

**DRAFT**



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# MEMORANDUM

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Date: October 29, 2001

To: The Honorable Chair and Members  
Pima County Board of Supervisors

From: C.H. Huckelberry  
County Administrator *CHH*

Re: Results of Peer Review Process for the Sonoran Desert Conservation Plan

## Background

On October 26, 2001, the results of the peer review process for the work of the Science Technical Advisory Team were presented by Dr. Reed Noss and Ms. Laura Hood Watchman at a public meeting that was attended by over fifty individuals from the science, ranch, and conservation community. Many of Pima County's federal government partners were in attendance, as were individuals from the City of Tucson and the State Land Department. The *Report of Independent Peer Reviewers: Sonoran Desert Conservation Plan* is attached.

## Report

The Peer Review report concludes that "it is clear to us that the Sonoran Desert Conservation Plan is a credible, science-based process designed to achieve clear and laudable goals for the long term conservation of biodiversity in Pima County." In arriving at this conclusion, the authors point out the ways in which the Sonoran Desert Conservation Plan science process is distinguished from other planning processes.

The authors found the following aspects of the Sonoran Desert Conservation Plan to be "exemplary features:"

- "There is a demonstrated commitment to keeping the science insulated from politics." The authors remarked during the presentation that it is typical for scientists to have sideboards and political constraints, but the Sonoran Desert Conservation Plan process has fostered "intellectual freedom and autonomy" which allows the science community "to exercise their best scientific judgment about what it takes to fulfill the primary goal of the conservation plan -- preserving the biodiversity of this region."
- "In addition to allowing the Science Technical Advisory Team and consultants to operate independent of politics, the County provided financial resources and staffing to the scientists sufficient to get the job done."

- "Some 150 species experts have been contributing .... These specialists comprise the top experts on the species in question and lend enormous credibility to the planning process. Their review comments have led to the refinement of the models to the point that they represent the best expert opinion."
- "The planning processes for the Sonoran Desert Conservation Plan and the County Comprehensive Plan are being closely integrated, such that conflicts between the two plans will be minimized. Rarely has conservation played such an integral role in land-use planning. This close coordination will make implementation of both plans proceed more smoothly."

The peer reviewers also offer recommendations for going forward. In presenting this advice Dr. Noss acknowledged that "people who disagree with the results of conservation planning processes will first attack the science." Dr. Noss, one of the founders of conservation biology, stated that the ideas presented could make an "already stellar process more defensible." Recommendations include technical enhancements that are described in the attached report, and these more general ideas: "In general, give more attention to the effects of roads;" Evaluate the effects of livestock grazing on biodiversity so that strategies and incentives can retain the benefits and reduce potential negative impacts; "Institutionalize adaptive management;" and "Keep science intimately involved throughout the process of Plan development and implementation."

#### Purpose of Peer Review

The science community has called for rigorous independent scientific review that is built into the process of natural resource planning and decision making. Independent scientific review can ensure that (1) the best available scientific information is used, (2) there is a clear separation between science and non-scientific issues, and (3) conclusions are consistent with the scientific information and assumptions are clearly stated.

I have attached two articles published about the peer review process. In one, the public relations manager for the Greater Tucson Planning and Conservation Council -- a group that intends to hide the identity of members but is apparently made up of developers, homebuilders, realtors and members of the banking and business community who have organized an effort to destroy the Sonoran Desert Conservation Plan -- is quoted to say that "it probably isn't the best choice to pick people from one side of a controversial issue and ask them to review this issue."

This statement reflects a continued lack of understanding about the difference between professional peer review and public comment. The Science Technical Advisory Team chose individuals from the science community who they count as peers and respect as national experts in conservation biology and habitat conservation planning. The resumes of Dr. Noss and Ms. Watchman demonstrate that these individuals are thought of as leaders and experts in their field. The interest oriented debate that the Greater Tucson Planning and Conservation Council is seeking has been taking place and will continue to take place in the public policy and political arena, where such discussions properly belong.

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### Conclusion

In responding to questions from the audience following the presentation, the reviewers stated that the Sonoran Desert Conservation Plan is "in the upper tier" and "on the cutting edge of conservation planning in every way: science, process, and in the use of technologies." The reviewers also stated that the strength of the Plan is that it goes beyond the narrow charge of the Endangered Species Act.

I will forward a more detailed review and analysis of the last three years of science based planning to the Board under separate cover, along with recommendations about how to implement the guidance of the Peer Reviewers.

### Attachments

Attachment 1-- *Report of Independent Peer Reviewers: Sonoran Desert Conservation Plan*  
Attachment 2 -- *Articles from the Arizona Daily Star and Tucson Citizen*



# Report of Independent Peer Reviewers: Sonoran Desert Conservation Plan

Reed Noss, Ph.D., and Laura Hood Watchman, M.S.

October 26, 2001

## Purpose:

We were asked by Pima County and the Science Technical Advisory Team (STAT) to provide a review of the planning process for the Sonoran Desert Conservation Plan (SDCP or "the Plan"), with emphasis on the biological science component and how it is being incorporated into the overall planning process. Our review should not be seen as a formal, exhaustive, or final peer review. Rather, our comments constitute informal feedback on the planning process, informed by our experience with regional conservation planning processes elsewhere and our expertise in conservation biology generally.

## Exemplary Features:

Several distinguishing features of the SDCP are particularly noteworthy and establish this Plan as exemplary among conservation plans:

- There was a demonstrated commitment to keeping the science insulated from politics. Too often, plans are compromised by having political sideboards placed on the scientific analyses and their interpretation. The science then loses much of its credibility and is unable to provide objective answers to key planning questions. Although all science is pursued within a cultural context and must be aware of that context, it also must be exercised with intellectual freedom and autonomy and must eschew bias. The autonomy of the scientists (including the STAT, the consultants, and the expert reviewers) in this Plan allows them to exercise their best scientific judgment about what it takes to fulfill the primary goal of the conservation plan---preserving the biodiversity of this region.
- In addition to allowing the STAT and consultants to operate independent of politics, the County provided financial resources and staffing to the scientists sufficient to get the job done.
- Some 150 species experts have been contributing as reviewers of the species habitat models. These specialists comprise the top experts on the species in question and lend enormous credibility to the planning process. Their review comments have led to the refinement of the models to the point that they represent the best expert opinion.
- The planning processes for the SDCP and the County Comprehensive Plan are being closely integrated, such that conflicts between the two plans will be minimized. Rarely has conservation played such an integral role in land-use

planning. This close coordination will make implementation of both plans proceed more smoothly.

Recommendations:

Although our overall impression of the science component of the SDCP is highly positive, we have several recommendations for improving certain aspects of the planning process and the scientific methodology. We offer these recommendations to help the County improve what is already a stellar planning process and to make the Plan more defensible in the face of what will surely be intense public scrutiny (as is always the case with such planning processes). Some of these recommendations may help the STAT make more rigorous and quantitative determinations of the contribution of the Plan to various planning goals. We recognize that time and financial constraints may make many of our recommendations infeasible. Hence, our recommendations should be seen not as prescriptions but simply as advice.

- 1) **The process of evaluating the contribution of the reserve design of the Plan (and any of various alternatives) to the stated goals could be carried out more efficiently using a site selection algorithm.** For example, the SITES software, developed by researchers at U.C. Santa Barbara for The Nature Conservancy, starts with a set of explicit and quantitative goals (e.g., protect x% of the known occurrences or y% of the modeled habitat of G1/G2 and S1/S2 species, represent z% of a given class of vegetation types or geoclimatic habitats) and a suite of planning units with associated biodiversity data. It then uses a "simulated annealing" approach to develop a portfolio of sites that attains those goals in the smallest overall area and in the most compact design. Effects of changing any of the goals can be quickly evaluated and observed on-screen. The process is highly transparent and flexible, and can be carried out interactively in a workshop format. Hence, this algorithm would allow the STAT to link the results (i.e., the reserve design) directly to the planning goals and communicate this linkage clearly to the public and decision-makers. Nevertheless, we emphasize that SITES and other such algorithms are useful for the process of reserve selection but do not suffice for the process of reserve design (e.g., assuring connectivity, delineating reserve boundaries), which must still rely largely on expert opinion.
- 2) **Species-specific conservation goals should be refined, and natural community conservation goals could be added.** It is entirely appropriate to articulate species-specific conservation goals, and we applaud the STAT for developing draft conservation goals. To alleviate some confusion concerning these goals, we suggest that the STAT refine them by creating two broad categories of goals: protection and management. Protection goals are associated with reserve design and the conservation status of known occurrences and potential habitat of species. Management goals include, for example, activities to minimize degradation of habitat in multiple-use reserves, habitat restoration, and restoring connectivity across potential barriers.

With respect to "protection" goals, we understand that the draft rarity goals are based on protecting proportions of potential (modeled) habitat. For rare (e.g., G1/G2) species, the goal should be to protect all known occurrences as well as a high proportion of potential habitat. The current draft population viability goals appear to be uniform across taxa, which reflects the fact that no population viability modeling has been conducted for the priority vulnerable species. These viability goals should be refined according to taxon and status. For example, The Nature Conservancy's ecoregional planning process identifies "rules of thumb" for viability targets for species according to status and the scale of habitat use (i.e., local-scale, intermediate-scale, coarse-scale, and regional-scale species). Also, the Florida Fish and Wildlife Conservation Commission, in its 1994 "Closing the Gaps" statewide conservation plan, established population viability goals for multiple species in Florida that differed by taxon. With respect to "management" goals, we would expect higher management goals for the most vulnerable species, just as the protection goals for these species are higher.

- 3) **The species habitat models should, where possible, be based on empirical relationships between species occurrences and environmental features and then validated with independent field data.** For example, multiple logistic regression can be used to compare a set of site-specific occurrence data with a set of random points in relation to a range of potential predictor variables such as vegetation, soils, elevation, topography, etc. This "resource selection function" approach often improves prediction accuracy over conceptual models based on expert opinion. We recognize that this approach may be possible for only a few species because of limited sample sizes of occurrence data. Nevertheless, every opportunity should be taken to validate conceptual and empirical models with new or otherwise independent field data. Models should be revised as new data suggest.
- 4) **More use of a coarse filter is needed to balance the fine-filter approach of the Plan.** The SDCP is oriented toward the habitat requirements of some 55 priority vulnerable species, mesoriparian communities, and a variety of "special elements" (mostly rare plant communities, but also certain physical habitats and features such as bat roosts). This fine-filter approach does not necessarily assure that all plant communities and environmental features will be represented adequately in the planning area. In particular, matrix communities such as paloverde-mixed cacti and creosote-bursage may be under-represented in a reserve design, as are xeroriparian communities. This under-representation, in turn, could affect long-term ecological processes and population viability for a number of species. Hence, most modern conservation planning processes (e.g., in Australia and the ecoregional plans of The Nature Conservancy) set representation targets for all communities and habitats. SITES can be used to accomplish these representation goals efficiently.

- 5) **Give more consideration to the population viability of particular species with demanding area requirements.** The species richness approach of protecting areas where three or more species have overlapping high potential habitat values should be explained more thoroughly, especially with respect to the scientific rationale. For example, studies elsewhere have suggested that protecting areas with overlapping high-value habitat or high species richness does not, in itself, assure that sufficient habitat will be available to provide for a viable population of any single species. We recommend that, if possible, some form of population viability analysis be conducted for those species with demanding area requirements or high sensitivity to habitat fragmentation. For example, researchers have used a spatially explicit population model called PATCH to determine the relative viability of populations of territorial vertebrates under several alternative landscape scenarios (e.g., alternative reserve designs) and to identify likely source and sink areas across regions.
- 6) **Consider using large, wide-ranging mammals as focal species for determining reserve sizes and, particularly, linkage requirements.** Species such as mountain lion, jaguar, bighorn sheep, pronghorn, kit fox, peccaries, and even coyotes, although not likely to be sought as "covered species" in the Plan, can, because of their large area requirements and mobility, help define the required habitat patch configuration for viability. Linkages, including road crossings, need to take into account the connectivity requirements and behaviors of such species. In many cases, large mammals play ecologically pivotal roles in the ecosystem.
- 7) **In general, give more attention to the effects of roads in the Plan.** Roads are recognized by conservation biologists as a chief threat to many sensitive animals and to the general integrity of ecosystems. The Plan currently recommends maintaining certain percentages of vegetation cover in proximity to roads, which might be advantageous for some species (e.g., birds) but dangerous for others (e.g., large mammals, in that studies have shown that dense vegetation close to roads leads to increased collisions because of decreased visibility). Effective wildlife crossings at key points on high-volume roads should be recommended, important roadless areas (and areas of low road density) should be identified, and standards for minimizing road-building in high-value habitats should be set.
- 8) **Critically evaluate the effects of livestock on biodiversity.** Given the key role of ranch lands in the conservation plan, it is critical to identify elements of biodiversity (including processes and structures as well as species) that may be threatened by livestock production, either directly (e.g., through vegetation removal and trampling) or indirectly (e.g., through fencing, water diversions, and contributing to the spread of exotics). Then, strategies and incentives must be developed to reduce the negative impacts of grazing while retaining the benefits of keeping land in ranches as opposed to subdivisions. Development of such strategies should be a transparent process that incorporates significant input from the ranching community to ensure maximum feasibility. We agree with the

County that participation of the ranching community is likely crucial to the success of the Plan.

- 9) **Pima County should institutionalize adaptive management that includes ongoing inventory, management, monitoring, and research.** The County and the STAT have already recognized that adaptive management is an important component of the SDCP. In order to create a meaningful adaptive management process, Pima County and other partners will need to ensure that there are full-time scientists whose job it is to implement adaptive management. The SDCP provides a tremendous opportunity to coordinate land management for conservation goals across land ownerships. The only way to adequately coordinate these management activities is to establish a strong adaptive management program. Ongoing monitoring of species status, habitat conditions, and landscape patterns will be an essential and undeniably expensive aspect of plan implementation. The STAT should assemble a team of experts who have experience designing similar monitoring programs as a first step to assure that monitoring and research are designed with enough statistical power to inform management decisions. The STAT should also issue explicit guidelines on research priorities associated with the SDCP. Pima County should consider establishing a competitive grants program where the STAT (or a similar scientific team) evaluates proposals and ranks them according to how well they conform to the research priorities. It is essential that the adaptive management process include periodic scientific peer review.

Finally, with respect to adaptive management, we suggest that it is useful to a) identify the most critical management questions that monitoring might help answer, b) select the most cost-effective and potentially most informative indicators, c) avoid blind data gathering, d) recognizing that a fully replicated and randomized design is virtually impossible to achieve, still strive to enforce standards of technical rigor and reasonable inference, and e) be explicit about the alternative conservation measures that will be triggered in the event that performance fails to meet stated conservation goals.

- 10) **Keep science intimately involved throughout the process of Plan development and implementation.** Some of the most profound failures of conservation plans result from bringing in scientists only sparingly during the development of a plan, perhaps only as reviewers of a draft planning document. So far, the SDCP has made excellent use of the scientific community through the intimate involvement of the STAT and the species experts and through this independent review. The ongoing role of the STAT or a similar scientific body is essential, and the STAT ought to be more and more interactive with the County, the SDCP steering committee, and stakeholders.

The SDCP is a science-driven process, which is its greatest strength. The STAT has been focused primarily on the large task of selecting priority vulnerable species, assuring the quality of the mapped information on species occurrences,

land cover types, vegetation, and other key map layers, and creating and refining the species habitat models and the reserve design. In addition to recommending where key biological cores could be protected from permanent conversion, scientists must be involved in adaptive management of protected and multiple-use areas. These management issues, from restoration of riparian areas to grazing management in biological cores and riparian areas, can be contentious and expensive. The STAT will need to provide leadership on ensuring that scientists are involved in framing broad management goals and site-specific management recommendations. For example, the species experts that have been involved in identifying priority conservation areas should also be consulted in developing management goals and evaluating management plans or agreements. The STAT should play a role in coordinating management activities and evaluating the costs and benefits to natural resources of various management alternatives.

We strongly recommend that the STAT and the species experts continue to be involved throughout the planning process and the implementation of the Plan and that additional peer reviews from outside experts be conducted periodically.

### Conclusion

We understand that considerable challenges remain as other jurisdictions in Pima County and the Arizona State Land Department make decisions about habitat conservation planning and development on their lands. The body of scientific data and analysis that the STAT has developed and continues to improve will serve as a sound basis for conservation planning across these jurisdictions. It is clear to us that the SDCP is a credible, science-based process designed to achieve clear and laudable goals for the long-term conservation of biodiversity in Pima County.



**Arizona Daily Star**SN [www.azstarnet.com](http://www.azstarnet.com)

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Saturday, 27 October 2001

## Desert Conservation Plan 'credible'

### Two environmental scientists laud county move 'at the cutting edge'

By Tony Davis

ARIZONA DAILY STAR

Two out-of-town environmental scientists Friday gave the county's million-acre conservation plan high marks.

Laura Hood Watchman of the Defenders of Wildlife and private conservation biologist Reed Noss praised the Sonoran Desert Conservation Plan as "a credible, science-based process designed to achieve clear and laudable goals for the long-term conservation of biodiversity in Pima County."

In a meeting with nearly 50 local scientists, environmentalists, ranchers and government officials involved with the plan, Watchman termed the plan "at the cutting edge of conservation planning." Noss said it lies in the top 10 percent in scientific credibility of more than 300 habitat conservation plans that have won federal approval.

For the three-day review of the Sonoran plan, the county paid \$4,000 to Noss, who has written extensively on conservation biology. The county paid travel expenses to Watchman, who has written a book and numerous studies analyzing habitat conservation plans around the country.

The county conservation plan would ring urbanized Pima County with reserves with various kinds of development restrictions to protect 55 vulnerable species.

The two praised some of the plan's key features that critics have found objectionable: insulation of the plan's scientists from politics, and linkage of the conservation plan with the county's proposed comprehensive land use plan. Their criticisms of the plan were mainly technical, but they said the plan should look more closely at the effects of grazing and road-building.

But a critic from a business-backed group questioned their neutrality, since they have a conservationist or activist background. "It probably isn't the best choice to pick people from one side of a controversial issue and ask them to review this issue," said Steve Emerine, a leader of the Greater Tucson Planning and Conservation Council.

Last year, County Administrator Chuck Huckelberry built a "firewall" to limit direct public contact with the county's biological consultant and scientific team who prepared the plan for release last spring. His action triggered sharp criticism from the city of Tucson, the State Land Department and surrounding suburban officials who said they couldn't support a plan that they had no role in preparing.

But such insulation gives scientists more autonomy and intellectual freedom, Noss said.

"A lot of times in these plans, science is constrained by politics," said Noss, of Corvallis, Ore. "In this case, the scientists were well aware that there were political and social issues, but they were able to isolate themselves and do what they thought was best."

The reviewers said linking the comprehensive plan and conservation plan will reduce conflicts between them. They praised the county for providing enough money and staffing for the plan and for consulting with 150 experts on various species.

Critics in the homebuilding industry have, however, warned that linking the plans could lead to federal control over local land use policies.

Emerine pointed out that the Defenders have regularly filed suit to enforce the Endangered Species Act. He said Noss is a conservationist who has written frequently in support of land preservation. Neither one, he said, "could exactly be called neutral."

Noss said he has worked for developers and government agencies as well as environmental groups, and his environmentalist clients include middle-of-the-road groups such as the Nature Conservancy and the World Wildlife Fund.

Maeveen Behan, the county's Sonoran plan project director, said Watchman's book on habitat planning is "one of the most comprehensive critiques of habitat plans around" and Noss "is one of the founders of conservation biology."

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# Expert says desert plan 'in top tier' of country

The neutral team of evaluators also made recommendations.

MARI N. JENSEN

Citizen Staff Writer

Oct. 27, 2001

The Sonoran Desert Conservation Plan is on the cutting edge of conservation planning in just about every way, a pair of outside experts told the plan's science team yesterday.

Although the two scientists had recommendations for improving the plan, so far it's "in the top tier" of conservation plans in the country, said lead reviewer Reed Noss.

"It's definitely in the top 10 percent of plans I've examined," he said. Noss, chief scientist of Conservation Science Inc. of Corvallis, Ore., and a past-president of the Society for Conservation Biology, also has reviewed other regional conservation plans.

He and his fellow reviewer Laura Hood Watchman, director of habitat conservation programs for Defenders of Wildlife in Washington, D.C., praised the degree to which the plan's science technical advisory team has been insulated from the politics of land-use planning.

"This is a real strength of this process, for which we congratulate the science team and the county," he said.

Noss and Watchman spent three days in Tucson talking to scientists, county staff and various interest groups to assess the work of the desert conservation plan's science team. A third reviewer, attorney Michael Bean of Environmental Defense in Washington, D.C., had to cancel because of illness.

William Shaw, the University of Arizona wildlife biologist who chairs the science team, said, "I think their review acknowledged what I think are the strengths of the process and pointed out the challenges as we move onto the next phase. I feel good."

Carolyn Campbell, executive director for the Coalition for Sonoran Desert Protection, said, "It was a pretty strong message we got from the

peer reviewers - that science needs to continue driving the plan."

Maeveen Behan, project director for the Sonoran Desert Conservation Plan and assistant to County Administrator Chuck Huckelberry, said of the reviewers' report, "I'm thrilled to have an action plan to go forward," and added, "I'm proud for the science team."

Paul Fromer said the reviewers' comments will help Pima County's consultants and staff focus on their next tasks, which include detailing how the proposed "conservation lands system" must be managed.

"That's where we need to head from here," said Fromer, lead biologist for RECON Environmental Inc., the San Diego-based consulting firm the county hired to help with the plan.

Shaw said, "What we've done now is define the vision. We're still faced with the very big challenge of realizing that vision."

The timetable is not firm, but Shaw said in November or December the team's proposal for preserving Pima County's native plants and animals should be ready for the Sonoran Desert Conservation Plan steering committee, an 84-person group of community representatives ranging from environmentalists to developers.

#### **PLAN OVERVIEW:**

Reed Noss and Laura Hood Watchman, experts on endangered species and habitat conservation plans, visited Tucson this week to review the work of the Sonoran Desert Conservation Plan's science team.

The two scientists characterized the plan as "a stellar planning process" and lauded the science team and Pima County on several points.

- The science has been insulated from the politics.
- Pima County has provided the science team with enough financial resources and staffing to get the job done.
- The plan represents the best expert opinion available because the science team consulted 150 top experts on the species in question.
- The Sonoran Desert Conservation Plan is being closely integrated with the county's comprehensive planning process, which will minimize conflicts between the two processes.

The experts also made recommendations for improving the plan if sufficient money and time are available. Their recommendations include:

- Use one of the computer models available that can test whether the proposed reserve design will meet the plan's conservation goals.
- Refine the plan's conservation goals by splitting them into two broad categories, protection and management.
- Protect the range of habitats that exist in the county, in addition to

protecting habitats of specific species.

- Consider wide-ranging large mammals such as mountain lions and bighorn sheep when deciding on reserve sizes and connections between reserves.
- Pay attention to the potential negative effects of roads.

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