

**ARIZONA'S
COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY:
2005-2015**



Arizona Game and Fish Department
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FOREWORD

Duane L. Shroufe, Director
Arizona Game and Fish Department

March 31, 2005

Arizona's Comprehensive Wildlife Conservation Strategy is the opportunity of a lifetime that many people and organizations have worked for decades to create.

Wildlife management in the 20th century was influenced by the 1937 Pittman-Robertson and 1954 Dingell-Johnson acts. The former brought funding and stability to game management programs in state wildlife agencies. The latter accomplished the same thing for sport fish management. Both programs rely on user fees (excise taxes) to generate funds to ensure, through state programs, that many wildlife resources would thrive and continue to provide enjoyment for future generations.

Nongame wildlife and endangered species programs were provided for, and mandated, by the 1973 Endangered Species Act and 1980 Forsythe-Chafee Act. However, no dedicated funding for state programs was provided.

Fortunately, the picture began to change in 1994 with a national grassroots effort to establish permanent funding for nongame wildlife. Although that initiative, Teaming With Wildlife, has yet to generate dedicated funds comparable in amount and stability to those provided by Pittman-Robertson and Dingell-Johnson, it led to enactment of the Wildlife Conservation and Restoration Program in 2001 and its 2002 successor, State Wildlife Grants. With these programs, Congress began to provide much-needed funds, for conservation of the full array of wildlife with emphasis on species that were not adequately funded or that were imperiled and in need of conservation attention.

Congress intended that these 2 programs provide enough funding to stem the rising tide of federally-listed endangered and threatened species. Congress required each state accepting funding to produce a Comprehensive Wildlife Conservation Strategy before October 2005, to describe how over the next 10 years it would meet the challenges of managing wildlife in the 21st Century.

Congress also required that states build their Comprehensive Wildlife Conservation Strategies through collaboration with stakeholders and interested parties, whether private, public, or tribal. This broad public participation must be well documented. Perhaps even more important, partnerships and new partnership opportunities must be evident throughout the implementation strategies. Strategies across the Nation are expected to collectively articulate a vision of public engagement in planning and delivering a comprehensive wildlife conservation program. Imagine 50 states, 5 territories, and the District of Columbia working toward the same goal: wildlife conservation, with a clear commitment to inform and educate the public about wildlife resources, conservation needs, and opportunities to enjoy wildlife through wildlife watching, sustainable use, or the pursuits of an armchair enthusiast.

Little more than a decade ago, as the Teaming With Wildlife initiative was born, the leaders of our state wildlife agencies and countless collaborators set in motion a change that will have a profound impact on our agencies, on our staffs, and on our constituents.

Are we ready? On behalf of the Arizona Game and Fish Commission and Department, I invite you to join us in proving that we are all ready. Together we can make this Strategy a living, working, evolving partnership for effective stewardship of our diverse and abundant living wildlife legacy.

Duane L. Shroufe
Director, Arizona Game and Fish Department

The Department's mission:

To conserve, enhance, and restore Arizona's diverse wildlife resources and habitats through aggressive protection and management programs, and to provide wildlife resources and safe watercraft and off-highway vehicle recreation for the enjoyment, appreciation, and use by present and future generations.

ARIZONA'S COMPREHENSIVE WILDLIFE CONSERVATION STRATEGY: 2005-2015

INTRODUCTION

The Arizona Game and Fish Commission (Commission) and Department (Department) serve the people of Arizona as stewards of the State's wildlife. These resources are a public trust, managed for the benefit of present and future generations. Under Arizona Revised Statutes Title 17, the Commission and Department are vested with the authority to manage the State's wildlife.

Wildlife management is influenced by many factors. Some factors, such as drought, wildfire, and changes in human population demographics are beyond the Department's authority. In addition, many or most of the resources upon which wildlife depend—primarily habitat—reside on lands not owned by the Department. Therefore the Department relies on the cooperation of multiple partners (private, state, federal, and tribal) with whom they share stewardship responsibility for conserving wildlife resources.

WILDLIFE CONSERVATION IN ARIZONA

Arizona has a rich biological diversity of wildlife and wildlife habitats—Arizona ranks third in the nation for the number of native bird species, second for reptiles, fifth for mammals, and eighth for overall vertebrate animal diversity (Stein and others 2000). Efforts to conserve these invaluable resources have been robust and productive over the last 75 years. The Commission

and Department were created in 1929 by a citizen initiative to protect and enhance the State's wildlife, primarily game species and later sport fish. In the late-1960s, Arizona became the first state in the country to dedicate a full-time employee (Richard Todd) to nongame wildlife conservation. The State of Arizona has a long record of commitment and achievement in wildlife conservation.

Through the 1980s and 1990s, the Department became widely acknowledged by its peers as being among the Nation's preeminent state wildlife agencies. Numerous national and regional awards affirmed the Department's achievements and leadership roles. Many factors contributed to this recognition, among them: the significance of state wildlife and habitat issues, the depth and breadth of its programs, the expertise and accomplishments of its staff, and the strength and effectiveness of its partnerships and public support. Game management, sport fish management, and nongame and endangered wildlife management were and continue to be the foundation for Arizona's wildlife legacy.

As the significance of wildlife and habitat issues grew, the need for change and even greater accomplishment became clear. Programs that had historically been relatively independent, and often single-species based, needed to become more integrated and holistic. A focus on landscape-level conservation to achieve greater efficiency and effectiveness was needed as pressures on wildlife and wildlife habitat grew along with an ever-increasing human population. Also, the agency's role as the management authority of Arizona's wildlife resources began to evolve toward facilitator and enabler, with more emphasis on collaborative, voluntary conservation partnerships to complement and sometimes replace more traditional regulatory approaches.

As the state and national economies changed, the need for even greater fiscal responsibility to achieve the most value for the dollar became clear. Wildlife management followed the example of successful private businesses, where best business practices dictated that priorities needed to be set and progress toward goals and objectives needed to be measurable, reported, and carefully evaluated so constant improvement could be achieved.

The Comprehensive Wildlife Conservation Strategy is designed to address these needs and requirements. It focuses partnership efforts on conservation at the landscape level, to address stressors that constrain wildlife conservation and wildlife-related recreation opportunities. In addition to limiting the quality of human life in wildlife-rich Arizona, these stressors often limit wildlife-related contributions to our economy. Wildlife is an important and growing component of numerous local economies (Silberman 2001, Southwick Associates 2003).

This Strategy provides a 10-year vision for achievement, subject to adaptive management and improvement along the way under the watchful eye of the Commission and its partners. The Strategy covers the entire State, from low desert to alpine tundra. In any given area, it provides the Department and its partners a clear sense of what needs to be done, and opens the door to a variety of ways to get it done. It also provides opportunities for many partners to take leadership roles in getting it done. Collaboration and synergy will be key to shared success, and shared success will be key to continued Congressional support for the programs that help fund the partnerships.

The plan that follows necessarily uses specialized language and is simplified by the use of acronyms to refer to programs, agencies. See Appendices A and B, respectively, for clarification of terms and acronyms.

CWCS AND THE STATE WILDLIFE GRANT PROGRAM

As a funding requirement of the State Wildlife Grants program (TWW 2003a), Congress charged each of the 56 States and Territories (hereafter referred to as ‘States’) with developing a statewide “Comprehensive Wildlife Conservation Strategy” (CWCS). These strategies will provide an essential foundation for the future of wildlife conservation and a stimulus to engage the States, federal agencies, and other conservation partners to strategically think about their individual and coordinated roles in prioritizing conservation efforts. State fish and wildlife agencies are leading the strategy development process with the aim to create a strategic vision for conserving the States’ wildlife. While each strategy will reflect a different set of issues, management needs, and priorities, the States are working together to ensure nationwide consistency and a common focus on targeting resources to prevent wildlife from declining to the point of endangerment. These efforts are being coordinated through the Teaming With Wildlife Committee (a standing committee of the International Association of Fish and Wildlife Agencies) at a national level. To remain eligible for State Wildlife Grant funding, State strategies need to be submitted to the National Advisory Acceptance Team by October 1, 2005, for evaluation and approval. In addition to the aforementioned requirements, these plans must be reviewed at least every decade (TWW 2003b).

EIGHT REQUIRED ELEMENTS OF THE CWCS

Congress identified 8 required elements to be addressed in each State’s wildlife conservation strategy (TWW 2003c). Congress also directed that the strategies must identify and be focused on the “species in greatest need of conservation,” yet address the “full array of wildlife” and wildlife-related issues. The strategies must provide and make use of these 8 elements:

- (1) Information on the distribution and abundance of species of wildlife, including low and declining populations as the State fish and wildlife agency deems appropriate, that are indicative of the diversity and health of the State’s wildlife; and,
- (2) Descriptions of locations and relative condition of key habitats and community types essential to conservation of species identified in (1); and,
- (3) Descriptions of problems which may adversely affect species identified in (1) or their habitats, and priority research and survey efforts needed to identify factors which may assist in restoration and improved conservation of these species and habitats; and,
- (4) Descriptions of conservation actions proposed to conserve the identified species and habitats and priorities for implementing such actions; and,

(5) Proposed plans for monitoring species identified in (1) and their habitats, for monitoring the effectiveness of the conservation actions proposed in (4), and for adapting these conservation actions to respond appropriately to new information or changing conditions; and,

(6) Descriptions of procedures to review the strategy at intervals not to exceed 10 years; and,

(7) Plans for coordinating the development, implementation, review, and revision of the plan with Federal, State, and local agencies and Indian tribes that manage significant land and water areas within the State or administer programs that significantly affect the conservation of identified species and habitats.

(8) Congress also affirmed through this legislation that broad public participation is an essential element of developing and implementing these plans, the projects that are carried out while these plans are developed, and the Species in Greatest Need of Conservation that Congress has indicated such programs and projects are intended to emphasize.

Arizona CWCS Element Guide (Road Map)

This guide is provided for the National Advisory Acceptance Team for the purpose of evaluating Arizona’s Comprehensive Wildlife Conservation Strategy (CWCS or Strategy) in addressing the 8 required elements. Section titles may be abbreviated. Only the beginning page number is given.

Element 1: Information on the distribution and abundance of species of wildlife, including low and declining populations as the state deems appropriate, that are indicative of the diversity and health of the state’s wildlife:		
NAAT Guidance	Section	Page
A. The Strategy indicates sources of information (for example, literature, data bases, agencies, individuals) on wildlife abundance and distribution consulted during the planning process.	Identifying Species of Greatest Conservation Need (Element 1)	32
B. The Strategy includes information about both abundance and distribution for species in all major groups to the extent that data are available.	Describing Species Distributions Using Ecoregions and Habitat Types (Element 1)	30
	Appendix F. Master Species List for the Apache Highlands North Ecoregion	575
	Appendix G. Master Species List for the Apache Highlands South Ecoregion	594
	Appendix H. Master species list for the Arizona-New Mexico Mountains Ecoregion	617
	Appendix I. Master species list for the Colorado Plateau Ecoregion	632
	Appendix J. Master species list for the Mohave Desert Ecoregion	654
	Appendix K. Master species list for the Sonoran Desert Ecoregion	679
	There are plans for acquiring information about species for which adequate abundance and/or distribution information is unavailable.	Identifying Species of Unknown Status (Element 1)
	Unknown Status Species and Monitoring Needs	528

Element 1: Information on the distribution and abundance of species of wildlife, including low and declining populations as the state deems appropriate, that are indicative of the diversity and health of the state’s wildlife:

NAAT Guidance	Section	Page
C. The Strategy identifies low and declining populations to the extent data are available.	Table 16. Tier 1a and 1b SGCN associated with each habitat type in Apache Highlands North.	91
	Table 17. Tier 1a and 1b SGCN associated with each habitat type in Apache Highlands South.	111
	Table 18. Tier 1a and 1b SGCN associated with each habitat type in the Arizona-New Mexico Mountain Ecoregion.	134
	Table 19. Tier 1a and 1b SGCN associated with each habitat type in the Colorado Plateau Ecoregion.	153
	Table 20. Tier 1a and 1b SGCN associated with each habitat type in the Mohave Desert Ecoregion.	172
	Table 21. Tier 1a and Tier 1b SGCN associated with each habitat type in the Sonoran Desert Ecoregion.	190
	Appendix M. All SGCN in Arizona	716
D. All major groups of wildlife have been considered or an explanation is provided as to why they were not. The State may indicate whether these groups are to be included in a future Strategy revision.	Compilation of a Comprehensive List of Wildlife in Arizona (Element 1)	29
E. The Strategy describes the process used to select the species in greatest need of conservation. The quantity of information in the Strategy is determined by the State with input from its partners, based on what is available to the State.	Soliciting Broad Public Participation in Development of the CWCS (Element 8)	23
	Identifying Species of Greatest Conservation Need (Element 1)	32
	Appendix L. Criteria for Scoring Arizona Wildlife under 4 Conservation Categories	707

Element 2: Descriptions of locations and relative condition of key habitats and community types essential to conservation of species identified in (1):

NAAT Guidance	Section	Page
A. The Strategy provides a reasonable explanation for the level of detail provided; if insufficient, the Strategy identifies the types of future actions that will be taken to obtain the information.	Developing Arizona’s CWCS at the Habitat and Species Scales	25
	Identifying Habitats of Greatest Conservation Need (Element 2)	33
B. Key habitats and their relative conditions are described in enough detail such that the State can determine where (in which regions, watersheds, or landscapes within the State) and what conservation actions need to take place.	Arizona’s Wildlife and Habitats (Element 2)	47
	Statewide Condition of Arizona’s Terrestrial and Riparian/Aquatic Habitat Types (Element 2)	75
	Ecoregion-Specific Habitat Conditions (Element 2)	85
	Areas of Conservation Priority within each Habitat Type	207

Element 3: Descriptions of problems which may adversely affect species identified in (1) or their habitats, and priority research and survey efforts needed to identify factors which may assist in restoration and improved conservation of these species and habitats:

NAAT Guidance	Section	Page
A. The Strategy indicates sources of information (for example, literature, databases, agencies, or individuals) used to determine the problems or threats.	Assessing Stressors/Threats to Arizona’s Wildlife and Wildlife Habitats (Element 3) Appendix O. Magnitude and urgency scores used to determine stressors with significant impacts in each of the major habitat type in each ecoregion	35 727
B. The threats/problems are described in sufficient detail to develop focused conservation actions.	Stressors that Impact Wildlife and Wildlife Habitats (Element 3)	50
C. The Strategy considers threats/problems, regardless of their origins (local, State, regional, national and international), where relevant to the State’s species and habitats.	Stressors that Impact Wildlife and Wildlife Habitats (Element 3) Major Stressors Affecting Habitat (Element 3) - AHN Major Stressors Affecting Habitat (Element 3) - AHS Major Stressors Affecting Habitat (Element 3) - AZNM Major Stressors Affecting Habitat (Element 3) - CP Major Stressors Affecting Habitat (Element 3) - MD Major Stressors Affecting Habitat (Element 3) - SD Conservation Actions to Address Stressors to SGCN (Elements 3, 4)	50 95 118 138 157 175 195 234
D. If available information is insufficient to describe threats/problems, research and survey efforts are identified to obtain needed information.	Developing Conservation Strategies and Identifying Information Needs (Element 4) Actions to Address Information Needs Related to Stressors	40 504
E. The priority research and survey needs, and resulting products, are described sufficiently to allow for the development of research and survey projects after the Strategy is approved.	Actions to Address Information Needs Related to Stressors	504

Element 4: Descriptions of conservation actions determined to be necessary to conserve the identified species and habitats and priorities for implementing such actions:		
NAAT Guidance	Section	Pages
A. The Strategy identifies how conservation actions address identified threats to species of greatest conservation need and their habitats.	Developing Conservation Strategies and Identifying Information Needs (Element 4)	40
B. The Strategy describes conservation actions sufficiently to guide implementation of those actions through the development and execution of specific projects and programs.	Conservation Actions to Address Stressors to Habitats (Element 4)	213
	Conservation Actions to Address Stressors to SGCN (Elements 3, 4)	234
C. The Strategy links conservation actions to objectives and indicators that will facilitate monitoring and performance measurement of those conservation actions (outlined in Element #5).	Identifying Species for Monitoring Habitat Condition (Element 5)	33
	Tracking Progress	529
D. The Strategy describes conservation actions (where relevant to the State’s species and habitats) that could be addressed by Federal agencies or regional, national or international partners and shared with other States.	Conservation Actions to Address Stressors to Habitats (Element 4)	213
	Conservation Actions to Address Stressors to SGCN (Elements 3, 4)	234
	Appendix P. Conservation and planning documents directing activities by the Department and its cooperators	759
E. If available information is insufficient to describe needed conservation actions, the Strategy identifies research or survey needs for obtaining information to develop specific conservation actions.	Actions to Address Information Needs Related to Stressors	504
	Unknown Status Species and Monitoring Needs	528
F. The Strategy identifies the relative priority of conservation actions.	Conservation Actions to Address Stressors to Habitats (Element 4)	213
	Conservation Actions to Address Stressors to SGCN (Elements 3, 4)	234

Element 5: Proposed plans for monitoring species identified in (1) and their habitats, for monitoring the effectiveness of the conservation actions proposed in (4), and for adapting these conservation actions to respond appropriately to new information or changing conditions:		
NAAT Guidance	Section	Page
A. The Strategy describes plans for monitoring species identified in Element #1, and their habitats.	Monitoring and Adaptive Management (Element 5)	44
	Monitoring and Adaptive Management (Element 5)	521
	Table 22. Summary of ongoing and planned SGCN and habitat condition monitoring efforts currently carried out by Arizona Game and Fish Department and cooperators.	530
	Appendix P. Conservation and planning documents directing activities by the Department and its cooperators	759
B. The Strategy describes how the outcomes of the conservation actions will be monitored.	CWCS Relational Database	42
	Tracking Progress	529
C. If monitoring is not identified for a species or species group, the Strategy explains why it is not appropriate, necessary or possible.	Monitoring and Adaptive Management (Element 5)	521

Element 5: Proposed plans for monitoring species identified in (1) and their habitats, for monitoring the effectiveness of the conservation actions proposed in (4), and for adapting these conservation actions to respond appropriately to new information or changing conditions:

NAAT Guidance	Section	Page
D. Monitoring is to be accomplished at one of several levels including individual species, guilds, or natural communities.	Monitoring and Adaptive Management (Element 5)	521
E. The monitoring utilizes or builds on existing monitoring and survey systems or explains how information will be obtained to determine the effectiveness of conservation actions.	Tracking Progress	529
	Table 22. Summary of ongoing and planned SGCN and habitat condition monitoring efforts currently carried out by Arizona Game and Fish Department and cooperators.	530
	Appendix P. Conservation and planning documents directing activities by the Department and its cooperators	759
F. The monitoring considers the appropriate geographic scale to evaluate the status of species or species groups and the effectiveness of conservation actions.	Table 22. Summary of ongoing and planned SGCN and habitat condition monitoring efforts currently carried out by Arizona Game and Fish Department and cooperators.	530
	Appendix P. Conservation and planning documents directing activities by the Department and its cooperators	759
G. The Strategy is adaptive in that it allows for evaluating conservation actions and implementing new actions accordingly.	CWCS Relational Database	42
	Tracking Progress	529

Element 6: Descriptions of procedures to review the Strategy at intervals not to exceed 10 years:

NAAT Guidance	Section	Page
A. The State describes the process that will be used to review the Strategy within the next 10 years.	Revisions to the CWCS within a 10-yr Timeframe (Element 6)	46

Element 7: Plans for coordinating, to the extent feasible, the development, implementation, review, and revision of the Strategy with Federal, State, and local agencies and Indian tribes that manage significant land and water areas within the state or administer programs that significantly affect the conservation of identified species and habitats:

NAAT Guidance	Section	Page
A. The State describes the extent of its coordination with and efforts to involve Federal, State and local agencies, and Indian Tribes in the development of its Strategy.	Coordination with Land Management Partners (Element 7)	22
	Table 5. Department partners and interested parties that assisted in developing the CWCS.	22
B. The State describes its continued coordination with these agencies and tribes in the implementation, review and revision of its Strategy.	Table 5. Department partners and interested parties that assisted in developing the CWCS.	22
	Implementation of Conservation Actions, Surveys, and Research	41
	Revisions to the CWCS within a 10-yr Timeframe (Element 6)	46

Element 8: Provisions to ensure public participation in the development, revision, and implementation of projects and programs. Congress has affirmed that broad public participation is an essential element of this process:		
NAAT Guidance	Section	Pages
A. The State describes the extent of its efforts to involve the public in the development of its Strategy.	Table 5. Department partners and interested parties that assisted in developing the CWCS.	22
	Soliciting Broad Public Participation in Development of the CWCS (Element 8)	23
B. The State describes its continued public involvement in the implementation and revision of its Strategy.	Revisions to the CWCS within a 10-yr Timeframe (Element 6)	46

HOW THE CWCS WILL BE USED

Currently, the Department operates under separate strategic plans for its Wildlife, Watercraft, and Off-Highway Vehicle programs. Each program’s strategies drive operational plans and implementation plans at the work unit level. As these 3 programs and the Business Administration program are brought together in the Department’s next-generation strategic plan, *Wildlife 2012*, the CWCS will provide an essential link between the broader wildlife elements of the strategic plan and the details of the operational and implementation plans. Thus, strategies from the CWCS are delineated in each of the 4 programs for 6 designated focal areas: Conservation, Recreation, Information and Education, Laws and Law Enforcement, Research, and Administration (AGFD 2004a).

For Department cooperators, the CWCS provides guidance to partner agencies, tribes, local governments, private landowners, business/industry affiliations, universities, and non-government organizations by identifying wildlife and habitat conservation goals and information needs at a strategic level. These conservation strategies and information needs apply to various spatial scales—statewide, regional, and site specific—and can be integrated into revisions of land management plans (for example: U.S. Forest Service forest plans, Bureau of Land Management habitat management plans, Department of Defense natural resource management plans, U.S. Fish and Wildlife Service Refuge System management plans, and local government/private landowner participation in Safe Harbor Agreements or Habitat Conservation Plans). The CWCS is one nexus for potential funding and improved coordination of partner-based conservation activities.

Arizona’s CWCS is not designed to replace or duplicate the Department’s existing wildlife management strategic plan, *Wildlife 2006* (AGFD 2001). Both plans serve different needs and reporting objectives—*Wildlife 2006* meets the Department’s responsibilities for managing Arizona’s wildlife under Title 17 obligations to the State, while the CWCS meets the Department’s eligibility to receive State Wildlife Grant funding. The objectives and approaches defined by Arizona’s CWCS will be used to prioritize federal “wildlife diversity” funds, matched with support from other sources, to ensure the implementation of conservation activities.

EXECUTIVE SUMMARY

ARIZONA'S APPROACHES FOR CONSERVATION

Arizona's CWCS is a document that plans for the conservation of species and their habitats. Working at large and small landscape scales, the plan first develops conservation actions to address stressors to habitats. This approach is meant to benefit all wildlife, including both vulnerable and common species, by managing for the habitat and resources upon which they depend. An example of this type of conservation action would be to identify important wildlife movement corridors and protecting them to minimize habitat fragmentation. To facilitate conservation of many species acting at different scales, Arizona's CWCS uses a multi-scale approach to classifying habitat types within Arizona. Specifically, there are 4 levels of classification:

1. **Statewide:** Coarse scale to address issues that are ubiquitous throughout Arizona.
2. **Statewide habitat types:** Based on the 14 vegetation communities identified by Brown and Lowe (1974), and 3 riparian/aquatic systems. This level addresses issues to wildlife that live in similar habitats or communities throughout Arizona.
3. **Ecoregion-level habitat types:** Ecoregions encompass regional collections of species and the resources upon which they depend. By describing each habitat type within specific ecoregions, this scale brings in regional issues. Ecoregions provide the appropriate scale for cooperation with neighboring states and sovereign nations on broad conservation efforts. There are 6 identified ecoregions for Arizona's CWCS:
 - Apache Highlands North
 - Apache Highlands South
 - Sonoran Desert
 - Mohave Desert
 - Colorado Plateau
 - Arizona-New Mexico Mountains
4. **Site Specific:** Fine scale for the conservation of specific habitat features (such as snags, nesting cavities, or caves) that are necessary for the well being of many species.

The species-level approach to conservation planning consists of continuing and expanding species-specific activities that address the needs of species of high conservation priority. These species require immediate and specific attention in order to halt or reverse the conditions contributing to their vulnerability. Whereas the habitat-level approach addresses resource needs of all species in that landscape, the species-focused approach aggressively manages conditions for those species which are already vulnerable.

DEVELOPING ARIZONA'S CWCS WITH INPUT FROM AGENCY PARTNERS (ELEMENT 7) AND THE PUBLIC (ELEMENT 8)

Various administrative and technical teams, stakeholder meetings, public input, responsive management surveys, and databases contributed to developing Arizona's CWCS:

- Oversight Group (Department divisional and work unit chiefs)
- Ecoregion Workgroup (Department technical staff and cooperating federal, state, and tribal resource managers and technical staff)
- Scientific Review Team (species experts, academics, and agency/non-government organization professionals)
- Stakeholder committees and councils (for various taxon-related or habitat conservation projects)
- Databases with new and existing management plans and agreements for conserving species and habitats
- Public opinion surveys on various wildlife-related and outdoor recreation topics
- Wildlife Summit workshops and open forum public meetings
- Department website (with comment field and background information on the CWCS)

In the development of the CWCS, the Department used extensive outreach to inform and encourage participation from the public and potential partners: 20 staff presentations; 28 presentations to external agencies, stakeholder councils, and non-government organizations; 4 media press releases (that generated at least 6 newspaper articles statewide); and email subscriber announcements to over 16,000 interested individuals and organizations. Coordination meetings between Department staff and federal agency representatives from local district offices provided another opportunity to engage partners in the CWCS development.

Among the 4 Wildlife Summit workshops held in October 2004 (2 in Phoenix and 1 each in Flagstaff and Tucson), 54 participating constituents provided initial input into developing major components of the CWCS. Summit participants provided 119 individual comments during group discussions of Department general challenges, funding allocations among challenges, ranking important stressors to wildlife and wildlife habitat, and proposing criteria for identifying Wildlife of Greatest Conservation Need (Gunn 2005a). An additional 418 constituents participated in an online Wildlife Summit survey, conducted between November 15 and December 6, 2004 (note: 256 of these participants completed the entire survey). Online survey participants provided 183 comments on the CWCS and related wildlife issues in Arizona (Gunn 2005b).

Forty-two constituents participated in a series of 8 public meetings on the CWCS draft plan, held statewide in late April and early May 2005. These participants provided 110 comments on the CWCS. An additional 52 CWCS-related comments were received through the Department's website between July 2004 and May 2005. Twelve comments were also received through correspondence with the Department's CWCS Planner or at Department-hosted events during this same timeframe.

SPECIES OF CONSERVATION PRIORITY (ELEMENT 1)

The Department rated all managed taxa in Arizona based on need for specific conservation attention (Element 1; "Vulnerable Species") and for lack of information about their vulnerability status (Element 1; "Unknown Status Species"). The Department simultaneously rated all taxa for value as an ecosystem engineer or indicator ("Community Focal Species") and relative

importance of Arizona as a management entity for this taxon (“Responsibility Species”). Both of these latter categories were used to identify species suitable for monitoring habitat condition (Element 5).

“Processes to Develop Arizona’s CWCS” describes the process used to evaluate the State’s wildlife under these categories. Specific criteria were adapted from input of the Teaming With Wildlife Committee (TWW 2003d), stakeholder input through Arizona’s Wildlife Summit workshops (Gunn 2005a), an online summit survey (Gunn 2005b), Department staff, external land management and natural resource regulatory agencies, and tribes.

Table 1 provides a count of wildlife taxa that were identified as 10-year priorities for conservation in Arizona. The lists of all wildlife in each ecoregion of Arizona are in Appendices F through K, with their ranking under each category; wildlife of immediate (2-3 year) conservation priority is listed under habitat types in each ecoregion.

	Total in Arizona ^A	Tier 1a ^B	Tier 1b ^B	Tier 1c ^B	Responsible	Community Focal	Unknown Status
Amphibians	32	3	9	6	7	9	1
Birds	297	9	40	52	7	199	36
Fish	72	24	9	2	21	33	0
Crustaceans & Mollusks ^C	86	7	21	2	25	26	44
Mammals	164	10	25	32	41	37	54
Reptiles	145	4	22	33	15	7	25
Total	796	57	126	127	116	311	160

^A: The Master Taxon List includes only those species that can be effectively managed in Arizona. For instance, transient, casual, and rare birds that occur unpredictably are not included.

^B: Tier 1a, 1b, and 1c represent all vulnerable species or the species of greatest conservation need.

^C: Other macroinvertebrates not evaluated at this time due to insufficient data.

The Department manages species at the species, subspecies, or population level, depending on legal requirements and protections, interagency coordination, stakeholder concerns, funding eligibility, national or international reporting conventions, and/or taxonomic determinations through scientific documentation. Counts of wildlife for Arizona’s CWCS may therefore not correspond exactly to counts on other Department species lists or narratives.

Species on the Master List that rated high under the Vulnerability category 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 Vulnerable; however, a subset of these requires most immediate attention. Species that rated high for Vulnerability were further separated into 3 tiers of priority (1a, 1b, and 1c). For the current effort, stressors with high and moderate impacts to species in Tier 1a and Tier 1b were identified, and specific actions were outlined to address these stressors.

HABITATS OF GREATEST CONSERVATION NEED (ELEMENT 2)

For the purposes of Arizona’s CWCS, habitat was defined in terms of 17 vegetation types distributed among 6 ecoregions. Of those vegetation types, 4 fall under the general category of desertscrub and represent the 3 deserts in the state (Chihuahuan, Mohave, and Sonoran); 3 represent the state’s grassland; 5 are forests and woodlands ; 3 represent aquatic systems and associated riparian areas; 1 is tundra and 1 is human-dominated systems. Because the premise of Arizona’s CWCS is that conservation of habitats will benefit whole communities of wildlife, all vegetation types/aquatic systems were treated as habitats in need of conservation. To customize conservation planning within each habitat, the Ecoregion Workgroup assessed important stressors within each habitat type within ecoregions (“Assessing Stressors/Threats to Arizona’s Wildlife and Wildlife Habitats (Element 3)”) and developed actions to address those stressors to benefit the majority of wildlife within each habitat (“Conservation Actions to Address Stressors to Habitats (Element 4)”).

Table 2. Habitat types in each ecoregion.

Habitat type	Apache Highlands South	Apache Highlands North	Arizona – New Mexico Mtns	Colorado Plateau	Mohave Desert	Sonoran Desert
Lower Colorado Sonoran Desertscrub					X	X
Upland Sonoran Desertscrub	X	X			X	X
Chihuahuan Desertscrub	X	X				X
Mohave Desertscrub		X		X	X	X
Semidesert Grassland	X	X			X	X
Plains & Great Basin Grassland	X	X	X	X	X	
Subalpine Grassland			X	X		
Chaparral	X	X	X	X	X	X
Madrean Evergreen Forest	X	X	X			X
Great Basin Conifer Forest	X	X	X	X	X	X
Montane Conifer Forest	X	X	X	X	X	
Subalpine Conifer Forest		X	X	X		
Alpine Tundra			X			
Human-dominated landscapes	X	X	X	X	X	X
Wetlands/Springs	X	X	X	X	X	X
Streams/Rivers	X	X	X	X	X	X
Lakes/Reservoirs	X	X	X	X	X	X

Where should Arizona focus attention within each habitat? The statewide habitat analysis that will comprehensively address this question has not yet been initiated. This task will need to be completed in the near future as new data on Arizona’s wildlife resources is compiled. As an initial step in this process, Department staff started by focusing on the fine grain analysis, linking all wildlife in Arizona to the habitat it occupies, and then prioritizing species for conservation attention. Location of these species is the finest scale of analysis for habitats in greatest need of conservation. Appendices F through K list all vertebrate, crustacean, and mollusk taxa in each habitat type separately for each ecoregion. Table 2 summarizes which habitat types are found in each ecoregion.

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

Over the past 500 years the landscapes of Arizona have changed dramatically. Anyone traveling across Arizona today will not come across any habitat that has not been affected by humans. Dams have been placed on rivers, developed urban and rural areas have increased in size, roads and fences were built throughout the state, and plant communities have been drastically altered. All of these changes have impacted wildlife. The Ecoregion Workgroup threat assessment addressed stressors that are important because they impact whole communities of wildlife (landscape focus) or because they impact species that are priorities for conservation right now (species focus).

At the landscape scale, stressors were evaluated for the magnitude and immediacy of their impacts to the structure and function of each habitat type in each ecoregion. This assessment identified stressors that impact larger communities of wildlife. At the species level, significant stressors to SGCN in Tier 1a and 1b were identified. A description of both processes can be found under “Assessing Stressors/Threats to Arizona’s Wildlife and Wildlife Habitats (Element 3).”

All together, the Department and cooperators identified 70 separate stressors that have serious impacts to at least one habitat type in Arizona. An additional 4 stressors act at the species but not landscape scale. Many of these stressors are related to 4 current themes: a rapidly increasing human population, changes to water storage and delivery systems in the Southwest, alteration of communities by invasive nonnative species, and the ongoing drought and warming trend. Although many traditional land use activities continue to have large impacts on wildlife, many of these activities have changed in nature and magnitude in recent decades. The Department anticipates that the subset of stressors related to population pressures and water use will grow in importance for their impact on biodiversity in Arizona.

INFORMATION NEEDS FOR ARIZONA’S CWCS (ELEMENT 3)

The Ecoregion Workgroup identified potential barriers to effectively addressing important stressors to wildlife and wildlife habitats. Many of these barriers were compiled as “information needs” (Table 3).

Table 3. Information needs for Arizona's CWCS.

Emphasis	Information Needs
Determine status and distribution	Determine distribution and population status of priority and nuisance species.
	Determine habitat requirements for species of conservation priority and develop models of their habitat use.
	Map the distribution of habitat features including: barriers to wildlife movement; areas of high human disturbance; high fuel load areas; important wildlife corridors; migration pathways; structures, sites and activities causing soil erosion; other structures; baseline vegetation; and vegetation changes.
Compile data, programs and information	Compile wildlife-related data, programs, and information such as: the Arizona Department of Transportation database of roadside invasive plants, pertinent wildlife studies, Florida's wildlife-friendly road crossing designs.
Research species biology	Develop genetic analyses on species of taxonomic uncertainty.
	Investigate features of species' biology that are of conservation concern. For example, understand characteristics that make particular species more invasive, other species important keystone species, or other species more sensitive to stressors such as long-term drought.
Research ecosystem conditions	Generate projections of future conditions and model past conditions related to land conversion, water usage, species re/introductions, dam removal, road building, management actions, etc.
	Develop GIS models to assess the impacts on wildlife and wildlife habitat from the presence of human activities and structures.
	Investigate functional mechanisms and conditions that affect shifts in ecosystem states. These mechanisms and conditions may be related to priority species and/or identified stressors.
	Implement adaptive management principles for large-scale projects. Treat these projects as experiments in order to extract the most information and conservation benefit.
Research stressors	Determine threats to vulnerable species.
	Research impacts of specific threats and activities on wildlife resources.
	Model, monitor, and research factors related to wildlife and wildlife diseases.
	Characterize non-point sources of identified stressors.
Develop conservation, research, and monitoring tools	Develop a process or processes to identify and prioritize significant habitats for short- and long-term conservation planning.
	Work with cooperators to develop research standards and methods to assess or address impacts from particular stressors.
	Investigate and develop alternatives for non-conservation projects and activities such as dam releases, road construction, and utility towers, so that these projects have less impact on wildlife and wildlife habitats.
	Establish monitoring programs and develop best monitoring techniques.
	Rank alternative conservation tools, identifying best and worst alternatives. Encourage development and use of wildlife friendly techniques.

CONSERVATION ACTIONS FOR ARIZONA'S CWCS (ELEMENT 4)

Conservation actions were developed to address important stressors identified at the coarse (landscape) scale and specifically to address stressors impacting SGCN. This comprehensive set of conservation actions will be implemented where feasible and appropriate, and includes many opportunities for implementation by cooperators. Implementation of management actions is subject to necessary environmental compliance review (where required), and in cooperation with key land managers. Large-scale conservation efforts should be coordinated through interagency workgroups and formal agreements where applicable.

Due to the comprehensive nature of the CWCS, many of the proposed actions are included for the benefit of the Department’s external partners and land managers, who will be the likely leads for implementing conservation activities. In many proposed actions, the Department may participate in an advisory and technical capacity in assisting land managers; in other cases, the Department may be the lead for those activities over which it has direct authority.

Table 4. Conservation strategies for Arizona's CWCS.	
Implementation of specific actions is considered where appropriate and feasible, for the benefit of wildlife and wildlife habitat. Strategies are not presented in order of priority.	
Emphasis	Conservation Strategy
Conserving wildlife habitat	Promote the restoration and protection of aquifers, springs, streams, rivers, lakes, and riparian systems. Support regulations ensuring minimum instream flow and water rights for wildlife resources.
	Perform landscape classification analyses to identify sensitive habitats, core wildlife areas, and important wildlife corridors.
	Acquire ecologically important lands, access agreements, conservation easements, and/or water rights.
	Support State planning efforts to address drought issues as they relate to wildlife resources.
Maintaining and re-establishing habitat and habitat connectivity	Promote maintenance and restoration of habitat connectivity by removing or modifying barriers, protecting corridors and riparian areas, and using wildlife-friendly roadway crossing structures.
	Promote maintenance and restoration of habitat connectivity by removing unneeded fences, by using wildlife-friendly barriers in future projects and when replacing old fences.
	Develop standards for new road, utility and power lines construction, and modification of existing structures and corridors to reduce impacts to wildlife.
Wildlife management	Promote implementation of recovery plans, habitat conservation plans, and other cooperative agreements for sustaining wildlife resources. Develop plans to conserve priority conservation species (Focal Community; Responsibility, and Vulnerability categories) that are not sufficiently addressed under existing plans.
	Manage so as to sustain or enhance sport fish and native fish populations.
	Develop contingency plans for rapid salvage of wildlife populations threatened with extirpation in situations of imminent habitat loss.
	Maintain and construct new wildlife water developments. Encourage conversion of livestock waters so they are also continuously usable by wildlife.
	Collaborate with partners to evaluate sampling techniques, reduce duplication of effort, and develop pathogen decontamination protocols to limit impacts to wildlife.
	Collaborate with partners on disease/pathogen/parasite issues to wildlife including: development of action plans to manage existing sources, identify and respond to new threats, and to educate the public.
	Evaluate, update, and enforce existing Department regulations to address evolving concerns about hybridization, nuisance animals, illegal stocking, and spread of animals used for bait.
Reduce/eliminate the effects of feral animal populations in sensitive habitats or near wildlife populations of concern.	
Public education and law enforcement to benefit wildlife and wildlife habitat	Educate the public about the impacts of free-ranging or feral animals, release of nonnative species, and illegal stocking of fish and live bait on wildlife resources. Increase enforcement of existing laws and promote more stringent laws prohibiting the release of domestic or nonnative animals into the wild.
	Utilize education and enforcement to promote human behavior that does not encourage wildlife to become a nuisance (for example: feeding wildlife, securing waste containers, and storage of food). Increase awareness of effects of feeding and litter on wildlife.
	Increase public awareness of how water conservation and ensuring instream flow can benefit wildlife.
	Encourage the use of low water-use native plants in landscaping.

Table 4. Conservation strategies for Arizona's CWCS.

Implementation of specific actions is considered where appropriate and feasible, for the benefit of wildlife and wildlife habitat. Strategies are not presented in order of priority.

Emphasis	Conservation Strategy
Public education and law enforcement to benefit wildlife and wildlife habitat	Educate the public regarding identification of contaminants, release prevention, and impacts to wildlife and habitats. Promote alternatives that reduce release of contaminants.
	Encourage cooperative clean up efforts of wildlife habitats.
	Increase public awareness of the potential effects of various types of recreation on wildlife resources. Encourage responsible outdoor recreation through education (for example: "Stay on the Trails," "Leave No Trace," "Be Bear Aware," "Stop Aquatic Hitchhikers"), enforce existing laws, and encourage development of new legislation.
	Inform the public and land management agencies on the effects of illegal harvest of wildlife. Cooperate with land management agencies to increase enforcement of existing laws.
	Support prevention and suppression of accidental or arson-caused wildfire through information and education and enforcement of appropriate regulations.
	Educate the public on the importance of community focal species (including predators, prey, wide-ranging species, keystone species, etc.) for ecosystem health.
	Representing wildlife values in multiple-use planning
Cooperate with state, federal, tribal, and local government partners to develop and implement watershed management plans that incorporate wildlife and habitat values.	
Prevent loss and degradation of sensitive habitats through involvement of planning efforts with local governments, private landowners, and agency/tribal land managers.	
Promote restoration of natural fire regimes for improving grassland and forest health.	
Promote adoption of sustainable forage management standards and guidelines for livestock and wildlife.	
Promote conservation of sensitive areas and habitats for wildlife.	
Encourage development and implementation of standards and guidelines for mining and landfill operations that consider the needs of wildlife resources.	
Encourage land management agencies to manage road and trail networks to ensure sustainable wildlife resources in balance with recreational opportunities, economic pursuits, and rural development.	
Representing wildlife values in other processes	Coordinate to reduce impacts to wildlife along the US-Mexico border.
	Encourage the operation of dams, canals, and diversions for improving or maintaining wildlife resources. Promote wildlife values in building new, renovating existing, or removing old water retaining structures.
	Promote programs for eliminating or limiting the spread of invasive plants and animals, and the recovery or reintroduction of native populations.
	Limit the spread of invasive plants and promote the restoration of native vegetation in disturbed areas.
	Support land management and regulatory agencies in enforcing Best Management Practices to prevent the introduction of toxins into ecosystems.
	Promote the use of engineered wetlands, discharge basins, and augmented riparian vegetation to pre-treat water prior to release into riparian systems. Promote the use of treated effluent to create wildlife habitat.
	Cooperate with land management agencies and municipalities on revising waste management plans to minimize impacts to wildlife resources.

MONITORING AND THE CWCS (ELEMENT 5)

Arizona's CWCS outlines existing and planned monitoring of species. At this time, efforts by federal land management entities are only starting to develop regional habitat monitoring plans, so coordination in these efforts is not yet part of CWCS. Building on existing strengths of the Department to monitor species, Arizona's CWCS outlines existing and planned monitoring of species both to identify trends in individual species and, by using Responsibility and Community/Focal species described under Element 1, to describe trends in habitat condition. The Department has moved over the past 6 or so years to develop multi-species plans for the conservation and monitoring of groups of species, and this effort will serve as the basis for monitoring beyond the traditional single-species focus.

Status of the 310 SGCN species will eventually be monitored. The CWCS begins implementation of this monitoring by focusing on the 183 species in Tiers 1a and 1b. Monitoring to determine the status of the 160 Unknown Status Species will also be initiated under the CWCS. All multi-species taxon plans currently under development will specifically address monitoring for both SGCN and Unknown Status species. The first planning effort where these CWCS priorities are being incorporated is the All Birds Monitoring initiative currently led by the Department.

ADAPTIVE MANAGEMENT AND THE CWCS (ELEMENT 5)

The CWCS also requires monitoring to describe effectiveness of conservation actions, followed by adaptive evaluation of conservation actions and implementation of new actions as indicated. Adaptive management provides an experimental platform upon which to incorporate existing knowledge of the system into management activities while allowing enough flexibility to implement alternative management strategies (Walters 1997, Brown and Ford 2002). Feedback loops between monitoring and management actions can correct for the uncertainty that is inherent in managing complex systems (Stromberg 2001, Clark 2002, Williams 2003). These feedback loops between management activities and monitoring allow researchers and land managers to adjust for changing circumstances (environmental, political, economic, etc) thereby ensuring success in achieving conservation goals.

Adaptive management contains an inherent flexibility allowing for multiple conservation actions to be developed, weighed and exercised. Monitoring the effectiveness of those actions relies on a number of mechanisms. These mechanisms may include:

- 1) Coordination and cooperation with all involved parties (that is: stakeholders, sponsors, agencies, academia, media, and general public);
- 2) Knowledge of pertinent information gaps and uncertainties relevant to specific conservation actions;
- 3) Formulation of alternate conservation action endpoints to assist in project organization, efficiency, and budgeting;
- 4) Monitoring at all scales necessary to determine level of success or failure for those conservation actions implemented;
- 5) Flexibility to switch to alternate actions if thresholds are not met;

- 6) Publication of results of conservation actions in highly accessible form (preferably on-line in Adobe PDF format); and
- 7) Self-revising as feedback loops between monitoring and actions frequently update information.

Arizona's CWCS is not meant to be a fixed set of conservation goals and strategies. Rather, the CWCS is a series of processes that can be used to identify Department and partner priorities and appropriate monitoring efforts for wildlife and wildlife habitat on various spatial scales (statewide, statewide within habitat types, habitat types within ecoregions, or site specific).

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

Arizona's CWCS is scheduled to be reviewed and revised on a series of 2-yr and 4-yr cycles during its 10-yr timeframe. 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. The Department will use its existing annual performance reports for Federal Aid projects and State Wildlife Grant funds to document progress on CWCS-related activities.

The Department will conduct an internal review of the CWCS prior to each 2-yr budget process 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 (see "Processes to Develop Arizona's CWCS, Revisions to the CWCS within a 10-yr Timeframe (Element 6)"). Every 4 years, a detailed evaluation of CWCS will be done to assess progress on conservation strategies, species status, important stressors, and to solicit partner and public input. Critical partners and key stakeholders will be asked to participate in the 4-yr reviews with the Department's internal staff. These evaluations allow "mid-course" corrections within the anticipated 10-year timeframe of the CWCS.