How Do Birds See the Landscape?

Introduction:
Time and money are in limited supply in wildlife conservation work. In an effort to predict where birds are likely to nest; that is, to evaluate a patch of land’s conservation value, Lawler and Edwards looked at landscape patterns in the aspen forests of the Uinta Mountains in northeastern Utah. They located nests for the four species of interest, northern flickers, red-naped sap suckers, mountain chickadees, and tree swallows, then they recorded not only the nearby vegetation but also larger patterns in the surrounding landscape. For three of the four species they were able to predict pretty successfully the kinds of habitat these birds would choose to nest in the following year. This is a more detailed layer of information than just saying flickers like aspen or spotted owls like old growth and it compliments an ongoing, wide scale research effort in wildlife conservation.

We spoke with Dr. Lawler about his research and how it may eventually be applied to conservation work.

ER: Dr. Lawler, what is your training?

JL: I got my undergraduate degree in biology and environmental studies at Bowdoin College. I first became interested in birds and habitat selection while I was at Bowdoin, working with Nathaniel Wheelwright. I worked with Nat on Savannah Sparrows on Kent Island in the Bay of Fundy. I was looking at how interactions with other species affected where the sparrows put their nests. I received both my Masters and my Ph.D. in ecology from Utah State University where I worked with Tom Edwards. My Masters research involved investigating habitat selection in cavity-nesting birds. I tested the predictive capability of habitat models based on associations with the structure and composition of vegetation around nests.

My Ph.D. research involved the same species of birds in the same mountain range. I chose to follow-up on some of the questions that emerged from my Masters work by investigating habitat selection at a broader range of spatial scales. For my Ph.D., I investi-
ER: But those fine-scale models are labor intensive?

JL: Right. They’re labor intensive in terms of both collecting the data required to build the model and collecting the data for making predictions at new sites. Because the models we developed were based on landscape patterns measured from satellite imagery, it was possible to apply the models without making additional measurements in the field. The only field data required to build the models were nest-site locations. The models were to be more accurate than WHR-type models without being as labor intensive as fine-scale habitat models that require additional field data for making predictions.

There are, of course, limitations to the accuracy of coarse-scale models that use only remotely-sensed data. Some species may not respond to landscape patterns and others might be limited by factors that can only be measured in the field at a finer spatial scale.

ER: We should point out that the major constraints for conservation work in almost every context is time and money.

JL: That’s definitely true. My co-author, Tom Edwards, and I were attempting to develop a tool that would take less time and less money to implement than fine-scale habitat models, but that would be more accurate than most coarse scale habitat models that had been developed at that time.

ER: What was it in your Master’s that didn’t work? You were looking for patterns and you didn’t see them?

JL: For my Masters, I examined habitat selection at a spatial scale that has traditionally been used by avian ecologists. I looked for nests of cavity-nesting birds and then collected information about the vegetation directly surrounding the nest. These data included the species, density, and sizes of trees, the type of groundcover, the species of shrubs, site slope and aspect, canopy height, and several other traditional measurements that avian ecologists have used to summarize habitat. I used these data to build fine-scale habitat models predicting nest presence.

I found that some of the models I built did not predict habitat well at other field sites. There are several reasons why these models were not general enough to apply to other sites. One of the most promising explanations was that birds were responding to factors at other spatial scales. It has been hypothesized that birds can view their environment at relatively large spatial scales and that they can, therefore, select habitat based on landscape patterns.

JL: To test the models from my Masters work, I went to three new field sites and searched them for nests. At each of the nests, as well as at a set of randomly selected trees that did not contain nests, I measured the same set of variables used in the models. I then ran the models on the new data set to see how many of the nests and non-nest points were correctly predicted.

Some of the models fit the data with which they were built relatively well. If I hadn’t gone out and tested the models at new field sites, I might have concluded that I had accurately assessed at least some of the factors associated with nest sites of the birds in the study. An important step in habitat modeling is the testing of models, and particularly testing models with new data.

The fact that some of the models didn’t fit the data collected at the new sites made me wonder if there were attributes of those sites in particular or attributes of certain landscapes that were less suitable for nesting. Or, conversely, whether factors at a finer spatial scale, such as that of the nest tree, had a larger influence on nest-site selection.

ER: That's where the satellite imagery comes in?

JL: Right. To investigate relationships with landscape patterns, I used satellite images of the Uinta Mountains to build a vegetation map. I then used this map to compare landscape patterns in areas
in which birds nested to those in those areas in which birds did not nest. To do this, I recorded nest locations in the field with a global positioning system (GPS) and plotted them on the vegetation maps in a geographic information system (GIS). Using a digital sample plot, I measured several aspects of landscape pattern around nests and randomly selected non-nest trees and then analyzed these patterns to find associations with nesting habitat. The Landscape Ecology paper demonstrates habitat models that use these relationships to predict nesting habitat. I also analyzed associations at a finer spatial scale, investigating the condition and structure of the trees that contained nests.

ER: What finer-scale factors did you investigate?

JL: As you can imagine, living in a hole in a tree places some unique constraints on where these birds can nest. The nest tree has to be large enough to support a cavity; it has to be strong enough to stand up once there’s a cavity in it; and for some birds the tree has to be soft enough to excavate. Many woodpeckers won’t excavate a completely healthy tree, they often select trees that have rotten sections or rotten heartwood. Red-naped Sapsuckers, for example, often select aspen trees with shelf fungi growing on their trunks. The fungi cause decay in the center of the trunk making it easier to excavate. To investigate tree condition and structure, I measured tree diameters, heights, some simple aspects of branching structure, heart rot, and the presence of shelf fungi.

When I compared the explanatory power of the habitat relationships at the three spatial scales (associations with tree structure and condition, associations with the structure and composition of vegetation surrounding the nest, and associations with landscape patterns surrounding the nest), I found that the relationships at the finest spatial scale were the strongest. Nest tree selection clearly depends on tree size and condition. At the intermediate scale, there were very weak associations. As my Master’s work had shown, these cavity-nesters clearly weren’t only selecting nest-sites based on the structure and composition of the vegetation immediately surrounding the nest. At the largest spatial scale, birds appeared to be responding to landscape patterns. We found that models based on relationships at this scale worked fairly well for predictive purposes.

ER: What about the flickers?

JL: The northern flicker is a medium to large size woodpecker that feeds largely on ants that it plucks off the ground—a feeding behavior that’s fairly different from that of most other woodpeckers.

ER: They’re fairly common here in the Northwest.

JL: They’re common across the U.S. Many people know what flickers are even if they don’t know their name. Flickers create larger holes than red-naped sapsuckers—the other woodpecker in the study—and require larger trees due to their larger size. The two woodpecker species, the flicker and the sapsucker, both use several different kinds of habitat. They don’t just live in the woods, for example.

ER: Like my back yard.

JL: Or the side of your house, or a telephone pole. But these two species, at least in the Uinta Mountains, spend some of their time in meadows. The flickers spend a lot of time on the ground feeding in meadows; they spend some of their time in the aspen trees picking insects off the trunks or branches of trees; and they spend some time in lodgepole pine and spruce-fir forests feeding on insects.

Red-naped sapsuckers often forage in willow bushes by streams, stripping the willow bark off the branches and eating the cambium, the soft bark underneath. They have some fairly interesting feeding behaviors. Not only do they feed on willow cambium, but sapsuckers, as their name implies, also drink the sap of trees. They put rings or patches of holes in trees, and then return to them regularly to drink the sap and clean the wells to insure that the sap keeps flowing. They do that with several different tree species.
Given the variety of resources that these two woodpecker species use, it isn’t surprising that they would require a mosaic of different vegetation types in the landscapes surrounding their nests.

We had not made the same predictions for the two other birds in the study, tree swallows and mountain chickadees. Both of these are secondary cavity nesters, meaning that, for the most part, they do not excavate their own cavities but must find preexisting cavities for nesting. Mountain chickadees are small birds that spend most of their time in the forest canopy. Thus we had predicted that chickadees would be associated with more extensive tracts of forest and not show any particular affinity for meadows or meadow edges. The data, however, indicated that chickadees nested in areas where aspen forests were highly fragmented and interspersed with meadows.

**ER:** Why did the chickadees not cooperate?

**JL:** There are at least two possible reasons why we had such trouble modeling chickadee habitat. First, chickadees may not respond to landscape patterns. Second, chickadees may not see landscapes at the scales that we measured them. Our vegetation map was relatively coarse-grained for modeling the habitat of such a small bird. The pixels of the map were 30x30 m. Although this level of resolution may have been appropriate for the three other species, it may have been too coarse for measuring chickadee habitat associations.

**ER:** How did you decide on the appropriate size of the sample plots for measuring landscape patterns?

**JL:** For the predictive models, I used a range of sample plot sizes. For every nest tree and randomly selected non-nest tree, I measured landscape patterns in plots of 16 different sizes. I then built 16 models for each species, each model using data from a different size sample plot. The models we used in our final analyses were those that best fit the data. So, basically, we let the data determine the sample plot sizes.

**ER:** I'm not familiar with the statistics you used.

**JL:** I built the models with a statistical technique known as classification tree analysis. Although the technique is relatively new to ecology, it has been used extensively in marketing and medical research, particularly in clinical research. These types of models have been shown to perform better than several other more conventional statistical techniques. And, because the method is simple to understand and often produces easily interpreted results, it may prove to be particularly useful for building habitat models that often need to be applied by and explained to, a wide range of people.

The classification tree models are basically sets of rules that predict different outcomes. In our study, the models consisted of rules based on landscape pattern variables that predicted where nests should be located.

**ER:** What were your variables for the flicker?

**JL:** The flicker model used three variables. These were first, the size of the largest patch of meadow in the sample plot; second, the size of the largest patch of willow in the sample plot; and third, the total amount of willow in the sample plot. The model predicted that flickers were most likely to nest where the largest patch of meadow in the landscape was at least 11.6 hectares [One hectare (Ha) is about 0.4 acres. Ed.] . This simple rule was most important for predicting flicker nest sites. The model also predicted that in landscapes with smaller patches of meadow, flickers were most likely to nest where the largest patch of willow was at least 1.7 ha, but where the total area of willows was less than 4.4 ha.

**ER:** I didn’t know the flickers were keying in on willows also.

**JL:** The flickers may not have actually been responding to the willows them-
selves. The presence of willows in a meadow may indicate that it is a relatively wet meadow. Wet meadows may have more insects that flickers feed on.

ER: Do the flickers forage in the willows for insects?

JL: I don’t think they do. In general, flickers aren’t often associated with dense vegetation. I found that they didn’t spend much time in the willows. Although there were some patches of willows that were situated between patches of aspen forest, most were located in meadows. In addition, most wet meadows in our study areas contained willows. The flickers did feed in these meadows. It is likely that the flickers in our study used willows as a visual cue that indicated meadows with good food resources. However, it is also possible that the flickers cued-in on something else in the wet meadows, or in the landscape that we did not measure. This is an important issue for habitat modeling. It is necessary to understand what the variables in the models represent. If, for example, flickers are selecting wet meadows by keying-in on a visual cue other than willows, our models are not likely to perform as well in areas where wet meadows do not contain willows.

ER: What habitat cues did the red-naped sapsuckers respond to?

JL: Sapsuckers appeared to be keying-in on a larger suite of habitat cues than were flickers. Their nests tended to be in landscapes with larger patches of meadow, more fragmented aspen forests, more willows, and in some cases larger patches of conifer forest. The sapsucker model was much more complicated than the one built for the flicker, but appeared to accurately reflect the mosaic of habitats that red-napes tend to use. By nesting in small patches of aspen forest interspersed with wet meadows, willows, and patches of conifer forest, the sapsuckers had access to several different food resources.

ER: Are the chickadees still giving you a hard time?

JL: Unlike the models built for the other three species, the chickadee model did not accurately predict nest sites when we tested it at new field sites. Again, I suspect that either the chickadees weren’t responding to landscape patterns or, the spatial resolution of our vegetation map was too coarse to accurately assess landscape patterns perceived by chickadees. There is at least one other explanation for the failure of the chickadee model. Although the other three species nest almost exclusively in aspen trees in the Uinta Mountains, mountain chickadees also nest in conifers. Because the analyses were restricted to nests found in aspen trees, the models may have been based on an incorrect assumption of what was and was not nesting habitat at the landscape scale.

ER: Where are you now? Are you at the EPA?

JL: I’m a National Research Council associate at the EPA lab in Corvallis, Oregon. I’m investigating different ways to use ecological theory to inform conservation planning at large spatial scales. As you mentioned earlier, conservation planning must often be done with little time and little money. Successfully prioritizing areas for conservation actions such as the establishment of nature reserves or ecological restoration requires tools and techniques that can help to over-
come these constraints. 

The selection of areas to protect biodiversity is often constrained by a lack of data. We seldom have accurate measures of biodiversity over large areas. So, conservation planners must use surrogates for biodiversity when selecting sites. One of the projects I have been working on involves developing these indicators of biodiversity. I’ve been investigating whether we can use certain groups of species as indicators of biodiversity. I’ve also been trying to determine what makes those indicator groups work. Why are some groups more successful than others? What attributes of indicator groups make them successful? Although many studies have tested different indicator groups, they have generally drawn different conclusions about which species make good indicators.

**ER:** For example?

**JL:** Studies tend to find that different groups of species work better in different areas. For example, work I’ve done with colleagues at the EPA, has shown that birds and mammals are good indicators of species diversity in the Pacific Northwest, but are poor indicators in Oregon and Washington. Conversely, freshwater mussels are good indicators of species diversity in the Middle-Atlantic states, but poor indicators in Oregon and Washington.

I’ve been doing some simulation modeling to determine the attributes of good indicator groups. Are they rare species? Are they diverse groups of species? Are they species with restricted ranges? Are they species with nested distributions?

**ER:** I would think off the top of my head that a wide-ranging generalist would be your best candidate.

**JL:** It turns out to be the opposite. The best indicator groups tend to be composed of species that have small geographic ranges. These species tend to inhabit different environments. That is, the best indicator groups include restricted-range specialists. In order to protect these species, conservation planners must, in general, select a large number of sites in diverse environments. Because the diverse environments provide habitat for a wide variety of other species, the selected sites end-up protecting a wide array of biodiversity.

It is important to note, however, that the fact that a species is found at a site doesn’t mean that the site is suitable for protecting that species. It is very difficult to select areas for conservation based both on biodiversity and on the potential for population persistence. In general, we have very little information about the population dynamics of most species, much less site-specific estimates.

One of the other research projects I am involved in looks at how we can address population persistence in the reserve selection process. Working with other ecologists at the EPA, I’ve been investigating whether we can use landscape pattern indices as surrogates for population persistence. If landscape measures accurately assess population viability, we can use those measures in conjunction with successful indicator groups to select areas for conserving biodiversity.

**ER:** This takes into account that the landscape is changing?

**JL:** It takes into account the fact that the landscape matters. Both the amount and configuration of habitat not only affect habitat selection, but they also affect population persistence.

**Literature Cited:**

1) Landscape patterns as habitat predictors: building and testing models for cavity-nesting birds in the Uinta Mountains of Utah, USA. JL Lawler, TC Edwards. 2002 Landscape Ecology 17:233-245
Politics and the National Academy of Sciences

Introduction:

The controversy over water allocation in the Klamath River basin is a classic western water conflict, too many users and too little water. [See the August 2003 issue of Environmental Review.] The National Research Council, an arm of the National Academies of Science, was asked by the federal government to conduct a scientific evaluation of what is known about Klamath Lake basin and the three species of endangered fishes it is home to. The NRC committee released an interim report in the spring of 2003 and its final report in October 2003. The interim report focused exclusively on one issue, the lake level, and to say that it was controversial is an understatement. The interim report found, contrary to many people's expectations, that there was no published evidence that tied lake levels to reproductive success of the endangered fishes. And many observers, including myself, expressed dismay at the current administration's apparent success in rolling back protection for endangered species.

However, the final report, which looks at all of the causes for the decline of the Klamath Lake fishes, not just the lake levels, gives no comfort to the Bush crowd. To put it in a nutshell, there are so many things working against the short-nosed sucker and Lost River sucker in the Klamath Lake system that raising or lowering the lake level in the summer won't make much difference to the survival of the fish.

As a result of the NRC final report it is clear that the parties involved, (local farmers, the tribes, government agencies, and environmental groups) will have to address the many underlying environmental problems in the Klamath basin and quit relying on the band-aid approach of giving the fish a little more water some of the time.

The Fish and Wildlife Service and the National Marine Fisheries Service are doing the best they can with severely limited resources to keep these species alive. The final report of the NRC committee spells out in some detail what needs to be done in terms of spawning habitat restoration, water quality improvement, and irrigation practices. The task now is to keep the pressure on and to find the money needed to reverse the trends in this ecosystem. Painful as the process may be, the implementation of the Endangered Species Act in this case, has provided notice to the people in the Klamath basin that the ecosystem that supports them is in decline and needs work. Implementing the recommendations of the NRC committee would go a long way toward providing a more diversified and revitalized local economy as well as a healthy ecosystem.

In next month's issue of Environmental Review we will interview William Lewis, the chairman of the NRC Committee on Endangered Fishes in the Klamath, for a more detailed explanation of the Klamath basin study. In this issue we learn how the NRC committees do their work and how the National Academies negotiate the political cross currents when they are called upon to evaluate the science that, we hope, provides the foundation for public policy. Gordon Orians is professor emeritus at the University of Washington, an authority on the biology and behavioral ecology of blackbirds, a member of the Academy, and for the last six years, chairman of the Board on Environmental Studies and Toxicology (BEST) of the NRC, which is the board that organized and supervised the committee on endangered fishes in the Klamath basin. We spoke with him about some of his experiences during his tenure on the board.

ER: Professor Orians, how does the National Research Council function?

GO: The National Academies is a body of people elected on the basis of their professional accomplishments as judged by their previously elected peers. The Academies is non-governmental and private — its charter from the government was signed by President Abraham Lincoln in 1863. It was established to provide a process by which the federal government could call upon the scientific community for advice and guidance. There are three major bodies in the National Academies: the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. Each has its own president.

As the needs of the federal government became more complicated and the
government was drawing more heavily upon the Academies, it was decided to establish the National Research Council, the NRC, as the working arm for doing the Academy’s studies. The NRC is hierarchically structured, the most important element of which is the boards that oversee the studies. When the government requests a study from the Academy, it is assigned to a board, or sometimes two boards.

The study that I chaired on cumulative effects of oil and gas exploration on Alaska’s North Slope was done jointly by the Board on Environmental Studies and Toxicology (BEST) and the Polar Research Board. There’s also an ongoing study on the Everglades which is joint between the Board on Environmental Studies and Toxicology and the Water Science and Technology Board, but most of the studies are done by a single board. The board members are drawn from throughout the scientific community of the United States and abroad and serve three-year terms, renewable for a second three-year term.

**ER:** Why go outside the Academy for board members?

**GO:** There are so many studies, particularly in fields that are poorly represented in the membership of the Academy that it would be impossible to do the studies just using Academy members. For environmentally related studies the majority of the committee members are not Academy members because there’s poor representation of environmental scientists among Academy members.

**ER:** How often do the boards meet?

**GO:** The boards meet typically several times a year for a two-day meeting. There may also be other responsibilities. This depends upon the boards; the boards operate somewhat differently. For example, BEST, which I chaired for the last six years until my term ended this summer, assigns a liaison person to every study. That person’s responsibility is to keep track of that particular study and to identify quickly any problems that might arise that need the board’s attention. At every meeting, the board discusses the ongoing studies, how they’re going, if there are any problems, and if they are progressing appropriately.

**ER:** Do the Academies ever refuse to do a study?

**GO:** Because the Academy was set up to respond to requests from the government, it is difficult to say no to the government when it asks. It’s hard to absolutely refuse to do a study.

**ER:** When would that situation even arise?

**GO:** It could arise if a board concluded that there was no reasonable scientific issue or body of data that could be evaluated in response to a request. Or the Academy could be asked to resolve a policy issue, not a science issue. Such a request would not be appropriate. Typically the staff, under guidance from the board, works with the soliciting entity to mold the mandate into an appropriate form. Sometimes the government is a bit uncertain about what it wants. Some of the studies are initiated as a result of legislation that requests an Academy study. Typically the NRC staff have worked with the staff of the senators or representatives to help craft the request so that it is appropriate scientifically. Or the request may come directly from a federal agency, such as EPA, FDA or the Department of Defense. There again the NRC staff would work with the appropriate agency to develop a draft prospectus for the study.

The board then evaluates a prospectus. It may decide that the task is still ill-defined and instruct the staff go back to the agency and get the task more appropriately posed. It’s important to clearly define the issues that are to be addressed. That’s one of the main functions of the boards.

**ER:** Is the federal government the only organization that can ask for a study?

A muskox bull on the North Slope in winter. These animals were exterminated in Alaska but have been reintroduced.
GO: The Academy was established to do studies for the federal government and the vast majority are requested by the federal government, but there’s nothing in the statutes that limits Academy studies to requests from the federal government. A few studies in fact are funded by other entities. I chaired a study on wolves, bears, and their prey in Alaska that was requested and funded by the state of Alaska. Another recent BEST study was funded by the California state EPA. A few studies are financed by limited program initiation funds the Academies has assembled, but the vast majority of the business is from the federal government.

ER: Are NRC reports subjected to independent reviews like academic journals?

GO: When an NRC committee has completed a draft report, an independent review committee is established. Its members are not known to the study group, and their recommendations are submitted anonymously. The NRC requires that every comment from a reviewer that is substantive be responded to in writing.

There is another person involved in the review process - the monitor. In the entire process of producing a report, the monitor is the only person who must be an elected Academies member. The monitor’s job is to determine that the committee has been appropriately responsive to the reviewers. The monitor gets the reports, the reviewers’ comments in writing, the committee’s response, and makes a judgment. Before the report can be published the monitor must concur that the committee has been appropriately responsive to the reviewers. Of course the committee cannot make all changes suggested by reviewers because reviewers often disagree and there is not a principle that asserts that reviewers are always correct and committees always wrong.

ER: How great a commitment in time are people making when they agree to be on a committee?

GO: The commitment varies a lot depending on the scope and complexity of the study. The biggest commitment I’ve experienced was the Alaska North Slope committee. Our comprehensive mandate was to assess the cumulative effects of decades of industrial activity on the North Slope on the physical, biological and human environments and to assess likely effects of future industrial activity. We had eight meetings, the longest of which were six days long, when we went up to Alaska in the summer and winter. We had public meetings in various cities in Alaska and visited the North Slope. We went to Barrow and then flew to Nuiqsut [A town on the eastern edge of
Studies that are more focused may be carried out by smaller committees; they may be completed in as little as six-months. In general, agreeing to serve on and NRC committee is a serious and non-trivial commitment. An enormous amount of valuable volunteer work is done by members of the scientific community to produce these NRC reports. Many people put in a lot of time and a lot of service for the country.

**ER:** You just said volunteer. Aren’t the committee members paid for their services?

**GO:** No. Committee members do not receive financial compensation for their efforts. Their out of pocket expenses are covered, but that is all. This is important because it assures that committee members have no financial interest in the study, and it undermines any claims that they are paid consultants. However, the work of the committees is supported by paid NRC staff members who handle all the committees’ logistical needs, help solicit and assemble documents, deal with communications, and provide editing and publishing services. All NRC committees depend heavily on the staff that support them.

**ER:** Why do people volunteer?

**GO:** One reason is that these studies are important and they’re influential. They often influence public policy. People view this as a way of engaging in the process where it might count. A second reason is that it’s also a marvelous learning experience.

For example, I learned an enormous amount about Alaska’s North Slope. I learned a lot about permafrost, about the dynamics of tundra vegetation, and about how the North Slope people use different resources. I gained this knowledge not only from hearing people making presentations but also from discussing issues with experts on the committee. One’s fellow committee members are bright people who are expert on things you don’t know anything about.

So serving on an NRC committee is exciting, it’s not entirely altruistic. You get something from it too. It is worthwhile professionally, so you tend to feel good and proud.

**ER:** How are committees assembled?

**GO:** The mandate for a study includes a list of the fields of expertise that need to be represented on the committee. NRC staff solicit suggestions from members of appropriate NRC boards and draw upon their experience with members of previous study committees. Final committee composition is decided in consultation with the person who has agreed to be the chair of the committee.

An effort is made to get representation of all scientific fields that are relevant to the study and also to get a variety of different points of view. Often the committees deal with controversial issues, so it is important that a committee not be obviously biased in favor of one particular view or perspective. However, committee members represent only themselves as individuals. They do not represent a constituency.

For example, the North Slope committee included people from environmental organizations, petroleum geologists and biologists employed by the oil industry, and independent scientists and social scientists who had received no funding from the oil industry. We had the whole mix.

When such a diverse group produces a consensus report, as we did, the report is powerful. That’s why NRC committees spend so much time trying to achieve consensus. When a diverse group of people with various perspectives agrees on many things, their report is hard to dismiss.

**ER:** How effective is an NRC report?

**GO:** It varies enormously. Some reports gather dust; other reports are extremely influential. Some reports from BEST have caused EPA to change
how it does business. You don’t know beforehand how a report will be reviewed and how influential it will be. You can only do your best and hope.

ER: How are the reports publicized or marketed?

GO: The product of a report is a book which is published by National Academies’ press. Recently, all reports are published on-line and you can read them there. All reports are public documents. But typically the budget for a study does not include money for other than publication and initial dissemination and briefings. The Academy doesn’t have money to do follow-ups unless somebody gives it money to do that. Much attention is given to the press releases and the briefings as to how to make them as effective as possible.

In the case of the North Slope report, we briefed members of Congress and had press releases in Washington, D.C. We returned to Alaska and briefed communities in Anchorage, Fairbanks, and on the North Slope. That’s it. We don’t have more money to do anything else. If somebody asks what else we’re going to do about it, we can’t do anything until somebody asks us to do something and says, Here’s the money.

ER: Don’t some studies produce interim reports before the final comes out?

GO: Yes, some mandates ask for an interim report but many of them don’t. In general the NRC prefers not to have an interim report, because interim reports are generally much narrower in focus and don’t deal with all of the components of the full mandate to the committee. But sometimes it’s important to have one. For example, in the case of the recent report on the Klamath River basin, major decisions were to be made before the full report could be completed. In particular, the government needed to make a decision whether or not to release water to irrigators in the basin or reserve it to maintain higher water levels in Upper Klamath Lake to protect two species of endangered fishes.

The situation in the Klamath River basin is complex because there are more claimants for water than there is water to supply their needs. Among the claimants are Indian tribes that have treaty rights; irrigators that were encouraged to settle by the government with assurances of water rights; endangered species of fish whose livelihood depends on adequate supplies of water. Resolving how the water should be allocated is a difficult policy decision that depends on many factors, but the decision should be informed by scientific understanding of the consequences of how the water is allocated.

ER: What was the focus for the interim report on the Klamath?

GO: The U. S. Fish and Wildlife Service had done an analysis of the two endangered suckers, which live in Klamath Lake itself and the coho salmon which spawn on tributaries of the Klamath River downstream in California. The Bureau of Reclamation was proposing to lower the minimum level of water in Upper Klamath Lake, but the Fish and Wildlife Service determined that lower lake levels and reduced flows of water in the river would jeopardize the endangered fish species. That determination from the Fish and Wildlife Service resulted in turning off water to irrigators. The issue that the committee focused on in its interim report was the scientific evidence to support the determination that reducing the lake level further would jeopardize the fish.
The full mandate to the committee included an analysis of the general situation in the basin and what would need to be done to reverse the serious decline in fish populations.

The final report deals primarily with all the things that have contributed to the decline of the sucker and the salmon and what it is you need to do to remedy those. In the case of the suckers, this includes putting screens in certain of the diversions, getting rid of certain dams, making available more spawning areas, and there’s a lot of pollutants from agriculture coming in that eventually have to be dealt with. Then for the coho salmon, which mostly spawn in the tributaries, there’s been a lot of problems because of the forestry practices along the tributaries. This has nothing to do with water coming down from the Klamath Lake itself. It’s not influenced by that because it’s different sources of water. No matter what you do on the main stem of the Klamath it doesn’t deal with that, although in the final report the committee does make recommendations about taking out a couple dams, Iron Gate dam and others which are not serving much purpose anyway.

Therefore the committee operated in two phases: first it looked specifically at the evidence with respect to lake water levels and the management of lake water levels on the reproductive success and survival of the suckers; and what would be the effects on the coho salmon of increased flows in the main stem below the dams on the Klamath River. The interim report dealt specifically just with those two things. The final report deals with all factors in the functioning of the much-altered basin that affect the viability of the fish populations.

ER: And it was the interim report that took so much flack.

GO: The interim report was controversial for two reasons. First, it said that there was no convincing evidence that increasing lake levels would be beneficial. The committee could find no relationship between lake level and spawning success or survivorship of the fish. Some of the best survival years had been with low lake levels and some of the worst with high water levels. BLM was proposing to lower it even further, and the committee said there was no scientific evidence to support that either.

With respect to the flows in the main stem, the committee said that it was not clear whether increasing those flows into summer would be helpful, because the extra water that would be released would be too warm for the salmon. The committee also pointed out that the salmon spawn in the tributaries not in the main stem of the river.

ER: How does the final report differ from the interim?

GO: The final report reiterates the conclusion the committee reached in its interim report but it looks at a much broader array of issues that affect the fish. The committee points out that so many other things have been altered that lake level alone doesn’t provide a strong signal. The committee concluded that unless many other things...
are changed, just increasing the lake level isn’t likely to benefit the fish.

ER: Is the NRC concerned about the motivations of the agencies that ask for studies? I’m thinking about the current administration’s efforts to roll back as many environmental regulations as it can.

GO: Any federal agency that asks for a report from the Academies has an agenda, that is, the agency has a reason for using the Academies. In general the reasons are honorable, in that the agencies genuinely need help in evaluating the scientific evidence. Sometimes, however, the motivation is to seek cover to be able to delay taking action. The agency can claim that it is inappropriate to act prior to receiving the NRC report, or an agency may hope that the NRC report will support action it wishes to take.

Take, for example, a recent report on arsenic in drinking water. Late in the Clinton administration the EPA proposed to adopt a standard of no more than 10 parts per billion of arsenic in drinking water, dropping it from 50 PPB. The Bush administration immediately delayed implementation of the new standard and requested a new NRC study even though the previous study and been completed only two years earlier.

That study was carried out under BEST, and it turned out that there was a great amount of new data. That was a fast track study with a narrow focus. Basically the new study reported that the evidence in support of more stringent standards is stronger now and 10 PPB may not protect public health.

ER: Everybody claims that the policies they want should be based on the best available evidence don’t they?

GO: Yes, they do, but support for the best available science is often based on the belief or hope that science will support previously held opinions. When it doesn’t people often try to discredit the report by various means. One way of course, is to challenge the committee’s interpretation of the information. But unfortunately that is not the most commonly used method. More frequently people seek ways to discredit the committee or how it operated. For example, the report on Alaska’s North Slope found evidence of significant cumulative effects on vegetation, some species of animals, and on people. Objections to the report were raised on the grounds that several members of the committee had signed a letter to the President urging that drilling for oil not be done in the Arctic National Wildlife Refuge. In other words, the committee’s report could not be trusted because of biases among its members. What people fail to realize is that such attacks constitute insults on all members of the committee. They imply that one or two committee members had managed to hoodwink all the other intelligent people on the committee and persuade them to agree to unsupported conclusions.

The interim report of the Klamath

Scientific information is only one of several sources of information that should inform public policy. The job of the NRC is not to do the job of decision makers.

ER: So the Bush administration did yield to the scientific evidence?

GO: Yes, they adopted the standard. Ironically, the request for a new study strengthened support for a position the administration preferred not to take and the power of the NRC report really terminated the resistance to a more stringent standard.
Environmental Review

Committee was attacked on the grounds that the committee did not have sufficient time to fully analyze the data and that the interim report had been a rush job. The truth is that the committee was not rushed and the final report affirms the conclusions of the interim report.

ER: How do you think the final report on the Klamath Basin will affect future actions there?

GO: Apparently the response to the final report has been fairly positive. The value of the NRC study is likely to be that people will take a broader look at the Klamath basin and all the things that can be done to improve things. The report gives environmental groups, Indians, and public agencies a list of valuable things to do that should help the fish and improve the functioning of the ecosystems in the Klamath basin.

The Klamath basin is an example of a common phenomenon in environmental issues. Attention focuses on one issue. In this case it was lake level, which admittedly was a trigger for an economically significant decision. Everybody argued about lake level and lake level only.

ER: Now we've got an agenda we can work with.

GO: There's an expanded agenda. The same process was operating with respect to the North Slope. The huge public debate focused on just one or two things. The report pointed out there was a broader range of issues that needed attention. The committee laid out a much broader agenda of topics and issues that ought to govern and influence the kind of decisions that will be made regarding future industrial activities on the North Slope.

The North Slope report is also an example of the importance of a carefully crafted mandate. The committee wasn't asked to say whether you should or should not drill anywhere. It was asked to evaluate what have been the effects and what are likely to be effects if you expand industrial activity in the regions. The committee avoided trying to make any policy decisions other than recommending investigations that would fill data gaps that prevented the committee from assessing some of the affects of the industrial activities.

ER: But doesn't avoiding policy decisions weaken the value of NRC reports?

GO: That might seem to be the case, but actually restricting NRC reports generally increases their value. First, avoiding the pitfalls of entering the policy arena enable committees to reach consensus. A consensus report is much more likely to influence policy decisions than a report with minority positions.

Second, the focus of NRC reports on scientific issues is a major reason why the reports are credible. The claim that the reports are unbiased rests on the fact that the best experts in the relevant fields have examined the scientific evidence and agree on what the data tell us.

Third, scientific information is only one of several important sources of information that should inform policy decisions. The job of the NRC is not to do the job of decision makers. Sometimes the agencies would like the Academy to do that. They'd like you to take them off the hook so they could say, I've got to do this because the Academy says I should.

That was how the mandate to the Klamath committee was crafted. Even though the interim report had a narrow focus it dealt with a scientific issue - the evidential basis for the importance of water levels. The full report examines the scientific evidence for a wide range of factors that are making life difficult for the fish and that could be remedied.

Documenting damage to tundra vegetation by oil exploration.

Damage to tundra vegetation remains visible for 15-20 years after one winter traverse.
Table of Contents: *Environmental Review* Volume Nine
January - December (2002)

January

Womens’ Health and the Politics of Abortion: Barbara Crane
Understanding Evolution Can Help Us Fight AIDS: Stephen Palumbi

February

Deforestation and Cloud Forests in Costa Rica: Robert Lawton
Organic Farms Hold Their Own Against Pests: Deborah Letourneau

March

Human Appropriation of Natural Systems: Christopher Field
Bioengineering Pesticides Into Plants: Allan Felsot

April

Understanding Biological Invasions in Hawaii: David Burney
Sea Otter Recovery in Prince William Sound: David Garshelis

May

Finding Wild Places Where Pandas Can Live: Colby Loucks
Having Faith: An Ecologist’s Journey to Motherhood: Reviewed by George Woodwell

June

Measuring What Matters: An Alternative to the Dow: Clark Williams-Derry
The Natural History of Hawaiian Honeycreepers: Paul Banko

July

Aldo Leopold and the Huron Mountain Club: Curt Meine
Understanding the Threats to Hawaiian Honeycreepers: Leonard Freed

August

What Will It Cost to Save Piping Plovers?: Michael Larson
The Decline of the Atlantic Bluefin Tuna: Elizabeth Babcock

September

Why Are Steller Sea Lions Declining?: Douglas Demaster
A New Species of Forest Elephant in East Africa: Lori Eggert
Classics Corner: Timothy Harris

October

Florida Panthers: Down but Not Out: David Maehr
Can Biotech Save Endangered Species?: William Conway

November

Alaska’s Glaciers and Climate Change: Keith Echelmeyer
Reintroduction of the Mexican Wolf in the Southwest: Brian Kelly
Classics Corner: Timothy Harris

December

New Protection for the Brazilian Amazon: Mark Cochrane
Natural History and Conservation of Bats: David Schmidly

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Name ____________________________________
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City ____________ State ______ Zip ________
ER: So you are not worried too much about the NRC being used?

GO: I think one can go overboard on worrying about who is trying to use the Academy. Everybody is. The Academy does its best to try, in composing the mandates, to avoid being deflected from evaluating the relevant scientific evidence. Most issues that reach the Academy are controversial. But the history of the Academy shows that it has played a valuable role in informing public policy issues. The country would be worse off without it.

Literature Cited:


NEXT MONTH

THE FINAL NRC REPORT ON THE KLAMATH BASIN

William Lewis

THE NATURAL HISTORY AND CONSERVATION OF WHOOPING CRANES

Thomas Stehn

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