

PROCESSES TO DEVELOP ARIZONA'S CWCS

DEVELOPMENT AND COORDINATION OF CWCS

This section describes the various workgroups, teams, and stakeholder meetings that helped develop Arizona's CWCS.

Oversight Group

The Department's Wildlife Management Division and Field Operations Division Assistant Directors, Branch Chiefs in the Wildlife Management Division, Information and Education Division, Development Branch, Law Enforcement Branch, and Funds Planning Section Manager and game and fish resource planners participated in this committee. The Oversight Group (or their alternates) met approximately on a monthly basis to provide direction and vision on development of CWCS (March 2004 through May 2005).

Specific tasks for the Oversight Group:

- Identify potential partners and interested parties (Appendix C);
- Promote internal and external outreach of CWCS efforts;
- As "process owners," ensure their staff support CWCS development efforts and meet requested deadlines for deliverables;
- Define the format and intent of Wildlife Summits, including survey questions;
- Test and evaluate draft threat matrices for the "Ecoregion Workgroup;"
- Provide guidance in structuring criteria for species of greatest conservation need, wildlife conservation strategies, plan revision process, and review of written drafts;
- Assist the CWCS Planner in specific information needs, evaluation efforts, facilitating development processes, and preparation for Commission updates.

Ecoregion Workgroups

The Department's CWCS development team included 6 regional leads (1 from each of the 6 regional offices; a Habitat or Wildlife Program Manager or Nongame Specialist), 5 Nongame Program Managers (representing taxonomic groups for native birds, mammals, reptiles/amphibians, fish, and crustaceans/mollusks) or their alternates, the Nongame Statistician, Nongame Senior GIS Analyst, the Heritage Database Management System (HDMS) Manager, CWCS Planner, a contracted planner from The Nature Conservancy (TNC), and game and fisheries specialists. The regional leads, statistician, GIS analyst, and planners were the primary authors of the CWCS plan. Other work unit staff, including representatives in the Oversight Group, assisted in writing various portions of the plan. The CWCS development team met monthly (July 2004 through February 2005). At meetings in August 2004, October 2004, and February 2005, the internal development team was augmented with representatives from state, federal, and tribal land management and regulatory agencies to produce major components of the CWCS. Participation in these meetings is documented in Appendix D.

Specific tasks for the Ecoregion Workgroups:

- Select a landscape classification system to use in Arizona's CWCS;
- Complete a threat assessment for Arizona's wildlife and wildlife habitat;

- Identify information needs and existing (or planned) operational plans, formal agreements, interagency workgroups, and recovery teams;
- Propose and define criteria for wildlife of greatest conservation need;
- Define spatially-relevant conservation goals, strategies (metrics), and monitoring efforts;
- Promote internal and external outreach of CWCS efforts;
- Assist the CWCS Planner in specific information needs, evaluation efforts, facilitating development processes, and preparation for Commission updates

Scientific Reviewers

External, recognized experts (university academics, agency professionals, independent scientists, and non-governmental organization specialists) assisted the Department by reviewing draft components of the CWCS: threat assessment, priority species criteria, and conservation strategies. This effort served as an informal peer-review process of Arizona's CWCS. These individuals on the team were involved in the CWCS review process in April and May 2005 (Appendix E).

Coordination with Land Management Partners (Element 7)

The Department regularly communicates and coordinates with numerous federal, state, tribal, and local governments, as well as private landowners, as partners in wildlife conservation planning and implementation. The Department has numerous formal partnerships through Memorandums of Understanding, conservation agreements, recovery plans, Habitat Conservation Plans, Safe Harbor Agreements, and various agreements with external agencies, tribes, local governments, and non-government organizations. Specifically for development of the CWCS, the Department invited all federal, state, and tribal land management and natural resource regulatory offices to participate in the Ecoregion Workgroup meetings and Wildlife Summit workshops. Table 5 lists external partners in both the Ecoregion Workgroup and with Wildlife Summits that helped assist in developing Arizona's CWCS.

Table 1. Department partners and interested parties that assisted in developing the CWCS.			
Federal Land Management/Regulatory Agencies:		State/Tribal Land Management/Regulatory Entities:	
USFWS	US Fish and Wildlife Service	ADHS	Arizona Dept of Health Services
USFS	US Forest Service	ADA	Arizona Dept of Agriculture
BLM	Bureau of Land Management	ASLD	Arizona State Land Dept (GIS section)
NPS	National Park Service	ASP	Arizona State Parks
NRCS	Natural Resource Conservation Service	ADEQ	Arizona Dept of Environmental Quality
FHA	Federal Highways Administration	ADOT	Arizona Dept of Transportation
USDA-WS	US Dept of Agriculture-Wildlife Services	AZ-DEMA	Arizona National Guard-Dept of Emergency and Military Affairs
USBR	US Bureau of Reclamation	ADWR	Arizona Dept of Water Resources
DOD	Dept of Defense		Hualapai Tribe
DHS	Dept of Homeland Security-Border Patrol		Hopi Tribe
Non-Governmental Organizations, Local Governments, and Various Stakeholder Workgroups:			
The Nature Conservancy		Defenders of Wildlife, SW Center	Habitat Partnership Committees

Wildlife Conservation Council	Arizona Quail Alliance	Habitat Connectivity Committee
Arizona Audubon Council	Wildlands Project	All Birds Conservation Initiative
Desert Flycasters	Arizona Wildlife Federation	Intermountain West Joint Venture
Arizona ATV Riders	Arizona-Sonoran Desert Museum	Sonoran Joint Venture
Desert Foothills Land Trust	Sky Islands Alliance	Partners In Flight
Coconino Natural Resources Conservation District	Southeastern Arizona Bird Observatory	Partners in Amphibian and Reptile Conservation
Grand Canyon Wildlands Council	Animal Defense League of Arizona	White Mt Crayfish Working Group
Mohave Sportsman Club	Tucson Herpetological Association	Native Fish Conservation Team
Coconino Sportsmen	Sierra Club, Grand Canyon Chapter	National Fish Habitat Initiative
Arizona Heritage Alliance	Maricopa County Parks and Rec	Mohave County
Center for Biological Diversity	Pima Association of Governments	Town of Superior
Arizona Native Plant Society	The Phoenix Zoo	Town of Wickenburg

Soliciting Broad Public Participation in Development of the CWCS (Element 8)

Wildlife Summits: Representatives of state and federal land management and regulatory agencies, tribal, municipal, and county governments, universities, special interest groups, agriculture and livestock affiliations, private landowner/rancher representatives, power and water utilities, sportsman groups, environmental-conservation groups, outdoor recreational groups, and land trusts were invited to participate in a series of CWCS workshops. These “Wildlife Summit” workshops were designed to address values, perceptions, and priorities for Arizona’s wildlife and natural resources among a wide diversity of the Department’s constituencies.

Four summits were held in October 2004. Two summits were in Phoenix (an agency/tribal summit on October 15 and a constituency summit on October 16) and 1 each in Flagstaff (October 23) and Tucson (October 30). For constituents, agency/tribal representatives, and the general public that were unable to attend the workshops, an online summit survey was available November 15–December 6, 2004.

Each summit was designed to accommodate up to 100 invited/registered participants (from the CWCS contact list of potential partners) to provide directed feedback on 3 topics: 1) the Department’s 12 general challenges (policies and statutory roles); 2) identify and rank important stressors affecting wildlife and natural habitats statewide; and 3) identify and rank important criteria for determining species of greatest conservation need. Each summit participant used a CoNexus® wireless keypad to respond to a prepared set of survey questions (dual-pair comparisons were used in each of the 3 topics).

The online survey, hosted on an external website (subcontracted vendor: Idea Sciences), also used the CoNexus® software to process user input. Gunn Communications, Inc. (a contracted vendor) facilitated the workshops, provided and operated the electronic response system, and compiled results for the Department. Constituency summits were held on Saturdays (as directed by the Commission), and the agency/tribal summit was held on a workday. The Wildlife Summit surveys documented stakeholder and public perceptions of wildlife and habitat issues specific to

components of Arizona's CWCS. Results from the workshops and the online survey are found in supporting documents to Arizona's CWCS (Gunn 2005a, 2005b).

Responsive management surveys: To better establish a foundation for the CWCS, the Department also relied on perspectives from a series of public opinion survey (reports from telephone interviews and sponsored workshops) on various wildlife and outdoor recreation topics. These surveys were conducted between 2001 and 2004:

- Report of the Flagstaff and Phoenix Mountain Lion Workshops - August 2004. (AGFD 2004b).
- Fishing and Hunting 1991-2001: Avid, Casual, and Intermediate Participation Trends. Addendum to the 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (Aiken 2004)
- Comprehensive Wildlife Conservation Strategy Survey—Arizona: January 2004 (Behavior Research Center 2004)
- Arizona Residents' Opinions on the Arizona Game and Fish Department and its Activities – 2004 (Responsive Management 2004)
- Economic Impact Analysis of Nonconsumptive Wildlife-Related Recreation in Arizona - May 2003 (Southwick Associates 2003)
- Arizona Residents' Opinions on the Arizona Game and Fish Department and its Activities - March 2003 (Responsive Management 2003a)
- Arizona Residents' Attitudes Toward Nongame Wildlife - February 2003 (Responsive Management 2003b)
- The Economic Importance of Off-Highway Vehicle Recreation for the State of Arizona (Silberman 2002). Jonathan Silberman, School of Management, Arizona State University.
- The Economic Importance of Fishing and Hunting for the State of Arizona (Silberman 2001). Jonathan Silberman, School of Management, Arizona State University.

A CWCS webpage on the Department's website (http://www.azgfd.com/w_c/cwcs.shtml) was launched in July 2004, concurrent with a press release that reached approximately 16,000 email subscribers, media, and partner groups. Press releases, postal mailings, phone calls, and email notifications were made to the 400+ groups/agencies/individuals on the CWCS contact list (Appendix C) in 2004 and early 2005. The CWCS webpage had a comment field for soliciting input from the public and partners on issues and concerns with developing the Arizona plan. Fifty-two CWCS-related comments were received from the Department's CWCS webpage between July 2004 and May 2005. Twelve additional comments on the CWCS effort were received through correspondence with the CWCS Planner or at Department-hosted events.

In late April and early May 2005, the Department hosted a series of open forum public meetings statewide at the start of the 30-day public review of the draft CWCS plan. These meetings were held on weeknights after the business day, and were hosted at each of the Department's regional offices at least once and the headquarters office twice. Background presentations on the CWCS and the draft plan were coupled with a question/answer session and opportunities for individuals to provide comments. Forty-two constituents and members of the general public participated in these meetings, and provided 110 comments.

All relevant comments received were considered in developing Arizona's CWCS. The Wildlife Summit and online survey reports are available to the public as Adobe PDF files through the Department's website (http://www.azgfd.gov/w_c/cwcs.shtml). Department managers and the Commission reviewed all CWCS-related comments during the development phase of the CWCS in late 2004 and early 2005.

DEVELOPING ARIZONA'S CWCS AT THE HABITAT AND SPECIES SCALES

One traditional focus of conservation efforts has been on protecting populations of rare, threatened, or endangered species (White and others 1999). More recently efforts have moved towards identifying and protecting parcels of land believed to contain highly diverse assemblages of various species. These approaches, albeit for different reasons, fall short of providing a comprehensive framework for the Department to allocate its financial and personnel resources. The initial approach conserves species that have reached the brink of extinction, but suffers because the cost and effort involved in rescuing a few species can quickly grow out of proportion to the contribution of those species to overall biodiversity; this is clearly not an efficient or effective use of limited resources. In addition, this approach removes the focus from other, more common species which are also under Department stewardship.

The second approach, focusing conservation on areas with high biodiversity, better addresses the needs of many species by conserving the underlying resources upon which they depend. However, the focus on land management puts the Department at a disadvantage because it is not a major land management agency; Department land holdings (Wildlife Areas, hatcheries, office complexes, and the Ben Avery Shooting Facility) represent only about 0.05% of the total area in the State. Instead, the Department must rely on cooperation with its conservation partners to influence their management decisions to include the needs of wildlife and wildlife habitat. In addition, many of the species under Department stewardship, from large ungulates to migratory birds, range over large areas with little regard for management boundaries. In this regard, management must be done at various spatial scales to address the needs of a diverse wildlife population across a state that is both topographically complex and heavily influenced by human activities.

Both of these approaches traditionally suffer from their focus on dynamic ecosystems without attention to the dynamic human nexus in which they operate. As the human population of Arizona continues to grow at an increasing rate (US Census Bureau 2005), the effects of human activity will put more stress on wildlife. Urban and rural growth in conjunction with increased recreation pressures often result in habitat fragmentation, deterioration, or complete habitat loss which The World Conservation Union (IUCN) has found to be the greatest threat to species worldwide (Baillie and others 2004). Therefore, stress due to human activities is expected to further impact wildlife in the future. Effective conservation planning must take into account not only the needs of the species, but also the needs of the human population and the effects of human activities on those species and their habitats. What is needed is a multi-scale conservation approach aimed at recovering species that are already at risk while simultaneously preventing

further imperilment through habitat conservation. Such an approach requires knowing which species are vulnerable and which human activities threaten them (Pulliam and Babbitt 1997).

To prevent further impacts to wildlife and to more effectively use available conservation resources, the Department has adopted a two-pronged approach to conservation planning (Fig. 1). The first prong, the left hand side of Figure 1, takes a landscape level approach, developing conservation actions to address stressors at the habitat level. This approach is meant to benefit all wildlife, both vulnerable and common species, by managing for the resources upon which they depend. An example of this type of conservation action would be to identify important wildlife movement corridors that can be protected to minimize habitat fragmentation. It is important to recognize that not all stressors act on the same scale, nor do different species react to stressors or to landscapes at the same scale. For example, raptors experience the landscape at a much larger scale than do most mammals. For raptors and many other birds, roads do not represent significant barriers to movement but for many mammals roads are a primary cause of habitat fragmentation. Arizona's CWCS uses a multi-scale approach to classifying landscapes within Arizona in order to further facilitate conservation of many species acting at different scales. Specifically, there are 4 levels of landscape classification:

1. **Statewide** - Coarse scale to address issues that are ubiquitous throughout Arizona.
2. **Ecoregion** - Wide, regional collections of species and the resources upon which they depend. The ecoregions are modified from those used by TNC in their ecoregional assessments. TNC's ecoregions are based on and closely follow the US Forest Service ECOMAP framework (Bailey 1994, 1995, 1998). Table 6 delineates the close association between TNC's ecoregions and Bailey's provinces. TNC treated all of Apache Highlands as one ecoregion; for the CWCS, the northern (and western) area is treated separately from the southern (and eastern) area. Cooperation with neighboring states and sovereign nations is also addressed at this level. This classification was adopted because the coverage extends past Arizona's borders into Mexico, tribal lands, and other States—which is anticipated to help facilitate conservation partnerships with those entities. There are 6 identified ecoregions for Arizona's CWCS:

<i>Apache Highlands North (AHN)</i>	<i>Apache Highlands South (AHS)</i>
<i>Sonoran Desert (SD)</i>	<i>Mohave Desert (MD)</i>
<i>Colorado Plateau (CP)</i>	<i>Arizona-New Mexico Mountains (AZNM)</i>

Table 6. Landscape classification schemes in Arizona: a crosswalk of TNC's Ecoregions and Bailey's Sections.	
TNC's Ecoregions	Bailey's Sections
Apache Highlands (North and West)	Tonto Transition
Apache Highlands (South and East)	Basin and Range
Arizona-New Mexico Mountains	White Mountain – San Francisco Peaks
Colorado Plateau	Grand Canyon Lands, Navajo Canyon Lands, Painted Desert
Mohave Desert	Mojave Desert

Table 6. Landscape classification schemes in Arizona: a crosswalk of TNC's Ecoregions and Bailey's Sections.

TNC's Ecoregions	Bailey's Sections
Sonoran Desert	Sonoran Colorado

- Habitat Types** - This level uses the 14 vegetation communities delineated by Brown and Lowe (1974) and 3 riparian/aquatic systems as proxies for wildlife habitat with the understanding that true habitat occurs at multiple scales. This level addresses stressors to wildlife that live in similar habitats or communities.
- Site Specific** - Fine scale for the conservation of wildlife populations with very specific habitat needs. This level also captures specific habitat features, such as: snags, nesting cavities, and caves—which are necessary for the well being of many species.

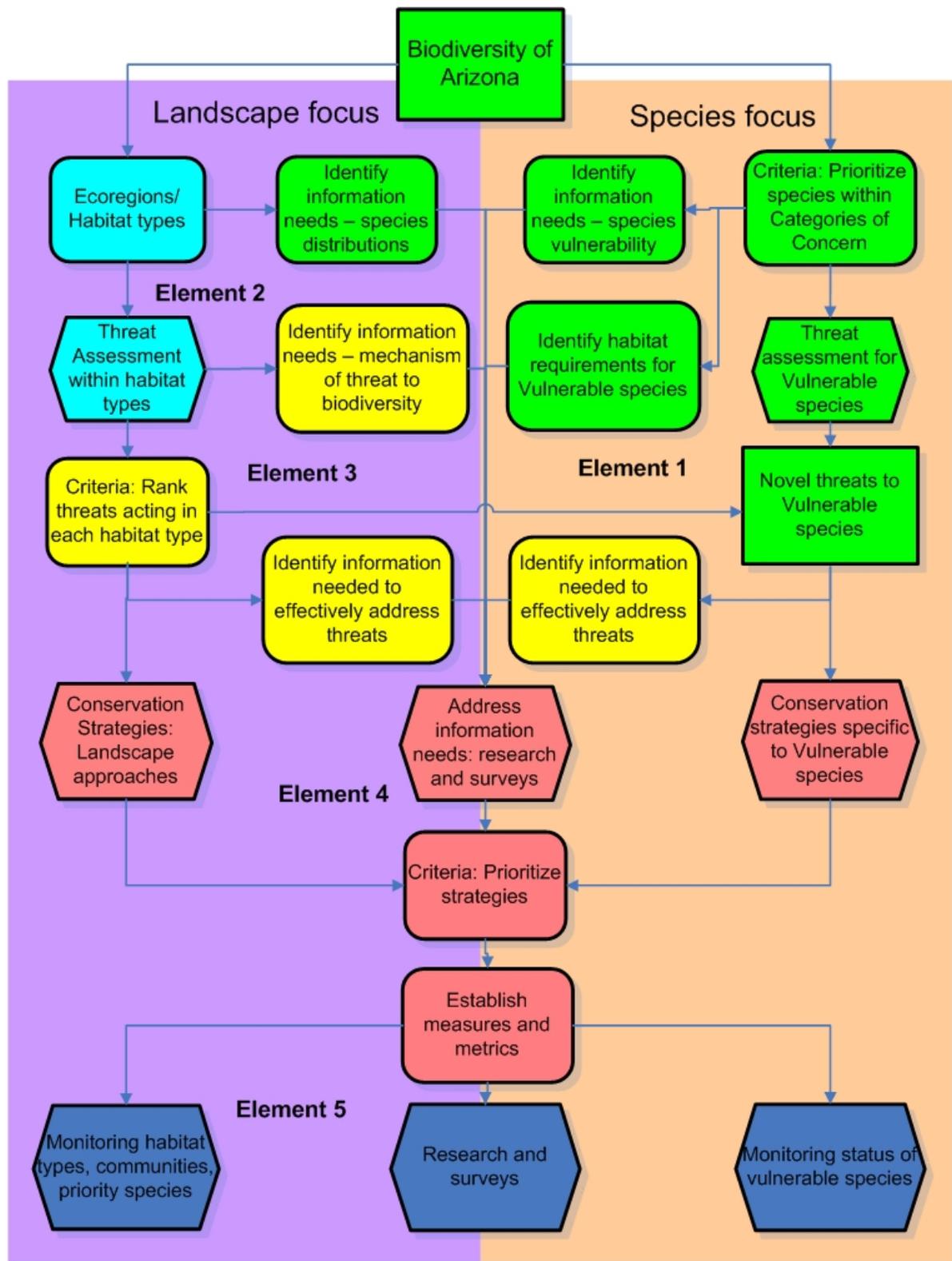


Figure 1. Two-pronged approach to wildlife conservation planning in Arizona's CWCS.

The second prong, parallel to the landscape level approach, consists of continuing and expanding species-specific activities that address the needs of species of greatest conservation need. These species require immediate and specific attention in order to halt or reverse the conditions contributing to their vulnerability.

The goals of this two-pronged approach are to proactively prevent further endangerment of all wildlife by managing the habitat on which they depend while simultaneously and aggressively managing conditions for those species which are already vulnerable. In order to accomplish those goals, a number of processes were designed to determine the status and level of threat to habitats as well as species, and then to develop conservation actions for stressors at both the habitat type and species levels. These processes are explained more fully below.

IDENTIFYING SPECIES OF GREATEST CONSERVATION NEED OR UNKNOWN STATUS (ELEMENT 1)
AND FOR MONITORING HABITAT CONDITION (ELEMENT 5)

Compilation of a Comprehensive List of Wildlife in Arizona (Element 1)

For Element 1 of Arizona's CWCS, the Department is required to identify wildlife of conservation priority—described nationally as “Wildlife of Greatest Conservation Need” (WGCN). The Department previously drafted a related list under the same name. To avoid confusion, Arizona's CWCS will instead refer to “Species of Greatest Conservation Need” (SGCN). Arizona's Title 17 language describes “wildlife” as all vertebrate species plus crustaceans and mollusks; these are the species for which the Department has statutory management responsibility. The SWG Program (developed in cooperation with the TWW Committee and mandated by the US Congress) has a broader definition of “wildlife” to encompass all species of vertebrates and macroinvertebrates, including insects and arachnids. While many state wildlife agencies (including the Department) do not have legal responsibility for insects and arachnids, some of their CWCS partners—federal, tribal, and other State agencies do have jurisdiction for these species. For the CWCS to be truly comprehensive in managing Arizona's wildlife, the Department must address the full array of wildlife in the state—game species, nongame species, sport fish, natives, nonnatives, and all macroinvertebrates.

Arizona's comprehensive list of wildlife was built on previous efforts. The Department's Heritage Data Management System (HDMS) maintains a list of all species reported to exist in Arizona. The HDMS list was checked against other species lists compiled by taxon-based programs (game species, sport fish, nongame mammals, birds, reptiles, amphibians, native fish, crustaceans, and mollusks) in the Department's Wildlife Management Division. The Department uses several Commission-approved species lists for funding eligibility among various sources: Arizona's Heritage Fund Program (a portion of Arizona Lottery revenues), and federal appropriations under the ESA Section 6 Grants, Sport Fish Restoration Act (Dingell-Johnson and Wallop-Breaux Acts), Wildlife Restoration Act (Pittman-Robertson Act), and Landowner Incentive Program.

Much of the previous work on nongame species focused on their legal protective status (ESA-listed threatened or endangered, candidates, or of State special concern). The 1988 *Threatened Native Wildlife in Arizona* (AGFD 1988) list of species is used for Department rules governing

scientific collection permits and wildlife holding permits. The March 16, 1996 version of *Wildlife of Special Concern of Arizona* (WSCA; AGFD 1996) identifies wildlife in Arizona that are regarded from a state perspective as extinct, extirpated, endangered, or threatened. The WSCA list is used by Department cooperators and outside contractors for projects developed and reviewed under environmental compliance with the National Environmental Policy Act, ESA, and other federal laws. The CWCS list of wildlife includes all taxa from these lists.

The complete list of wildlife in Arizona's CWCS includes wildlife identified from the previously mentioned lists as well as compilations of resident and migratory species developed by external partners. The master list was refined by Department taxon experts to ensure that wildlife were identified at the level they are managed. For some species, management is at the level of individual populations (for example desert tortoise), while other species are managed at the specific or sub-specific level. For clarity, the comprehensive list of wildlife is referred to in this plan as the "Master Species List" (see Appendices F through K).

The Department only considered those species whose survival depends on the quality of habitat in Arizona. Accidental and casual bird migrants were not included on the list of Arizona wildlife, nor were those species with anecdotal or unconfirmed sightings. Feral mammals and most nonnative or pet trade species that reside in Arizona were not included on the species list, but are addressed in the threat assessment under the "Nuisance animals" category. Nonnative species that are actively managed (most sport fish fall into this category) were included on the Master Species List. As a result, counts of wildlife for Arizona's CWCS may therefore not correspond exactly to counts on other Department species lists or narratives. The extensive list of insects and arachnids was not included due to insufficient data to adequately assess their management needs. In the interim, habitat types may be used as a proxy for managing these species as part of the community where they occur.

Describing Species Distributions Using Ecoregions and Habitat Types (Element 1)

Using the ecoregions and habitat types established for Arizona's CWCS, Department taxon experts used published literature and external species occurrence resources to document ecoregions and habitat types used in any life history stage by each crustacean, mollusk, and vertebrate species. Habitat types previously occupied by extirpated species were also identified. This information is compiled in a relational database and GIS layer. Other macroinvertebrates will be assessed in a later iteration of the CWCS, when more information on their occurrence and status is available.

Describing Species Status Related to Habitat- and Species-level Conservation (Element 1)

All species on the Master Species List were evaluated under the criteria outlined below. Arizona's CWCS uses 4 categories (Table 7) that reflect separate, independent ways to describe a species' conservation status. The 4 categories reflect 15 specific criteria used to evaluate each wildlife species in Arizona (Appendix L). These criteria were adapted from a list of SGCN concepts to consider by the TWW Committee (TWW 2003b), stakeholder input through Arizona's Wildlife Summit workshops (Gunn 2005a) and an online summit survey (Gunn 2005b), Department staff, and external land management and natural resource regulatory

agencies and tribes (Appendix D). These categories were designed to capture the diversity and health of Arizona’s wildlife.

Many of the 15 criteria overlap previous evaluative efforts (ESA listings or candidate reviews, WSCA, interagency sensitive species lists, and Heritage/IUCN assessments). Department taxon experts also solicited input from agency staff and outside experts to generate ratings of species for the other criteria.

Table 7. Categories for describing conservation status of wildlife in Arizona.	
Species were rated using the associated criteria under each category (see Appendix L for details).	
Status Category	Criteria
Community Focal	Keystone and strongly interactive species
	Home range size
	Habitat quality indicators
Responsibility	Responsibility status
	Administrative protection status on tribal lands in Arizona
	Administrative protection status in Mexico
Vulnerability	Federal or state legal status (ESA and WSCA)
	Extirpated status
	Imperiled status (Heritage global rank)
	Declining status
	Disjunct status
	Demographic status
	Concentration status
	Element occurrence (includes endemics)
Fragmentation status	
Unknown Status	All criteria used to score “Vulnerability” category—priority species are those for which there is not sufficient information to rate this species for ‘Vulnerability’

Wildlife Summit participants provided input on criteria to determine whether individual species should be prioritized for conservation management (Gunn 2005a, 2005b). These criteria overlapped completely with the criteria used in the CWCS, except in one aspect. Wildlife Summit participants suggested inclusion of “future threats to wildlife and natural habitats” and “potential for recovery and conservation success” as considerations for identifying species of greatest conservation need. Both of those concepts are used to prioritize CWCS conservation actions for species instead of prioritizing the species themselves. These considerations also are part of developing annual operational plans for species and habitat management, and part of the decision-making processes used by the Department and its partners for funding of wildlife-related projects.

Identifying Species of Greatest Conservation Need (Element 1)

Species on the Master List that rated "1" for any criteria under the Vulnerability category (Table 7; Appendix L) are SGCN and were designated to have the highest priority for directed conservation management. Vulnerable species require conservation actions aimed at improving conditions for those species through intervention at the population or habitat level. Over 300 species were identified as SGCN (Appendix M); however, a subset of these requires most immediate attention. Species that rated "1" for Vulnerability were further separated into 3 tiers of priorities (1a, 1b, and 1c). The criteria defined below are based on current Department stakeholder commitments, legal obligations, and species of special concern lists both within and outside of the agency. Species in Tier 1a and 1b are in most immediate need of conservation, and will be addressed as part of the initial implementation of Arizona's CWCS.

Tier 1a: Scored "1" for Vulnerability and match at least one of the following:

- Federally listed species
- Candidate species
- Existence of a signed conservation agreement
- Require monitoring following delisting

Tier 1b: Scored "1" for Vulnerability, do not match the above criteria, but do match at least one of the following:

- Is petitioned for listing
- Is high priority in the Arizona Partners in Flight Bird Conservation Plan or occurs on any of the following species of special concerns lists:
 - BLM Sensitive Species
 - USFS Sensitive Species
 - NPS Sensitive Species
 - Pima County Priority Vulnerable Species
 - Trilateral Committee Species of Common Concern
 - Federal Species of Concern
 - WSCA

Tier 1c: Scored "1" for Vulnerability, but match none of the above criteria.

Identifying Species of Unknown Status (Element 1)

For some species, insufficient information currently exists to assess the Vulnerability status of the species. Information may be lacking about population size or dynamics, or available habitat size, condition, or fragmentation. Of the 225 species that met this criterion, taxon experts identified a subset that warrants more immediate attention in the next few years. This subset included species that taxon or other scientific experts suspect might be declining, but for which definitive information was unavailable. Appropriate surveys and monitoring will be developed to determine the status of any species considered as an immediate priority. Appendix N assigns species that warrant immediate attention to ecoregions where they occur; specific information on the habitats they use is given under the respective ecoregion heading in "Ecoregion-Specific Habitat Conditions (Element 2)."

Identifying Species for Monitoring Habitat Condition (Element 5)

Species on the Master Species List that rated "1" for any criteria under the Responsibility or Community/Focal categories (Table 7; Appendix L) were designated as species that could be monitored to describe the condition of Arizona habitats. Criteria under the Responsibility category rank species higher if their global status is largely a function of their status in Arizona, if they contribute to the unique character of wildlife in Arizona compared to other parts of the United States, or if they have unique value to sovereign nations that interact with Arizona to conserve wildlife. The 'Responsibility' category was designed to give importance to species that are uniquely represented in the United States by their Arizona populations. Community/Focal species criteria indicate important ties between the species and the larger ecosystem. Ratings for all species in each ecoregion for these 2 criteria are provided in Appendices F through K.

IDENTIFYING HABITATS OF GREATEST CONSERVATION NEED (ELEMENT 2)

Habitats of Value to Communities of Wildlife

The Department is required to define and identify habitats of greatest conservation need. The classic definition of habitat is the environment in which an animal of a certain species can survive and reproduce or, more simply, any place where the species occurs (Odum 1971). Since many animals are closely associated with specific vegetation types, these are often used as proxies for habitat. However, this oversimplified definition fails to capture the spatial dimensions inherent in habitat. In reality, habitat must be defined at a scale appropriate to the organism of interest. For example, a remnant patch of desert vegetation in an urban environment might be more than sufficient to support a population of Gambel's quail, but would be seriously inadequate for a population of pronghorn antelope. Furthermore, simply protecting large natural areas from degradation is not enough to insure healthy ecosystems and habitats. One must also consider the dynamic and varied nature of ecosystems (Sanderson and others 2002).

Landscapes are not consistent in physical structure or vegetation types, but are composed of a number of different elements or patches dispersed throughout, which are in a state of constant change (Pickett and Cadenasso 1995, Koehler 2000). Landscape heterogeneity, or variation across space, is created and maintained by underlying geomorphological features such as soil and topography; disturbance processes such as fire or human activities (Pickett and White 1985, Barton 1994); climate and microclimate effects (Allen and Breshears 1998); environmental gradients (Allen and Peet 1990, Barton 1994); and sometimes the organisms themselves, like beavers (Wright and others 2002) and humans. This variability in structure and vegetation results in a non-random dispersion of wildlife and humans across the landscape. Most wildlife and humans tend to concentrate their activities in those areas that are best suited to their needs.

At some scale, many organisms rely on landscape variability for survival. A good example of this is an amphibian that spends a large part of its life in a terrestrial habitat but must return to an aquatic habitat to reproduce. Many other organisms also use multiple habitats (for example to breed, hide, or feed), rely on temporary or permanent concentrations of resources, and move around the landscape in non-random ways according to the distribution of resources (Gardner and others 1989, Szacki and Liro 1991, Etzenhouser 1998, McIntyre and Wiens 1999, Semlitsch and Bodie 2003). Questions that might be asked include: does the species depend on large,

contiguous areas of habitat or can it tolerate (or even require) some level of non-contiguous or fragmented habitat? If the species uses different habitat types, how must those types be interspersed and connected in a landscape? In other words, not only the spatial extent, but the spatial distribution of habitat patches on the landscape is important. Furthermore, movement between patches must be assured through the presence of appropriate corridors.

Arizona is a large, topographically complex state with a wide variety of land uses ranging from highly protected areas such as federal wildernesses to highly developed urban areas. Wildlife exist and use every habitat type in the state and often rely on variability within and between habitat types to survive. The Department has therefore identified all habitat types as inherently valuable to the natural heritage of Arizona and worthy of conservation actions. Using a multi-scale approach, Arizona's CWCS describes statewide, habitat-level, and regional habitat issues.

In future iterations of Arizona's CWCS, the Department hopes to further refine the landscape classification to include finer scale habitat needs. This would require a comprehensive GIS based habitat analysis, that due to time and data restraints, was not feasible at this time. Instead, the Department chose to expend effort on identifying relative stressors, species of greatest conservation need, and information gaps. During this process, the Department has identified specific data gaps that need to be addressed prior to performing a comprehensive statewide landscape analysis. These gaps include but are not limited to species distributions, species habitat needs, location of relevant structures such as right of way fencing, culverts, utility towers, location of wildlife corridors, migration pathways, locations of sensitive habitats, and direction of future growth. Many data gaps can be filled through cooperation with the Department's partners to consolidate existing or collect new information, and others will require GIS-based modeling to fill.

Concentrating on the other aspects of the plan first enabled the Department to better plan the landscape analysis necessary to identify the location and relative conditions of key habitats and communities as required in Element 2, in regards to species of greatest conservation need. Specifically, this analysis needs to identify and/or locate:

- 1) Sensitive habitats
- 2) Key wildlife corridors and migration pathways
- 3) Core habitat areas
- 4) Threatened habitat (from development)
- 5) Key conservation areas
- 6) Species richness distributions
- 7) Native-dominated riparian areas
- 8) Vegetation communities
- 9) Land uses

Habitats of Value to Species of Greatest Conservation Need

Department taxon experts described the distributions of all species in Arizona by identifying occupied habitat types within each ecoregion (Appendices F through K). Distributions of SGCN requiring immediate attention are also listed in "Ecoregion-Specific Habitat Conditions (Element 2)" under each ecoregion (Table 16 through Table 21).

ASSESSING STRESSORS/THREATS TO ARIZONA'S WILDLIFE AND WILDLIFE HABITATS (ELEMENT 3)

Arizona's biodiversity—the number and types of species and genetic resources—is the result of the climate, geography, and biological history of this region. The biological resources of Arizona are not a random assemblage, but a co-evolved one. The ability to conserve these resources now and into the future depends on the ability to integrate human activities into the landscapes in a way that least disturbs Arizona's ecosystems. Not all human activities are equally disruptive of the natural processes in this State, so the most effective conservation will address stressors that have the largest impact, and those that are emerging in the next decade.

Generating a Comprehensive List of Stressors in Arizona

To develop a list of potential stressors to wildlife and natural habitats in Arizona, Department staff adapted national conventions for describing categories and classes of threats (CMP 2004a). This framework was used by many other States in their CWCS plans as a standard for naming and defining threats, and will aid in addressing and working on multi-state conservation issues. (Table 8). State, federal, and tribal partners assisted the Department in conducting a detailed threat assessment for the CWCS that identified important stressors specific to wildlife resources in Arizona. Many identified stressors in Arizona's threat assessment are based on legal and accepted recreational or economic pursuits, national security actions, or for public safety/use.

Table 8. National convention of threat categories and classes used in Arizona's CWCS threat assessment.	
Threat Category	Threat Class
<i>Habitat Conversion</i> - Intentional conversion of natural habitat that is detrimental to wildlife use and survival; causes loss or degradation of wildlife habitat and available forage.	Housing and urban development
	Agricultural operations
	Recreation areas
	Destructive resource harvesting
	Management of nature to improve human welfare
<i>Transportation and Infrastructure</i> - Development of corridors/passages for transportation use, movement of resources, and relaying communications; increases wildlife mortality and fragmentation of wildlife habitat.	Military activities
	Roads
	Railroads
	Overhead utility lines and towers
<i>Abiotic Resource Use</i> - Extraction or use of rock, minerals, metals, fuels, and water; causes direct or indirect impacts to wildlife habitat.	Shipping Lanes
	Drilling
	Mining
<i>Consumptive Use of Biological Resources</i> - Harvest or use of plant and animal populations that impacts wildlife distribution and fitness, or ecosystem processes.	Water use
	Hunting, trapping, and fishing
	Gathering
	Forest and woodland management

Table 8. National convention of threat categories and classes used in Arizona's CWCS threat assessment.

Threat Category	Threat Class
<i>Non-consumptive Resource Use</i> - Activities that have an incidental but negative impact to wildlife or their habitats.	Grazing
	Motor-powered recreation
	Non-motorized recreation
	Military activities
	Scientific research
<i>Pollution</i> - Introduction and spread of unwanted matter and energy into ecosystems from point and non-point sources; causes increased mortality of wildlife and degradation of their habitats and available forage.	Chemicals and toxins
	Nutrient loads
	Solid waste
	Waste or residual materials
	Noise from low-level flights
	Light pollution
<i>Invasive Species</i> - Introduction and/or spread of unwanted nonnative and native organisms into ecosystems; increases wildlife predation, competition, and reduced fitness or loss of wildlife habitat and available forage.	Invasive plants
	Invasive animals
	Pathogens
	Introduced genetic material
<i>Climate Change</i> - Long-term changes linked to global warming and ozone depletion; causes increased mortality of wildlife and degradation of their habitats and available forage.	Habitat shifting and alteration
	Climate variability
<i>Changes in Ecological Processes</i> - Alteration of ecological processes outside of the natural range of variation, to the detriment of wildlife and their habitats.	Habitat-wide processes
	Species-linked processes

Under the classes, stressors are listed and described so that their relevance is in a statewide context. For instance, the threat category 'Habitat Conversion' is universally understood to mean loss or destruction of natural habitat; change in land use may further habitat fragmentation and/or degradation. Under the category of 'Habitat Conversion,' all States using this convention will include a class for 'Recreational sites and facilities,' but only some States will highlight 'ski resorts' as a specific stressor.

A detailed threat assessment was conducted to identify and evaluate a list of stressors to wildlife and natural habitats in Arizona. During these threat assessments, Ecoregion Workgroup participants (Appendix O) identified stressors that were unique or of greater influence to borderland areas in both the Sonoran Desert and Apache Highlands South ecoregions. "International Border Issues" include direct or indirect impacts to wildlife and wildlife habitat from illegal immigration or smuggling traffic and enforcement efforts. These same stressors were addressed differently in each state with border issues; the Department opted to create a new category for this issue, since existing stressor classes for military activities, for instance, do not

encompass behaviors of illegal border traffic, nor do they highlight the barrier created to wildlife movement by all of these activities along a linear border.

Arizona's original CWCS included a Core Plan that corresponds to the current Executive Summary, and was approved by the Commission. The following table of threat categories and classes encompass the stressors identified during the Ecoregion Workgroup's threat assessment and deemed feasible for conservation action in the initial implementation of Arizona's CWCS (Table 9).

Table 9. Threat categories and classes originally addressed by conservation actions in Arizona's CWCS.	
Threat Category	Threat Class
Habitat Conversion - Intentional conversion of natural habitat that is detrimental to wildlife. Wildlife use of the area or survival are jeopardized due to degradation of wildlife habitat and available forage.	Housing and urban development
	Agricultural operations
	Recreation areas
	Destructive resource harvesting
	Management of nature to improve human welfare
Transportation and Infrastructure - Development of corridors/passages for transportation use, movement of resources, and relaying communications that increases wildlife mortality or fragmentation of wildlife habitat.	Roads
	Railroads
	Overhead utility lines and towers
Abiotic Resource Use – Extraction or use of rock, minerals, metals, fuels, and water that causes direct or indirect negative impacts to wildlife habitats.	Drilling
	Mining
	Water use
Consumptive Use of Biological Resources – Harvest or use of plant and animal populations in a manner that negatively impacts wildlife distribution and fitness, or ecosystem processes.	Gathering
	Forest and woodland management
	Grazing
Non-consumptive Resource Use – Activities that have an incidental, but negative impact to wildlife or their habitats.	Motor-powered recreation
	Non-motorized recreation
Pollution - Introduction and spread of unwanted matter and energy into ecosystems from point and non-point sources that causes increased mortality of wildlife or degradation of their habitats and available forage.	Chemicals and toxins
	Nutrient loads
	Solid waste
	Waste or residual materials
	Noise from low-level flights
Invasive Species - Introduction and/or	Invasive plants

Table 9. Threat categories and classes originally addressed by conservation actions in Arizona's CWCS.

Threat Category	Threat Class
spread of unwanted nonnative and native organisms into ecosystems outside their natural range that increases wildlife predation, competition, and reduced fitness or loss of wildlife habitat and available forage.	Invasive animals
	Pathogens
	Introduced genetic material
Changes in Ecological Processes - Alteration of ecological processes outside of the natural range of variation, to the detriment of wildlife and their habitats.	Habitat-wide processes
	Species-linked processes

Identifying Stressors in each Habitat Type

Representatives from State and federal land management agencies, natural resource regulatory authorities, and Native American tribes were invited to participate in a threat assessment for Arizona's CWCS. Two Ecoregion Workgroup meetings were held in August 2004, one in Phoenix for the southern half of the State and one in Flagstaff for the northern half. Participants worked in break-out groups representing each ecoregion (Appendix D) where they provided local expertise in evaluating stressors. To ensure the comprehensiveness of this assessment, teams of at least 10 people who had expertise in ecosystems and particular species or taxonomic groups were formed for each ecoregion (Appendix D).

Table 10. Rating criteria for components used to estimate the importance of each stressor in the Arizona CWCS threat assessment.

Component: Magnitude			
Rating:	Area Affected:	Or % Targets Affected:	Or Degree of Impact:
Extreme (4)	Throughout (>50%)	Most or all (>50%)	Severe damage or loss
High (3)	Widespread (15-50%)	Many (25-50%)	Significant damage
Medium (2)	Scattered (5-15%)	Some (5-20%)	Moderate damage
Low (1)	Local or none (<5%)	Few or none (>5%)	Little or no damage
Component: Urgency			
Rating:	Time that impacts start:	Likelihood of threat in next 10 yrs:	
Extreme (4)	Current (<1 yr)	Existing (100%)	
High (3)	Imminent (1-3 yrs)	High probability (50-99%)	
Medium (2)	Near-term (3-10 yrs)	Moderate probability (10-49%)	
Low (1)	Long-term (>10 yrs)	Low probability or None (0-9%)	
Conventions adapted from Salafsky and others (2003)			

Each group was asked to evaluate impacts from each stressor in terms of the individual components of Magnitude and Urgency, using the ratings low, medium, high, or extreme (Table

10). Participants were asked to score these 2 components for each vegetation community or riparian/aquatic system within in each ecoregion to: 1) describe the extent to which each stressor is an issue now or is expected to become an issue in the near future; and 2) describe the extent of impacts from each stressor on ecosystem processes by affecting species diversity, resilience, and primary productivity.

Once individual stressors were scored, the importance of each stressor per landscape was rated as low, medium, high, or extreme based on the Magnitude and Urgency components. The ratings were translated into scores of 1, 2, 3, or 4, respectively. Next, values for the 2 components were multiplied together, and their square-root taken to get an overall importance value that also ranged from 1 to 4. Stressors evaluated to have a high (3) to extreme (4) level of impact to landscape structures or processes were flagged for developing a list of conservation strategies and actions/opportunities. Important stressors to wildlife and wildlife habitat are described under "Major Stressors Affecting Habitat" under each habitat type in "Ecoregion-Specific Habitat Conditions (Element 2)."

Identifying Stressors to SGCN

Stressors may have a different impact on a single species than they have on the community; indeed stressors that do not significantly impact entire communities may nonetheless have considerable impact on individual species. Stressors that impact SGCN in Tier 1a and Tier 1b were identified by Department taxon experts. Stressors were considered if they have high or medium impacts to each species. For this exercise, the stressor categories provided by CMP (2004a) were further expanded to include "Species-level stressors" that encompasses stressors that impact species but not landscapes.

Trade-Offs to Make a Comprehensive Threat Assessment Less Complex

In these assessments, there are some trade-offs related to the Department's attempts to make the threats open to evaluation by wildlife and habitat experts. One trade-off is that each stressor is identified in the fashion it is most easily understood. For example, the impacts of recreational facilities are many and diffuse, but are traditionally and most effectively addressed at the point source, so resource managers tend to consider these impacts (from habitat conversion, pesticide and fertilizer use, water consumption) under one heading. Other stressors arise from non-point sources, and are addressed by managers where they have impacts. Thus, "soil erosion" arises from many sources, but managers are aware of it by its impacts. In order for stressors to be described as they are perceived by resource managers, there should be no expectation that individual stressors are mutually exclusive.

Since different stressors may measure the same activity, there is no way to effectively add together the impact of all stressors in a given habitat type. For example, roads are constructed in the service of livestock and agriculture operations, public utility maintenance, woodland and forest management, and off-highway vehicle recreation. All of these activities are treated separately as potential stressors, as is road building itself. It would therefore not be reasonable to add together the magnitude of all these threats in a habitat type.

Interactions between potential stressors were not considered, due to the magnitude of such a task. There are essentially an infinite number of ways to consider interactions among a list of approximately 70 individual potential stressors. It is clear that some of the individual stressors that were evaluated are also interrelated in ways that have significant impacts on wildlife and natural habitats. For example, “nonnative plant invasion,” “road building,” and “altered fire regimes” present risks to wildlife that could be addressed collectively.

DEVELOPING CONSERVATION STRATEGIES AND IDENTIFYING INFORMATION NEEDS (ELEMENT 4)

Active management to benefit species may be targeted at individual species or at the habitats they use. One set of priority conservation actions was developed assuming that restoration of ecosystem structure, processes, and functions would provide the most benefit to the most species. Some species, however, are already in compromised status, and warrant attention to impacts that may have only local effects. In the parallel process for species-level conservation planning, conservation actions were prioritized based on their ability to address stressors impacting SGCN.

Prioritizing Conservation Actions Based on Impact to Habitat Types

Through the threat assessment exercise (see “Identifying Stressors in each Habitat Type”), stressors with the largest magnitude and immediacy were identified for each habitat type in each ecoregion. For each stressor, a comprehensive list of actions was compiled that could be taken to reduce major impacts. Any action addressing significant stressors in a habitat type has priority under Arizona's CWCS. The stressors are compiled by ecoregion and habitat type in “Ecoregion-Specific Habitat Conditions (Element 2),” whereas the comprehensive list of appropriate actions for each of these stressors is under “Conservation Actions to Address Stressors to Habitats (Element 4).”

For each stressor that was identified as important in at least one habitat type within Arizona, Ecoregion Workgroup participants developed comprehensive lists of actions or opportunities that would reduce the effect of each stressor. At the same time, the groups identified some barriers to effectively addressing these threats; these barriers were compiled as “information needs.” Information needs were identified at each stage in the CWCS planning process. These information needs and the conservation actions were rolled up into less operational “strategies” that are reported in Table 3 and Table 4.

Each conservation action will be considered for operational planning as appropriate. The Department uses a 3-tiered planning approach with implementation plans developed to address specific operational plan elements, each of which must tier to specific strategic plan elements (“Implementation of Conservation Actions, Surveys, and Research,” below). Conservation actions will be implemented where feasible and appropriate, subject to applicable environmental compliance review, and in cooperation with key land managers. CWCS actions are comprehensive in scope—many are outside of the Department's authority and direct control, but identify goals to be developed and implemented by other key stakeholders (Appendix P). Note that Appendix P recommends key partners for implementing each strategy, but does not imply commitment of any specific entity to those tasks.

Prioritizing Conservation Actions Based on Impact to SGCN

For each of the stressors identified for each SGCN in Tier 1a or Tier 1b, Department taxon experts identified conservation actions that would have the most impact to benefit the species. These conservation actions were selected from the comprehensive list of actions developed for these stressors having impacts at the habitat-level, or novel actions were developed to address species-specific needs. The list of Tier 1a and Tier 1b species, high and medium impact stressors, and species-specific conservation actions are in "Conservation Actions to Address Stressors to SGCN (Elements 3, 4)."

Information Needs for Species of Greatest Conservation Need

Presently, the Department does not have detailed habitat requirements for all SGCN. Information on the status and distribution of Arizona's wildlife is documented in hundreds of existing technical reports developed by the Department's Research Branch and Nongame and Endangered Wildlife Program, as well as game management surveys by the Department's regional offices and Game Branch. Arizona's Heritage Data Management System (HDMS) abstracts for Arizona wildlife are available through the Department website (http://azgfd.gov/w_c/edits/species_concern.shtml). Presently, the Department has not compiled detailed habitat requirements for all SGCN. Most research and baseline information from the above sources lacks information on habitat needs (or thresholds), and instead documents suitable or preferred habitats.

In order for the Department to develop conservation planning integrating all SGCN at appropriate habitat scales, gaps in the understanding of habitat requirements for some species will have to be addressed. Arizona's current CWCS plan addressed this uncertainty by using the same habitat types to classify all SGCN. These habitat types are closely related to the distribution reporting in Appendices F through K. Questions about the distributions of some species remain. Using the scoring system in Table 2, Department taxon experts evaluated their confidence in the distribution used to report each species. These scores are given in the Master species lists in Appendices F through K.

These uncertainties regarding species distributions and habitat requirements are addressed under the first 2 information needs in Table 3.

Table 2. Scoring used to report confidence in species' distributions.	
Rating	Confidence level
1	Completely confident
2	Somewhat confident
3	Information from possibly outdated sources
4	Not confident

Implementation of Conservation Actions, Surveys, and Research

Over the past 6 years, the Department has directed its Nongame and Endangered Wildlife Program to develop multispecies conservation plans that address management needs at larger, landscape levels. These multispecies plans represent the future direction of the Department to

address species with and without specific legal protection status. This CWCS highlights those multi-species and -agency plans that have already been developed and implemented, and describes similar plans that are in development. Like the existing multispecies and habitat-oriented Arizona Bat Conservation Strategic Plan and the Arizona Bird Conservation Initiative, planning efforts that are underway will include identification of conservation needs. Conservation actions from Arizona's CWCS will be directly incorporated in future plans and will result in interagency cooperation towards these ends.

For its specific implementation commitments, the Department uses a 3-tiered planning process that includes Strategic, Operational, and Implementation planning. The CWCS is unique in that it identifies stressors, threats, and actions that are pertinent to all 3 planning levels. The Department's Strategic plans are developed for each of the 4 Department programs: Wildlife Management, Watercraft, Off-Highway Vehicle, and Business Administration. However, an effort is currently underway to develop one Strategic Plan for the Department that covers all programs. Before strategic planning is finalized, it undergoes review and approval by the Arizona Game and Fish Commission. Once adopted, strategies are used for operational planning; the second tier of the Department's planning process (AGFD 2004a). The 4 Department programs pass approved strategies to the following 6 focal areas within each program: Conservation, Recreation, Information and Education, Laws and Law Enforcement, Research, and Administration. In the third tier of planning, individual work units develop annual Implementation Plans. Actions identified in the plan provide focal areas for both Operational and Implementation plans.

Concurrent to the development of any of those plans, priorities of CWCS will need to be assessed and integrated into the plans. CWCS strategies and actions built in to plans represent partnership opportunities or may be completed solely by the Department. CWCS strategies and actions not included in Department plans provide opportunities for external partner conservation actions.

CWCS RELATIONAL DATABASE

All data collected and generated during the CWCS processes are stored in one centralized relational database (CWCS database). The CWCS database is meant to be "living" in that any changes or edits to numerous components of the CWCS can be made in real time and instantly compiled, linked, and applied to all other relevant areas. For example, a change to a single stressor would automatically be reported at the habitat type and species levels, and in applicable planning documents. In addition, the centralized location of all data facilitates sharing of information and planning across work units and among cooperators. The structure of the CWCS database is complex but can be conceptualized as consisting of four main areas: Species, Stressors, Habitat types and Documents. Each of these areas consists of multiple tables which are interrelated and will be explained in more detail below. Figure 2 shows the simplified structure of the CWCS database. The main areas of the CWCS database are shown in the large boxes. Arrows connecting those boxes, indicate relationships between different areas. The direction of the arrow indicates the type of relationship. For example, the double headed arrow between "Stressors" and "Habitat types" indicates that all Stressors are linked to one or more "Habitat

types” and all “Habitat types” are linked to one or more “Stressors”. The single headed arrow between “Species” and “Documents” indicates that while all “Documents” are linked to one or more “Species”, the converse is not necessarily true. Not all “Species” are linked to specific “Documents”.

The species section of the database contains the Master Species List of all wildlife that are managed in Arizona. Species information may be retrieved grouped by taxon or by the individual species scientific or common name. Each species is linked to specific information including but not limited to: scores for all criteria used to determine species status (Table 7), conservation priority level (Appendix L), the habitat types used by the species (Table 16 – Table 21), species specific stressors, and actions to address those stressors (see “Conservation Actions to Address Stressors to SGCN (Elements 3, 4)”). This allows any species or group of species to be retrieved based on geographic distribution, vulnerability status, and/or threat level.

The stressors section contains all data collected during the threat assessment exercise (Appendix O). The main table for this section contains a comprehensive list of habitat type and species level stressors, their definitions, and the stress categories to which they belong. Stressors are linked to habitat types and the scores for magnitude and urgency (Table 10) within each of the habitat types. In addition, as indicated in Figure 2, each stressor is associated with specific conservation actions (See “Conservation Actions to Address Stressors to Habitats (Element 4)”) which may be applied at either the habitat or species level.

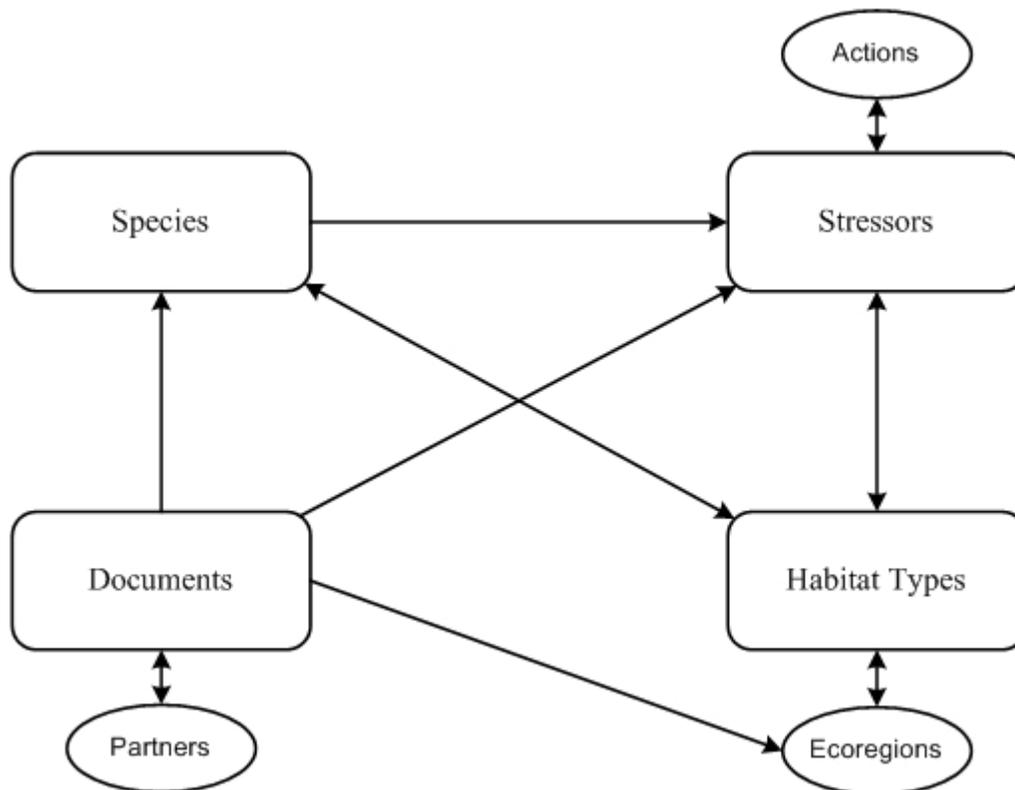


Figure 2. Structure of the CWCS Relational Database

The habitat types section of the database contains a comprehensive list of all habitat types in Arizona. The habitat types are linked to ecoregions, species, and stressors. This section also links the CWCS database to a geographical information system (GIS) allowing species and stressors to be placed in a spatial context.

The documents portion of the database contains references to planning documents and conservation agreements, both signed and draft, that the Agency is involved with. Each document is linked to the ecoregions, species, and stressors that it applies to (Appendix P). In addition, documents are linked to a separate table containing the partners involved in each plan. This section also provides a document tracking mechanism which facilitates cooperation between work units and among cooperators. The Department plans to expand this section of the CWCS database to include habitat types and conservation actions specific to each document. These additions will allow the CWCS database to be linked to the Field Operations Division database in order to track the implementation of conservation actions. At the current time most documents in the CWCS database are conservation agreements and planning documents. In the future, the Department will also be adding MOU's and other pertinent conservation documents to the CWCS database.

MONITORING AND ADAPTIVE MANAGEMENT (ELEMENT 5)

To develop the Monitoring and Adaptive Management sections for the State's CWCS, existing Department processes were first assessed and then additional components were identified in order to better align implementation and monitoring with Arizona's CWCS.

Monitoring

Current monitoring programs are established depending upon the Department's commitments, resources and funding priorities. By necessity, the 183 SGCN species in Tier 1a and 1b comprise the majority of monitoring efforts and were designed to fulfill requirements of various conservation agreements, recovery plans, safe harbor agreements, and others. The Department has established and participates in other monitoring programs with a variety of intended goals and histories of development, as illustrated in the following partial list. Habitat and species monitoring are integral to management of a number of properties owned by the Department (for example, Sipe native fish monitoring). Through the Department's Heritage Fund IIAPM program, various "windows" (eligible species, habitats or conservation needs) are identified for which proposals are solicited for research and monitoring. The Department has benefited greatly from this program which has resulted in current and planned monitoring (for example, narrow-headed gartersnake surveys and monitoring). Habitat management plans have been developed with other agencies (for example, San Pedro Habitat Management Plan). In addition, the Department participates in ongoing cooperative efforts with nongovernmental organizations and the private sector (for example, Audubon Society IBA's and Christmas Bird Counts).

Despite the Department's active involvement in large-scale monitoring activities, clearly there remain many gaps in our understanding of management and conservation needs of Arizona's

wildlife. Arizona's CWCS plan addresses conservation needs for species that do not necessarily qualify under other existing funding "windows." For instance, of the 183 Tier 1a and tier 1b species 144 are not identified as threatened or endangered under the ESA. Lack of monitoring for these species will be remedied under CWCS. The Department is continually engaged in the development of monitoring efforts, and over the past 6 years has directed its Nongame and Endangered Wildlife Program to develop multispecies conservation plans that address management needs at larger, landscape levels. These multispecies plans represent the future direction of the Department to address species without specific legal protection status, and will complement existing monitoring priority given to Tier 1a and 1b species and those for which funding is available. This CWCS highlights those multi-species and -agency plans that have already been developed and implemented, and describes similar plans that are in development. Like the existing multispecies and habitat-oriented Arizona Bat Conservation Strategic Plan and the Arizona Bird Conservation Initiative, planning efforts that are underway will include identification of monitoring and conservation needs.

This new type of planning that is underway is also notable in that, where possible, it tiers from national and/or regional conservation planning efforts. This has enabled the state plans to implement standards that are understood and applied in other projects in Arizona and throughout North America. This sort of standardization of monitoring measures and metrics is an active area of work in wildlife conservation, and much of it is still in development (for example, Gibbs and others 1998, Dinsmore and others 2002, MacKenzie and others 2003, Schoonmaker and Luscombe 2005).

Although several land management agencies plan to develop regional habitat monitoring guidelines/plans, none are yet in process in that apply to Arizona. Instead, during this transition period at least, the Department will build on its existing strengths by utilizing existing and proposed monitoring of individual and multispecies groups to capture the conditions of habitats where they occur. To this end, the Department has identified 116 Responsibility species and 311 Community/Focal species that are resources for describing habitat conditions.

Adaptive Management

Additional CWCS Ecoregion Workgroup meetings will need to be convened with Department partners and other stakeholders to define quantifiable performance measures and identify partner priorities among the list of conservation actions and information needs. The Department's Nongame and Endangered Wildlife Program is in the process of developing taxon-based management plans, similar to the efforts already completed for bird species with the Arizona Partners In Flight Conservation Plan (Latta and others 1999) and for bats in the Arizona Bat Conservation Strategic Plan (Hinman and Snow 2003). These taxon-based plans are envisioned as implementation plans, bridging the strategic goals of the CWCS with the operational activities and stakeholder responsibilities identified in numerous recovery plans, conservation agreements, and other partnership-designed initiatives and agreements.

Because implementation plans must tier to existing strategic goals and operational approaches, reporting on these plans can be used to report on accomplishments under CWCS. A Field Operations Division (FOD) database for prioritizing and tracking work activities is currently in

use. The database allows for the activities to be linked to specific reporting criteria such as CWCS stressors, and can be modified to link the updates to any reporting mechanism entered into the program. These work unit activity databases, along with associated narrative, become their annual Implementation Plans. Further incorporation of CWCS reporting will be accomplished by linking the FOD database to the CWCS database.

REVISIONS TO THE CWCS WITHIN A 10-YR TIMEFRAME (ELEMENT 6)

The Oversight Group developed a schedule for review and revising Arizona's CWCS (Table 3). This review process will be synchronized with the Department's 2-year budget planning cycle that is approved by the State's Executive and Legislative branches. Arizona's CWCS will be evaluated internally prior to the start of each 2-yr budget process to allow the Department opportunities to amend the CWCS to address changing priorities, variations in habitat and environmental conditions, and to adaptively manage based on wildlife and habitat responses to conservation actions or treatments. A "CWCS Implementation Team," likely comprised of Department representatives from the Oversight Group and Ecoregion Workgroup, will conduct the 2-yr cycle internal reviews.

Table 3. Schedule for CWCS review and revision aligned with the Department's budget cycle.											
FY05		FY06		FY07		FY08		FY09		FY10	
July-1-2004 to June-30-2005		July-1-2005 to June-30-2006		July-1-2006 to June-30-2007		July-1-2007 to June-30-2008		July-1-2008 to June-30-2009		July-1-2009 to June-30-2010	
Develop initial CWCS plan		Submit CWCS for approval in July 2005				Internal review - amend CWCS by Apr 2008				4-yr review partners / public in Feb 2010	
Budget process		2-yr budget process				2-yr budget process				Budget process	
CWCS 10-yr timeframe		Year 1		Year 2		Year 3		Year 4		Year 5	
FY11		FY12		FY13		FY14		FY15		FY16	
July-1-2010 to June-30-2011		July-1-2011 to June-30-2012		July-1-2012 to June-30-2013		July-1-2013 to June-30-2014		July-1-2014 to June-30-2015		July-1-2015 to June-30-2016	
		Internal review - amend CWCS by Apr 2012				4-yr review partners / public in Feb 2014				Internal review - amend CWCS by Apr 2016	
Budget process		2-yr budget process				2-yr budget process				Budget process	
Year 5	Year 6	Year 7		Year 8		Year 9		Year 10		Year 1	
Note: State fiscal year (FY) is not aligned with the Federal fiscal year (October 1 to September 30 of the following year). Each 2-yr budget cycle process starts in Spring of the second half of the fiscal year, with the proposed budget to the Commission in June, the State's Office of Strategic Planning and Budget review in August, and to the State Legislature in January of the next fiscal year.											