalysts for discussion among those working in the fields of endangered species policy and science. The *UPDATE* can, and should, be an effective vehicle for participation.

If you read something with which you particularly disagree—or agree—please let us know. We will all benefit from your contribution to this ongoing dialogue.

Sincerely,
M. Elsbeth McPhee
Managing Editor



Come out of your hole and let us know what you think! [*Peromyscus polionotus*]. Photo by Dr. Nicholas Holler, Alabama Cooperative Fish and Wildlife Research Unit.

Endangered Species UPDATE

A forum for information exchange on
endangered species issues
May/June 1999 Vol. 16 No. 3

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Cover: Wood stork (*Mycteria americana*).
Photograph by David McEwen, © U.S. Fish
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The Need for HCP Reform: Five Points of Consensus

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Abstract

The Clinton Administration has spent six years turning a virtually nonexistent Habitat Conservation Plan program into a major Endangered Species Act initiative covering over 11 million acres of land. The HCP program has been strongly criticized by conservationists and independent scientists as failing to provide imperiled species with needed safeguards against habitat destruction. The Clinton Administration has now released a "five-point plan" to address the need for better species safeguards in HCPs. These five areas of conservation planning—biological goals, adaptive management, monitoring, permit duration limits, and public participation—are among the top priorities of the conservation community, and the Administration is to be congratulated for highlighting them. Now that virtually everyone involved with HCPs agrees that these are important areas for reform, it is time for the Administration to move beyond vague policy guidance and to take firm action to ensure these priorities are actually achieved. The Administration can take such action—and send an unambiguous message that it is committed to approving only those HCPs that truly conserve species—by adopting enforceable wildlife safeguards in each of the five areas.

Introduction

On March 9, 1999, the U.S. Fish and Wildlife Service and National Marine Fisheries Service (Services) released their long-awaited proposed "5-point plan" for improving habitat conservation plans (HCPs). The plan comes out at a time when conservationists and independent scientists are expressing increased concern about the hazards to wildlife posed by recently-approved HCPs. As this concern has spilled into the media, the Services have aggressively defended these HCPs as securing conservation commitments from owners of state and private lands that otherwise could never be obtained.

Despite this wide disconnect in the public debate, the proposed 5-point plan suggests that the divide on the issue of HCPs may be closing a bit. The Services' plan identifies five areas for HCP reform that have long been top priorities of conservationists and independent scientists: biological goals, adaptive management, monitoring, per-

mit duration limits, and citizen participation. As discussed below, the Services merely explain the five areas of reform and suggest approaches for their field staff to consider adopting in future HCP negotiations—disappointingly, they do not firmly commit to any specific action. This article suggests a number of bottom-line standards that the Services could adopt immediately to ensure that HCPs better protect species.

Nonetheless, simply by acknowledging the need for better safeguards for species in these five crucial areas of conservation planning, the Services have significantly advanced the debate. After the 5-point plan was announced, key participants in the HCP process from regulated industry expressed support for the effort. A consensus on the need for HCP reform has finally emerged—now we can focus on how this reform should be crafted to ensure that HCPs are truly consistent with the ESA's conservation goals.

A brief history of the HCP revolution

HCPs are agreements between the Services and nonfederal landowners that allow landowners to engage in the "incidental take" of listed species (i.e., to destroy or degrade habitat in connection with economic activity) in return for conservation commitments outlined in the HCP. In the absence of an HCP and its associated permit, landowners are prohibited by the ESA's take provision and ESA regulations from destroying or degrading habitat in a manner that kills or injures listed animal species.

Most conservationists expressed support for the original concept of HCPs when it was incorporated into the ESA in 1982 because they thought it would result in habitat enhancements on our neglected nonfederal lands. In the San Bruno Mountain HCP (1983), the HCP that provided the model on which Congress based its 1982 amendment to the ESA, roughly 8% and 13%

of the remaining habitats of two listed butterfly species, the mission blue butterfly (*Plebejus iacariodes missionensis*) and the San Bruno elfin butterfly (*Callophrys mossi bayensis*), were allowed to be destroyed for the purpose of real estate development. In return, however, the developers agreed to provide funding needed to control invasive species and otherwise manage the remaining habitats for the long-term benefit of the butterflies. This trade-off was generally viewed as benefiting the species—in fact, Congress explained its adoption of the HCP amendments on the ground that the San Bruno HCP would result in "enhancement" of the species' survival prospects.

Upon arrival of the Clinton Administration, the Department of Interior (DOI) began instituting a number of administrative policy changes to make HCPs more attractive to state and private landowners. The most prominent of these changes was the "no surprises" policy, announced in August 1994. Under this policy, the Services assure landowners that they will have no obligations beyond those stated in the HCP, regardless of whether the HCP is contributing to the decline of a species or even causing its extinction.

The new DOI leadership did more than implement HCP policy changes. It also sent strong messages down to Service field staff about the importance of getting deals done. A Fish and Wildlife Service biologist working on numerous Clinton-era HCPs told a University of Michigan research team, "We have been bombarded from above with this sort of can-do attitude—to get out there and work with the applicant and get some product on the market. Anything that delays that or makes it more difficult is not viewed favorably. The whole concept of customer service has been really stressed with the applicant being considered the only customer" (Anderson and Yaffee 1998).

Evaluating the Clinton Administration HCP program on these terms, the

Services clearly succeeded. Before the arrival of this administration, the Services had approved only 14 HCPs covering less than one-half million acres. Today roughly 250 HCPs govern the management of over 11 million acres of private and state lands across the U.S., and an additional 200 HCPs are under negotiation.

The conservationists' critique

Many conservationists and independent scientists have strongly challenged the notion that the Clinton HCP initiatives have been a success. These criticisms have been voiced by groups of conservationists and scientists with widely varying views on the promise and perils of HCPs. Some conservationists and scientists reject virtually any accommodation with developers and others who would destroy endangered species habitat in connection with their economic activities. Expressing alarm about the amounts of incidental take authorized under recent HCPs, they are calling for an HCP moratorium and strict enforcement of the ESA's take prohibition.

A second group of HCP critics (which includes this writer) acknowledges the need for such negotiated arrangements with landowners. The recent spate of listings of salmon species in the Pacific Northwest was a useful reminder of how much of our society's everyday activities potentially harm imperiled species and their habitats. As the interconnectedness of our activities with the fate of endangered species becomes increasingly apparent, we cannot reasonably demand that everyone immediately adopt a "no take" lifestyle or be subject to ESA enforcement. Instead, we need to build a conservation planning process that invites broad sharing of information and ideas on how to bring economic activities into balance with the natural world. Such a conservation planning process must secure commitments not just to protect habitats, but to manage and re-

store them. Under this view of HCPs, the Services could promote species conservation by carefully balancing limited incidental take authorization with landowner commitments toward habitat protection, management, and restoration.

Despite these differences in perspectives, HCP critics share three major concerns about the Clinton Administration HCP program. First, the Services have approved HCPs allowing a substantial net loss of habitat and employing untested mitigation strategies without any explanation of how the plans, when combined with other activities occurring in the species' range, would meet the species' overall conservation needs. According to *Using Science in Habitat Conservation Plans* (Kareiva et al. 1999), a major scientific study of HCPs sponsored by the American Institute of Biological Sciences (AIBS), nearly half of the HCPs reviewed allowed 50% or more of species' populations or habitat on the permittee's property to be destroyed, and nearly one-third of the plans allowed 100% of species' populations or habitat on the property to be destroyed. Moreover, despite the fact that most listed species are imperiled due to habitat loss, the study found that most of the HCPs failed to adequately assess how the anticipated level of habitat destruction would impact the species' overall populations.

Second, by enacting their "no surprises" policy, the Services have drastically reduced the flexibility they will need to protect species from the hazards of incidental take if monitoring data show that HCP management strategies have failed (see Kostyack 1998). Third, in crafting many HCPs, the Services have negotiated behind-the-scenes with regulated industries and failed to provide meaningful opportunities for conservationists, independent scientists, and other concerned citizens to provide input (Anderson and Yaffee 1998).

In issuing their proposed 5-point plan, the Services tacitly acknowledge each of these problems. In response to the criticism that HCPs have lacked any mechanism for evaluating their role in the overall recovery of the species, the Services state that future HCPs should have biological goals that are based on "the overall conservation needs of the covered species and/or its habitat." In response to criticisms about the impact of "no surprises" on the flexibility to address failed HCPs, the Services acknowledge the need for better monitoring of HCP effectiveness, adaptive management to respond to information derived from monitoring, and limits on the duration of "no surprises" assurances. Finally, in response to concerns about inadequate public participation, the Services state their intention to expand the public comment period on proposed HCPs.

The Services should be applauded for recognizing the need for action on each of these crucial issues. But the now that virtually everyone agrees that HCPs pose risks to species that must be addressed, have the Services taken meaningful action to address these risks?

The need for enforceable safeguards for wildlife

In assessing whether an agency action is meaningful, the first question one must ask is, has the agency committed itself legally to doing anything to change the status quo? Or has the agency spoken in such generalities, and with so many caveats, that it essentially leaves the real decision-making to another day?

Using this test, the proposed 5-point plan largely fails the test of meaningful action. First, the plan is proposed as an addendum to the HCP Handbook (FWS and NMFS 1999), a policy guidance to Service field staff. Unlike regulations, policy guidances are not always enforceable in a court of law. Without any clear legal obligation to follow the

5-point plan, Service staff could simply choose to ignore it. Second, the plan speaks vaguely in terms of factors that field staff ought to consider in negotiating HCPs, not in terms of objective bottom-line standards that must be satisfied before an HCP may be approved. This approach (which was also used in the first edition of the HCP Handbook) is based on the flawed premise that the problem with past HCPs is that field staff merely lacked information about what would be helpful to protect species.

Contrary to this assumption, field staff working on HCPs in the past five years have had access to a wealth of information about what makes scientifically-sound conservation planning. What they lacked was any message from the Clinton Administration leadership regarding which scientific principles should not be shortchanged even in the face of enormous political pressure to satisfy the landowner-applicant and to get the deal done. The 5-point plan is silent on this pressing question. By failing to provide bottom-line standards for field staff, the Clinton Administration leaves intact a highly-politicized HCP deal-making culture in which every safeguard for species is on the table, subject to being traded away.

The Services have defended this absence of bottom-line safeguards on the ground that every HCP has unique factual circumstances and that field staff therefore need to adopt a different approach to each successive HCP. There is some merit to this argument—small-scale HCPs are certainly different from large-scale HCPs, and HCPs dealing with urbanization are different from those dealing with resource extraction. These distinctions, however, merely suggest that differing types of safeguards may be needed depending on the type of HCP. They do not argue for abandoning any attempt at creating safeguards.

The Services' argument about the impossibility of creating across-the-

board safeguards for wildlife would be more persuasive if they had not already provided such safeguards for landowners in their "no surprises" regulation. To restore some balance to the HCP equation, the Services need to give endangered species the same kind of reliable protections that landowners already enjoy. The following discussion of the elements of the 5-point plan suggests some possibilities.

Biological goals and objectives

The first element in the 5-point plan, biological goals and objectives, is by far the most promising. The plan states unambiguously that "[i]n the future, every HCP will include specific biological goals and objectives" (FWS and NMFS 1999). As the Services acknowledge, this requirement represents a departure from the first edition of the HCP Handbook, which left the issue to the discretion of field staff. Due to the absence of any enforceable requirements, many HCPs in the past have failed to identify what conservation outcome could be expected from the plan's minimization and mitigation measures.

For example, in the Nick Gross HCP (1996), the landowner was required to pay a mitigation fee if its real estate subdivision resulted in the loss of a bald eagle nest—the HCP made no mention of what conservation outcome would result from the payment of the fee. Under such HCPs, habitat destruction is virtually certain, while habitat protection or restoration is purely speculative. By requiring that the anticipated outcome of the HCP be specified in biological terms, the Services enable the public to evaluate whether the plan's conservation measures adequately compensate for the authorized habitat destruction.

The 5-point plan ultimately misses the mark on biological goals and objectives, however, because it does not provide any language to ensure that appropriate goals and objectives are cho-

sen. Although it provides an example of an objective that it considers appropriate—"to conserve an adequate number of acres of habitat in a certain configuration, so that a viable corridor is maintained" (FWS and NMFS 1999)—it leaves unanswered the crucial question of how Service staff will determine *what amount* of acreage is adequate and *what kind* of corridor is viable.

This question must be answered in both substantive and procedural terms. Substantive guidance is sorely needed on ESA's Section 10(a)(2) criteria for approving HCPs, the meaning of which has been the subject of longstanding debate. For example, in 1997, attorneys for several California timber companies vehemently objected to the National Marine Fisheries Service's proposal to require that HCPs provide "essential habitat functions" for Pacific salmon (Stelle 1997). According to the timber companies, this approach placed an unfair burden of "recovery" on their HCPs, whereas the Services had previously required no more than that HCPs ensure the "survival" of listed species. Although the National Marine Fisheries Service ultimately adopted (informally) the "essential habitat functions" approach for salmon, no rule has been promulgated to clarify the meaning of this term or to address whether this standard applies to other species covered by HCPs. Before this formulation or any other becomes the guiding principle for future HCPs, the Services should propose a regulation and obtain broad input on what conservation outcome is needed from HCPs to fulfill the letter and spirit of the ESA.

In addition, the Services should develop rules on what procedures must be followed in setting biological goals and objectives. The 5-point plan states that goals and objectives will be derived by "examining the applicant's proposed action and the overall conservation needs of the covered species and/or its habitat" (FWS and NMFS 1999). Although this is a useful start, the Ser-

vices need to go further and explain *how* they will determine the impact of the applicant's proposed action and the species' conservation needs. For example, is it enough for the Services to rely on the recovery plan? What if the recovery plan has not been completed? Can an interim conservation strategy be formulated and relied upon in setting the HCP's biological goals and objectives? Will any of this analysis be placed in writing and be subjected to independent scientific review?

The absence of any answers to these procedural questions has led to serious scientific shortcuts in recent HCP negotiations. As noted earlier, in most of the plans reviewed in the recent AIBS study, the Services authorized substantial habitat destruction without adequately considering the impacts of that habitat destruction on imperiled species (see Kareiva et al. 1999). To provide reliable assurances that appropriate HCP goals and objectives will be chosen, the Services need to establish scientifically-sound procedures for choosing them, issued in the form of a regulation after the public has had a meaningful opportunity for input.

Adaptive management

As the AIBS study (Kareiva et al. 1999) makes clear, HCPs are virtually always prepared in the absence of complete information about the status and needs of the species and the likely impact of the proposed activities. Mitigation and minimization measures are often untested (a point also confirmed by the AIBS study) and are therefore unreliable. Perhaps most importantly, it is impossible to predict future ecological, legal, and socio-economic changes that will affect species covered by HCPs. It is therefore essential that the Services treat all HCPs as "learning laboratories" and that they build adaptive management provisions, or contingency plans, into the HCPs. Requiring adaptive management provi-

sions in HCPs is particularly critical considering the fact that, due to the "no surprises" policy, the Services are greatly limited in their ability to rectify any problem not anticipated in an HCP.

In their 5-point plan, the Services acknowledge the critical importance of adaptive management. Yet their solution to the challenge of incorporating adaptive management into HCPs is woefully inadequate. Rather than requiring adaptive management, the Services leave to field staff the decision of whether and how to incorporate adaptive management provisions into HCPs. The ultimate decision is to be based on individual judgments of whether there are "significant biological data or information gaps that incur a significant risk to species at the time the permit is issued." This discretionary approach will not likely do anything to change the status quo—in fact, it is virtually identical to the approach taken in the original edition of the HCP Handbook, which calls for adaptive management when "significant uncertainty exists." Because every HCP is developed in the face of significant uncertainties, the Services should require that adaptive management strategies be included in every HCP and that such strategies address every significant risk of HCP failure that can reasonably be anticipated. If one of the risks is that the mitigation strategy will not succeed, mitigation measures should be carried out and evaluated before any significant amount of take occurs.

In the absence of such clear direction, permit applicants will continue to commit to taking corrective action only with respect to (at most) a narrow set of possible HCP failures, and to commit only to taking very limited action in response to such failures. This is the approach followed in the Natomas Basin HCP (1997), which the Services oddly cite as a model for adaptive management (FWS and NMFS 1999). The Natomas Basin HCP's adaptive management program, funded by possible

mitigation fee increases, only provides for expanded habitat protection if the plan fails to achieve its targeted mitigation ratio of one acre of habitat acquired for every two acres developed. No such expansion of protection is required if this arbitrarily-established ratio is achieved but proves to be inadequate to save the covered species. Moreover, the HCP's limited fee increases are not even likely to redress a failure to achieve the targeted mitigation ratio. Once it is determined that the HCP has failed to achieve its targeted mitigation ratio, responsibility for correcting the problem is assigned to a very narrow set of individuals—developers still seeking building permits, who may not be willing to pay for the mistakes of others. Those who have already received their building permits and destroyed habitat (including the developers who drafted the HCP) have no responsibility for taking any corrective action.

The Services should set standards for adaptive management that prevent these kind of abuses and ensure that all landowners engaging in incidental take carry a fair share of the burden of addressing problems with their HCPs. At the same time, the Services should provide limited assurances to landowners about their future HCP liabilities (in the form of limits on adaptive management responsibilities) as a strategy for enticing them to make significant conservation commitments. For example, landowners should not be held responsible for correcting problems that arise due to activities outside of the landowner's property and outside the off-site reserve, if any, created under the HCP.

Once the Services place a cap on a landowner's adaptive management responsibilities, however, they need to address who will take corrective action, and using what procedure, in the event the HCP fails and the landowner is deemed not responsible due to the cap. The Services are reportedly consider-

ing a new policy in which they would reserve the right (or clarify that they have always reserved the right) to revoke the landowner's incidental take permit in the event it is found to be jeopardizing a species' existence. Although this would be a step in the right direction, the Services need to clarify that they have the authority to take *any* action necessary to further species recovery, not just those needed to avert jeopardy, so long as they are willing to pay for such action. Moreover, the Services should acknowledge that they have a legal duty to act to avert jeopardy, not merely the discretionary ability to do so. Finally, the Services need to identify a funding mechanism for taking any corrective action that is not provided for in the HCP. Only by taking this combination of steps will the Services be able to repair the tears in the safety net created by the "no surprises" policy.

Monitoring

The AIBS study of HCPs found that only 22 of the 43 plans studied had a clearly outlined monitoring program, and only 7 of those 22 plans indicated how the monitoring could be used to evaluate the HCP's success (Kareiva et al. 1999). Thus, many HCPs go forward without any scientifically-credible strategy for monitoring effectiveness. By not securing reliable monitoring information, the Services are at risk of blindly condemning endangered species to continued failed management strategies.

Like its adaptive management provisions, the 5-point plan's monitoring provisions contain no bottom-line standards to ensure that a scientifically-credible monitoring program is put in place. Instead, the 5-point plan suggests a number of possible approaches and then leaves the ultimate decision in the hands of those negotiating the HCP. Considering that both the Services and the permittee arguably have an incentive not to uncover data that

might raise questions about whether the product of their lengthy negotiation is a failed HCP, bottom-line requirements for scientifically-credible monitoring are needed. Because monitoring is expensive, these requirements should vary depending on the scope and the impact of the HCP.

Permit duration

Many HCPs have terms of 50 years or more. By locking in "no surprises" assurances to landowners for such lengthy time periods, the Services have unnecessarily increased the risk that those crafting the HCP will fail to anticipate the needs of the imperiled species and that species will suffer serious declines and possible extinction as a result.

The 5-point plan acknowledges this risk of long-term HCPs, but also states that long-term HCPs are sometimes needed (for example, to ensure that the long-term benefits of mitigation programs are realized). Thus, the plan places no limits on permit duration, but merely sets forth a number of factors that field staff should consider in deciding such limits on a case-by-case basis (such as the duration of the landowner's proposed activities). This approach, which largely repeats the factors relating to permit duration that had already been set forth in the Services' regulations, will not likely reduce the length of assurances to landowners or otherwise benefit species. Given the lack of enforceability of these factors and the lack of any real change in the status quo, Service field staff has no new leverage to deny a politically-powerful landowner's request for excessive "no surprises" assurances. The Services need to set objective limits on the duration of "no surprises" assurances. Several categories of durational limits could be established so that longer-term assurances can be offered to landowners as an incentive for building greater long-term certainty for wildlife into their HCPs.

The Services have explained their failure to set objective limits on the ground that some mitigation programs take several decades to implement. Setting limits on assurances, however, would not preclude the Services from extending the mitigation program beyond those limits. The long-term benefits of mitigation programs can be realized simply by keeping the HCP and its implementation agreement in effect after the assurances have expired.

Public participation

As revealed by the recent National Wildlife Federation sponsored University of Michigan study, *Public Participation in Habitat Conservation Planning* (Anderson and Yaffee 1998), the Services have frequently failed to capture the numerous benefits of public participation. Instead, many large-scale HCPs are negotiated behind-the-scenes by permit applicants and the Services, and then released to the public for comment. The public comment period does not provide an opportunity for meaningful input because of the complexity of the HCP and because of the difficulty of making last-minute changes without jeopardizing the entire deal. Although the first edition of the HCP Handbook directed Service staff to "encourage" permit applicants to get interested citizens, groups and agencies involved in HCP development (FWS and NMFS 1996), the University of Michigan team found little evidence that this approach was producing meaningful participation.

Although the 5-point plan acknowledges the importance of public participation, it does virtually nothing to address the numerous problems identified by the University of Michigan team. It simply extends the comment period from 30 to 60 or 90 days for certain types of HCPs. This step is largely a formality, since such extensions are already routinely provided and do not elicit broad public participation. The 5-point plan also states its

intention to "encourage applicants for most large-scale, regional HCP efforts to provide extensive opportunities for public involvement during the planning and implementation process" (FWS and NMFS 1999). This "encouragement" approach is virtually identical to that taken in the first edition of the HCP Handbook, which failed to ensure meaningful opportunities for participation.

The Services have failed to address the basic problem identified in the University of Michigan study—by ceding control over the HCP development process to the permit applicant, they have prevented interested citizens and groups from having meaningful input into decisions that have long-term impacts on the fate of their wildlife resources. To get such meaningful input, the Services cannot depend upon permittees' willingness to take voluntary actions that many of them believe to be unacceptably costly and time-consuming. They need to establish firm requirements for field staff to share information with, and solicit input from, scientists, conservationists, neighboring landowners and other interested citizens throughout the negotiation of large-scale HCPs. By creating a more welcoming atmosphere for citizen participation, the Services will greatly improve their ability to obtain the best available science regarding the needs of imperiled species and to secure the political support for HCPs that is needed for effective HCP implementation.

Conclusion

After spending five years turning a virtually nonexistent HCP program into a major ESA initiative covering over 11 million acres of land, the Clinton Administration has now paused to identify five areas where safeguards for species are needed. These five areas of conservation planning—biological goals, adaptive management, monitoring, permit duration limits, and pub-

lic participation—are indeed worthy of our attention, and the Administration is to be congratulated for highlighting them. Now that virtually everyone involved with HCPs agrees that these are important priorities, it is time for the Administration to move beyond vague policy guidance and to take firm action to ensure these priorities are actually achieved. The Administration can take such action—and send an unambiguous message that it is committed to approving only those HCPs that truly conserve species—by adopting specific and enforceable wildlife safeguards in each of the five areas.

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Incentives and Land Acquisition: Key Tools for Restoring Fish and Wildlife Habitat

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Abstract

Financial supports and other landowner incentives can be a valuable tool for promoting restoration of habitats for imperiled and sensitive fish, wildlife, and plants, and thereby supplementing the Endangered Species Act and other resource policies. This paper highlights various incentives approaches, as well as goals and general principles for incentives programs. It also considers situations in which incentives are less likely to be effective and other ecosystem protection and restoration tools will be needed, such as funding for acquisition of lands and conservation easements. These latter situations are likely to be quite significant. Some types of landowners and land management and development operations that convert native habitats are unlikely to be swayed by incentives alone. Potential funding sources for both incentives and acquisition programs are identified.

Introduction

This paper provides an overview of incentives that can supplement biodiversity protection policies by promoting (1) restoration of habitats for imperiled and sensitive fish, wildlife, and plants on privately owned lands, and more generally, (2) improved ecosystem management. Properly designed incentives can be a valuable tool to support and encourage improved land management and habitat restoration by private landowners and resource managers. Goals, general principles, funding sources, and examples of existing and potential new incentives are discussed, including some private-sector initiatives.

We also consider situations where such incentives are less likely to be effective, and where other tools will be needed, such as funding for acquisition of lands and conservation easements. These latter situations are likely to be substantial in both their importance and extent. Acquisition can also provide benefits not likely to be realized through most incentives programs, including long term protection, full protection and restoration

(to the extent restoration is biologically possible) for particularly sensitive sites, public access, and high benefit/cost ratios.

The discussion is largely from the perspective of federal incentives programs that can supplement the Endangered Species Act (ESA), other resource policies, and the goal of species recovery and ecosystem restoration. A number of incentives, however, can also—and in some cases must—be implemented at the state and local level. While the paper is based partly on forestland conservation in the West, most of the concepts will be broadly applicable.

Incentives versus regulations

In order to help maintain the efficacy of both approaches, the relationship between incentives programs and resource protection policies merits close attention. Incentives are not a substitute for policies that protect public trust resources or require recovery of endangered species. Since incentives are voluntary and will not be adopted by all landowners, public policies are needed to provide consistent protection for fish, wildlife,

rare plants, and basic ecosystem function. Replacing basic biodiversity protections with incentives also raises questions of whether it is appropriate to pay private parties to avoid harming resources that belong to everyone, including future generations.

Incentives are needed to encourage desired behavior beyond basic legal requirements. The ESA, for example, fails to clearly and consistently require habitat restoration needed for species' recovery. At the same time, failure to protect existing habitat areas will only make the restoration task more difficult and costly. ESA enforcement programs are constrained by insufficient funding and information. More effective and consistent enforcement of the ESA and other public policies would slow habitat losses and degradation. Likewise, it would be inefficient and counterproductive to simultaneously give landowners financial support or other incentives to restore habitats, while issuing Incidental Take Permits (ITPs) or other permits to destroy habitat below baseline levels. (Exceptions may include incentives targeted to different species and habi-

tats than those covered by the ITP.)

Enforcement efforts might also be furthered by using ESA section 4(d) rules to provide consistent "take" standards, and by establishing penalties sufficient to offset the incentive to destroy habitat as part of lucrative development or resource extraction operations (Cheever et al. 1999). Improved ESA enforcement would also encourage landowners to develop more credible habitat conservation plans (HCPs). So far, most HCPs rely on inadequate science and fail to substantially mitigate habitat losses authorized by take permits (Hall 1997; Noss et al. 1997; American Lands 1998; Kareiva et al. 1999).

The issue of regulatory assurances is complicated, but generally, regulatory assurances such as "no surprises" guarantees are not encouraging landowners to develop conservation plans which protect imperiled and sensitive species, use the best available science, include adequate adaptive management regimes, and provide commensurate restoration of habitats and ecosystems. Because "no surprises" locks-in HCPs that are negotiated in the absence of adequate standards, it has mostly just encouraged landowners to develop HCPs that cover as many species as possible through the weakest mitigation measures possible (WAFC 1997).

Instead, landowner assurances could focus on clarifying the process for improving HCPs over time, rather than on precluding meaningful improvements. Parity is also needed between landowner assurances and the quality of conservation plans, and between public and private responsibility for improving plans over time. Changes to "no surprises" could either be made administratively or through ESA reauthorization legislation like HR 960 (introduced by George Miller (D-CA)).

Other principles and goals for incentives to protect biodiversity

Targeting and program design are also important considerations for incentives programs. First and foremost, incentives are needed to encourage high priority actions not already or adequately required by law. Of particular interest is habitat restoration for endangered or otherwise sensitive species, and protection and restoration of natural ecosystems and ecosystem processes that support native biodiversity more generally.

The fiscal integrity and effectiveness of incentives programs will also be furthered by maintaining proportionality between the level of public support provided to landowners and the amount and duration of habitat restoration or other public good generated. In other words, a dollar of public assistance should secure at least a dollar's worth of conservation and restoration. Budget offsets for incentives could also be found by removing subsidies for new roads, construction of second homes, industrial timber management practices, and other activities that degrade native ecosystems and convert productive resource lands. As currently used, ITPs often also subsidize corporate landowners by externalizing continued habitat degradation onto the public.

Incentives can either be broad in scope, like tax credits for all restoration activities, or targeted to specific goals, such as (in the forestry sector) using longer timber rotations, restoring older forest habitats, and retaining large green trees and snags during logging operations. Ideally, broad programs would still include implementing mechanisms to help identify higher priority conservation areas and goals.

Other priorities include projects that enhance landscape/habitat connectivity (versus creating population

"sinks" in isolated areas), that promote species' recovery, and that will maintain the habitat gains for extended periods via conservation easements or other mechanisms. Both individual species' needs and the broader ecosystem merit consideration. Forest management practices that maintain minimal northern spotted owl (*Strix occidentalis caurina*) habitat in the northern California redwood region, for example, may still fail to provide adequate conditions for other species that are more dependent on old growth habitats.

Types and examples of incentives

In examining existing and potential incentives, we find it useful to differentiate between financial incentives, other public incentives programs, and private sector incentives programs. The following discussion highlights various types of these incentives and more promising examples (Table 1). Many of these examples and other related topics are discussed in the literature (Boutard and Rinehart 1992; Best and Wayburn 1995; Eisner et al. 1995; Johnson 1995; Keystone Center 1995; National Wildlife Federation 1995; Senatore et al. 1996; Thompson 1997; National Research Council 1998).

Financial incentives

Some landowners are already taking advantage of estate tax reductions and income tax deductions from dedicating conservation easements that protect key resources. Additional easements incentives will also be needed with gradual elimination of federal estate taxes.

A number of options have been proposed for expanding conservation easement incentives. First, the goal of protecting and restoring threatened or endangered species' habitats could be explicitly included in section 170(h)(4) of the IRS code, which lists

Table 1. Types of selected incentives programs

<p><u>Financial incentives</u></p> <p>Promoting conservation easements</p> <p>Tax deductions or credits for project costs</p> <p>Cost-share programs help cover project costs</p> <p>Tax changes to promote management goals</p> <p>Direct payments, rents, and/or estate tax deferrals</p> <p>Supporting markets for products from better managed ecosystems</p>	<p><u>Other public incentives</u></p> <p>Education, outreach, and technical assistance</p> <p>Landowner recognition programs</p> <p>Removing impediments (or "disincentives")</p> <hr/> <p><u>Private sector incentives</u></p> <p>Third party, performance-based certification</p>
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the types of donated easements that qualify for tax deductions. Second, heirs could be permitted to consistently finalize easements *post mortem* if they protect or restore endangered species' habitats. Similarly, the heirs could be allowed to donate additional rights to existing easements if this increases or enhances habitat for imperiled species. Third, an estate tax credit, rather than the less valuable tax deduction, could be allowed for easement donations. Fourth, the cap on individual and corporate income tax deductions for donations of conservation easements could be increased, while keeping the deduction proportionate to the value of the easement. Fifth, the number of years during which income tax deductions for easement donations can be counted could be increased. Currently, deductions can only be spread across a six year period. Finally, and perhaps most controversially, when threatened and endangered species are involved, the easement's donation value could be calculated as if the habitat had not already been protected, *if* the land covered by an easement shelters protected species, *and if* the easement increases protection for listed and unlisted species beyond existing legal requirements.

Tax deductions and credits could also be used to help cover the costs of landowners' habitat restoration projects, regardless of whether those projects are associated with conser-

vation easements. Examples include the provisions in HR 960. This ESA reauthorization bill would establish federal income tax deductions to offset property taxes on lands with qualifying conservation projects. Income tax credits would also be authorized for project costs. To be eligible, projects must include medium to long-term conservation contracts or agreements.

Cost-share programs can also be used to support landowner conservation projects. In addition to developing new programs, existing programs like the USDA Forest Service's Stewardship Incentives Program could be targeted more specifically towards biodiversity conservation.

Sector-specific tax changes could be used to promote specific management goals. In the forestry sector, federal capital gains and state timber harvest taxes could be reduced for trees grown beyond a minimum period (such as 120 years), with exceptions for existing old growth, and increased for trees harvested at earlier ages. The specificity of such tax changes should make them particularly effective, although this may make it more difficult to build a constituency for instituting them.

Direct payments, rents, and/or estate tax deferrals could also be given to landowners in return for habitat restoration and other activities. Examples include HR 960's proposals for term-limited habitat resto-

ration contracts, modeled on the Conservation Reserve Program. These contracts would essentially "rent" habitat restoration. Landowners who undertake qualifying conservation agreements would be eligible for estate tax deferrals. Another approach is to pay landowners a "bounty" for growing more rare plants or endangered species' habitats.

One last type of financial incentive that bears mention is supporting new markets for products from restored or better-managed ecosystems. Examples include promoting market infrastructures for edible mushrooms, medicinals, and other products from older forests.

Non-financial public sector incentives

Several types of non-financial public-sector incentives programs can also be useful. Education, outreach, and technical assistance can be effective with landowners who are interested in sound resource stewardship. Examples include state programs that help landowners with stream bank and riparian habitat restoration. Outreach effectiveness can be increased by working through extension service programs, community groups, and non-governmental organizations that enjoy high levels of landowner acceptance. Similarly, landowner recognition programs can help reinforce and encourage desired stewardship practices. Examples include various state programs that provide awards or other

forms of recognition to good resource stewards.

Efforts to remove impediments (or "disincentives") for habitat restoration have also been increasing. Examples include the U.S. Fish & Wildlife Service's "safe harbors" program, which provides landowners with assurances that, if they increase endangered species habitat, they will be allowed to continue managing the new habitat areas. While the program is promising, stricter safeguards could allay concerns that "safe harbors" itself could become a perverse incentive. These safeguards include a prohibition on giving "safe harbors" agreements to landowners who have already substantially degraded their habitat conditions and whose land management routinely reduces habitats to these levels, or who are receiving permits to take habitat below baseline conditions (Bean 1998). The existing Plum Creek Timber company HCP, for example, gives a *de facto* "safe harbors" guarantee to Plum Creek for the same habitat that ostensibly mitigates the company's earlier take of habitat—undermining both the HCP and the concept of "safe harbors." Other safeguards include using independently conducted surveys to identify accurate baseline conditions, and ensuring that "safe harbors" properties do not become habitat "sinks."

Landowner willingness and ability to provide habitats could also be improved by clarifying the land management practices that will (and won't) take protected species under the ESA. Uncertainty about ESA rules sometimes leads to preemptive logging and habitat destruction. If "take" is adequately defined, "no take" agreements might also be used.

In resource lands where property taxes are still based on the potential for development, the taxes could be reformed to reflect current usage and reduce conversion pressures. Enroll-

ment in current use tax programs should be contingent on dedication of conservation easements to preclude development, or on contractual obligations to repay back taxes, should the property be developed in the future. Taxes can be further reduced where lands are enrolled in conservation programs and taken out of intensive resource production, as under Oregon's SB 791.

A particularly promising idea, specific to the forestry sector, is to establish revolving timber receipts (or "loan") funds to provide up-front income to landowners who delay logging to establish long rotations and older forests. A similar Nature Conservancy project in Virginia enables landowners to "deposit" their logging rights in a "forest bank," and receive a percentage of those rights' value as a yearly fee. Fees are funded through periodic logging operations spread across the group's holdings, using improved forest practices.

In addition, the costs of forest restoration projects could be deducted from taxes when the costs are incurred, rather than when logging occurs. For this approach to work properly, landowners should enter into agreements to use longer timber rotations or other improved silvicultural practices; otherwise, the tax changes could also support shorter rotations and other detrimental practices. Another forestry-specific proposal would factor-out inflation when calculating capital gains taxes on timber. Currently, taxes are paid on both inflation as well as real gains, discouraging longer timber rotations and establishment of older forest habitats.

Finally, difficulties in obtaining information on desired land management and restoration practices, on markets for alternate products, and on existing incentives programs are often cited as limiting landowners' transition to more beneficial practices (Vickerman 1998). Solutions include

channeling outreach programs through university extension services and other entities that are already known to and used by landowners.

Private sector incentives

While various types of private-sector incentives programs may exist, one particularly exciting approach is third-party certification based on independently-developed performance standards. Identifying and certifying products from well-managed resource lands enables consumers to exercise preferential selection, and can convey significant market benefits to landowners and resource managers. In the agricultural sector, the organic labeling movement is supporting landowners who discontinue use of synthetic pesticides and other harmful chemicals and practices.

In the forestry sector, the Forest Stewardship Council (FSC) has established procedures and performance-based standards for certifying products from well-managed forests. Consumer interest in certified forest products is reportedly quite strong in Europe, and is growing in the US (Reuters 1999). Of course, consumer confusion is always a risk. Consumers may be unaware, for example, that the American Forest & Paper Association's Sustainable Forestry Initiative is not designed as a certification system (American Lands 1999).

Limitations to incentives and the need for habitat acquisition funding

Not all landowners will respond to incentives. Consequently, funding will also be needed for habitat acquisition and restoration programs. While acquisition is particularly suitable with rare plants, ecosystems, and other priority sites, incentives are unlikely to provide complete protection and restoration for such sites (Press et al. 1996). Landowner par-

Benefits of fee simple acquisition

- Permanent protection
- Suitable for industry landowners with "all or nothing" approaches to land management
- Establishes a clear foundation for land restoration and management in the public interest, with the potential for appropriate public access for research, recreation, and other uses
- Can be more cost-effective than other approaches that require substantial ongoing payments, or where the cost of easements or development rights approaches the cost of full acquisition. Purchase costs will also be relatively low in the case of recently logged-over properties
- Transaction costs for negotiation, monitoring, and enforcement can also be relatively low
- Can provide full protection for particularly sensitive or important sites, or areas where predominant land management practices are incompatible with the conservation goals
- Can be combined with conservation easement dedication to ensure long-term protection

ticipation in some incentives programs has also been lower than expected, perhaps due to the lack of direct financial benefits (Vickerman 1998; Timpe et al. 1999).

Incentives are most likely to leverage additional conservation and restoration from non-industrial forestland owners and others who are already somewhat conservation-minded, and who are better positioned to use alternate land management practices. Incentives are far less likely to affect decisions by larger wood products companies, developers in areas with high land values, and others with major investments in enterprises that rely on converting habitats or maintaining them in poor condition. Likewise, private sector initiatives like certification will probably have little impact on major industry players until consumers begin consistently rejecting non-certified products.

These limitations should not be underestimated. The wood products industry, for example, controls over half of the private timberland in west coast states, often in key watersheds and locations for species' conservation and recovery. (Ownership of other types of forestland is weighted more heavily towards non-industry landowners, particularly in California.) The industry's internal accounting methods, investments in processing mills which can utilize extremely

young trees for paper and manufactured board products, global markets where many countries have even lower labor and environmental standards, and other factors create a strong bias against using longer rotations and other less environmentally-harmful forest practices—even though these practices can yield greater amounts and higher qualities of sawtimber.

New funding sources for acquisition programs could, of course, also be used to expand incentives programs. Not surprisingly, two promising bills to free-up the federal Land Water Conservation Fund promote both acquisition and incentives (HR 798 and S 446, introduced by George Miller (D-CA) and Barbara Boxer (D-CA)). In many cases, however, it will still be more efficient to buy key lands or interests in land outright, given the level of ongoing "rents" or other incentives needed to really change landowner decision-making.

Acquisition can be through fee simple purchase, purchase of conservation easements, and/or purchase of timber or development rights. While easements can be held by either non-governmental land trusts or qualified public agencies, the following discussion generally assumes that fee simple acquisition will be conducted by public agencies.

Principles and goals for acquisition programs

Many of principles and goals for incentives programs are also applicable to acquisition efforts. As with incentives, focusing program resources on high priority projects is a chief concern. While land and habitat acquisition programs can help in a variety of situations, priorities include key salmon watersheds which need restoration and protection beyond levels likely to be achieved through regulatory and incentives-based strategies. Lands which provide critical habitat linkages and reserve areas in landscape-level restoration plans should also be given preference, both from species-specific and ecosystem-wide perspectives. Likewise, habitat areas for particularly sensitive, rare, and/or endemic plants, fish, wildlife, or fungi are also a priority, regardless of their location, especially for species which cannot tolerate significant disturbances from land management or other activities.

While acquisition tool selection will depend partly on the landowner and the resources to be protected, generally the most cost-effective and easily-enforced tool should be used.

Acquisition is best done through permanent mechanisms such as fee simple acquisition and/or acquisition of conservation easements. Deed restrictions should not be used unless made enforceable by third parties.

Benefits of conservation easement acquisition

- Permanent protection
- Suitable for non-industrial, family landowners who wish to retain title to and exclusive use of their property, while protecting and restoring public trust resources
- Easements can restrict ecologically-damaging land management practices, while allowing more environmentally sound practices to continue
- Can be more cost-effective than incentives that require substantial ongoing payments to achieve the same goal, and where the landowner is willing to make a bargain sale due to the estate and income tax benefits associated with easements
- Also useful where conservation goals can be met while allowing significant resource management
- Easements can be dedicated to, and monitored and enforced by independent, non-governmental land trusts with proven track records and landowner acceptance

Purchasing the rights to future timber harvests and/or development projects will help ensure continued resource protection. The effect of discount rates and net present value calculations on timber values also means that future timber harvest rights can be purchased along with current rights at little added expense. Here, as elsewhere, the quality of the appraisal will also be a chief concern.

The effectiveness of conservation easements will also be greatest when the easements are legally binding, dedicated in perpetuity, and prohibit land management practices that conflict with restoration and protection goals. Trusts or other endowments can be established to cover long-term monitoring and enforcement expenses. Likewise, acquisitions by local, state, or federal agencies must be accompanied by explicit, binding mandates for long-term habitat restoration and protection. Dedication of conservation easements to non-governmental land trusts or other qualified entities can also be used to help protect publicly-acquired lands.

Funding sources for habitat acquisition and incentives programs

A variety of existing and new funding sources can be used for acquisition and incentives programs. One logical source is the federal Land Water Conservation Fund (LWCF)

appropriations. HR 798 and S 446 are two of the more promising proposals to free-up the LWCF, which is funded by revenues from Outer Continental Shelf oil leases. Other dedicated or appropriated federal funds would also be appropriate.

With growing recognition that steps must be taken to address anthropogenically-induced global climate change, protection, acquisition, and restoration of forests and other natural systems may also be financed by companies seeking credits to offset their greenhouse gas emissions. Before such credits are given, basic standards will need to be established to account for sequestration benefits. A cap on the total number of allowable credits will also be needed to ensure that emissions reduction targets are also met.

Another approach that could be highly effective is levying impact taxes or fees on activities that destroy or degrade native ecosystems, or which maintain these areas in a degraded state. Such activities include low density development, as well as clear-cutting combined with short timber rotations. The taxes or fees would correct market failures, whereby developers, timber companies, and others externalize environmental costs on the public and other landowners. Tax/fee rates should reflect the cost of financing habitat acquisition and restoration on compa-

rable sites. Re-instituting the federal real estate transfer tax is commonly cited as one specific step that could be taken. According to one proponent, a 0.1% real estate transfer tax would yield \$300 million/year (Fischer 1994).

Other appropriate and promising measures include elimination of fiscal, tax, research, and price subsidies for new roads, construction of second homes, wood products from immature forests, intensive agricultural practices, and other activities that contribute directly to habitat and resource land conversion. Likewise, implementation of more meaningful penalties for ESA violations would both encourage more consistent compliance, and help fund restoration programs in cases of non-compliance. Concerns with inter-landowner inequities in ESA implementation could also be addressed through habitat restoration trust funds financed by large landowners who converted significant portions of ecosystems prior to species' listing and protection.

Finally, as noted above, existing cost share and technical assistance programs could also be more specifically focused on biodiversity conservation and restoration. Programs include Forest Legacy, Stewardship Incentives, Conservation Reserve, Wetlands Reserve Program, and Environmental Easements.

Beyond acquisition

While the full potential of acquisition programs remains unexplored, they may also have their limitations. Per acre acquisition costs may be prohibitive in some real estate markets. Likewise, some landowners will remain unwilling sellers. And basic ecosystem restoration will still be needed on broader landscapes which are lower priority for acquisition, including areas remaining in production for timber, agriculture, or other uses.

Consequently, additional tools are needed to systematically address basic resource management, development patterns, and restoration. As discussed above, taxes could be levied on activities which destroy or degrade native ecosystems, or maintain these areas in a degraded state. While landowners who continue these activities would be helping to fund restoration in key areas, other landowners might adopt improved land management practices. Such taxes would essentially level the playing field and encourage more ecologically sustainable land management practices.

Considerable room also exists for improving the design and implementation of state forest practice rules and land use policies, and establishing basic agricultural practices policies. Given the importance and unique function of such state policies, it is imperative that they not be rolled-into "no surprises" type guarantees for HCPs and other federal agreements that address different and often much narrower issues.

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Marine Matters

Hawaii's Endangered Humpback Whales

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Abstract

This article is Part I of a three part series on the endangered humpback whale (Megaptera novaeangliae) and the Hawaiian Islands Humpback Whale National Marine Sanctuary. It will focus on the natural history of the humpback whale, its status, and the current policy for its conservation and management in Hawaii. During the winter months, humpback whales assemble in the near shore waters adjoining the main Hawaiian Islands to calve and mate. These waters serve as principal breeding and calving areas for the humpback whale in the North Pacific. Understanding the biology and status of the humpback whale will allow us to develop sound policy to further humpback whale protection.

Introduction

This article is the first in a three part series on the endangered humpback whale (*Megaptera novaeangliae*) and the Hawaiian Islands Humpback Whale National Marine Sanctuary, the United States' newest national marine sanctuary. Part I of this series will focus on providing information about the natural history of the humpback whale, its status, and the current policy for its conservation and management in Hawaii. Part II will discuss the Hawaiian Islands Humpback Whale National Marine Sanctuary (Sanctuary) Program, its purpose, its stated goals and objectives for protecting the endangered humpback whale and its winter habitat in Hawaii, and it plans for implementation. The third and final piece will provide insight into the process to allow for public participation in the ongoing development and management of the Sanctuary through the establishment of a 25-member Sanctuary Advisory Council.

Species description

The humpback whale is one of six species listed in the family of

whales known as Balaenopteridae. This family is divided into two genera, Balaenoptera and Megaptera. The genus Megaptera includes a single living species, *Megaptera novaeangliae* or humpback whale. The distinguishing features that separate this genus from Balaenoptera are the presence of unusually long flippers (about 1/3 total body length), a more robust body, fewer throat grooves (14-35), a more variable dorsal fin (in both shape and size), and utilization of very long (up to 30 minutes), complex, repetitive vocalizations (Payne and McVay 1971) during courtship (NMFS 1991). All six species within this family have only four fingers within their flippers—the middle or third finger missing (Tinker 1988).

Distribution and abundance of humpback whales in the North Pacific

Humpback whales are widely distributed throughout the world in both coastal and open ocean areas. Generally, humpbacks inhabit waters over and along the edges of continental shelves, and around oceanic islands and atolls. Their distribution

occurs seasonally between low latitude wintering areas used for mating and calving and high latitude summer feeding areas. In the North Pacific, summer feeding areas occur in coastal waters from California along the Pacific rim to Japan. Wintering areas in the North Pacific include three primary areas: waters near Mexico, Japan, and Hawaii (Rice 1974; Johnson and Wolman 1984). In Mexico, humpback whales winter off the southern tip of Baja, around the Revillagigedo Archipelego, and in coastal areas off mainland Mexico (Urban and Aguayo 1987). In waters off Japan, humpbacks winter off the Bonin and Ryukyu Islands (Rice 1978). Humpback whales wintering in Hawaii occur primarily in waters less than 100 fathoms deep around the main Hawaiian Islands (Herman and Antinoya 1977; Rice and Wolman 1978).

Prior to commercial exploitation in the twentieth century, there were approximately 15,000 humpback whales in the entire North Pacific (Rice 1978). In 1966, at the end of commercial whaling by International Whaling Commission member na-

tions, the numbers had dropped to between 1,200 and 1,400 (Gambell 1976; Johnson and Wolman 1984). Population numbers in the North Pacific, however, are rising. In 1994, a study based on separate assessments of different wintering areas concluded that the North Pacific humpback whale population was greater than 3,000 (Barlow 1994). The most recent study undertaken yielded estimates of approximately 6,000 humpback whales (Calambokidis et al. 1997). This study was based on a large collaborative effort among 16 research groups that collected identification photographs throughout the North Pacific from 1990 to 1993.

Of the known humpback whale wintering and summering areas in the North Pacific, the Hawaiian Islands are considered to contain the largest seasonally-resident population. Early shipboard surveys of the coastal waters of the Hawaiian Islands by the National Marine Fisheries Service (NMFS) during the winter seasons of 1976-79 produced estimates between 550-790 whales (mean estimate 650) (Rice 1978; Wolman 1978). Baker and Herman (1987) used fluke identification photographs to estimate 1,407 whales visited the Hawaiian Islands from 1980 to 1983 (95% confidence limits of 1,113 and 1,701 whales). In 1994, Cerchio yielded estimates of 2,500 to 5,000 individuals based on samples of photographs taken from Kauai for 1989-1993. More recently, Calambokidis et al. (1997) yielded estimates of 4,000 humpback whales for Hawaii based on samples of photographs taken between 1991 to 1993.

Humpback whales in Hawaiian waters

The marine waters surrounding the Hawaiian Islands comprise only a portion of the overall habitat of the humpback whale. During the winter months, however, these waters pro-

vide breeding, calving, nursing and resting areas for the majority of the endangered humpback whale population in the North Pacific. For over 25 years, researchers have presumed that the social behavior of humpback whales while on their wintering grounds was related to reproduction. Calves are born during the winter season and gonadal activity in both males and females increases in the winter months (Chittleborough 1954; 1955; Nishiwaki 1959). Females generally give birth to a single calf at two to four year intervals (Baker et al. 1987; Glockner-Ferrari and Ferrari 1984; Clapman and Mayo 1987), but a few females have been known to calve in successive years on the Hawaiian wintering grounds (Glockner-Ferrari and Ferrari 1987). In the Northern hemisphere, births usually occur during the months of January through April. At birth, calves are approximately 4-5 m long and are light gray in color (Chittleborough 1958; Nishiwaki 1959). Calves remain with their mother for approximately one year (Chittleborough 1954). Mother-calf pairs are frequently accompanied by a male "escort" (Herman and Antinaja 1977). Escorts appear to consort with the mother in order to mate with her, and intense aggression among escorts and "intruding" whales has been observed (Tyack and Whitehead 1983; Baker and Herman 1984; Mobley and Herman 1985).

Humpback whales appear to be polygynous. Mating is characterized by complex acoustic displays (i.e. songs) and vigorous physical competition among males (Mobley and Herman 1985). Typically, aggressive encounters between males occur within "competitive groups" composed of multiple males presumably vying for proximity to a lone female (Tyack and Whitehead 1983; Baker and Herman 1984; Glockner-Ferrari and Ferrari 1985). Long complex "songs," first identified by Payne and

McVay (1971) and Winn and Winn (1978), are heard throughout the humpback's wintering grounds. The singer is normally a lone whale (Baker and Herman 1984) and the exact function of these songs is not known. Singers have also been observed to stop singing and join with mother-calf pairs, and sing while escorting (Tyack 1981; Darling et al. 1983; Frankel et al. 1989; Helwig et al. 1993). Researchers propose that songs serve a dual function—to establish spacing among individual singers and advertise to females (Helwig et al. 1993).

Conservation and management of humpback whales in Hawaiian waters

Humpback whales in Hawaii are directly protected by federal and state legislation. These laws provide the administrative framework for the management and conservation of the species.

The Marine Mammal Protection Act (MMPA; 16 U.S.C. §1361 et seq., as amended) establishes protection for all species of marine mammals in U.S. waters and is the principal federal legislation that guides marine mammal species protection and conservation policy. Under the MMPA, it is unlawful, with certain exceptions, for any person, vessel, or other conveyance to "take" any marine mammal in U.S. waters. In addition, the MMPA prohibits any person subject to the jurisdiction of the United States or any vessel or conveyance subject to the jurisdiction of the United States to take any marine mammal on the high seas. Under the MMPA, the term "take" is statutorily defined to mean "to harass, hunt, capture, or kill or attempt to harass, hunt capture or kill any marine mammal" (16 U.S.C. §1362 Sec.3(13)). It is also unlawful to import any marine mammal or marine mammal products in the United States. Primary responsibility with

respect to the conservation and management of cetaceans and pinnipeds (other than walruses) under the MMPA has been delegated to the NMFS. The MMPA allows certain exceptions on taking for specific purposes (primarily for research, education, public display, and incidental to commercial fisheries) if the taking will not disadvantage the affected species or stock. These permits are very specific in designating the numbers and species of animal that can be taken, as well as times, dates, places, and methods. There are currently six active NMFS research permits governing humpback whale research in Hawaiian waters.

The humpback whale has been listed as an endangered species since June 1970. The Endangered Species Act (ESA; 16 U.S.C. §1531 et seq., as amended) provides protection for species that are listed as endangered or threatened in U.S. waters and upon the high seas. The most significant protection provided by the ESA is the prohibition on "taking". Much like the MMPA, the ESA broadly defines "take" to mean "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in such conduct" and it is applicable to any person subject to the jurisdiction of the United States (16 U.S.C. §1532 (19)).

Once a species is listed under the ESA, recovery plans are prepared to identify conservation measures necessary to improve the species' status. In November 1991, NMFS published a final Humpback Whale National Recovery Plan (NMFS 1991). The recovery plan summarizes current information on humpback whales, identifies problems that may interfere with their recovery, and recommends research or management actions to restore and maintain this endangered species. The major objectives of the plan are to: (1) maintain and enhance habitat; (2) identify and reduce hu-

man-related mortality, injury, and disturbance; (3) measure and monitor key population parameters to determine if recommended actions are successful; and (4) improve administration and coordination of the overall recovery effort for this species.

In addition, Section 7 of the ESA requires all federal agencies to use their authorities to conduct conservation programs and to consult with NMFS concerning the potential effects of their actions on any listed species. In Hawaii, this primarily entails reviewing marine construction permits for the U.S. Army Corps of Engineers and U.S. Navy and Marine Corps activities at various amphibious underwater and aerial target training areas (Payne 1997).

To address increasing human activity in preferred humpback whale habitat in Hawaii, the NMFS issued the final rule (50 CFR 222.31) for approaching humpback whales in Hawaii. These regulations state that, except as provided in subpart C (governing endangered fish and wildlife permits), it is unlawful for any person subject to the jurisdiction of the United States to commit, or to cause to be committed, within 200 nautical miles of the Islands of Hawaii, any of the following acts with respect to humpback whales: (1) operate any aircraft within 1,000 feet of any humpback whale; (2) approach by any means, within 100 yards of any humpback whale; (3) cause a vessel or other object to approach within 100 yards of a humpback whale; or (4) disrupt the normal behavior or prior activity of a humpback whale by any other act or omission.

Section 6(f) of the ESA provides that states may regulate endangered species if the state protection measure is more restrictive than ESA. Those species designated as endangered or threatened under the ESA receive the same status under state law. The Hawaii Department of Land and Natu-

ral Resources (DLNR) requires permits for research on endangered species and further requires the possession of a federal permit as a prerequisite for issuance of the state permit. Within DLNR, the Division of Aquatic Resources is responsible for marine endangered species management.

In addition, under the authority of the State of Hawaii Ocean Recreation Management Plan (ORMP), rules were promulgated controlling the operation of recreational water craft (e.g., jetskis, parasails, sailboards, canoes, and kayaks) in Hawaiian waters "to avoid possible adverse impacts to humpback whales or other protected marine life." Under Hawaii Administrative Rules Title 13 (Chapter 256-112), jetskis and parasails are banned from Maui waters during the humpback whale season between December 15 and May 15.

Hawaiian Islands Humpback Whale National Marine Sanctuary

The programs, agencies, and legislative authorities described thus far have very broad scopes in that they pertain to and are responsible for more than one species or resource. The Hawaiian Islands Humpback Whale National Marine Sanctuary, on the other hand, was designated specifically to protect the humpback whale and its Hawaii habitat. The purpose of the Sanctuary is to complement the existing efforts of the various programs, agencies, and legislative authorities that protect, manage, and conserve humpback whales and their habitat in Hawaiian waters.

The goals of the Sanctuary are to: (1) protect the North Pacific population of humpback whales and their habitat within the Sanctuary; (2) to educate and interpret for the public the relationship of humpback whales to the Hawaiian Islands marine environment; (3) to manage human uses of the Sanctuary consistent with the

Hawaiian Islands Humpback Whale National Marine Sanctuary Act and the National Marine Sanctuaries Act as amended; and (4) to provide for the identification of marine resources and ecosystems of national significance for possible inclusion in the Sanctuary.

The next article in this series will outline the policies and programs for the implementation of the Hawaiian Islands Humpback Whale National Marine Sanctuary.

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Conservation Spotlight

Satellite Tracking of Wood Storks (*Mycteria americana*) in the Southeastern United States

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Abstract

*Although conventional VHF telemetry has been used to track the general migration of the endangered wood stork (*Mycteria americana*), little detail is known of complete migration paths or patterns of winter range use. Because satellite telemetry allows one to collect such a high frequency of location information, this technology was used to track four wood storks from the breeding colony in coastal Georgia to their wintering grounds in south and central Florida. In this preliminary survey, the four telemetered storks showed distinctly different migration paths as well as differences in winter range size, geographic location, and patterns of use. Because wood storks demonstrate high variability of geographically large winter ranges, using satellite technology is essential because it allows a more robust analysis of the species' habitat use.*

Introduction

The American wood stork (*Mycteria americana*) is the only true stork regularly found in the United States. It ranges from South America to the southern United States and its breeding range extends from the southeastern U.S. south through Mexico and Central America, in Cuba and Hispaniola, and through South America to western Ecuador, eastern Peru, Bolivia and northern Argentina (FWS 1996).

Although the U.S. breeding population of wood stork may have formerly bred in all the coastal southeastern states from Texas to South Carolina, current breeding in the U.S.

has become largely restricted to Florida, with some rookeries in Georgia and South Carolina. Since 1976, the number of storks nesting in Florida has declined to less than 15% of the total regional population and the number of pairs nesting in Georgia and South Carolina has risen to over 2,000 pairs. It is thought that this northward shift in breeding locations may be due to failing rookeries in southern Florida, especially in Everglades National Park (FWS 1986).

Declines in the overall number of breeding pairs caused the U.S. breeding population of the species to be declared federally endangered in 1984. This breeding population could

be considered for delisting if a self-sustaining population of 10,000 pairs is obtained or considered for reclassification to threatened with 6,000 breeding pairs (FWS 1996). With conservation efforts, downlisting could occur in the next five years (L. Finger, FWS, pers. communication). The recovery plan for the U.S. breeding population of the wood stork was developed with this goal in mind. Determining where adult wood storks go to forage, roost and breed is a top research priority because the breeding success of the wood stork is dependent on the quantity and quality of feeding and nesting areas. Determining the movement patterns of fledg-

lings, sub-adult, and post breeding adults is also necessary to prevent decline (L. Finger, pers. communication). Scientists believe that birds from rookeries in Georgia and South Carolina regularly move back into central and southern Florida during the later fall months, though this migration has not been studied in depth.

Satellite telemetry has been successfully used to document the seasonal movements of a number of migratory birds, yielding information vital to the development of long-term conservation plans. Determining the migration patterns and rates of adult and juvenile wood storks is a priority of the recovery plan (FWS 1996). To address several tasks identified in the plan, a cooperative program was developed involving biologists from the Savannah River Ecology Laboratory, FWS, Disney's Animal Kingdom, and the Wildlife Conservation Society. The purpose of the study was to track four, free-ranging wood storks, from their summer breeding grounds at Harris Neck Wildlife Refuge, Georgia, to their wintering locations in southern Georgia and Florida. The information gathered in this preliminary study will provide data on the patterns of movement and habitat utilization for the critical wintering period.

Methods

Four wood storks (2 adult and 2 juvenile) were captured in August of 1996 at Harris Neck Wildlife Refuge and outfitted with a backpack harness with a telemetry unit that combined a VHF transmitter (for ground and airplane tracking) and an ARGOS certified transmitter for satellite tracking. The units weighed 60 grams and were manufactured by Microwave Telemetry (Columbia, Maryland). Two units were set to transmit to the satellite every fifth day for approximately 675 days and two units were set to transmit every other day for 330

days. The satellite transmitters send information for determining the animal's location (with accuracy ranging from 100 meters to several kilometers). Approximately 395 location fixes collected between August 1996 through January 1998 were used in this analysis.

Results

The performance on the transmitters varied considerably with two of the four units failing within several months of attachment. The data obtained from all four units, however, showed that the storks' movement patterns varied considerably.

The maximum distance traveled from Harris Neck varied from 405 to 724 km with the time to reach the migration's southern extreme varying from 8 to 68 days. Differences in migration paths from the original colony can be seen for two storks in Figure 1. These paths varied not only in dis-

tance traveled but also geographic area, with stork 2 spending most of its time on the west coast of Florida and ranging to the extreme south, while stork 4 focused activity in the northeastern and eastern central portions of the state. Although these storks originated from the same colony, they did not migrate to the same wintering area.

Discussion

This study serves as a preliminary survey of wood stork migration patterns and wintering habits using satellite tracking technology as outlined in the recovery plan for the wood stork. Because satellite telemetry allows one to collect such a high frequency of location information, use of specific regions (coastal vs. inland) and habitat types (freshwater vs. brackish/saltwater) can be determined, as well as the timing of major inter-regional shifts in location

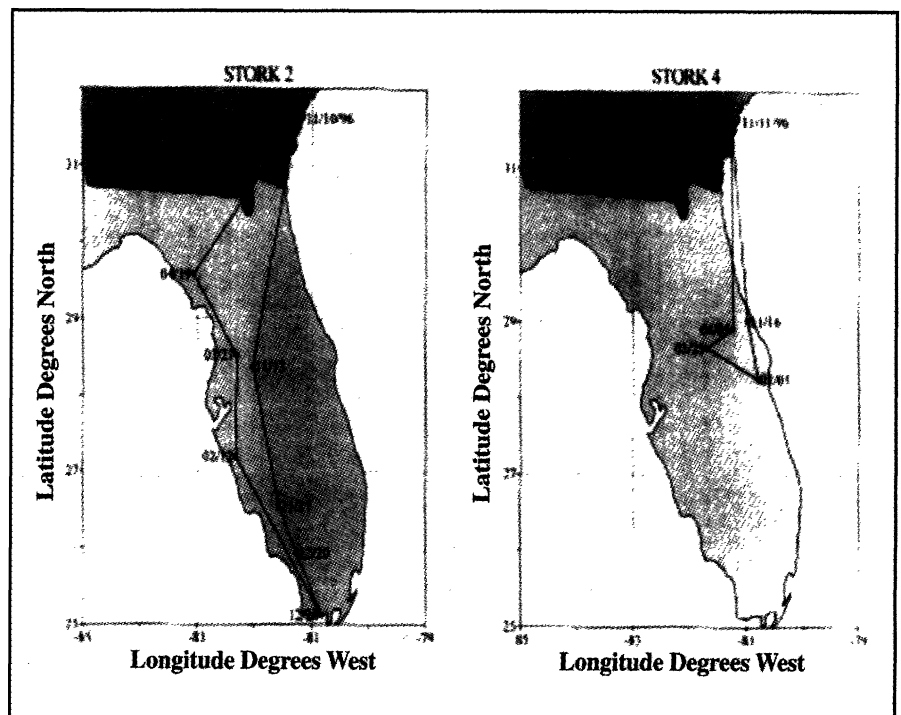


Figure 1. 1996-1997 migration maps for two wood storks, *Mycteria americana*, as revealed by ARGOS satellite tracking. Shown are representative dates and locations for two storks that departed Harris Neck National Wildlife Refuge, Georgia (USA) in November 1996, overwintered in Florida (USA), and returned in late April and early May 1997 (note that lines connecting the location points are shown here for graphic purposes only; exact travel routes between points were not determined).

(pseudo-migration). This is especially important since it appears that wood stork show a great deal of individuality in their patterns of habitat use, and these different winter ranges could potentially affect reproductive success and differential mortality. The data demonstrate that their winter range can be considerably large, with birds utilizing several wetland areas. Additional studies involving a larger sample size are currently in progress.

In addition, this study provided preliminary data for several behavioral research needs for this species, including a number of "tasks" defined in the revised recovery plan for the U.S. breeding population of the wood stork (FWS 1996). This telemetry project documented the regional movement patterns of two sub-adult storks (Task 3.1.1), and provided what is likely the only information of its type for pre-breeding age storks. Documentation of the regional movements of the two post-breeding adults (Task 3.1.2) provided additional information to a small database (Comer et al. 1987), as well as assisted in the determination of roosting and foraging habitat (Task 1.1.2) during the post-breeding season, a topic of research that has received little attention.

Education initiative

To expand the use of this data, a web site (<http://www.clark.net/pub/wcsweb/stork/>) was created that allows anyone interested in wood storks or satellite telemetry to track the migratory paths of these endangered birds. The web site provides detailed information on the natural history of wood storks, purpose of the tracking study, transmitter attachment techniques, daily location fixes of each bird, and summary location maps that give users the opportunity to watch movethese birds move along their migratory routes. Such information has

practical application for classroom projects in math, science, and social studies and builds awareness of the need to conserve species and their habitats.

Conclusion

This study has provided some useful preliminary information on the movement patterns of wood storks. It is our hope that future studies involving a larger sample size would give us greater insight into the habits of this endangered species and address additional points outlined in the recovery plan. Clearly, the sheer number of locations that satellite tracking technology is capable of collecting enables us to address a more comprehensive range of research questions than traditional VHF telemetry and is a valuable resource to the long-term management of a migratory species such as the American wood stork.

Acknowledgments

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News From Zoos

Group Calls for Immediate Steps to Stop African Bushmeat Crisis

On 19 February 1999, 34 experts representing 28 organizations and agencies assembled at the offices of the American Zoo and Aquarium Association (AZA) to discuss the commercial bushmeat crisis in Africa and its impact on threatened and endangered species, particularly great apes. Participants in this meeting represented zoological parks, major conservation organizations, animal welfare advocates and the bio-medical research community. Bushmeat is defined as the meat of wild animals obtained by hunting and has been a staple of the diet of forest dwelling African peoples for centuries. The bushmeat trade is defined as the commercial sale of wild species for human consumption. Gorilla, chimpanzee and other species of primates, elephants and small antelope are among the animals slaughtered and sold for their meat in the markets of equatorial Africa. Extensive logging has opened up the forest areas and provided avenues for hunters to transport their kills to the city markets. Logging companies are also not adequately provisioning the workers in their camps, all of which is contributing to the non-sustainable use of wildlife. "If current unsustainable rates of exploitation continue, the commercial bushmeat trade will decimate, if not eliminate, some endangered species such as great apes, forest elephants and other fauna upon which the health of forest ecosystems depend," the statement reads. The coalition meeting at AZA developed the consensus statement that acknowledges the vast number of problems that need to be solved, and the variety of approaches each group is currently taking, or may be willing to undertake in the future.

In order to expedite an effective campaign to address these issues, the coalition agreed to formalize a task force to better define the immediate, medium and long-term components of this campaign. A coordinator will be hired, housed at the AZA, and be funded and directed by the committee. The coalition hopes to guide and influence any necessary legislation, as well as take an active role in educating the public both here and hopefully in Africa. Help from foundations, governments, and a wide range of individuals and experts will be essential. All the signatories to the consensus agreement are committed to a campaign that ensures that the response to the conservation challenges is built upon a foundation of respect for the people who live in the areas in question.

For a complete copy of the Consensus Statement and list of current signatories, please contact Jane Ballentine, AZA, (301)562-0777 x252; jballentine@aza.org.

Aqua Zoo renovation will have dolphin-inspired atrium

A 90-foot-square atrium, capped by a split undulating roof set with four rows of skylights, inspired by dolphins swimming through waves, will be the most striking addition to the \$15 million renovation of the popular Amazon river dolphin at the Pittsburgh Zoo. The Aqua Zoo's bluestone exterior walls will remain, but the interior will be gutted and 15,000 square feet added, increasing the city's aquarium to 43,000 square feet. The addition's walls and skylight will be clear glass because the animals that will be housed there need natural sunlight. The tall glass walls will be canted outward toward the roof and the floor will cantilever a bit over the hillside below. The exterior with retained stone facing will be sea foam gray. Among other amenities will be a new two-story-tall tank, a penguin exhibit, a fresh water exhibit and a second saltwater area. Funds for the new structure have come from local foundations and local and state government. Pittsburgh's "Aqua Zoo" is closed during the renovation, and is expected to reopen in April 2000. [Edited from an article by Donald Miller, Pittsburgh Post-Gazette]

New Project Researches Ocean Awareness

The Ocean Awareness Campaign is a joint venture whose purpose is to discover and change Americans' views of the condition of the world's oceans. A coalition of 50 accredited aquariums and zoos, museums, and other organizations is trying to learn what its members can do to increase awareness about the threats the oceans face. The Pew Charitable Trusts and the David Packard Foundation are supporting the campaign by funding a team of national polling firms who are analyzing attitudes about the oceans. So far, research shows that most people think human actions in general have a huge impact on the oceans. Most people, however, don't connect individual behavior to these actions. The project's ultimate goal is to find out how to better communicate the importance, value and relevance to our lives. To access a clearinghouse on related ocean conservation issues, visit www.seaweb.org.

Information for News From Zoos is provided by the American Zoo and Aquarium Association.

Bulletin Board

Research Funds for Conservation Biology

The Lincoln Park Zoo Scott Neotropic and Africa/Asia Funds support field research in conservation biology around the world. The Scott Neotropic fund focuses on projects undertaken in Latin America and the Caribbean, while the Africa/Asia fund focuses on projects throughout Africa, Asia, and the Pacific. Most awards fall in the range of \$3,000 to \$6,000. The current deadline for receipt of Scott Neotropic proposals is 1 September, and Africa/Asia proposals have no deadline for 1999. For additional information and application procedures go to <http://www.lpzoo.com>, email steveed@ix.netcom.com, or write to: Lincoln Park Zoo SNF/AA Funds, c/o Director of Conservation and Science, Lincoln Park Zoo, Chicago, IL 60614.

Environmental Enrichment Conference

The 4th International Conference on Environmental Enrichment will be held in Edinburgh, Scotland from 29

August – 3 September 1999. Hosted by the Royal Zoological Society of Scotland, the main aim of the conference is to provide a forum for discussion between the theory-based scientist and the practical application of the zoo-keeper. For further information, contact In Conference Ltd, 10B Broughton Street Lane, Edinburgh EH1 3LY, Scotland (Tel. +44 (0)131 556 9245, Fax +44 (0)131 556 9638, email inconference@cableinet.co.uk).

Conservation Biology Meeting

The Society for Conservation Biology 1999 Annual Meeting will be held June 17-21 at the University of Maryland in College Park. The theme for this year's meeting is "Integrating Policy and Science in Conservation Biology." For information on registration and meeting agenda, go to <http://www.inform.umd.edu/SCB/>.

SCGIS Conference

The Society for Conservation Geographic Information System invites you to join them for their an-

nual conference July 23-25 in Idyllwild, California. The mission of the SCGIS is to serve, represent and connect individuals using GIS for conservation work worldwide. SCGIS invites you to join them this summer at their annual meeting. For further information, visit their website at <http://www.scgis.org/conference/>.

Ex Situ Plant Conservation Symposium

The Strategies for Survival: *Ex Situ* Plant Conservation Symposium will be held on September 29 – October 1 in Glencoe, Illinois. The Symposium, hosted by the Chicago Botanic Garden, will be immediately followed by the annual meeting of the Center for Plant Conservation. For further information, contact Dr. Kayri Havens, Chicago Botanic Garden, by email (khavens@chicagobotanic.org), or by telephone (847-835-8378).

Announcements for the Bulletin Board are welcomed.

Endangered Species UPDATE

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