

# REVIEW OF JAGUAR CONSERVATION AGREEMENT ACTIVITIES MARCH 1997 THROUGH DECEMBER 2003

Prepared by:

William E. Van Pelt, Nongame Mammals Program Manager

Wildlife Management Division  
Arizona Game and Fish Department

in cooperation with the  
Jaguar Conservation Team and Work Group



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Program Chief: Terry B. Johnson  
Arizona Game and Fish Department  
2221 West Greenway Road  
Phoenix, Arizona 85023-4399  
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Many volunteers have actively participated in the Jaguar Conservation Team and Jaguar Working Group. They have contributed significantly to this effort in terms of donated time and money.

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William E. Van Pelt

## INTRODUCTION

In March 1997, the Arizona Game and Fish Department (AGFD) and New Mexico Department of Game and Fish (NMDGF) entered into a Conservation Agreement with other state, local, and federal cooperators, with voluntary participation by private individuals, to conserve the jaguar (*Panthera onca*) along the borderlands of Arizona and New Mexico and to stimulate parallel efforts in Mexico (Johnson and Van Pelt 1997; Van Pelt and Johnson 2002; Table 1). The two state wildlife agencies believed that if strong partnerships were developed under this approach, it would be a significant step forward in bringing local governments, private landowners, and nongovernmental organizations directly into jaguar conservation.

The Jaguar Conservation Agreement provides a variety of opportunities for stakeholders and interested parties to become involved in: collection of biological information (to provide a sound scientific basis for decisions); consideration of relevant cultural, economic, and political factors; design and implementation of a comprehensive approach to conservation (including public education); and monitoring, evaluation, and feedback.

In addition to an over-arching Memorandum of Agreement (MOA) among the signatories, the Conservation Agreement includes a Conservation Assessment, which describes the status of the jaguar in the United States and identifies threats to the jaguar in Arizona and New Mexico, and a Conservation Strategy, which focuses on reducing or eliminating threats in Arizona and New Mexico that might prevent expansion of the current range and distribution of the jaguar.

Under the Conservation Agreement, AGFD and NMDGF must submit evaluation and progress reports to the U.S. Fish and Wildlife Service (USFWS). The first report was completed in July 1998 (Van Pelt and Johnson 1998) and the second in June 2000 (Johnson and Van Pelt 2000). This third report reviews all Jaguar Conservation Agreement activities from March 1997 through December 2003. The information herein was compiled with assistance from members of the Jaguar Conservation Team (JAGCT) and Jaguar Working Group (JAGWG), to help ensure that objectives outlined in the Conservation Agreement are being accomplished and that any deficiencies identified are addressed and corrective measures are implemented.

Arizona Game and Fish Department	New Mexico Department of Game and Fish
Arizona Department of Agriculture	New Mexico Department of Agriculture
Arizona State Land Department	New Mexico State Land Office
Cochise County, Arizona	Hidalgo Soil and Conservation District
Pima County, Arizona	Otero County, New Mexico
Santa Cruz County Arizona	U.S. Department of Agriculture, Wildlife Services
U.S. Forest Service, Southwestern Region	National Park Service, Intermountain Region
Bureau of Land Management, Arizona	Bureau of Land Management, New Mexico

## BACKGROUND

Johnson and Van Pelt (1997, 2000) and Van Pelt and Johnson (1998) summarized the biological, legal, and conservation status of the jaguar in the Arizona-New Mexico-Mexico borderlands, and the activities of the JAGCT from conception through June 2000. In this report, we will describe the extent of progress toward accomplishing the goals and objectives set forth by and for the JAGCT for the last 6 years. To do this, we present those goals and objectives as they were described in Johnson and Van Pelt (1997).

## CONSERVATION OBJECTIVES AND ACTIVITIES

The Jaguar Conservation Assessment and Strategy outlined eight main objectives, each with one or more activities, for conserving jaguars in Arizona and New Mexico. The objectives are:

1. Implement the Conservation Assessment and Strategy.
2. Establish a Jaguar Conservation Team and an Arizona-New Mexico Working Group.
3. Determine species distribution and status.
4. Cooperate with Mexico.
5. Identify, maintain, and promote existing and other suitable jaguar habitats.
6. Promote scientific jaguar management and public education.
7. Increase legal protection.
8. Evaluate progress and accomplishments.

## RESULTS

### OBJECTIVE 1. IMPLEMENT THE CONSERVATION ASSESSMENT AND STRATEGY

The Jaguar Conservation Assessment and Strategy was implemented through an MOA on 26 March 1997. Signatures or letters of intent were received from 16 entities representing state and federal agencies and local governments with land management responsibilities in southeastern Arizona and southwestern New Mexico (see Table 1). The signatories formed the JAGCT.

Hidalgo County, New Mexico also signed the MOA in 1997. However, on December 9, 1997, the County submitted a letter notifying the JAGCT of its intent to withdraw from the agreement because they believed that the MOA would affect their ability to maintain sovereignty over its affairs. Per the MOA, the JAGCT gave the County 60 days to rescind its withdrawal letter. The County did not, and the withdrawal took effect on February 9, 1998. Notably, withdrawal as a signatory and subsequent member of the JAGCT, for broader legal reasons has not diminished the County's participation in the JAGWG.

Before signing on as a JAGCT cooperator, USFWS requested an amendment to the MOA to recognize the federal status of the jaguar and the need for activities to comply with the federal law. The proposed amendments were sent to the signatories for review. At the January 22, 1998

JAGCT meeting, a verbal vote by members present accepted the amendments proposed by USFWS. To comply with MOA procedures, written votes were requested by May 25, 1998. The written vote was again in favor of amending the agreement as requested by USFWS. Although the amendments were approved, the USFWS never signed the MOA.

#### OBJECTIVE 2. ESTABLISH A JAGUAR CONSERVATION TEAM AND AN ARIZONA-NEW MEXICO WORKING GROUP

The first JAGCT meeting was held on April 30, 1997 in Douglas, Arizona. Terry B. Johnson, AGFD, was elected Chair. For the first year, meetings were held on a quarterly basis (July 30 and October 15, 1997; and January 22, 1998). Quarterly meetings continued through July 1998, when the JAGCT decided that henceforth it would meet only twice each year, starting in January 1999. All JAGCT meetings are held in public settings, and participation is voluntary. Those present who are not signatories to the MOA constitute the JAGWG. Sixteen JAGCT/JAGWG meetings were held through December 2003.

To accomplish some of the tasks outlined in the Conservation Assessment and Strategy, various committees have been formed (Appendix I). Some committees have met frequently since formed to accomplish work assigned to them.

Primary activities at JAGCT/JAGWG meetings include committee reports, discussion of action and information items, and task assignments. Summary notes of the meetings are distributed to the jaguar mailing list, which has approximately 400 entries. In addition, final summary notes are posted on the AGFD website ([http://www.azgfd.com/w\\_c/jaguar\\_management.shtml](http://www.azgfd.com/w_c/jaguar_management.shtml)).

#### OBJECTIVE 3. DETERMINE SPECIES DISTRIBUTION AND STATUS

To determine the jaguar's distribution and status, four tasks were identified in the Conservation Assessment and Strategy: 1) collect and compile jaguar distribution and occurrence information by the second JAGCT/JAGWG meeting and submit the results to three experts in the field; 2) establish a protocol for handling jaguars; 3) establish a sighting report procedure; and 4) within one year (April 1998), draft a report on the current status of the jaguar in Arizona-New Mexico. Progress on these tasks is as follows:

Task 1: Collect and compile jaguar distribution and occurrence information by the second JAGCT meeting and submit the results to 3 experts in the field. AGFD and NMDGF compiled occurrence records and distributed the information in the July 1997 JAGCT/JAGWG meeting for comment. Corrected information was redistributed in the October 1997 meeting. The final information was referred to the Jaguar Scientific Advisory Group (JAGSAG; see Objective 6, Task 1) for review. JAGSAG accepted the records as verifying jaguar presence in the borderlands area. However, because the majority of the confirmed occurrences were prior to 1960, the JAGSAG recommended that one or more jaguars be radio-collared as quickly as possible to collect current data, especially on habitat use and movement patterns. Although JAGSAG

accepted the records as confirmation of jaguar presence in the borderlands area, there was some concern whether jaguar habitat persisted in this region.

Task 2: Establish a protocol for handling jaguars. In the July 1997 JAGCT meeting, a committee was established to draft a jaguar handling protocol. The committee collected relevant information from AGFD; U.S. Department of Agriculture - Animal and Plant Health Inspection Service, Wildlife Services (Wildlife Services); and The Phoenix Zoo. They distributed the final handling protocol in the October 1997 JAGCT meeting (Appendix II). The protocol was effective when a suspected jaguar was pursued near Arivaca, Arizona on October 18, 1997. The animal was not captured, and hair samples collected during the pursuit proved not to be from a jaguar.

After the October 1997 pursuit, the JAGCT asked the Depredation Committee to develop a capture protocol to specify the actions, supplies, and personnel necessary to pursue and capture a jaguar. After being reviewed by JAGSAG member Dr. Howard Quigley, the protocol was finished in July 2000 (Appendix III) and was distributed to appropriate parties. Since then, AGFD personnel have assembled a capture kit, including all equipment needed to anaesthetize and collar a jaguar. The kit is being maintained and stored at AGFD's Region V office in Tucson.

Task 3: Establish a sighting report procedure. In the July 1997 JAGCT meeting, AGFD distributed a jaguar sighting rating system for comment. The rating system was modified from Tewes and Everett's (1986) criteria for evaluating cat sighting reports. AGFD incorporated suggestions from members of the working group, and distributed a final ranking system and jaguar sighting form to the JAGCT in 1998 (Appendix IV).

In 1999, AGFD personnel presented a training workshop in Safford for AGFD Region V Wildlife Managers. This workshop taught the necessary skills to identify large cat sign, take accurate measurements, and rate potential jaguar sightings. Each Wildlife Manager in the region (15) received a track identification kit, the rating criteria, and Jack Childs' book *Tracking the Felids of the Borderlands* (1998; see Objective 5, task 8). To date, AGFD has distributed about 75 copies of the Childs book and track identification kits, mostly to field personnel. Additionally, Childs distributed this material to USFWS (one copy each to New Mexico and Arizona), NMDGF (two copies to Wildlife Managers in southern New Mexico), and Wildlife Services (two copies to Arizona and four to New Mexico).

In January 1999, the JAGCT began developing a brochure for the public and government agencies to provide information on how to report a jaguar sighting. The draft brochure was distributed for comment in the July 2000 and January 2001 JAGCT meetings. The final brochure was sent for printing in April 2001 and distributed to members in the July 2001 JAGCT meeting. AGFD, the U.S. Forest Service (USFS), and Defenders of Wildlife (Defenders) all contributed money for printing additional copies of the brochure.

Seventy-four reputed jaguar sightings were documented, ranked, and when appropriate, investigated by AGFD from March 1997 through December 2003 (Appendix V). Fifty-six reports were either received too late for follow-up investigations or the information provided did

not require an investigation. Fifteen of the latter 56 were ranked as Class II sightings and the remaining 41 were ranked as Class III sightings.

Eighteen sightings were reported in a time frame that allowed immediate investigation, or were accompanied by some form of physical evidence that was suitable for analysis. Nine of these investigations were ranked Class III after concluding the observer misidentified either the tracks of a mountain lion or black bear or misidentified the animal observed (mountain lion, bobcat, domestic cat). The remaining nine sightings investigated proved inconclusive. Five were ranked as Class III, 3 were ranked Class II, and 1 was ranked a low Class I.

There were two definitive jaguar sightings in Arizona during the past six years. After nine months of camera monitoring, the first photo documentation of a jaguar occurred on December 9, 2001 at 9:23 p.m., when a remote camera set by Jack Childs captured a photograph of an adult male jaguar. The animal appeared to be healthy and, according to Dr. Howard Quigley, was probably not a formerly captive animal. This was based on no visible evidence of pad wear from pacing or calluses on legs from lying down.

A distinct color pattern on the inside of the leg and tail helps distinguish individual jaguars. This was used to identify the jaguar photographed in December 2001 as a different individual than either of the two jaguars sighted in Arizona and New Mexico 1996 and different than the ones that Dr. Carlos Lopez-Gonzalez, University of Queretaro, is studying in Mexico. This same jaguar was photographed again on August 6, 2003 at 2:47 a.m. by a remote camera set by Childs.

One additional jaguar sighting was reported to AGFD, although the sighting was in the Burro Mountains of New Mexico. This sighting was ranked Class I, based on a plaster cast of a track taken by a high school biology teacher who had observed a large, black felid in the Burro Mountains in May 1999. Two members from the depredation committee and 2 researchers conducting studies in Mexico examined the cast. Everyone agreed the track belonged to a large felid, but because the cast was incomplete (1 toe and the back of the heel pad were missing), the cat species was not identified.

Five reputed jaguar sightings were reported to NMDGF from March 1997 through December 2003; all were ranked Class III sightings (Appendix VI). All five were followed up with either phone calls or e-mails, and two were deemed worthy of field investigation. The two field investigations resulted in a positive identification of a mountain lion and a probable mountain lion. Two of the three that were not field investigated were considered probable mountain lions, and the third was classified unknown. Two jaguar vocalizations were also reported, but were not considered sightings by NMDGF.

Task 4: Within one year (April 1998) the JAGCT would draft a report on the current status of the jaguar in Arizona-New Mexico. This task has been deferred, as Johnson and Van Pelt (1997) adequately summarized the existing information relevant to the jaguar's status along the Arizona-New Mexico borderlands. In addition, a new book, *Borderland Jaguars: Tigres de la Frontera*

(Brown and Lopez-Gonzalez 2001) adequately outlines the jaguar's current status in the borderlands region.

The scientific community accepts that Arizona and New Mexico are the northern limits of jaguar range, and considers the jaguars recently occurring as probable transient, dispersing individuals from Sonora, Mexico. AGFD and NMDGF consider the jaguar an extremely rare, but naturally occurring, species in both Arizona and New Mexico.

#### OBJECTIVE 4. COOPERATE WITH MEXICO

To encourage cooperation with Mexico in regard to jaguar conservation, two tasks were identified in the Conservation Assessment and Strategy: 1) coordinate jaguar activities at the annual meeting of the Trilateral Committee for Wildlife Conservation and Management, which is held jointly by Canada, Mexico, and the United States, and 2) encourage Mexico to determine the present distribution of jaguars and identify travel corridors. Progress on these tasks is as follows:

Task 1: Coordinate jaguar activities at the annual Trilateral Committee meeting. Governmental and nongovernmental participants these meetings exchange information about a variety of wildlife-related subjects, including jaguar conservation. AGFD has represented JAGCT interests at these meetings each year since JAGCT was formed. The Trilateral Committee has helped facilitate sharing of jaguar information between the United States and Mexico.

One of the greatest challenges in conducting jaguar research is insufficient funding. In the July 2000 JAGCT meeting, the working group suggested that JAGCT draft a letter to the North American Commission for Environmental Cooperation (CEC) to request inclusion of the jaguar on their list of high-priority species and projects to fund. As a result, in August 2000 AGFD participated in a meeting of the Shared Species Workgroup of the Trilateral Committee in Denver, Colorado to discuss priority species and projects. Jaguar research was identified as one of the top five priorities. This designation allows funding to be made available through the CEC, although no funding has been committed to date.

In March 1999, the Wildlife Conservation Society (WCS) assembled 30 of the world's jaguar experts in Morelos, Mexico to develop a strategy for an international jaguar conservation effort. JAGCT Chair Terry B. Johnson was invited to participate to provide expertise on the northern limits of the species; William E. Van Pelt, AGFD, attended on Johnson's behalf. The workshop, "Jaguars in the New Millennium," was designed to assess the status and distribution of jaguars across their range and to develop geographic priorities to guide jaguar conservation. The geographic priorities for jaguar conservation can be found at <http://www.savethejaguar.com>. The printed workshop proceedings were published in Spanish, with English abstracts, in 2002 (on behalf of JAGCT, AGFD provided funds to support the proceedings). Sanderson and others (2002) used the priority setting and planning exercise conducted at the meeting, to outline what is required to save an imperiled species.

In October 1999, a Mexican Federal agency, Secretaria de Medio Ambiente y Recursos Naturales (SEMARNAT), requested that a JAGCT representative make a presentation in a jaguar conservation planning meeting in Moctezuma, Mexico to outline the conservation approach being taken by Arizona and New Mexico for jaguars. At JAGCT Chair Johnson's request, William E. Van Pelt made the presentation, which was very well received. Mexico continues to work toward convening a team similar to the JAGCT in the State of Sonora. At least three "exploratory" meetings have been held in Sonora thus far, for local communities, ranchers, and state and federal entities to discuss this issue.

Task 2: Encourage Mexico to determine the present distribution of jaguars and identify travel corridors. The JAGCT has provided considerable encouragement on this issue to Mexico and to scientists interested in working in Mexico; the WCS workshop was partially rooted in JAGCT's efforts. Additionally, two important studies in Mexico have been initiated in close cooperation with JAGCT efforts. Since 1997, Dr. Raul Valdez, New Mexico State University, and Dr. Carlos Lopez-Gonzalez have been conducting jaguar surveys in Sonora, Mexico. As a result of these two studies, a breeding population of jaguars has been identified approximately 140 miles south of the U.S.-Mexico International Border. The primary threat to jaguar survival in this region appears to be opportunistic killing. According to officials and research cooperators in Mexico, as many as 14 jaguars, including young, were killed in that area from 1999 through 2003.

Both Valdez and Lopez-Gonzalez hope to radio-collar jaguars to gather detailed information on habitat use and travel corridors. Since Lopez-Gonzalez initiated snaring attempts in his study area in 2001, he has had one jaguar escape and has captured and collared one lactating female jaguar and five mountain lions. Jack Childs, Matt Colvin, both members of the JAGCT Depredation Committee, and Brandon Jones, Wildlife Services, visited Lopez-Gonzalez's study area in April 2002. Although they did not capture a jaguar while there, they investigated several cattle kills that were attributed to jaguars.

Dr. Valdez's work involves the human dimensions aspect. He is working with the first landowner based conservation association in Mexico. Valdez and the landowners are developing a plan for sustainable use of natural resources on approximately 29,947 hectares (74,000 acres) to improve ecological conditions. Although the landowners lose 10-20 heads of livestock per year to jaguar depredation, they are participating in the group and have decided that they will no longer kill jaguars. Prior to this decision, one young jaguar and six adult mountain lions were killed in this area, and one 3-year old female jaguar was killed just northeast of this area.

The landowners are very cooperative in this endeavor and have been reducing cattle grazing across portions of the area. In some sections, they have eliminated cattle grazing. They are beginning to realize financial benefits from the land through means other than grazing, such as guided hunts, and will pursue these opportunities to supplement their income from ranching.

Oscar Moctezuma, with Naturalia (a nonprofit organization in Mexico), was invited to speak in the July 2003 JAGCT meeting about his organization's conservation activities. Naturalia is committed to conserving natural diversity, especially where endangered species are concerned.

The organization's new project is the "Preserving Mexico Campaign;" the money raised will be used to purchase and protect priority areas. This campaign has allowed Naturalia to purchase a 10,000 acre ranch in Mexico to become the first reserve in Mexico specifically purchased to protect jaguars. The ranch is managed by Naturalia and the Northern Jaguar Project, a non-profit organization that supports Lopez-Gonzalez's research.

**OBJECTIVE 5. IDENTIFY, MAINTAIN, AND PROMOTE EXISTING AND OTHER SUITABLE JAGUAR HABITATS**

Eight tasks were outlined in the Conservation Assessment and Strategy to achieve this objective: 1) review relevant scientific literature to identify habitat use patterns and develop range-wide habitat suitability criteria applicable to habitats in Mexico, Arizona, and New Mexico; 2) review proposed and on-going projects and activities for potential impacts on jaguars and jaguar habitats; 3) beginning 12 months after establishment of JAGCT (April 1998), AGFD and NMDGF will coordinate with land-management agencies and private landowners to inventory jaguar habitat; 4) in 24 months (April 1999), AGFD and NMDGF will produce maps delineating jaguar habitat and land ownership patterns; 5) encourage protection and enhancement of jaguar habitat and travel corridors; 6) AGFD and NMDGF will pursue protection and enhancement agreements for suitable jaguar habitat; 7) monitor and identify new, continued, and diminishing threats to jaguar population expansion; and 8) identify livestock depredation and control measures. Progress on these tasks is as follows:

Task 1: Review relevant scientific literature to identify habitat use patterns and develop range-wide habitat suitability criteria applicable to habitats in Mexico, Arizona, and New Mexico. In 1997, a literature search by the JAGCT Habitat Committee identified nearly 400 jaguar-related articles. In 1999, much of this information was included in a more extensive jaguar bibliography developed by independent researchers (Fitzhugh and others 1999). The JAGCT has reviewed the material referenced by Fitzhugh and others (1999) to glean information relevant to its efforts to develop habitat, depredation, and educational publications.

The JAGCT Habitat Committee has held 10 meetings and conference calls to develop and recommend habitat suitability criteria for Arizona, New Mexico, and northern Mexico. They also drafted a map of areas in Arizona that may have one or more jaguar habitat characteristics (see Objective 5, task 4). The committee identified, and JAGSAG accepted, five criteria for determining potential jaguar habitat: 1) vegetation community associations; 2) prey densities; 3) human densities and proximity to agriculture and urban areas; 4) distance to water; and 5) areas must be within 80 km (50 miles) of documented jaguar sightings. JAGSAG recommended that a "terrain ruggedness index" be included in, and elevation be removed from, the criteria to determine habitat suitability.

The Sierra Institute Field Studies Program in Arizona (Institute; University of California Extension, Santa Cruz, CA) submitted an unpublished report to the Habitat Committee in June 2000. Faculty and students at the Institute identified potential jaguar habitat in Arizona and New Mexico using methods outlined by the JAGCT Habitat Committee. The report identified

potentially suitable jaguar habitat and important travel corridors by mountain range, valley, and wash complex. The committee asked JAGSAG to review the report. JAGSAG generally agreed with the approach taken, but not with all final recommendations (for example, using reintroduction as a tool to study habitat use). JAGSAG agreed with the finding of the report that insufficient prey should not automatically eliminate an area as potential jaguar habitat, as prey numbers may be manipulated through appropriate management. Finally, JAGSAG recommended that the Habitat Committee continue modeling potential jaguar habitat in the southwestern United States, using the general criteria mentioned above until specific habitat-use data from jaguar populations in northern Mexico become available.

Task 2: Review proposed and on-going projects and activities for potential impacts on jaguars and jaguar habitats. Fundamental to this objective is a definition of what is and is not jaguar habitat, and what areas provide the most likely linkages between these areas of potential habitat in northern Mexico and the southwestern United States. Although AGFD and NMDGF have begun to identify potentially suitable jaguar habitat (Hatten and others 2003; Menke and Hayes 2003), there is little detailed information on habitat use by jaguars in Arizona, New Mexico, and Mexico to confirm any results. However, studies being conducted by Dr. Raul Valdez and Dr. Carlos Lopez-Gonzalez in Sonora, Mexico offer great promise. Lopez-Gonzalez has already provided AGFD with GPS locations of areas in his study area in Sonora, Mexico that he considers suitable jaguar habitat. This information will be used to refine a jaguar land-use/habitat suitability model, when (if) JAGCT develops one.

In 1997, as part of the Jaguar Conservation Assessment and Strategy, Wildlife Services agreed to conduct a risk assessment for the possibility of accidentally killing a jaguar in Arizona and New Mexico through use of M-44 devices. Their assessment concluded that, over the past five years, no felids of any kind were killed by M-44 devices in the area of concern (Appendix VII).

Concerns were expressed in several JAGCT meetings during the reporting period about Immigration and Naturalization Service (INS)/Border Patrol proposals for border security projects, which include an extensive 15-foot high fence, 24-hour lighting, new roads, and other items. The question is whether these projects might pose serious threats to likely jaguar movement corridors between the United States and Mexico. An Environmental Impact Statement for these projects failed to address potential impacts on jaguars. JAGCT sent INS a copy of the AGFD report on potentially suitable habitat for jaguars (Hatten and others 2003) and offered assistance in identifying key landscape linkages between the United States and Mexico. After JAGCT accepts the NMDGF habitat report (Menke and Hayes 2003), it will be provided to INS for consideration. JAGCT will also encourage NMDGF to offer technical assistance to INS in using the New Mexico report.

AGFD, USFS, and USFWS have been providing comments regarding potential impacts that a proposed Tucson Electric and Power powerline to Mexico might have on jaguars, other wildlife, and associated habitats along the various proposed routes. Through its Habitat Committee, JAGCT will monitor the environmental review process closely, and continue to

encourage the appropriate member agencies to provide comments and recommendations to interested parties when requested.

Other than these specific activities, no projects have been identified as having potential impacts on jaguars or their habitats.

Task 3: Beginning 12 months after establishment of JAGCT (April 1998), AGFD and NMDGF would coordinate with land management agencies, state lands, and private landowners to inventory jaguar habitat. AGFD did not complete its report on *Characterizing and Mapping Potential Jaguar Habitat in Arizona* (Hatten and others 2003) until January 2003, and NMDGF did not complete its report on *Evaluation of the Relative Suitability of Potential Jaguar Habitat in New Mexico* (Menke and Hayes 2003) until July 2003. The Hatten and others report is being refined for submittal to a peer-reviewed journal, with publication anticipated in late 2004 or in 2005. The NMDGF report has not been formally submitted or approved by the JAGCT. Due to lack of resources, NMDGF has no intention of submitting it to a peer-reviewed journal.

Task 4: In 24 months (April 1999), AGFD and NMDGF will produce maps delineating jaguar habitat and land ownership patterns. At the December 2000 JAGCT Habitat Committee meeting, members voted that AGFD should take the lead in writing a jaguar land-use/habitat suitability report. This prompted JAGCT to invite GIS Senior Analyst Jim Hatten, AGFD, to its January 2001 meeting to present a land-cover/habitat suitability map for the jaguar in Arizona. The map was created using overlays of habitat criteria: vegetation community associations, human densities and proximity to agriculture and urban areas, distance to water, elevation, terrain ruggedness, and documented jaguar sightings. General conclusions drawn from applying the model were that, in Arizona, jaguars have been most often observed in areas with low density occupancy by humans; in javelina, white-tailed, or mule deer habitats and less commonly in elk habitats; usually within 10 miles of perennial or intermittent waters; and twice as often in scrub grasslands as any other biome classification. Jaguar sightings were clumped in southern and southeastern Arizona and scattered in the central part of the State, with "hotspots" to the north and south of Tucson. The land-cover/habitat suitability map identified three distinct areas of potential jaguar habitat in Arizona: southeastern Arizona, central Arizona, and north-central Arizona. AGFD submitted the final report, *Characterizing and Mapping Potential Jaguar Habitat in Arizona* (Hatten and others 2003) to the JAGCT in January 2003.

In 2001, NMDGF contracted with the Earth Data Analysis Center (EDAC) of the University of New Mexico to model potential jaguar habitat in the State. EDAC evaluated a combination of habitat variables within 50 miles of Class I or II sighting locations in New Mexico to determine the relative suitability thresholds of areas for jaguars. The variables were: vegetation community distribution, terrain ruggedness, prey abundance, road density as an index to human activity, and proximity to water. Thresholds of suitability for each variable were set in accordance with AGFD's potential habitat report (Hatten and others 2003), and GIS was used to map potential jaguar habitat in New Mexico. The model predicted two areas with the highest probability of being able to support jaguars in New Mexico: the Peloncillo and Animas mountains, and adjacent areas of the Gila and San Francisco river drainages along the New Mexico-Arizona

border. NMDGF completed its report, *Evaluation of the Relative Suitability of Potential Jaguar Habitat in New Mexico* (Menke and Hayes 2003), and distributed it in the July 2003 JAGCT meeting. This report has not been formally approved by the JAGCT.

Task 5: Encourage protection and enhancement of jaguar habitat and travel corridors. No substantial progress was made on this task during this reporting period, although JAGCT member agencies individually encouraged broad-scale protection or enhancement of several “known” jaguar travel corridors and areas of recent occurrence. To date, such encouragement has been made largely within land-management planning processes of federal and state agencies and in fact is largely redundant to recommendations for other large carnivores and their ungulate prey bases. In 2003, the New Mexico State Legislature passed a resolution supporting the development of safe crossings for wildlife travel areas across highways, and directing the New Mexico Transportation and Game and Fish departments to work cooperatively toward long-term planning of road projects to allow successful linkage of wildlife habitats. These efforts should consider linkage areas between potential jaguar habitats, and provide an opportunity to protect and enhance travel corridors. As inventories for potential jaguar habitat are completed and important use areas (if any) are identified, JAGCT member agencies will be better able to work toward ensuring their protection and enhancement.

Several JAGCT Working Group participants have established remote-sensing cameras near the Mexican border, along potential jaguar travel corridors. In 1997, Warner Glenn, Wendy Glenn, and the Malpai Borderlands Group set a camera in the lower Peloncillo Mountains, Cochise County, Arizona. In 1999, Jack Childs set a camera in the Baboquivari Mountains, Pima County, Arizona. Childs also received a grant from the Wildlife Conservation Society to initiate a Borderlands Jaguar Detection Project (BJDP) that will function on behalf of and in cooperation with JAGCT. The grant provided for setting up six additional cameras, hair snares, and track transects/plots beginning in March 2001. In January 2002, The Phoenix Zoo donated six more cameras to the BJDP. In November 2003, an informal group, Friends of the Jaguar, donated an additional camera. Twelve cameras are now being used in the field, and one is being repaired. Several other groups, including Defenders, have cameras set up in potential jaguar habitat. At the December 2000 Habitat Committee meeting, members expressed the need for better coordination among these monitoring efforts to achieve the widest coverage possible.

Hair collected from snares monitored by Jack Childs eventually will be sent to a lab for genetic analysis. If jaguar hair is found, it will be compared to samples from Mexican populations to determine the origin of the individual.

Task 6: AGFD and NMDGF will pursue protection and enhancement agreements for suitable jaguar habitat. From 1998-2003, AGFD's Heritage Fund (*Lottery Dollars Working for Wildlife*) granting program solicited proposals for jaguar habitat and travel corridor identification, protection, and enhancement projects in Arizona. Although two proposals were submitted, neither was eligible for funding.

Task 7: Monitor and identify new, continued, and diminishing threats to jaguar population expansion. As a result of jaguar research activities in Mexico, JAGCT recently learned that an open-pit mining operation and associated road development have been proposed for areas adjacent to the Arizona-New Mexico borderlands area. These projects could impact linkage between known and potential jaguar habitat in the United States and the northern-most known population of jaguars in Mexico. In July 2003, the Habitat Committee was assigned to investigate these projects and provide JAGCT with a better understanding of their scope and possible impact. Nothing has been reported to JAGCT to date.

Additionally, the Habitat Committee suggested that JAGCT invite INS to attend JAGCT meetings. Several INS projects (for example, brush-clearing and installation of stadium lights along the International Border) could affect jaguar movements between Mexico and the United States. Acting on behalf of the JAGCT Chair, William E. Van Pelt invited INS to attend the January 2001 meeting. INS expressed an interest in becoming involved with the working group and has now attended three JAGCT meetings.

Task 8: Identify livestock depredation and control measures. A Depredation Committee was established in the April 1997 JAGCT meeting to identify livestock depredation detection and control measures. The Committee subsequently developed kill verification procedures (Appendix VIII) and recommendations for compensation values (Appendix IX) that were approved and implemented by JAGCT (Van Pelt and Johnson 1998).

In May 1998, JAGCT cooperated with The Phoenix Zoo and the Malpai Borderlands Group to send two members from the Depredation Committee to Brazil to collect first-hand information regarding livestock depredation by jaguars. Jack Childs compiled the information collected into a field guide, *Tracking the Felids of the Borderlands* (Childs 1998). This guide has been provided to Wildlife Managers and Wildlife Services agents in Arizona and New Mexico to help them identify potential jaguar sign. Additionally, more than 900 copies of the book have been sold and distributed throughout the United States, Brazil, and Australia.

In August 1999, Depredation Committee member Jack Childs conducted a workshop in Silver City, New Mexico on identification of jaguar sign and depredation. USFWS requested that all large-cat (i.e. mountain lion) depredation control work temporarily cease until after the workshop. The workshop was mandatory for all Wildlife Services employees involved in mountain lion depredation control in the borderlands region. It was also attended by personnel from NMDGF and USFWS. Childs distributed 10 copies of his book and track identification kit to workshop attendees.

In the July 2000 JAGCT meeting, the role of Depredation Committee chair was transferred from Warner Glenn to Jack Childs (at Glenn's request). Childs reported to the JAGCT at the July 2000 meeting that he had recently received one potential jaguar depredation call. Upon investigation, the depredation was attributed to a mountain lion.

OBJECTIVE 6. PROMOTE SCIENTIFIC JAGUAR MANAGEMENT AND PUBLIC EDUCATION

Two tasks were identified in the Conservation Assessment and Strategy to promote sound scientific decisions regarding jaguar management and public education: 1) establish a Jaguar Scientific Advisory Group and 2) promote public support through the development and distribution of informational and educational material. Progress on these tasks is as follows:

Task 1: Establish a Jaguar Scientific Advisory Group. In the January 1998 JAGCT meeting, the Chair announced that all six scientists who had been asked to sit on the JAGSAG had accepted their nominations. The scientists are: Alan Rabinowitz, Wildlife Conservation Society; Brian Miller, the Denver Zoo; Michael Tewes, Texas A&M University; Howard Quigley; Raul Valdez (New Mexico State University); and Carlos Lopez-Gonzalez. JAGSAG members subsequently reviewed and commented on habitat criteria and JAGCT priorities. The highest priority identified for jaguar work in the borderlands is to radio-collar at least one individual to enable collection of detailed information on habitat use and movement patterns.

Task 2: Promote public support through the development and distribution of informational and educational material. JAGCT has implemented various strategies since 1997 to educate the public about jaguar conservation efforts. Since 1998, AGFD has carried a jaguar advisory in its hunt regulation booklet, to advise hunters about the possibility of encountering a jaguar in southern Arizona. Similar information is included in general AGFD news releases at the onset of big game seasons. The information includes a reference to a \$5000 reward posted by The Arizona Houndsmen for information leading to the arrest and conviction of any person who intentionally kills a jaguar in Arizona while it is federally listed as an endangered species.

During this reporting period, AGFD established a JAGCT/jaguar page on its Web site (<http://www.azgfd.com/jaguar>). The page includes information from JAGCT and is one of the most visited pages on the AGFD Web site. AGFD also printed and distributed a brochure designed to inform people about reporting jaguar sightings. This brochure was distributed in Arizona, New Mexico, and Mexico; it also can be found on the AGFD Web site.

Since 1998, the Education Committee has been developing a comprehensive educational packet concerning the Endangered Species Act, using the jaguar as an example species. These efforts have been discussed at each JAGCT meeting to date and significant progress has been made. Originally, the Committee wanted to design a program for all grade levels. However, that proved too ambitious and they recently scaled back to grades 4 through 8 or 9. In February 2000, nine educators met in Willcox, Arizona to create a jaguar-integrated program (lesson plan) that will enable students to use problem-solving and critical-thinking skills to explore various issues surrounding jaguars, such as economic, social, environmental, and land-management concerns. The Education Committee disseminated the lesson plan to 15 educators in May 2001 for critical review, primarily to ensure that the materials met state and national education standards and would be "user friendly" to educators serving grades 5 through 8.

In April 2003, the jaguar-based curriculum was finalized, although it will be revised as new information becomes available. The current version was translated into Spanish in autumn 2003. Two hundred copies (100 each in English and Spanish) were printed and will be disseminated to educators through the Education Committee. Any educator who requests a copy must attend a workshop to learn how to use the materials to ensure that the materials are going to those who will definitely use them in their curriculum. During a nongovernmental Felines Natural History Workshop, held at Fort Huachuca (Arizona) in conjunction with an annual track count in the Huachuca Mountains, 25 educators were trained in using the curriculum with students. Additional training was provided to 23 participants (including several from northern Mexico) at the 2003 fall *Senderos* conference, sponsored by the Arizona Association for Environmental Education. The Education Committee will track these educators closely over the next year to determine what in the curriculum works and what adaptations can/should be made.

The Education Committee also assembled, for use with the jaguar curriculum, 22 resource trunks, each of which contains: four replicated skulls (jaguar, bobcat, mountain lion, domestic cat); a mapping exercise with range maps, precipitation maps, vegetation maps, and jaguar distribution maps; literature comparisons including cultural attitudes and comparisons of past and present mountain lion hunters; changing land use patterns; the history of jaguar conservation; and activities in developing conservation strategies (for example, group processes, identifying areas). Additional classroom resources included within each trunk are three videos (from PBS/Nature, National Geographic, and Dorling Kindersley) and the following books: *Eyes of Fire* (Glenn 1996), *Tracking the Felids of the Borderlands* (Childs 1998), and *Borderlands Jaguar: Tigres de la Frontera* (Brown and Lopez-Gonzalez 2001).

Funding to develop and finalize the curriculum and resource trunks was provided by the National Fish and Wildlife Foundation and the Malpai Borderlands Group.

In January 2004, the renovated AGFD exhibit at the Arizona Capitol Museum in Phoenix opened, featuring a small exhibit on the jaguar in Arizona.

An Outreach Committee was formed in July 2002 to develop a long-term strategy for public education and outreach regarding jaguar conservation in the borderlands. Suggestions for outreach included holding public meetings in rural, borderland communities. Scotty Johnson, Defenders, Chairs the Committee. Members are Steve Pavlik, Sarah Rinkevich, Don Cullum, Janice Przybyl, and Levi Klump. Wendy Glenn, Malpai Borderlands Group, will help distribute information generated by the Committee but will not actively participate in it.

Several outreach events (Table 2) were held in autumn 2002. Each included 1) a presentation centered on Jack Childs' camera monitoring work and his documentation of a jaguar in Arizona, and 2) panel discussion with representatives from different agencies. In addition to public education, the purpose of these meetings was to re-engage people who have stopped coming to JAGCT meetings. Defenders and NMDGF provided funding to summarize the 2002 outreach meetings and develop recommendations for future jaguar outreach efforts. The report, *Rural Outreach on Behalf of the Jaguar: An Analysis of the First Series of Outreach Meetings*

*Organized by the Outreach Subcommittee of the Jaguar Conservation Team (Warshall and Bless 2003) was completed in July 2003.*

Date	Location
23 September	Bisbee, Arizona
24 September	Douglas, Arizona
3 October	Nogales, Arizona
8 October	Patagonia, Arizona
9 October	Sierra Vista, Arizona
15 October	Animas, New Mexico
26 October	Arivaca, Arizona

The Outreach Committee received a \$1000 grant from WCS for its outreach efforts. Additionally, four other organizations (Defenders, AGFD, USFWS, and NMDGF) each contributed \$1000 to the JAGCT for use in outreach efforts.

Members of the Depredation Committee have conducted or participated in at least 43 workshops or presentations on jaguar sign identification since August 1998.

Jack Childs' book, *Tracking the Felids of the Borderlands* (1998), is now being translated into Spanish, for additional outreach to the Hispanic community.

#### OBJECTIVE 7. INCREASE LEGAL PROTECTION

To increase legal protection for jaguars in Arizona and New Mexico, three tasks were identified in the Conservation Assessment and Strategy: 1) within 1 year (April 1998), AGFD and NMDGF would attempt to increase state legal disincentives for unlawful take of jaguars; 2) AGFD would consider whether changes are needed in A.R.S. 17.239 to preclude legal killing of jaguars as stock killers; and 3) USFWS will consider whether listing the jaguar under the "Similarity of Appearance" clause is appropriate. Progress on these tasks is as follows:

Task 1: Within 1 year (April 1998), AGFD and NMDGF would attempt to increase state legal disincentives for unlawful take of jaguars. In Arizona, AGFD successfully advocated state legislation (Senate Bill 1106) in 1998 that when (if) the jaguar is delisted federally, impose a \$2500 criminal penalty (Class 2 Misdemeanor) and up to \$72,500 in civil penalties for the unlawful take of a jaguar. These fines are commensurate with current federal penalties under the Endangered Species Act (ESA). The legislation was signed into law by Jane Hull, Governor of Arizona, on May 7, 1998. The legislature's stated desire was to ensure that state penalties would not be additive to current federal penalties and would serve as an inducement to federal delisting.

In the 1998 legislative session, NMDGF could not introduce jaguar legislation because the New Mexico legislature only addressed budgets during that session. In the 1999 session, however, Senate Bill 252 was signed into law, establishing new regulations and penalties for illegally

killing a jaguar. They will take effect when (if) the jaguar is removed from the federal endangered species list. Although this law provides state penalties as high as the amounts for any animal protected by the state of New Mexico, these penalties are not as high as those under the ESA. If these State penalties are to serve as an inducement to delisting, they must be increased.

Task 2: AGFD would consider whether changes are needed in A.R.S. 17.239 to preclude legal killing of jaguars as stock-killers. After reviewing A.R.S. 17.239, AGFD determined that no changes were needed in the law. Because the jaguar is federally listed as endangered, it cannot be legally killed even if livestock have been harmed.

Task 3: USFWS will consider whether listing the jaguar under the "Similarity of Appearance" clause is appropriate. Endangered status for the jaguar was extended to include the United States in 1997, subsequent to the Conservation Agreement. This task no longer is applicable.

#### OBJECTIVE 8. EVALUATE PROGRESS AND ACCOMPLISHMENTS

The Jaguar Conservation Assessment and Strategy stipulates that AGFD and NMDGF are to report to USFWS each January on progress on tasks identified in the Conservation Assessment and Strategy. This report is to be an evaluation of the JAGCT efforts to date.

Although greatly limited by lack of financial and staff resources and a continuing lack of detailed biological information about the jaguar at the northern edge of its range, JAGCT continued to make progress since its inception on all 8 objectives identified in the Conservation Assessment and Strategy. Of the 19 individual tasks identified under Objectives 3-7, 10 have been completed (some were finished late, as indicated in the text under the specific tasks) and seven others have been initiated. During the current reporting period, significant progress was made on: completing a jaguar capture protocol (Objective 3, Task 2); designing a brochure to educate the public on how to report jaguar sightings (Objective 3, Task 3 and Objective 6, Task 2); modeling jaguar land use/potential habitat in Arizona and New Mexico (Objective 5, Task 4); and preparing and distributing a jaguar lesson plan (curriculum) to educators (Objective 6, Task 2). JAGCT has made no progress on two tasks (Objective 3, Task 4 and Objective 5, Task 3), primarily because of the paucity of biological information on jaguar habitat requirements at the northern edge of the range (the U.S.-Mexico borderlands).

As of this reporting period, the public remains generally supportive of and involved in the Conservation Assessment and Strategy. The collaboration among agencies and local communities has opened constructive dialogue and cooperation on jaguar conservation in Arizona and New Mexico. It has also been productive in some unexpected ways. For example, interested citizens and nongovernmental organizations involved in the Education Committee have contributed approximately \$20,000 to the education/outreach effort, including in-kind contributions.

We can only hope that sufficient funding and staff resources are soon allocated by cooperating agencies to properly support the public involvement that has been evident throughout this effort.

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#### APPENDIXES

Appendix I. Committees, and members, assembled by the Jaguar Conservation Team since 1997.

KILL VERIFICATION\DEPREDATION COMMITTEE MEMBERS: Jack Childs, Chairperson. Members: Kelly Glenn-Kimbrow, Warner Glenn, Chas Erickson, Levi Klump, Steve Fairaizl, Brandon Jones, Paul Pirtle, Matt Colvin, Craig Miller, Keel Price, and Gabriel Paz.

COMPENSATION COMMITTEE: Ed Sanchez, Chairperson. Members: Warner Glenn, Levi Klump, Ron Bemis, and Chuck Chambers.

HABITAT COMMITTEE: Bill Van Pelt, Chairperson. Members: Bill Moore, Lee Benson, Don Cullum, Tim Snow, Michael Robinson, Craig Miller, Ben Brown, Sarah Rinkevich, Steve Spangle, Jeff Williamson, Gary Helbing, Judy Keeler, Warner Glenn, Wendy Glenn, Cordy Cowan, Tony Povalitis, Reese Woodling, Meira Gault, Bill Cowan, Jimmy Stewart, and Stephen Williams.

EDUCATION COMMITTEE: Sue Krentz, Chairperson. Members: Don Cullum, Karen Kay Husted, Rod Mondt, Craig Miller, Karen Schedler, Michael Robinson, and Steve Pavlik.

OUTREACH COMMITTEE: Scotty Johnson, Chairperson. Members: Steve Pavlik, Sarah Rinkevich, Don Cullum, Janice Przybyl, and Levi Klump.

Appendix II. Jaguar handling protocol established by the Jaguar Conservation Team in 1997.

Policy: State wildlife agency representatives on the conservation team or designees will respond to all jaguar calls, including stock killers, in accordance with procedures prescribed in this protocol.

Procedures:

- A. The purpose of these procedures is to create a situation where jaguars and humans can co-exist. In dealing with jaguars, there are a number of factors that must be considered. These factors may include the individual jaguar's physical condition, damage of personal property, and public safety. We must be aware of the effects jaguars may have on landowners and government agencies, and be sensitive to what people and agencies feel their role is when we handle jaguars.
- B. During normal working hours, reports of jaguars that may need to be handled, should be reported to the conservation team's state wildlife agency representative. Handling requirements of jaguars are outlined below by category. Each agency will have its own policy of how to route information on a jaguar that must be handled, but the end results should be the same, involvement of all affected parties and timely resolution of any situation.
- C. The conservation team member receiving the call will determine if the jaguar call requires an immediate response (Appropriate response for each category are described below in Section D).
  1. Category 1: Jaguar which is considered to be in immediate danger because:
    - a. the jaguar is injured;
    - b. the jaguar is confined or restrained and unable to leave the area, i.e. foot snare
  2. Category 2: Jaguar which is not considered in immediate danger, but is of special interest to the Conservation Team or may be in danger in the future because:
    - a. the jaguar is defending a kill, or has been involved in a depredation;
    - b. the jaguar is uncollared and/or marked and is temporarily confined or restrained, i.e. treed by dogs

3. Category 3: Jaguar is not in immediate danger, nor is there reason to believe that it will become one because:
    - a. the jaguar is only observed traveling through or resting, and is uninjured and posing no threat to personal property;
- D. As soon as the category has been determined, the conservation team member responding to the call will follow the procedure for the appropriate category listed below.
1. Category I situations require an immediate response by a state wildlife agency representative of the conservation team or their designee. If a depredation is involved, a depredation team member should also respond.
    - a. The reporting party will be advised that the jaguar poses a threat to public safety and that all people should keep out of the area where the jaguar is located. The reporting party will also be told not to do anything that might cause the animal to injure itself.
    - b. The conservation team member or their qualified designee will travel to the site and assess the situation as soon as possible.
    - c. The safety of the jaguar and any people present are the most important aspect of handling. If for any reason, any of the actions below would imperil the jaguar or the people present, those actions should not take place, and the jaguar should be released immediately.
    - d. Injured jaguars will be anesthetized and the extent of injuries evaluated. Non-debilitating injuries that can be treated on-site, will be treated and the animal will be processed and released, if appropriate. Debilitating injuries will be treated on-site, as best possible. Then the jaguar will be transported to a veterinarian experienced in working with large carnivores and/or wild animals for treatment, and if necessary, to an appropriate holding facility for rehabilitation. Rehabilitated jaguars will be released as soon as possible at or near the capture site. Non-releasable, rehabilitated jaguars will be placed at a captive facility.
    - e. Jaguars that are handled will be anesthetized, processed and released on-site. Recommended anesthesia is Telazol at a dose of 5 mg/kg (2.3 mg/lb) [Schobert 1987, Kock and others 1989, Barnett and Lewis 1990] administered by experienced personnel only, with a jab stick or dart pistol or rifle (long range only). Processing includes taking standard physical measurements (weight, length, girth, pad sizes, skull and tooth

dimensions); estimating age; assessing physical condition; taking blood samples for genetics evaluation; assessing physical parameters and parasites/disease testing; photographing; ear-tagging and radio collaring. Ear-tags should be numbered and non-protruding; round plastic tags are preferred.

- f. When a Category I jaguar is captured on private property and the landowner does not want it released on-site, the jaguar will be moved to and released at a pre-approved release site. Both state wildlife agencies will pre-determine at least one release site where jaguars can be relocated. If a jaguar is moved to the release site, and remains in the area, a second site must also be identified for the release of a second jaguar, if needed. If the jaguar does not remain in the vicinity of the release site, successive jaguars can also be released there until one does occupy the area. In the case of depredation, the landowner will be offered fair compensation for the loss, after verification by a depredation team member that the depredation was by a jaguar.
2. If a Category II jaguar is on a natural kill, the location of the kill will be visited, the kill verified and documented, and habitat data recorded. If the kill is a depredation, the landowner will be offered fair compensation for the loss, after verification by a depredation team member that the depredation was by a jaguar. The conservation team's checklist for suspected predator kills and the track documentation guide should be used.
3. If a Category III jaguar is reported, the reporting party will be asked to describe the animal, and a record of the date, time, location and circumstances of the observation will be recorded on a jaguar sighting form. The reporting party will be encouraged to photo-document the animal when possible. No action is required for this category; however, if tracks are present, a qualified conservation team member should attempt to verify the sighting by track identification as soon as possible.

Appendix III. Capture protocol and equipment needed to immobilize, radio-collar, and monitor a jaguar.

### Calling Order to Assemble Capture Team

#### In Arizona

Bill Van Pelt or Terry Johnson	Contacts US Fish and Wildlife Service (USFWS) to verify permission to proceed with capture. Will transport USFWS representative and veterinarian, if necessary. Either Bill or Terry will have in hand, a copy of the USFWS permit allowing the capture to take place.
Tim Snow or Ron Olding	Has possession of radio tracking equipment. Will contact qualified dart person and qualified veterinarian. Will transport veterinarian if necessary.
Warner Glenn or Jack Childs	Makes arrangements for hunters, hounds, and mules.

Note: The appropriate land management agency will be notified of capture attempt. Also, anyone holding use permits on public lands or owning private lands in the immediate vicinity of the capture attempt will be notified.

The calling order may vary depending on geographical location of sighting. This calling order is based on the fact that the greater frequency of sightings has historically been in Arizona

In New Mexico

Chuck Hayes,  
Pat Mathis,  
or  
Greg Schmitt

Contacts US Fish and Wildlife Service (USFWS) to verify permission to proceed with capture. Will transport USFWS representative and veterinarian, if necessary.

Pat Mathis,  
Nick Smith,  
or  
Kerry Mower

Has possession of radio tracking equipment. Will contact qualified dart person and qualified veterinarian. Will transport veterinarian if necessary.

Warner Glenn  
or  
Jack Childs

Makes arrangements for hunters, hounds, and mules.

### **Capture Protocol**

After a capture team has been assembled (a hunter, dart gunner, veterinarian, and appropriate agency staff with a copy of the USFWS permit in hand), a capture attempt can be initiated. Each team member should be in good physical condition and be prepared for long hours in the saddle. Bring your own water and sack lunch.

The following should be done in advance of a capture:

Procure a copy of a current permit from the USFWS to allow the capture of jaguars, including take provisions for capture related jaguar mortality. The permit should be sufficient to account for liability of capture participants in case of injury or death to humans or the jaguar in order to protect the members of the capture team. The capture team is made up of volunteers and needs to be protected against lawsuits. Required permit(s) issued by USFWS will be written in such a manner that live-capture of a jaguar is legal in Arizona and New Mexico provided that live-capture, handling and attachment of radio-telemetry, and subsequent monitoring is done as outlined in the Jaguar Conservation Agreement. Permits from the New Mexico Department of Game and Fish will be issued to appropriate members of the Jaguar Conservation Team provided that live-capture of a jaguar or jaguars, handling and attachment of radio-telemetry, and subsequent monitoring of jaguars is done as outlined in the Jaguar Conservation Agreement and as approved by the USFWS.

Note: A permit allowing for the capture of a jaguar has been issued to the Arizona Game and Fish Department by The U.S. Fish and Wildlife Service. The Permit was issued on March 2, 2000, and is good for two years.

The following procedure will be followed in the event that hounds are used to bring the jaguar to bay:

When the capture team arrives at the place where the jaguar was sighted, the capture team will allow the hunter and hounds to start the track. During the chase, it will be necessary to follow the instructions of the hunter so as not to interfere with the hounds. The hunter will attempt to stay as close to the hounds as is practical and shall have in hand a portable 2-way radio in order to maintain contact with the rest of the capture team.

At the time the jaguar is bayed or treed, the following procedure will be followed:

- A. All people except the dart shooter and the dog handler will move back and all hounds will be leashed and tied or held within sight of the jaguar. When the veterinarian has determined that the anesthetic has taken effect, the hounds will

- be removed from the area by the dog handlers so as to minimize the risk of mishap.
- B. The cat will be darted and the shooter will attempt to unobtrusively maintain visual contact until the cat is asleep. Note: The cat should be anesthetized as quickly as possible to reduce the risk of injury to the cat, the hounds and the capture team. The drug of choice will be Telazol at a dose of  $\pm 5\text{mg/kg}$ , to be calculated by darter and veterinarian.
  - C. In the event that the jaguar leaves the area after it has been darted, 15 minutes will be allowed for the anesthetic to take affect. At this time, the dog handler will take one or two hounds on a leash and trail the cat to where it is sleeping.
  - D. If the cat does not leave the area and is in a dangerous situation, such as on a bluff or high in a tree where injury from a fall is likely, the cat will be chased from the area before the drug takes affect. If that is not possible, the cat will be assisted out of the tree when the drug has partially taken affect and the veterinarian decides it is safe to do so. If necessary, a tarp will be used to catch the animal if it falls. It may be necessary to call off the capture if the situation is assessed to be too risky to the jaguar or capture team.
  - E. At this time the cat will be moved into the shade.

The veterinarian will:

Monitor breathing and heart rate, cover and protect the eyes, take blood samples for genetics and disease, treat dart wound site, assess physical parameters such as gums, eyes, coat condition, and obtain fecal and urine samples if possible.

The collar team will:

Affix radio collar on cat and collect tissue and mid-dorsal hair samples. Dried blood and tissue can be scraped from under the claws for DNA analysis to determine the prey species of the jaguar's previous meal. Photographs should be taken of the head, teeth and bottoms of feet (close up) and the full body. A close up photo of the end of the tail should be taken to show the pattern of the black and white rings and spots. Any unusual or distinguishing features should be photographed.

The data team will:

Record data such as sex of animal, length of body and tail, heart girth, skull length, width and girth, weight and age of cat. The canine tooth length and bite width should be measured to help determine age. Measure length and width of front and rear footpads.

- F. When the work is completed and the veterinarian has determined that the cat is stable, everyone will leave the area, with a spotter watching from a distance until the cat is able to leave the area.

In the event of accidental mortality of the cat, the veterinarian will document the reasons causing the death of the cat and list the first aid procedures used in the attempt to resuscitate the animal. Necropsy procedures can be performed at this time if deemed necessary by the veterinarian. The carcass will be turned over to the U.S. Fish and Wildlife Service.

### Materials list

The following materials will be broken down into kits that will easily fit into a backpack or saddlebag. The kits will be stored in the office of the Nongame Specialist at the AGF D Region V office in Tucson. Additional kits may be kept available at other locations.

Backpack	Jab stick
Collar with extra collar material	Empty film containers (for samples)
Collar wrench	Blindfold
Telazol-2 bottles	Filled water bottle
Syringes	Rubber gloves
Darts-2 each (3cc, 2cc, 1cc)	Forceps
Sterile water	Ziplock bags
Dart gun	Flashlight
Chapstick	Batteries
Duct tape	Plastic tarp (10X10)
Hole punch	30 foot nylon rope and portable scale (to be furnished by Jack Childs)
Calipers	DNA tissue collecting kit (to be furnished by Jack Childs)
Tape measure	
Disposable camera	
*2- hand held 2-way radios	

\*Radios need to be added to kit just prior to use to ensure battery life.

### **Veterinarian Supply List**

The following is a list of items that that would be necessary in a Vet bag. Additional items were included in a kit the last time a capture was attempted, and may be necessary. Inputs from the veterinarians on additions and modifications to this list based on their own experience and expertise is encouraged. Consideration of the terrain and distance that materials must be carried in a backpack by capture personal on foot should be considered.

Blood tubes (sst, rt, lt)  
Syringes  
Swabs and tubes  
Parasite tubes  
Water (in a spray bottle)  
Tubes for feces and urine  
Antibiotics (such as triple antibiotic ointment)  
Eye wash / wetting gel  
Surgical pack containing sutures and needles  
Intubation tubes  
Breathing bag  
Betadine  
Neosporin or similar topical ointment  
Cotton balls  
Gauze  
Medical/Athletic tape  
Rubber gloves  
Atropine  
Epinephrine  
Dopram  
Dexamethasone  
Soludelta cortef  
Ivomec

Some of the items on this list will be included in the veterinarians personal travel kit. Other items can be kept on hand in the offices of the respective game and fish departments, to be determined by game and fish personal at regional office.

## Monitoring

**Funding:** A commitment of funds and equipment to monitor the jaguar's movements and activities must be made prior to the animal being collared.

**Responsible Agencies:** The Arizona Game and Fish Department will monitor the jaguar within the state of Arizona. To the degree feasible, the New Mexico Game and Fish Department will monitor the jaguar within the state of New Mexico. Qualified members of the Jaguar Conservation Team will be authorized to monitor jaguars in New Mexico according to objectives of the Jaguar Conservation Agreement.

**Methodology:** Ground telemetry will be used when possible. Aerial telemetry will be used if necessary, including for locations in Mexico if a jaguar crosses the border.

The JAGCT will contact the appropriate Mexican Governmental agency in order to coordinate monitoring efforts back and forth across the border. Dr. Carlos Lopez Gonzalez has volunteered to contact the appropriate Mexican Government officials and assist in coordinating monitoring efforts back and forth across the border.

1. The jaguar will be monitored after release from a distance sufficient to avoid detection of the observer by the jaguar, while allowing the observer to monitor the cat's physical recovery from drugs.
2. The jaguar will be monitored daily for 3 days to ensure no immediate negative effects (capture myopathy, etc.) occur from capture. Ideally, monitoring should take place daily for as long as possible, however, monitoring shall be done in such a manner so as not to interfere with the animal's normal habits and movements. Also, monitoring should take place in such a manner so as not to alert the general public to the location of the jaguar.
3. The jaguar will be monitored weekly for one month and then biweekly until end of collar life. Aerial telemetry may be used as necessary to monitor the animal.
4. Additional monitoring will occur if resources allow, including weekly locations and prey use investigation.
5. Monitoring information will be made available to the conservation team at a level sufficient to evaluate progress and maintain the confidential nature of jaguar location data.

Appendix IV. Ranking system for jaguar sightings and sighting form established by the Jaguar Conservation Team in 1997.

### **Ranking Criteria**

Class I-some sort of physical evidence is provided for verification

- 10 A jaguar is in the possession of the observer, via trapping, hunting, treeing by hounds, or a road-kill, and visual evidence of the sighting can be provided for verification. Examples of evidence are: photographs, videos, pelage or hair follicle, skull, or carcass.
- 9 Verifiable jaguar sign is presented for evaluation. Examples of sign are: tracks (measurable or plaster casts), scat, kill verification, or hair follicles.
- 8 A jaguar is observed, and reported separately, by two reliable individuals. Inconclusive physical evidence is provided. Examples of inconclusive evidence are shadowy photographs or incomplete measurements of tracks or scats.

Class II-Detailed information of sighting is provided. Attempts to verify the sighting will be made by the state wildlife agencies.

- 7 An experienced observer, who is familiar with wildlife in the area and spends long hours in the field reports a jaguar sighting. No physical evidence is provided. Examples of an experienced observer are: biologist, trapper, hunting guide, and naturalist.
- 6 An observer accustomed to looking for details and spending long hours in the field provides an accurate description of a jaguar. Examples of a detailed observer include bird watchers, rock collectors, and ranch hands.
- 5 An observer is not "experienced in the outdoors" but seems reliable. Examples of reliable observers include college professors, and zookeepers.

Class III-Information of a cat sighting is provided. No follow-up will be attempted.

- 4 Details of observer are vague and not specific or account is inconsistent.
- 3 Observer seems to have questionable credibility and exaggerates other events.
- 2 Observer describes a cat-like sighting.
- 1 Observer describes something besides a jaguar or provides information of no value.

**Jaguar Sighting Form**

Interviewer \_\_\_\_\_ Date \_\_\_\_\_ Class/# \_\_\_\_\_  
Observer: Name \_\_\_\_\_ (H) Telephone \_\_\_\_\_  
Address \_\_\_\_\_  
Occupation \_\_\_\_\_ (W) Telephone \_\_\_\_\_  
Recreational/Outdoor experience \_\_\_\_\_  
2ndObserver: Name \_\_\_\_\_ (H) Telephone \_\_\_\_\_  
Address \_\_\_\_\_  
Occupation \_\_\_\_\_ (W) Telephone \_\_\_\_\_  
Recreational/Outdoor Experience \_\_\_\_\_  
Other Observers \_\_\_\_\_  
Original report date \_\_\_\_\_ via phone \_\_\_\_\_ via letter \_\_\_\_\_ in person \_\_\_\_\_  
Sighting date \_\_\_\_\_ Report received by \_\_\_\_\_  
Agency \_\_\_\_\_ Address \_\_\_\_\_ Telephone \_\_\_\_\_  
Second report date \_\_\_\_\_ via phone \_\_\_\_\_ via letter \_\_\_\_\_ in person \_\_\_\_\_  
Report received by \_\_\_\_\_  
Agency \_\_\_\_\_ Address \_\_\_\_\_ Telephone \_\_\_\_\_  
Time of day and duration of sighting: \_\_\_\_\_  
Location of sun to observer: \_\_\_\_\_  
Location: (state, county, landmarks & legal description) \_\_\_\_\_  
\_\_\_\_\_ 1/4 \_\_\_\_\_ 1/4 Section \_\_\_\_\_ Township \_\_\_\_\_ Range \_\_\_\_\_ Other \_\_\_\_\_  
Describe site: (habitat type, land use, visibility, etc.) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
Description of animal: (color, markings, etc.) \_\_\_\_\_  
Body length \_\_\_\_\_ Legs and Feet \_\_\_\_\_  
Tail length \_\_\_\_\_ Head and Face \_\_\_\_\_  
Other comments: \_\_\_\_\_  
Number of animals seen \_\_\_\_\_ Distance of observation \_\_\_\_\_  
Optical aids used \_\_\_\_\_ Photograph taken \_\_\_\_\_  
Occurrence description: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
Behavior: (Describe in observer's words) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
Jaguar sign (evidence) observed in area: (tracks, scat, prey remains) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Appendix V. History of reported jaguar sightings in Arizona, 1997-2003.			
Year reported	Class	Location	Comments
1997	III-1	Patagonia Mountains	No file; account described in JAGCT notes. Not investigated.
1997	III-1	Tucson Mountains	Third-party observation; unable to confirm. Not investigated.
1997	I-9	Cerro Colorado Mountains	Animal pursued with hounds; no capture.
1997	II-7	Santa Rita Mountains	Interview too late for field investigation.
1997	II-7	Huachuca Mountains	Reported too late for field investigation.
1997	II-5	Huachuca Mountains	All black; seen from less than 50 feet. Not investigated.
1998	III-1	Elfrida	No file; account described in JAGCT notes. Not investigated.
1998	III-4	Near Marana	Reported in October. All black, details sketchy. Not investigated.
1998	III-2	Cienega Creek	Tracks reported were found to be bear tracks.
1998	II-7	Near Hereford	Reported too late for field investigation.
1998	III-2	Catalina foothills	Reported as ocelot w/ kittens. Investigated.
1998	III-2	Whetstone Mountains	Reported as jaguarundi. Not investigated.
1999	II-5	Santa Rita Mountains	Reported too late for field investigation.
1999	III-2	San Pedro/Redington	Black; reported too late to for field investigation.
1999	III-2	Tucson	Description too bobcat-like; long tail? Not investigated.
1999	III-4	Santa Rita Mountains	Reported as a dark puma; Outreach provided.
1999	III-2	Aravaipa Creek	Describes young lion; tannish-gray with spots. Not investigated.
1999	III-2	Huachuca Mountains	Investigation found that tracks were from a mountain lion.
1999	III-4	Huachuca Mountains	Describes and reported as jaguarundi. Not investigated.
1999	III-2	Catalina	Picture provided with report, bobcat.
1999	III-2	Peloncillo Mountains	Investigation found tracks reported were bear tracks.
1999	III-4	Davidson Canyon/I-10	Description vague; no evidence found.
1999	III-3	Patagonia Mountains	No actual sighting; observation by smell. Not investigated.
1999	III-2	Aravaipa Creek	Dead ocelot reported; animal was a bobcat.
2000	III-2	Benson	Investigation found tracks of multiple lions.
2000	III-4	White Mountains/Alpine	Coordination too late to obtain evidence.
2000	II-6	Oro Valley	Reported in August. Not investigated
2000	II-7	Portal	Black; interview too late for investigation.
2000	III-4	Prescott	Black; no file. Not investigated.
2000	III-2	Douglas	Small cat, ocelot-like. Not investigated.
2000	II-7	Little Dry Creek, New Mexico	Duffy sighting in Fall 1998; interview request – JAGCT. Not investigated.
2000	II-7	Gila National Forest, New Mexico	Jacobi sighting in August 1990; interview request – JAGCT. Not investigated.
2000	III-2	Hereford	Reported smaller than lion. Not investigated.
2000	III-2	Catalina	Investigation found small, bobcat-size tracks.
2000	III-2	Oracle	Description of young lion. Not investigated.
2000	III-2	California Gulch	Investigation found evidence of a Mountain lion.
2000	II-7	Baboquivari Mountains	Conflicting info reported. Investigation conducted.
2000	III-1	Dos Cabezas Mountains	Hunter found deer in tree. Not investigated.

Appendix V. History of reported jaguar sightings in Arizona, 1997-2003.			
Year reported	Class	Location	Comments
2001	III-2	Santa Rita Mountains	Juvenile male; gray with black spots; report 2002. Not investigated.
2001	III-1	Unknown	Very dark cat; first thought it was a bear. Not investigated.
2001	III-2	Phoenix	Description of bobcat. Not investigated.
2001	III-2	NW Tucson	Size was between a bobcat and a mountain lion. Not investigated.
2001	III-2	Clay Springs	Black cat photo. Investigation found it was a house cat.
2001	III-3	Flagstaff	Sighting was in the mid-1970's; reported after seeing web-site information. Not investigated.
2001	III-2	Catalina foothills	Describes jaguarundi; thinner than a mountain lion. Not investigated.
2001	II-5	Catalina foothills	Reported in Feb 2002. Not investigated.
2001	III-2	Willcox	Describes bobcats. Not investigated.
2001	III-4	Whetstone Mountains	Sighted between ½ - 1 mile away. Not investigated.
2001	III-4	Mule Mountains	Description sketchy; black cat; reported late. Not investigated.
2001	I-10	South of Tucson	Jack Childs photo.
2002	II-7	Atascosa Mountains	Black. Reported too late for investigation.
2002	III-2	Tortolita Mountains	Gray, not jaguar or lion. Investigation produced no evidence.
2002	III-1	Catalina foothills	Third party report; unable to confirm. Not investigated.
2002	III-1	Whetstone Mountains	Tracks in snow; reported one week later. Not investigated.
2002	III-3	Tucson	12 <sup>th</sup> and Valencia; reported after newspaper. Not investigated.
2002	II-6	Catalina foothills	Interview too late for investigation.
2002	III-2	East Tucson	Described as ocelot-sized animal. Not investigated.
2002	II-7	Near Amado	Reported too late for field investigation.
2002	III-3	Tucson	Saw same cat 4 years ago. Not investigated.
2002	III-4	Catalina foothills	Details sketchy; black; report late. Not investigated.
2002	III-2	Catalina foothills	Describes young mountain lion. Not investigated.
2002	II-6	San Pedro/Charleston	Observer sending track photos; none sent in. Not investigated.
2002	III-2	Green Valley	Cocoa-brown with gold spots. Not investigated.
2002	III-4	Huachuca Mountains	Dark, face spotted perhaps; report late. Not investigated.
2002	II-5	Safford	Black; A Wildlife Manager was asked to investigate.
2002	III-4	Santa Rita Mountains	Glossy black; only hindquarters seen. Not investigated.
2002	III-4	Benson	Black; rest of description vague. Not investigated.
2002	III-2	Saguaro Lake	Black; possibly jaguarundi. Not investigated.
2003	III-2	Tucson	Smaller than a mountain lion. Investigation found no evidence.
2003	II-5	Tucson	Black. Investigation found no evidence.
2003	I-10	South of Tucson	Jack Childs photo. Same jaguar as photographed in December 2001.
2003	III-4	Catalina foothills	Sighting was in Fall 2000; reported after seeing photo in newspaper. Not investigated.

Appendix V. History of reported jaguar sightings in Arizona, 1997-2003.			
Year reported	Class	Location	Comments
2003	II-7	San Pedro/Hereford	Observer tracing tracks; none received. Not investigated.
2003	III-4	Atascosa Mountains	Black with brown spots; report too late for investigation.
2003	III-2	Tortolita Mountains	Description too small. Not investigated.
2003	III-2	Catalina foothills	Reported as jaguarundi. Not investigated.

Appendix VI. History of reported jaguar sightings in New Mexico, 1997-2003.			
Year reported	Class	Location	Comments
2000	NA	SW New Mexico	Report of jaguar-like sound (roaring outside a tent). An interview was conducted, but no field investigation was conducted of the site. A field investigation of the site was attempted but was inaccessible due to weather and road conditions. The general area was searched, and no sign of any large felid was observed. This was not considered a sighting.
2002	NA	SW New Mexico	Report of jaguar-like sound (hissing emanating from a cave). An interview was conducted. No evidence of jaguar presence was identified. This was not considered a sighting.
2002	III-2	SE New Mexico	The observer initially reported a spotted cat (initially believed to be a young mountain lion after discussion with NMDGF personnel). After seeing a jaguar photo in the newspaper, the individual then reported the sighting as a jaguar. A follow-up interview was attempted, but there was no response. A field check and remote cameras revealed no evidence of jaguar. Probable mountain lion.
2002	III-2	Near Silver City	Report of road killed black cat. The carcass was salvaged and taken to University of New Mexico-Museum of Southwestern Biology. After cleaning, the specimen was identified as a mountain lion that had been covered with asphalt and run over by multiple vehicles.
2003	III-2	Near Lake Roberts	Report of black cat observed crossing the road at dusk by 2 individuals walking along the road. The sighting occurred in the same location where the reporting individual had previously observed mountain lion sign on several occasions. A field investigation was not conducted given the duration of time since the sighting and the probability of it being a mountain lion.
2003	III-2	Datil area	Secondhand report of hunter observation of a jaguar. The hunter is a seasonal firefighter, and several attempts to contact and interview the individual were unsuccessful.
2003	III-2	Near Tres Piedras	Report by motorist of jaguar crossing highway. The individual saw a cat-like animal crossing the highway and pulled over. The animal was obscured by brush, but it had spots and a long tail. A field investigation was not conducted given the age of the sighting and probability of it being a mountain lion.

## Appendix VII. Assessment of M-44s use in Arizona and New Mexico.

As part of the Jaguar Conservation Agreement (JAGCA), which was finalized and submitted to the U.S. Fish and Wildlife Service in March 1997, USDA APHIS ADC (now Wildlife Services) agreed to conduct an assessment of the risk of accidental killing of a jaguar in Arizona and New Mexico from use of M-44 devices<sup>1</sup>. These devices are used routinely to take coyotes suspected of preying on livestock. M-44 devices are currently registered for use by ADC personnel in Arizona and New Mexico and by private applicators in New Mexico. Private applicator use in New Mexico is regulated by the New Mexico Department of Agriculture. M-44s have not been nor are they currently registered for private applicator use in Arizona. Since Proposition 201 became effective July 1, 1995, M-44 use in Arizona has been prohibited on public land.

The Conservation Assessment and Strategy in the JAGCA called for an analysis of M-44 use in Cochise, Pima, and Santa Cruz Counties in Arizona and Hidalgo County in New Mexico for the previous five years. It called for determination of (1) the number and species of felids taken by such methods; (2) the amount of area worked in the above counties; and (3) expert opinion on baits that would be least likely to attract jaguars while still allowing for effective M-44 use.

Data for conducting the assessment were generated from the ADC Management Information Systems in the Arizona and New Mexico ADC programs, and using records from Federal Fiscal Years 92-93, 93-94, 94-95, 95-96, and year-to-date 96-97. These were the latest years that have been maintained in the current MIS systems and for which data were retrievable at the ADC state offices. Each fiscal year begins October 1 and ends the following September 30. Information on private applicator use and species take was obtained from the New Mexico Department of Agriculture.

The maximum potential number of M-44 devices in use by ADC personnel in the five counties at any one time during each of the five fiscal years was retrieved from the MIS records. Each number represents the sum of the maximum number of M-44s that were in the field on each cooperating property under agreement on which ADC used M-44s during each fiscal year. The actual time or number of days that each M-44 was in the field is not retrievable from the MIS system. Therefore, it must be emphasized that the numbers of M-44s shown are not the *actual* number that were present at any one time, but represent the maximum number that *could have been* present at some time during the fiscal year.

New Mexico Department of Agriculture records of private applicator M-44 use in Hidalgo County show no take of felids has ever occurred by private applicator use of this method (B.

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<sup>1</sup>The M-44 device is a spring-loaded cyanide ejector mechanism that is anchored in the ground and which uses a fetid bait to attract coyotes. When a coyote pulls up on the baited top of the device, the spring-loaded plunger is triggered so it pops upward, through a small plastic capsule containing a small (0.8 g) amount of powdered/granular sodium cyanide, into the coyote's mouth. The coyote is generally killed within seconds.

Moore, Wildlife Specialist, NMDA, pers. comm.). Currently, six private applicators are licensed to use M-44s in the county, three of which live on the same ranch. No data are available on the sizes of the ranches where private M-44 use could occur. Collectively, the six applicators have a total of 59 M-44 devices in possession. Use records indicate that about 30 of the devices may be set at any one time. BLM and USFS policies do not allow private use of M-44 devices on federal public lands. Therefore, the only land status areas on which private use of M-44 devices is allowed are private and State Trust lands in Hidalgo County.

#### M-44 BAITS TO AVOID OR MINIMIZE FELID TAKE

In general, members of the cat family are not attracted to the most commonly used M-44 baits because such baits contain fetid or rotten scented meat as the base material. Also, ADC personnel frequently incorporate glandular lures containing coyote pheromone in M-44 baits which greatly enhances species specific attraction and lessening the attractiveness to felids. When setting M-44 devices, ADC Specialists avoid techniques such as sight attractants which would make the devices more attractive to felids. These canid-specific use patterns serve to greatly reduce the risk of taking felids. **Table 1** suggests that M-44 use by ADC over the past five years has been successful in avoiding non-target felid take. Nevertheless, opinions of ADC personnel experienced with M-44 use and baits indicate that the risks to felids (members of the cat family) could be further minimized by avoiding use of any fresh meat baits, avoiding baits that rely on fresh fish as the base, and to avoid using anise oil as a bait ingredient (B. Fletcher, ADC Specialist, Hope, NM).

#### CONCLUSIONS

The above information indicates that M-44 devices have not resulted in the mortality of any felids in the affected area in the last five years despite use of these devices by ADC personnel in Arizona and New Mexico and by private applicators in Hidalgo County, New Mexico. ADC M-44 use has not been widespread in the area. It is estimated the areas with M-44 use totaled no more than about one-half of 1% of the area of the four counties in any one year. No use has occurred on National Forest lands which are presumed to encompass the majority of the habitat most likely to be used by jaguars. Although M-44 use on the New Mexico portion of the Coronado National Forest could occur, it is expected to be relatively infrequent and of low intensity. M-44 use in Arizona is only allowed on private land. In general, M-44 devices are not attractive to felids because fetid or rotten scented bait materials and, in many cases, canid-specific gland lures, are used as the attractive agents. Cats generally prefer fresh meat and are not generally attracted to bait materials that are composed of animal flesh that is in an advanced state of decomposition, and are not generally attracted to coyote pheromone. This assessment indicates accidental or incidental take of a jaguar by M-44 use is highly unlikely to occur.

#### RECOMMENDED MITIGATION MEASURES

Because the risk to jaguars from M-44 use is exceedingly small, the mitigation measures currently established in the Jaguar Conservation Assessment and Strategy (dated March 24, 1997) should be adequate to minimize risk. Those measures cover M-44 use by ADC and are:

In the event that APHIS-ADC agents kill, or cause debilitating injury that precludes successful release of, a jaguar during lawfully authorized predator control activities, the incident shall immediately be reported to the primary cooperators; the capture method resulting in such take will cease immediately within five miles of the take location and within five miles of any other location of a confirmed reliable jaguar occurrence within the preceding six months; and APHIS-ADC will consult with the primary cooperators to determine how to proceed and whether additional guidelines and/or mitigation measures should be established for use of such methods in Cochise, Pima, Santa Cruz, and Hidalgo counties.

If requested by the Jaguar Conservation Team, ADC will instruct personnel working in areas suspected to be inhabited by one or more jaguars to avoid using M-44 baits that have fresh meat or fish or anise oil as ingredients.

Appendix VIII. Checklist for suspected predator kill and track documentation guide established by the Jaguar Conservation Team in 1997.

### Checklist for Suspected Predator Kill

**Date Inspected:** \_\_\_\_\_ How located: found by AGFD personnel, reported by  
rancher, forester, hunter, other? Note which.

**Note:** Look for tracks prior to inspection and follow track documentation guide.  
Gather feces and hair samples if available. Make an extensive photographic record of the site and carcass.  
Notify Depredation Committee Leader-Warner Glenn (520) 558-2470

**Species:** \_\_\_\_\_

**Location:** \_\_\_\_\_

**Estimated time since death:** \_\_\_\_\_

**Kill site description:**

Slope direction: \_\_\_\_\_ Percent: \_\_\_\_\_

Cover vegetation type: \_\_\_\_\_

Tree or shrub species where kill is stashed: \_\_\_\_\_

**General Appearance:**

Drag marks present \_\_\_\_\_ How far dragged \_\_\_\_\_

Predator tracks present \_\_\_\_\_ Species \_\_\_\_\_

Kill covered \_\_\_\_\_ Type of debris \_\_\_\_\_

Has kill been moved \_\_\_\_\_ How many times \_\_\_\_\_

Number of burial sites \_\_\_\_\_

**Carcass Characteristics:**

Carcass fed upon \_\_\_\_\_ Percent consumed \_\_\_\_\_

Position of carcass (*on side, extended, curled up, other*) \_\_\_\_\_

Point of first feeding (*rib cage, hind quarters, front quarters, other*) \_\_\_\_\_

Use of entails (*parts missing, parts present, percent consumed*) \_\_\_\_\_

Use of muscle and fat (*front and hindquarters, neck etc. Percent consumed*) \_\_\_\_\_

**Signs of predator damage on carcass:**

Tooth marks-location \_\_\_\_\_ Claw marks-location \_\_\_\_\_

Measurements (*between canines, claws etc.*) \_\_\_\_\_

Blood on ground or carcass-describe \_\_\_\_\_

Signs of subcutaneous or internal bleeding-describe location \_\_\_\_\_

Probable means of kill (*choked, broken neck or vertebrae, other*) \_\_\_\_\_

Teeth marks on vertebrae \_\_\_\_\_ Signs of struggle or chase at kill site \_\_\_\_\_

**Assessment of predator involvement:**

Certain \_\_\_\_\_ High Probability \_\_\_\_\_ Possible \_\_\_\_\_ Predator not cause of death \_\_\_\_\_ Other \_\_\_\_\_

**Condition of prey prior to death:**

Sex \_\_\_\_\_ Age \_\_\_\_\_ Antlers or horns \_\_\_\_\_ Lactating \_\_\_\_\_ Unborn young present \_\_\_\_\_

Fat present on: intestines, liver, kidneys, heart, saddle, hips, ribs brisket. Note parts not present for examination.

Femur marrow (circle): solid or gelatinous \_\_\_\_\_ Color (circle): red, yellow, white, spotted pink, dark pink

Parasites present: Ticks \_\_\_\_\_ Load (circle): heavy, medium, light

Nose bots \_\_\_\_\_ Other parasites \_\_\_\_\_

**Evidence of old injuries or disease** \_\_\_\_\_

**Notes** (continue on back if necessary) \_\_\_\_\_

### Track Documentation Guide

Date: \_\_\_\_\_ Time: \_\_\_\_\_ Investigator: \_\_\_\_\_  
Prevailing conditions (circle): windy, cloudy, dry still, rainy, other \_\_\_\_\_

#### Track Media:

Snow (circle): wet, dry    Dry (circle): hard, soft    Mud (circle) soft, dry    Sand    Other \_\_\_\_\_

Please sketch track and mark measurements as described below. Make all measurements in millimeters. Toes are numbered from left to right.

Measurement 1: From top of the second and third toes to bottom of the lowest point of pad: \_\_\_\_\_

Measurement 2: From the outer edge of first toe to the outer edge of the fourth toe: \_\_\_\_\_

Measurement 3: From the left outer edge of the pad to the right outer edge of pad: \_\_\_\_\_

Measurement 4: From the top edge of the pad to bottom of the lowest point of the pad: \_\_\_\_\_

Each toe should be measured and there are three measurements per toe.

Toe 1:

Sketch track below:

Measurement 1: Width of toe one-third distance down from top of toe: \_\_\_\_\_

Measurement 2: Width of toe two-thirds distance down from top of toe: \_\_\_\_\_

Measurement 3: Length of toe from top to bottom: \_\_\_\_\_

Toe 2:

Measurement 1: Width of toe one-third distance down from top of toe: \_\_\_\_\_

Measurement 2: Width of toe two-thirds distance down from top of toe: \_\_\_\_\_

Measurement 3: Length of toe from top to bottom: \_\_\_\_\_

Toe 3:

Measurement 1: Width of toe one-third distance down from top of toe: \_\_\_\_\_

Measurement 2: Width of toe two-thirds distance down from top of toe: \_\_\_\_\_

Measurement 3: Length of toe from top to bottom: \_\_\_\_\_

Toe 4:

Measurement 1: Width of toe one-third distance down from top of toe: \_\_\_\_\_

Measurement 2: Width of toe two-thirds distance down from top of toe: \_\_\_\_\_

Measurement 3: Length of toe from top to bottom: \_\_\_\_\_

If track is suspected to be a jaguar, take pictures with scale indication.

Comments: \_\_\_\_\_

Appendix IX. Compensation criteria and monetary values for livestock loss attributed to jaguars established by the Jaguar Conservation Team in 1997.

Five items pertain to compensating livestock owners for losses attributed to jaguars:

1. Notification of depredation committee member-the kill site needs to be examined by someone knowledgeable about jaguar sign. The Depredation Subcommittee needs to notify the livestock associations in Arizona and New Mexico about who to notify if a jaguar is suspected of making a kill.
2. Examination of the kill site must occur within two or three days. Verification of a predator can only be successful on fresh kills. If it is impossible to tell, it may be necessary to trail with hounds until treed or bayed. This has to be done with extreme caution and as a last resort.
3. Values placed on livestock killed by jaguars needs to be reasonable (market value) but enough to fully compensate the owner for the loss. Although prices may seem high, livestock owners must feel they are being compensated fairly, causing them to want to leave the jaguar alive. The suggested values for 1997 are as follows:

Calf:	\$ 400.00
Yearling:	\$ 500.00
Cow:	\$ 600.00
Horse:	\$1500.00
Sheep:	\$ 200.00
Goat:	\$ 200.00

4. Notification of compensation fund. For as long as it lasts, the Malpai Borderlands Group has funds set aside to pay for confirmed jaguar kills. Payments can be made immediately if the need arises.
5. Upon verification, make payment to owner. Payments to owners must be made as quickly as possible by check from the fund holder.