Ecological Considerations for Border Security Operations

Outcomes and Recommendations of the Border Ecological Symposium

Tucson, Arizona
March 9-10, 2005

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ECOLOGICAL CONSIDERATIONS FOR BORDER SECURITY OPERATIONS

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I. INTRODUCTION

A. Border Ecological Symposium: Assumptions, Goals, Participants, and Process

Symposium Assumptions

- That the current and proposed border security infrastructure and activities along the U.S.-Mexico border, particularly in southern Arizona, is impacting endangered species and the general ecological health of the region
- That mitigation of such ecological impacts must include considerations for maintaining the security of the U.S.-Mexico border in southern Arizona and adjacent states
- That solutions to the ecological impacts of border security operations can be attained through a collaborative process including application of existing science, information-gathering, and legislative actions

Symposium Goals

- Identify existing science relating to U.S.-Mexico cross-border wildlife habitat and movement, and the effects on habitat and wildlife relating to border security infrastructure and activities
- Identify information gaps relating to the effects on wildlife of border security infrastructure and activities
- Catalog issues of concern relating to the effects on wildlife of border security infrastructure and activities
- Compile data needed to produce a document ("Ecological Considerations for Border Security Operations") addressing the current ecological status of the U.S.-Mexico border region, identifying information gaps and how they might be resolved, identifying ecological concerns and potential solutions, and outlining next steps in a process to fully incorporate ecological considerations in current and future border security operations

Symposium Participants

Designed for success through collaboration of diverse interests, the Border Ecological Symposium included participation by private scientists and researchers; private foundations; University of Arizona, Arizona State University, and Northern Arizona University staff; representatives of the following agencies: Coronado National Memorial, U.S. Customs and Border Protection, U.S. Border Patrol, Coronado National Forest, Cabeza Prieta National Wildlife Refuge, U.S. Fish and Wildlife Service, Bureau of Land Management, Arizona Game and Fish Department, Arizona Department of Environmental Quality, Organ Pipe Cactus National Monument, National Parks Service, Arizona State Parks, Arizona State Land

Department, and Southwest Strategy; and representatives of the following Non-Governmental Organizations: Defenders of Wildlife, Wildlands Project, Arizona Wilderness Coalition, Sky Island Alliance, Sierra Club, Northern Jaguar Project, Philadelphia Zoo, Sonoran Joint Venture, Arizona-Sonora Desert Museum, Sonoran Institute, and World Wildlife Fund. In addition, staff representing U.S. Senators John Kyl (R-AZ), John McCain (R-AZ), and U.S. Representative Raul Grijalva (D-AZ) were present.

Symposium Process

The Border Ecological Symposium was organized and funded by the non-governmental organizations Wildlands Project and Defenders of Wildlife with the understanding that protecting the ecology of the U.S.-Mexico border region cannot be accomplished by conservation organizations alone and that such actions will require collaboration among a wide range of stakeholders, including local governments; state and federal agencies; elected officials; conservation organizations; scientists; universities; and private individuals. This collaborative approach was taken with the hope that inclusion of a broad range of concerned parties would be the most effective means for initiating a dialogue with the appropriate federal and state agencies, based on the need for elevating ecological issues within the broader border security discussion.

To maintain a careful and unbiased process and documentation, the two-day proceeding was directed by professional facilitators, with presentations and comments both audio taped (Day 1) and manually recorded by professional note-takers (Day 2). These notes were consolidated, edited for readability, and transcribed for publication in this document by the sponsoring organizations with a commitment to replicating the comments and information obtained in the most accurate format possible.

It is important to note that while the agreed-upon focus of the symposium on ecological impacts of border security operations remained intact throughout the proceedings, there was a clearly-stated understanding among participants that the highest level consideration for mitigating impacts to habitat and wildlife from border security operations is international immigration policy reform that results in the channeling of immigrants through legal ports of entry rather than through other locations elsewhere along the border.

There was also general understanding among participants that, because the Border Patrol is essentially the only agency implementing security operations, much of the discussion would revolve around that agency's operations. However, it was the wish of the participants that this focus on one agency's work was not intended to single out the Border Patrol as the major source of concerns. Further, it was the stated hope of the participants that discussions during the symposium would represent the group's desire to work with the Border Patrol to assist it in making an ecologically safe, as well as secure, border.

While a consensus was not reached among all symposium participants regarding methods for resolution of identified ecological considerations, the extensive list of critical issues identified below (I-D) was deemed an appropriate justification for elevating ecological concerns to a prominent role in the border security debate. However, the concerns and considerations discussed in this document do not represent the opinions of any specific agency, organization, or individual in attendance. No endorsements of this document were

required of individual participants, although the sponsors indicated that any such endorsements would be valuable.

Participants agreed to a general process for creation and use of this document during pre-symposium communications and during the symposium itself. As a first step, a questionnaire was prepared by the sponsors and distributed to potential symposium attendees. The questionnaire contained requests for opinions on a number of border-related topics, including critical issues that need to be addressed, what Border Patrol activities were working well, what Border Patrol activities needed potential changes, activities recommended for minimizing fragmentation of cross-border wildlife linkages, and other questions relating to the process of gathering information during the symposium.

Based on responses to the questionnaire, the sponsors created a "critical issues" list and a draft outline for this document, both of which were used to formulate the agenda for the symposium. That agenda was broken down into two days of work, with the first day providing several informational presentations on borderland wildlife and border security infrastructure and its effects, followed by general group discussion about how this document should be designed and utilized. The second day provided small, facilitated group opportunities to discuss Identification and Resolution of Information Gaps, and Identification of Ecological Concerns and Potential Solutions. The various lists of comments, concerns, and considerations appearing in this document are exact representations of the language used by participants (documented in both electronic and manual formats), a process that was authorized and agreed upon in advance by attendees.

Participants generally agreed that the document to be produced, represented here, would be used for two general purposes: as an educational tool to provide involved agencies and governments with insights into ecological considerations and concerns related to border security infrastructure and activities; and to elevate those considerations to a more prominent role within the overall public debate on best practices for border security operations.

A basic distribution plan for this document, which calls for delivery to elected officials, media, agencies, conservation and humanitarian organizations, and private landowners, was preliminarily approved by participants. Next Steps needed to further promote the Border Ecological Symposium's efforts were also outlined. Those future steps included completing this "Ecological Considerations for Border Security Operations" document, and widely distributing it along with a news release on sponsor letterhead describing the symposium. Other next steps were formation of research-gathering and outreach committees; creation of a comprehensive bibliography of available materials; and continuation of outreach to an expanded group of organizations, landowners, and tribes with similar interests in border ecological issues.

B. Description of Border Environment & Native Species

The borderlands of southern Arizona, particularly the "Sky Islands" region in southeastern Arizona, are recognized as one of the most significant ecological zones in

North America (Felger and Wilson, 1994). This recognition is due largely to the wide diversity of plant communities and, in turn, the wildlife that inhabits those communities. The broad diversity of plants and animals in the borderlands region is made possible through an unusual convergence of four major ecoregions: the southern terminus of the temperate Rocky Mountains; the eastern extent of the low-elevation Sonoran Desert; the northern terminus of the subtropical Sierra Madre Occidental; and the western extent of the higher-elevation Chihuahuan Desert. This overlap of ecoregions allows species not normally sharing the same habitat to live together in a unique ecological setting.

The U.S.-Mexico borderlands region in southern Arizona and southwestern New Mexico encompasses several biotic communities, including Plains, Great Basin, and Semidesert Grasslands; Chihuahuan Desert Scrub; Madrean Evergreen Woodlands; Lower Colorado Sonoran Desert Scrub; and Arizona Upland Sonoran Desert Scrub (Brown and Lowe, 1980).

Separate conservation planning efforts conducted by World Wildlife Fund, The Nature Conservancy, theWildlands Project, and other organizations have specifically identified the Sky Islands region in Chihuahua and Sonora, Mexico and southeastern Arizona as one of the continent's most important north-south corridors for species movement. Scientists widely recognize that preservation of key wildlife linkages connecting habitats on opposite sides of the Mexico-Arizona border is an important consideration for maintaining movement of regional native species across their traditional habitat and range. Maintenance of these wildlife linkages can be of particular significance for survival of threatened and endangered species.

Endangered species with documented historical or current use of cross-border wildlife linkages and other habitat involved in border security activities in the Tucson Sector include jaguar, Mexican gray wolf, Sonoran pronghorn, southwestern willow flycatcher, Chiricahua leopard frog, lesser long-nosed bat, black-tailed prairie dog, and Cactus ferruginous pygmy-owl. Other species using habitat impacted by border security activities include the yellow-billed cuckoo, desert tortoise, black bear, cougar, and desert mule deer. Although endangered species like jaguarundi, ocelot, and American bison have generally occurred only to the east of the Tucson Sector, their survival will also be impacted as a result of security activities along the Arizona-Mexico border which result in the shifting of immigrant traffic into New Mexico and Texas. Several endangered plant and fish species also can occur on or near the Arizona-Mexico border.

Cross-border wildlife linkages with a documented or high potential for use by the species named above include the Peloncillo Mountains–El Berrendo region; the San Bernardino National Wildlife Refuge–Sierra San Luis corridor; the San Pedro River corridor; the San Rafael Valley–Sierra San Antonio region; and habitats south of the border connecting to Coronado National Memorial, the Patagonia Mountains, the Pajarita Wilderness Area, Buenos Aires National Wildlife Refuge, Cabeza Prieta National Wildlife Refuge, and Organ Pipe Cactus National Monument. Some of these linkages are unfragmented, largely roadless landscapes. Other wildlife linkages are already fragmented by various types of border security infrastructure.

C. Description of Current and Proposed Border Security Infrastructure

The United States began implementing its current border policy 10 years ago with "Operation Gatekeeper" in San Diego, which focused on moving migrants away from the urban areas along the US-Mexico border. This strategy resulted in shifting migrant crossings into extremely remote and ecologically sensitive areas of the desert southwest. Now, a majority of crossings are occurring in AZ, where the international border is contiguous to no less than six federally-protected, ecologically valuable areas.

Border Patrol activities vary depending on the terrain of the area, the existing levels of migrant traffic, and other variables, but generally the Border Patrol chooses from a standard suite of activities for their various operations. In almost all areas of the border, the Border Patrol conducts routine patrols on existing roads as a part of normal operations. Most existing roads are improved or semi-improved roads, and can be located on public and private land. Four-wheel drive vehicles, all terrain vehicles (ATVs), and horses are regularly used by Border Patrol for routine patrols. Drag road operations are also quite common and are used to track foot traffic entering the country. Drag roads are accomplished by the use of a four-wheel drive vehicle towing several tires bolted together and pulled on sections of the road at speeds between 5-7 miles per hour, smoothing out the dirt and allowing for easy tracking of footprints. (Department of Homeland Security, October 2004)Off-road operations, defined as any ground activities conducted by Border Patrol outside of established roads or trails, are also regularly used in remote areas of the border, and may include foot patrol, horse patrol, four-wheel drive vehicles, ATVs, and motorcycles. Air operations are also common in remote areas, and are often used in conjunction with off-road operations. In these operations, helicopters fly along the border at elevations high enough to be seen in order to deter undocumented migrants, and also to aid in detection and search-and-rescue missions. Other activities routinely utilized are checkpoints located along major highways, portable high-voltage lighting systems, observation points on elevated platforms, and rescue beacons, used as a means to locate and rescue migrants in distress. ***(Id.)***

Camp outposts in remote areas are becoming more popular with the Border Patrol as operations increase in remote areas that are difficult to access. These outposts can consist of one or two 27-foot camp trailers, or can consist of more permanent structures, such as the 3,840 square-foot modular building currently deployed on Cabeza Prieta National Wildlife Refuge as part of "Operation Desert Grip." These outposts may also include other amenities such as helicopter landing pads, as well as the accompanying infrastructure needed to support agents who are stationed there for multiple days or even weeks at a time. (***Id.)***

Besides these on-the ground activities, Border Patrol also has a suite of technology-based systems that are routinely used in normal operations. Otherwise known as Integrated Surveillance Intelligence Systems (ISIS) components, they include operational repeaters, which are typically located on mountain or hilltops, small sensors buried underground, Remote Video Surveillance (RVs) systems, and Remote Radar/Optical Systems. (***Id.)***

Permanent infrastructure is also commonly used in Border Patrol operations, and can include fencing, vehicle barriers, border roads, and permanent lights. Fences are generally 10 to 15 feet high and are most commonly constructed from military surplus steel landing mats. Vehicle barriers are temporary or permanent structures designed to impede illegal vehicle entry only; they do not necessarily preclude pedestrian or wildlife movement. Various styles of vehicle barriers include permanent barriers with 10-foot fence extensions or low barriers and temporary barriers constructed from railroad rails or pipe. Border roads include improved and semi-improved roads, located on public and private property. These roads are primarily used as patrol routes, drag roads, and firebreaks. Permanent lighting is used in areas with utilities, specifically near points-of-entry, and consists of stadium-type lights on approximately 30 to 80-foot poles with two to six lights per pole. They are typically spaced about 150 to 350 feet apart and are generally operated 10 to 12 hours, from dusk until dawn. (*Id.)*

D. Critical Issues That Need to be Addressed

Environmental Issues

- General damage to vegetation and habitat
- Fragmentation of habitat and wildlife corridors
- Introduction of exotic species
- Air and water contaminants
- Wildlife mortality and displacement
- Modifications of wildlife behavior
- Concerns related to threatened and endangered species and species of special concern
- Difficulties in habitat restoration, and protection of habitat improvements
- Restoration of damaged areas (and challenges involved, including health concerns)

Policy Issues

- Potential exemptions to existing environmental laws
- Border Patrol's inadequate compliance with environmental laws
- Current policy's continual shifting of migrant traffic to more remote and ecologically sensitive areas
- Deterring all illegal cross border traffic at or near the border
- Managing growth and development in ecologically sensitive areas along the border
- Safety issues that preclude ecological study and monitoring – i.e., employees precluded from entering certain locations (related to movement of contraband)

Agency and NGO Issues

- Border Patrol organization and structure (need to incorporate better "conservation ethic," greater need for education on conservation issues)
- Need for improved communication between agencies, NGOs and general public
- Insufficient on-the-ground coordination between agencies, NGOs
- Lack of GIS and mapping coordination
- Identification of mechanism to adopt border ecological recommendations

International Issues

- Difficulty in bi-national cooperation due to increased security requirements crossing international border
- Bi-national agency cooperation issues, including lack of bi-national planning and coordination
- Difficulties conducting research and monitoring on Mexican side of border

II. IDENTIFICATION & RESOLUTION OF INFORMATION GAPS

A. Information Gap Identification

- Locations of operations
- Expected results from operations
- How border security enforcement relates to shifting immigration patterns
- Actual effectiveness and consequences of law enforcement operations on human immigration
- Locations of high intensity drug traffic areas
- Which wildlife habitats are most imperiled from all causes
- Impacts to wildlife and habitat from current illegal traffic and security operations
- Specific ecological education currently received by border patrol agents and staff
- Details on security-related governmental activities on both sides of US-Mexican border
- Available funding resources for all border security activities
- Status and scale of border security projects currently underway
- Incomplete literature search for border-related science and ecology topics
- Lack of accurate and complete ranking of borderlands wildlife by protection status and vulnerability to border security activities
- Lack of a uniform process by which to obtain needed research
- Effects of increased activity on displacement of wildlife from corridors
- Lack of existing data for species of concern
- Statistics on geographical source of immigrants
- Impact and quantity of off-road vehicle use
- Effects of Border Patrol activities on riparian areas
- Effectiveness of border security enforcement technologies
- Locations of planned security operations and their compatibility with migratory wildlife
- Locations of cross-border corridors for wildlife, and natural levels of movement
- Location of future infrastructure, including roads, power/gas lines, and developments
- Habitats, including corridors, riparian areas, and grasslands, imperiled by exotic species
- Safety issues that preclude ecological study and monitoring
- Cultural, social, economic forces that are deterring human migration
- Effectiveness of security operations in deterring illegal traffic across sensitive areas
- Impact of increased access to public lands resulting from new border roads

B. Information Gap Resolution

- Collect data on impacts to wildlife/habitat from illegal traffic and security operations
- Monitor infrastructure for impacts to ecological resources
- Determine compatibility of security operation/infrastructure with migratory wildlife
- Monitor locations of future infrastructure
- Monitor effectiveness of operations at deterring illegal traffic across sensitive areas
- Enlist assistance from private and academic entities
- Conduct "Least Cost Path" corridor analysis
- Compile data on planned wildlife corridors
- Study of effects of border security activities on long horn
- Development of GIS mapping for border region to provide mitigation options
- Research of effectiveness of border barriers
- Encourage bureaucrats to defer to scientists on ecological issues
- Study on number and location of immigrant detainments
- Develop lists of potential funding sources for studies
- Use video to monitor wildlife as well as people
- Develop outreach campaign to influence political decision making
- Consult "Death Map" compiled by Humane Borders

III. IDENTIFICATION OF ECOLOGICAL CONCERNS & POTENTIAL SOLUTIONS

A. Ecological Concerns Related to Current Border Security Operations

- Prevalence of illegal roads and trails
- Creation of impermeable infrastructure the would preclude cross border animal migration
- Interruption of vegetative corridors immediately N and S of border
- Wildlife disturbances and behavior modification
- Artificial light
- Trash
- Habitat degradation
- Invasive species
- Soil erosion or compaction
- Vehicle impacts in designated wilderness compromising wilderness standards
- Impacts of aerial reconnaissance and helicopter operations
- Restrictions of data collections/research due to security/law enforcement
- Disruptions of ecological studies due to dangerous border situations
- Constant shift of migrant traffic to more remote areas due to security operations
- Lack of environmental compliance in implementation of security operations
- Wilderness as a category, resource, or paradigm?

- Compromised data collections due to restrictions
- General negative impact on data collection of all types
- Pollution and depletion of wildlife water resources
- Construction and development of security outposts in ecologically sensitive areas
- Lack of an established process of implementing environmental compliance for security agencies
- Insufficient coordination during planning and implementation of projects
- Lack of feedback from land planners
- Precedent-setting legal exemptions from environmental regulations
- Habitat degradation and wildlife movement
- Addressing only the symptoms of the immigration problem, not the cause
- Focusing on long-term efforts to solve these problems
- Finding short-term solutions to the immigration problem without tackling problem of political and economic policies in Central/South America
- Further decline of federally-listed species
- Loss of wildness: loss of dark skies, flow of people on public lands, noise, wildlife disruptions
- Roads, structures within wilderness areas
- Lack of continuous communication and education related to vulnerable species and conservation biology
- Lack of analysis of border security impacts on migratory wildlife
- Physical barriers or impediments to wildlife dispersal
- Negligence of existing environmental laws
- Human traffic moving to wilder, more remote areas to avoid detection
- Public safety issues created by vigilantes, private landowners protecting assets
- Effects of night lighting on wildlife movement
- Lack of adequate training for border patrol agents and subsequent impact on environment
- Lack of border-related ecological education for general public
- Damage to vegetation and habitat
- Effect on nocturnal activities of wildlife by nighttime immigrant movement
- Lack of communication between agencies and NGOs
- Lack of accountability on part of agents and individuals
- Lack of knowledge about Mexican economy
- Alteration of wildlife behavior and mating resulting from noise, lights, vehicles
- Lack of transparency, i.e. open communication
- Air and water pollution resulting from border security operations and immigrant traffic
- Concern for people monitoring and gathering information due to unsafe border security and immigration activity
- Lack of environmental law enforcement by Mexican government

B. Potential Solutions for Minimizing Ecological Concerns and Impacts Related to Border Security Operations

Border Security Infrastructure

- General acceptance that roads, fences and barriers, artificial lighting, buildings, monitoring devices, construction activities, aircraft landing pads, and other physical systems all have ecological impacts.
- Use more high tech surveillance methods instead of fences and constant vehicle traffic
- More strategic deployment of infrastructure elements to minimize impacts to wildlife and habitat
- Research and investigate new infrastructure options less harmful to the environment
- Configure Unmanned Aerial Vehicles to be less noisy
- Quantify the actual benefits of various types of infrastructure and use only the most effective

Border Security Operations and Related Activities

- More restrictions on off-road vehicle use in wilderness and other roadless areas
- Consider using transport helicopters to intercept and detain migrants rather than vehicles
- Use smaller vehicles that have less effect on the environment, rather than modified Humvees and other large vehicles
- Obtain more funding for ecological restoration activities as part of mission of Department of Homeland Security
- Instill knowledge that every federal agency has a responsibility to protect the environment
- Weed-free hay for border patrol horses to reduce invasive plant infestations
- Tough enforcement standards to preclude entry of invasive species
- Improve agent environmental knowledge, provide environmental sensitivity training
- More meaningful environmental impact assessments prior to project implementation
- Don't let politics interfere with ecologically sensitive border security behavior

Multi-Stakeholder Coordination

- Increase intra-governmental and NGO-governmental collaboration and communication
- More coordination between NGOs and border patrol on ecological/environmental education
- Convene a summit between NGOs, stakeholders, border patrol, and other federal agencies
- Agencies should include NGOs in collaborative task force efforts
- Improve communication with NGOs at early planning stages of NEPA projects
- Address a process that encourages government agencies to recognize border ecology issues

Legal, Policy, and Decision-Making

- Recognition by Department of Homeland Security that the agency is subject to all applicable environmental laws and regulations, and has an obligation to protect the environment
- Development of strict standards for preventing introduction of invasive species
- Add more infrastructure and agents in sensitive areas
- Increase strategic planning for redirection of vehicle traffic to protect sensitive areas

- Seek more funding for managing, monitoring border security operations
- Land management agencies are best qualified to make border operation decisions than Department of Homeland Security

Custom and Culture of Border Control and Enforcement

- Provide new ecological training modules for prospective Border Patrol agents who are not familiar with borderland conservation issues
- Encourage Department of Homeland Security to hire biologists to sit on recovery teams
- "Tread lightly" training doesn't go far enough – training must translate to actual operations
- Strict adherence to existing regulations is critical
- Increase research on alternatives to current barriers that have less impact on wildlife
- Begin statistical modeling of immigrant traffic routes to determine effectiveness and placement of barriers.
- Respect and implement data and suggestions of wildlife agencies, biological studies
- Better follow-up by Border patrol and USFWS on suggestions from stakeholders
- Develop an agency commitment to mitigation and restoration as well as protection
- Agencies should coordinate responsibilities with NGOs for better education and policies
- Develop better ecological data to satisfy requirements of non-federal funding sources
- Support candidates who advocate for improved border ecological protection
- Develop a multi-agency and NGO task force to promote and guide compliance with environmental laws
- Utilize existing multi-agency task forces to accomplish broader ecological goals
- Current Border Patrol Liaison officer is recognition that communication is essential in a time of rapid expansion of Border Patrol efforts – this position should be strengthened further
- Decrease collaboration gap through additional forums, meetings, and networking with Border Patrol officials
- Increase information available to the public sector regarding actual progress and failures in border security operations
- Compartmentalize Border Patrol operations into smaller sectors to increase local effectiveness
- Maintain a big picture approach at the top levels of Border Patrol management
- Develop a means by which to identify what operations are working well and highlight those operations
- Develop an NGO public relations effort to explain and justify why advocating for borderlands environmental protection does not mean such advocates are opposed to national security efforts
- Respect and implement recommendations from wildlife agencies
- Need to encourage Congress to recognize importance of long-range planning to avoid ecological "train wrecks"
- Begin thinking about solutions as scale-driven on a local, national, and international level
- NGOs must educate themselves on issues of immigration, economy, and internal cooperation between the two countries
- NGOs must recognize and promote the bigger environmental picture as it relates to the overall political situations -- while not falsely promoting themselves as political scientists

- Use the border security debate as an opportunity to engage the public through conferences and workshop dialogues that can forge connections with new groups

Humanitarian and Environmental Education

- Border issues must be broadly communicated to people far removed from the region to encourage legitimate discourse and problem-solving on a national scale
- Develop clear, concise, and data-driven descriptions of impacts to wildlife and habitat from current immigration and security operations
- Educate potential traditional and non-traditional funders on the full spectrum of borderlands issues
- Engage humanitarian organizations in the ecological impacts of immigration

C. Potential Resources, Collaborations, and Contributions Available from Agencies, Scientists, NGOs, and Interested Stakeholders

Ongoing and Proposed Collaborative venues

- Sonoran Institute: eco-regional monitoring effort
- NGO and agency land management symposiums
- BLM: cooperative efforts at trash removal on National Parks, Forests, and Conservation Areas
- Jaguar Conservation Team: Jaguar study with camera traps
- Literature search on wildlife linkages
- NPS: study of research occurring along the border
- World Wildlife Fund (WWF): Colorado River Delta surveys
- WWF and IBWC International Boundary Waters Commission
- Tohono O'Odham: collecting trash, monitoring trash deposits via their maintenance division
- Melanie Culver: Large cat study in SE Arizona—looking at Huachuca Mountain wildlife corridors, and most imperiled habitats
- EPA: conducted remote sensing comparison data
- Border Patrol: keeps records of off-road activities
- Border Patrol: has motion-sensor wildlife data they could share – trade details on locations of critical habitat for sensor-generated data for those sites
- Wildlife linkage Workshops: ADOT, AZGFD, BLM, USFS identifying critical linkages statewide
- WWF, Nature Conservancy, Wildlands Project: research on key wildlife linkages
- University of Arizona: gap assessment for Arizona
- Sky Island Alliance: cross-border projects
- Danielle Odell: study on effects of vegetation trampling and soil compaction on small mammal and vegetative communities in Organ Pipe
- NPS: Ongoing research in Organ Pipe NM

- USFWS: biological assessments on effects of Border Patrol operations
- Past, present and future EAs, EISs
- Interagency meetings on public record, monitor results
- Potential funding sources: notify of public meetings

Other Specific Resources

- Freedom of Information Act
- Notices of public meetings
- Humane Borders "death map project"
- BLM road maps, BLM offices
- USGS Border mapping project
- University of Texas at El Paso GIS program
- University of Arizona Social Science & Renewable Natural Resource schools' GIS data
- All border universities & agencies
- USFS Rocky Mountain Station research
- SW Strategy Working Group
- National Academic Consortium of Homeland Security
- NASA LandSat imaging
- National Science Foundation biological stations
- American Zoo and Aquarium Association
- Sonoran Desert Conservation Plan data and research
- Ecosystem Millennium Project

IV. NEXT STEPS

STEP 1: Finish and disseminate document to media, legislators, political groups, NGOs, landowners, general public to be used as tool to gather more information, and as an educational vehicle

STEP 2: Create ongoing dialog with participants on next steps – forming research committee, education/outreach committee, establishing a process to monitor impacts, contact researchers and other stakeholders to request additional info, with goal of creating an organic, continually updated document

STEP 3: Reincorporate additional info into document on regular basis, begin creating a comprehensive bibliography of existing and new research.

STEP 4: Reach out to other groups that operate along the rest of the southern US border, Need to reach out to Native American nations and individual landowners

Potential educational uses: Possible to have group perform congressional briefings, on a quarterly basis, based solely on science – not asking to support on any position, just to bring information

STEP 5: Organize and convene a second Border Ecological Symposium in 2006, better identifying individual topics, monitoring progress, maintaining focus on wildlife corridors, and elevating engagement with elected officials and Border Patrol management to discuss solutions

V. APPENDICES

A. Abstract of presentation by Kim Vacariu, Wildlands Project

"Cross-Border Connections: the Big Picture

The importance of the Sky Islands and their cross-border wildlife linkages is a key component of the Wildlands Project's conservation vision for North America. The Wildlands Project has continued to promote conservation on a very large landscape scale, with a focus on protecting the "Spine of the Continent Megalinkage," which runs between Canada and Mexico. At the southern tip of this megalinkage lie the Sky Islands and associated cross-border wildlife linkages. The Wildlands Project is conducting a "Room To Roam Campaign," with a goal of identifying critically endangered Wildlife Linkages along the Spine of the Continent. One of the most endangered linkages identified in the campaign is the U.S.-Mexico Borderlands. The junction of four major ecoregions in the Sky Islands allows species from diverse biotic communities to coexist within the same habitat. More than 4,000 plant species, half the continent's bird species, and an incredible array of mammals and reptiles all call the Sky Islands home. Protecting the vital wildlife linkages existing along the U.S.-Mexico border is key to the survival of many of these species.

For more information, contact Kim Vacariu kim@wildlandsproject.org

B. Abstract of presentation by Jenny Neeley, Defenders of Wildlife

"Existing and Proposed Infrastructure: DPEIS Overview"

Why is Arizona becoming the focus of border security operations?

The strategic shutdown of urban areas 10 years ago (starting with Operation Gatekeeper in San Diego) has shifted migrant crossings into extremely remote and ecologically sensitive areas. Now a majority of crossings are occurring in Arizona. At the same time as this dramatic shift has occurred, the total number of illegal crossings has remained virtually unchanged. According to the GAO, this shift is the only discernable effect the current strategy is having. As migrant crossings shift, so do the bulk of security operations. As Arizona has become the focus of migrant crossings, it has also become the focus of ever-increasing Border Patrol operations. In October, 2004 the Border Patrol released a Revised Draft Programmatic Environmental Impact Statement (PEIS) for Arizona. To understand the context of the Border Patrol's activities and operations as they relate to ecological impacts in the Tucson Sector, it is necessary to review the status of the agency's current activities, special operations, technology-based systems, and Infrastructure.

For more information, contact Jenny Neeley jneeley@defenders.org

C. Abstract of presentation by D. Rick Van Schoik,
SW Consortium for Environmental Research and Policy

"Transboundary Ecosystem Management"

Along the U.S.-Mexican border, infrastructure and the heightened security activities bisect the north-south cores, corridors, and buffers essential to preservation of ecosystems. The Southwest Consortium for Environmental Research and Policy (SCERP) and its partners convened an annual policy conference, Border Institute VI, where participants developed 10 recommendations to affect change in current transboundary ecosystem management policies throughout the U.S.-Mexican border region. Recommendations addressed institutionalization of existing programs,

sovereignty concerns, education of citizens, land use planning, funding and revenue streams, approaches to water protection, watershed assessment of the Rio Grande/Río Bravo and Colorado River, a public relations campaign, and specific changes to existing border programs and organizations.
For more information, contact D. Rick Van Schoik scerp@mail.sdsu.edu

D. Abstract of presentation by Paul Beier, Northern Arizona University
"Impacts of Artificial Night Lighting on Terrestrial Mammals"
Although artificial night lighting is so pervasive that it is obvious on photos taken from space, there are few studies, or even anecdotal reports, of how light pollution affects wild mammals. I reviewed the biology of mammalian vision and mammalian biological clocks, and studies of how moonlight affects nocturnal behavior of mammals, to make plausible inferences about 5 types of impacts. Artificial night lighting (1) probably inhibits dispersal movements (including use of corridors) by mammals, and (2) may increase or decrease mortality of mammals on roads. Assessing and mitigating these 2 impacts should be a relatively straightforward technical task. In addition, artificial night lighting almost certainly (3) disrupts foraging patterns, (4) increases predation risk, and (5) disrupts biological clocks of mammals, but we lack quantitative estimates of these impacts for wild mammals. These 3 impacts are most meaningfully studied at the population level, but all studies so far have focused on responses of individual animals, usually in laboratory settings. There has been a remarkable lack of collaboration between ecologists (who study moonlight effects on individuals in the wild) and laboratory physiologists (who study artificial light effects on lab animals). Such collaboration could bring rapid progress, replacing speculation like mine with strong inference and empirically-based mitigation measures.
For additional information, contact Paul Beier paul.beier@nau.edu

E. Abstract of presentation/paper by Kurt Menke et al, University of New Mexico
"Priority Conservation Areas in the U.S.-Mexico Border Region for North American Tropical Cats: the Jaguar, Jaguarundi, and Ocelot"
The purpose of this study was to develop a blueprint of important areas for neotropical cats – jaguars, jaguarundis, and ocelots -- in the border region of the U.S. and Mexico. This was done by: (1) compiling reliable sightings for all three species in the border region from the early 1900s to present; (2) conducting field surveys in the border region to ascertain the presence of neotropical cats and (3) conducting a GIS-based habitat mapping workshop where 29 scientists and conservationists working in the border region contributed important information relating to the distribution and status for all three endangered species. Experts were asked to delineate and describe specific areas in the border region that once or currently support(ed) neotropical cat populations. A total of 864 cat sightings were compiled. Additionally, 21 Cat Conservation Units (CCU's) and 7 Cat Conservation Corridors (CCC's) were identified as areas needing protection for cats in the border region. Only 8.9% of the CCC's and 1.1% of the CCU's currently have any protection. An additional 12 CCU's and 12 CCC's were identified as "areas needing further study." Therefore, research in these identified areas needs to be undertaken to fill many gaps in knowledge. The two main benefits from this study are the identification of focal areas for future research and conservation measures, and the formation of an

international network of concerned scientists and conservationists. It is this synthesis of people and knowledge on both sides of the border that is fundamental to the future protection of North America's "Neotropical bordercats."
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VI. BIBLIOGRAPHY

A complete Bibliography is essential for completion of the first phase of actions recommended by participants at the Border Ecological Symposium. Such a Bibliography will be included in this document as it becomes available. Sponsors of the symposium are requesting that all participants or other sources forward any bibliographical data they may have available to kim@wildlandsproject.org

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