Chapter 5 : SPECIES OF CONSERVATION CONCERN

Introduction

Natural resource managers must prioritize conservation efforts so that species most at risk to extirpation or extinction are addressed with an appropriate management response (e.g., Millsap et al. 1990). Small populations are generally at greater risk to extinction than large populations because small populations are more susceptible to the generally accepted causes of extinction (e.g., demographic and environmental stochasticity, diminishing genetic resources, and disruption of social structure) (Simberloff 1986). Moreover, species that experience substantial population declines from anthropogenic causes, or those most vulnerable to future declines, deserve high priority in conservation efforts (Cassidy et al. 2001).

Several processes that incorporate the principles of populations at risk have been used to identify species of conservation concern and to rank their vulnerability to extirpation (Hansen et al. 1999). These processes have resulted in a variety of lists of plants and animals that deserve conservation focus (e.g., Nachlinger et al. 2002, NatureServe 2002). We refer to these plants and animals as species of conservation concern, or species of concern. Species of conservation concern are those with declining or rare habitats or populations, based on current sources of information.

In this chapter, we identify species of conservation concern in the Great Basin Ecoregion (Great Basin) and State of Nevada. Our objectives were to (1) identify species of conservation concern that were most at risk to further population declines and potential extirpation in the Great Basin and Nevada, based on the principles of populations at risk; and (2) further identify which of these species and their habitats are appropriate for regional assessment in the Great Basin and Nevada, as opposed to species whose habitats can only be evaluated through fine-scale, local assessments. (See Wisdom et al. 2003 for details about differences in regional versus local assessments for species of concern.) Identification of species of concern is essential for comprehensive planning and management of associated habitats, to ensure that the needs of species most at risk are addressed in land management.

Methods

Identifying Species of Concern in the Great Basin.—We followed the process described by Wisdom et al. (2003) to identify species of conservation concern in the Great Basin (Fig. 5.1). We began this process by starting with the list of 363 species of conservation concern previously identified by Suring et al. (in prep.) as being associated with the sagebrush ecosystem in the western United States (as listed by Wisdom et al. 2003). Identification of these species by Suring et al. (in prep.) was based on the general process described by Master (1991) (see Wisdom et al. 2003). These 363 species were considered to be potentially at risk of regional extirpation in the sagebrush ecosystem in the western United States, owing to habitat or population declines or rarity (Wisdom et al. 2003, Suring et al. in prep.).

We reviewed this master list of 363 species to identify which of these species were of conservation concern in the Great Basin (Fig. 5.1 Step 1). We applied 2 screens to the master list to identify the subset of these species that were of conservation concern in the Great Basin, as follows:

- Species that occur within the Great Basin (Fig. 5.1 Step 2), and
- Species that are at risk (i.e., those ranked S1, S2, S3, or S4 by NatureServe [NatureServe 2002]) in California, Nevada, or Utah (i.e., states within the Great Basin Ecoregion) (Fig. 5.1 Step 3).

Identifying Species of Concern for Regional Assessment.—Once the species of concern were identified for the Great Basin, we subsequently identified which of these species were appropriate to include in our regional assessment. Not all species and associated habitats are appropriate for regional assessment (Wisdom et al. 2003).

To begin the process of identifying which species of concern were suitable for regional assessment, we classified the species remaining after application of the 2 screens as having a range ≥100,000 ha within the Great Basin or as having a restricted distribution within the Great Basin (Fig. 5.1 Step 4). Our purpose was to include only species with large ranges in our regional assessment. Habitats for species with small or restricted ranges cannot be assessed accurately with the coarse resolution of vegetation data associated with the 90-m sagestitch map that is currently available for ecoregional assessments in the sagebrush ecosystem (Wisdom et al. 2003). We estimated range size for each species based on the most current range maps available (e.g., Albee et al. 1988, Opler et al. 1995, Wilson and Ruff 1999, Utah Division of Wildlife Resources 2002).

The resulting list of species of concern with large ranges was further reviewed to exclude species most responsive to fine-scale habitat features, as these features cannot be mapped or modeled at the ecoregion scale (e.g., roost structures for bats) (Fig. 5.1 Step 5). We then reviewed additional, locally developed lists of species at risk for the Great Basin to ensure that our list of species of concern for regional assessment was comprehensive (Fig. 5.1 Step 6). For this purpose, we reviewed target species identified by The Nature Conservancy for the Great Basin (Nachlinger et al. 2001) and vertebrate species considered to be sensitive by the states of Nevada (Nevada Natural Heritage Program 2002) and Utah (Utah Division of Wildlife Resources 1998). Species from these lists were added for regional assessment if such species were associated with sagebrush habitats, had large ranges, and appeared to have declining or rare habitats or populations in the Great Basin.

Finally, each species' association with habitats in the Great Basin, using cover types that occur in the Great Basin, was evaluated by species experts (see Chapter 6) (Fig. 5.1 Step 7). Species not specifically associated with sagebrush habitats in the Great Basin, as determined by the species experts, were dropped for regional assessment. Species deemed by experts to be closely associated with fine-scale habitat features (e.g., rock outcrops) also were excluded from regional assessment, as part of the review process.

Range Maps.—We estimated the size of each species' range with maps available from the most current sources, as described earlier. These maps also were subsequently used to define the area in which habitats for each species were evaluated in our regional assessment (Wisdom et al. 2003). Sources were selected from the literature for each species that provided the most recent and most detailed depiction of their current range. These range maps were scanned at 1,200 dpi and registered through imaging processes to produce an electronic map. The scanned images of the ranges were then digitized in a geographic information system to obtain spatial files suitable for use in our analysis.

Note that we define a species' range as the polygon or polygons that encompass the outer boundaries of a species' geographic occurrence within an ecoregion. A species' range may

consist of 1 or more polygons, with each polygon encompassing an interacting population (Wisdom et al. 2003). The range maps we used fit this definition, and are different from distribution maps of populations that represent documented occurrences of a species. Our definition also differs strongly from maps of predicted distribution of habitats for species, such as those produced by GAP analysis (Scott et al. 1993). See limitations and assumptions related to use of these range maps at the end of this chapter and in Wisdom et al. (2003).

Results

We identified 207 species of conservation concern that were associated with sagebrush habitats in the Great Basin (Appendix 3). This list consisted of 133 plants, 11 invertebrates, and 63 vertebrates. All plant species of concern, and all but 1 of the invertebrates of concern, were restricted to small areas of the Great Basin (Fig. 5.1 Step 4). Management of species with restricted ranges is best based on site-specific analyses rather than through an ecogegion-wide assessment (Wisdom et al. 2003).

Fifty-two of the 207 species had ranges considered large enough for regional assessment in the Great Basin (Fig. 5.1 Step 4). Forty-five of these 52 species (1 amphibian, 9 reptiles, 19 birds, and 16 mammals) had broad-scale habitat associations suitable for regional assessment (Fig. 5.1 Step 5). One additional species of concern was identified from lists developed by The Nature Conservancy (Nachlinger et al. 2001), the State of Nevada (Nevada Natural Heritage Program 2002), and the State of Utah (Utah Division of Wildlife Resources 1998) (Fig. 5.1 Step 6), resulting in 46 species considered for regional assessment. Six of the 46 species, however, were not specifically associated with sagebrush habitats in the Great Basin, based on further reviews by species experts (Fig. 5.1 Step 7). Consequently, our final list of species suitable for regional assessment in the Great Basin consisted of 40 vertebrate species (1 amphibian, 9 reptiles, 17 birds, and 13 mammals) (Table 5.1). These ranges for each of the 40 species are outlined in Figs. A4.1-A4.5 of Appendix 4.

Discussion

The majority of species of conservation concern that were associated with sagebrush habitats in the Great Basin consisted of plants (Appendix 3). Suring et al. (in prep) also found that most (70%) of the species of concern associated with the sagebrush ecosystem in the western United States were plants (Wisdom et al. 2003). However, all such plant species are local endemics or have site-specific requirements, either of which excludes them from regional assessment based on our criteria (Wisdom et al. 2003). The combination of a high number of plant species of concern and their lack of suitability for regional assessment illustrates the compelling need for local assessments to estimate and monitor these species' habitats and population status and trends.

Interestingly, only a handful of invertebrates were identified as being of conservation concern in the Great Basin, similar to the small percentage of invertebrates identified by Suring et al. (in prep) as being of concern in the sagebrush ecosystem across the western United States. Suring et al. (in prep), however, found that invertebrates have some of the highest vulnerability rankings under the NatureServe evaluation of species at risk (NatureServe 2002). Moreover, invertebrates are substantially understudied compared to other taxa (Bonnet et al. 2002, Clark and May 2002), suggesting that we have the least knowledge about their status and requirements.

Consequently, the lack of knowledge about invertebrates may pose a bias in ranking systems used to identify species of conservation concern, including our process (see Chapter 9).

In contrast to plants and invertebrates of conservation concern, many vertebrates of concern are suitable for regional assessment, although many others are not (see Appendix 3). The degree to which the habitat associations and needs of the 40 species identified for our regional assessment might be used to represent the larger set of species of concern in the Great Basin is unknown, both ecologically and logistically (see Chapter 9). This question can only be addressed with additional research. Until such research is conducted, there remains a compelling need for local evaluations of the many plants and animals of concern beyond the 40 we included in our regional assessment.

Assumptions and Limitations

Knowledge of population status and habitat requirements tends to be more complete for species of high public interest (e.g., commodity species, such as game and furbearer species, and threatened or endangered species as listed under United States Endangered Species Act) than for other species (Wisdom et al. 2002). The knowledge base also tends to be better for birds than for mammals and for mammals compared to reptiles and amphibians (Wisdom et al. 2002). This unevenness in the understanding of population status and natural history among taxa may lead to shortcomings when identifying species of conservation concern. Efforts must be as thorough as possible when assembling a comprehensive species list, gathering all available information for all species on the list. See Chapter 9 for details about these and the additional limitations listed below.

- The lack of knowledge about invertebrates may have resulted in a bias in the process we used to identify species of conservation concern.

- Most plant species of concern have local ranges or specialized site requirements that cannot be mapped accurately with coarse-resolution data currently available for regional assessments. Consequently, assessment of conditions for most plants of concern must be done through local field inventories, rather than through regional assessments.

- The process used to create range maps for species often results in an overestimate of the actual size of the range by including locations that are peripheral to habitats used by the species, and by including cover types that are not suitable as habitat (see Wisdom et al. 2003). Consequently, some species identified as suitable for regional assessment may have more restricted ranges that pose challenges to their inclusion in such assessments.

Key Findings

- We identified 207 species of conservation concern that were associated with sagebrush habitats in the Great Basin. These species consisted of 133 plants, 11 invertebrates, and 63 vertebrates. Habitats for the plant and invertebrate species, as

well as many vertebrates, could not be evaluated as part of our regional assessment, and instead require local assessment.

- We identified 40 vertebrate species of conservation concern (1 amphibian, 9 reptiles, 17 birds, and 13 mammals) that were appropriate for regional assessment of the Great Basin, and these species are the focus of our assessment.

Literature Cited

Albee, B. J., L. M. Shultz, and S. Goodrich. 1988. Atlas of the vascular plants of Utah. Utah Museum of Natural History, Logan, Utah, USA. Available online at: http://www.nr.usu.edu/Geography-Department/utgeog/utvatlas/ut-vascatlas.html.

Bechard, M. J., and J. K. Schmutz. 1995. Ferruginous hawk (*Buteo regalis*). The birds of North America, number 172. A. Poole and F. Gill, editors. The Academy of Natural Sciences, Philadelphia, Pennsylvania, USA, and The America Ornithologists' Union, Washington, D.C., USA.

Bonnet, X., R. Shine, and O. Lourdais. 2002. Taxonomic chauvinism. Trends in Ecology and Evolution 17:1-3.

Clark, J. A., and R. M. May. 2002. How biased are we? Conservation in Practice 3:28-29.

Carroll, L. E., and H. H. Genoways. 1980. *Lagurus curtatus*. Mammalian Species 124.

Cassidy, K. M., C. E. Grue, M. R. Smith, R. E. Johnson, K. M. Dvornich, K. R. McAllister, P. W. Mattocks, Jr., J. E. Cassady, and K. B. Aubry. 2001. Using current protection status to assess conservation priorities. Biological Conservation 97:1-20.

Dobbs, R. C., P. R. Martin, and T. E. Martin. 1998. Green-tailed towhee (*Pipilo chlorurus*). The birds of North America, number 368. A. Poole and F. Gill, editors. The Academy of Natural Sciences, Philadelphia, Pennsylvania, USA, and The American Ornithologists' Union, Washington, D.C., USA.

England, A. S., M. J. Bechard, and C. S. Houston. 1997. Swainson's hawk (*Buteo swainsoni*). The birds of North America, number 265. A. Poole and F. Gill, editors. The Academy of Natural Sciences, Philadelphia, Pennsylvania, USA, and The American Ornithologists' Union, Washington, D.C., USA.

Garrison, T. E., and T. L. Best. 1990. *Dipodomys ordii*. Mammalian Species 353.

Green J. S., and J. T. Flinders. 1980. *Brachylagus idahoensis*. Mammalian Species 125.

Hansen, A .J., J. J. Rotella, and M. L. Kraska. 1999. Dynamic habitat and population analysis: an approach to resolve the biodiversity manager's dilemma. Ecological Applications 9:1459-1476.

Haug, E. A., B. A. Millsap, and M. S. Martell. 1993. Burrowing owl (*Speotyto cunicularia*). The birds of North America, number 61. A. Poole and F. Gill, editors. The Academy of Natural Sciences, Philadelphia, Pennsylvania, USA, and The American Ornithologists' Union, Washington, D.C., USA.

Holt, D. W. and S. M. Leasure. 1993. Short-eared owl (*Asio flammeus*). The birds of North America, number 62. A. Poole and F. Gill, editors. The Academy of Natural Sciences, Philadelphia, Pennsylvania, USA, and The American Ornithologists' Union, Washington, D.C., USA.

Jones, S. L. and J. E. Cornely. 2002. Vesper sparrow (*Pooecetes gramineus*). The birds of North America, number 624. A. Poole and F. Gill, editors. The Academy of Natural Sciences, Philadelphia, Pennsylvania, USA, and The American Ornithologists' Union, Washington, D.C., USA.

Johnson, M. J., C. Van Riper, III., and K. M. Pearson. 2002. Black-throated sparrow (*Amphispiza bilineata*). The birds of North America, number 637. A. Poole and F. Gill, editors. The Academy of Natural Sciences, Philadelphia, Pennsylvania, Pennsylvania, USA, and The American Ornithologists' Union, Washington, D.C., USA.

MacWhirter, R. B., and K. L. Bildstein. 1996. Northern harrier (*Circus cyaneus*). The birds of North America, number 210. A. Poole and F. Gill, editors. The Academy of Natural Sciences, Philadelphia, Pennsylvania, USA, and The American Ornithologists' Union, Washington, D.C., USA.

Martin, J. W. , and B. A. Carlson. 1998. Sage sparrow (*Amphispiza belli*). The birds of North America, number 326. A. Poole and F. Gill, editors. The Academy of Natural Sciences, Philadelphia, Pennsylvania, USA, and The American Ornithologists' Union, Washington, D.C., USA.

Martin, J. W., and J. R. Parrish. 2000. Lark sparrow (*Chondestes grammacus*). The birds of North America, number 488. A. Poole and F. Gill, editors. The Academy of Natural Sciences, Philadelphia, Pennsylvania, USA, and The American Ornithologists' Union, Washington, D.C., USA.

Martin, S. G. 2002. Brewer's blackbird (*Euphagus cyanocephalus*). The birds of North America, number 616. A. Poole and F. Gill, editors. The Academy of Natural Sciences, Philadelphia, Pennsylvania, USA, and The American Ornithologists' Union, Washington, D.C., USA.

Master, L. L. 1991. Assessing threats and setting priorities for conservation. Conservation Biology 5:559-563.

McCarty, R. 1978. *Onychomys leucogaster*. Mammalian Species 87.

McGrew, J. C. 1979. *Vulpes macrotis*. Mammalian Species 123.

Millsap, B. A., J. A. Gore, D. E. Runde, and S. I. Cerulean. 1990. Setting priorities for the conservation of fish and wildlife species in Florida. Wildlife Monographs 111.

Nachlinger, J., K. Sochi, P. Comer, G. Kittel, and D. Dorfman. 2001. Great Basin: an ecoregion-based conservation blueprint. The Nature Conservancy, Reno, Nevada, USA.

NatureServe. 2002. NatureServe Explorer: an online encyclopedia of life [web application]. Version 1.6. NatureServe, Arlington, Virginia, USA:. Available online at: http://www.natureserve.org/explorer.

Nevada Natural Heritage Program. 2002. Nevada sensitive animal list. Department of Conservation and Natural Resources, Carson City, Nevada, USA. Available online at: http://heritage.nv.gov/index.htm

O'Gara, B. W. 1978. *Antilocapra americana*. Mammalian Species 90.

Opler, P. A., H. Pavulaan, and R. E. Stanford, coordinators. 1995. Butterflies of North America. Northern Prairie Wildlife Research Center Home Page, Jamestown, North Dakota, USA. Available online at: http://www.npwrc.usgs.gov/resource/distr/lepid/bflyusa/bflyusa.htm (Version 05DEC2001).

Reynolds, T. D., T. D. Rich, and D. A. Stephens. 1999. Sage thrasher (*Oreoscoptes montanus*). The birds of North America, number 463. A. Poole and F. Gill, editors. The Academy of Natural Sciences, Philadelphia, Pennsylvania, USA, and The American Ornithologists' Union, Washington D.C., USA.

Rotenberry, J. T., M. A. Patten, and K. L. Preston. 1999. Brewer's sparrow (*Spizella breweri*). The birds of North America, number 390. A. Poole and F. Gill, editors. The Academy of Natural Sciences, Philadelphia, Pennsylvania, USA, and The American Ornithologists' Union, Washington, D.C., USA.

Scott, J. M., F. Davis, B. Csuti, R. Noss, B. Butterfield, C. Groves, H. Anderson, S. Caicco, F. D'erchia, T. C. Edwards, Jr., J. Ulliman, and R. G. Wright. 1993. Gap analysis: a geographic approach to protection of biological diversity. Wildlife Monograph 123.

Simberloff, D. 1986. The proximate causes of extinction. Pages 259-276 *in* D. M. Raup and D. Jablonski, editors. Patterns and processes in the history of life. Springer-Verlag, Berlin, Germany.

Stebbins, R. C. 1985. A field guide to western reptiles and amphibians, Second edition. Houghton Mifflin Company, New York, USA.

Steenhoff, K. 1998. Prairie falcon (*Falco mexicanus*). The birds of North America, number 346. A. Poole and F. Gill, editors. The Academy of Natural Sciences, Philadelphia, Pennsylvania, USA, and The American Ornithologists' Union, Washington, D.C., USA.

Sterling, J. C. 1999. Gray flycatcher (*Empidonax wrightii*). The birds of North America, number 458. A. Poole and F. Gill, Editors. The Academy of Natural Sciences, Philadelphia, Pennsylvania, USA, and The American Ornithologists' Union, Washington, D.C., USA.

Suring, L. H., M. J. Wisdom, M. M. Rowland, and B. C. Wales. In Preparation. Determining species of potential conservation concern associated with sagebrush ecosystems in the western United States. Unpublished report on file with: Pacific Northwest Research Station, Forestry and Range Sciences Lab, 1401 Gekeler Lane, La Grande, Oregon, USA.

Utah Division of Wildlife Resources. 1998. Utah sensitive species list. Utah Division of Wildlife Resources, Salt Lake City, Utah, USA.

Utah Division of Wildlife Resources. 2002. Utah Conservation Data Center. Available online at: http://dwrcdc.nr.utah.gov/ucdc/.

Wilson, D. E. and S. Ruff. 1999. The Smithsonian book of North American mammals. Smithsonian Institution Press, Washington, D.C., USA.

Wisdom, M. J., N. M. Warren, and B. C. Wales. 2002. Vertebrates of conservation concern in the Interior Northwest: priorities for research. Northwest Science 76:90-97.

Wisdom, M. J., M. M. Rowland, L. H. Suring, L. Schueck, C. Wolff Meinke, B. C. Wales, and S. T. Knick. 2003. Procedures for regional assessment of habitats for species of conservation concern in the sagebrush ecosystem. March 2003 Report, Version 1, USDA Forest Service Pacific Northwest Research Station, LaGrande, Oregon, USA.

Yosef, R. 1996. Loggerhead Shrike (*Lanius ludovicianus*). The birds of North America, number 231. A. Poole and F. Gill, editors, The Academy of Natural Sciences, Philadelphia, Pennsylvania, USA, and The American Ornithologists' Union, Washington, D.C., USA.

Zegers, D. A. 1984. *Spermophilus elegans*. Mammalian Species 214.

Zeveloff, S. I. 1988. Mammals of the intermountain west. University of Utah Press, Salt Lake City, USA.

Table 5.1. Forty species of conservation concern identified for regional assessment in the Great Basin Ecoregion and Nevada with their global and state rankings.[a]

Common name	Scientific name	Global rank	State rank			Source[b]
			California	Nevada	Utah	
Amphibians						
Great Basin spadefoot	*Scaphiopus intermontanus*	G5	S5	S4	S4	1
Reptiles						
Great Basin collared lizard	*Crotaphytus insularis*	G5	S?	S4	S4	1
Long-nosed leopard lizard	*Gambelia wislizenii*	G5	S5	S4	S4	1
Desert horned lizard	*Phrynosoma platyrhinos*	G5	S5	S4	S4	1
Sagebrush lizard	*Sceloporus graciosus*	G5	S5	S4	S5	1
Desert spiny lizard	*Sceloporus magister*	G5	S5	S5	S3S4	1
Night snake	*Hypsiglena torquata*	G5	S5	S5	S4	1
Striped whipsnake	*Masticophis taeniatus*	G5	S4	S5	S5	1
Longnose snake	*Rhinocheilus lecontei*	G5	S5	S5	S3	1
Ground snake	*Sonora semiannulata*	G5	S4	S5	S2	1
Birds						
Ferruginous hawk	*Buteo regalis*	G4	S3S4	S3	S2N,S2S3B	1,2,3,4
Swainson's hawk	*Buteo swainsoni*	G5	S2	S2B	S3B,SRN	1,3,4
Northern harrier	*Circus cyaneus*	G5	S3	S4	S3N,S4B	2
Prairie falcon	*Falco mexicanus*	G5	S3	S4	S4	1
Greater sage-grouse	*Centrocercus urophasianus*	G4	S3	S4	S2	1,2,3,4
Short-eared owl	*Asio flammeus*	G5	S5	S4	S2S3	1
Western burrowing owl	*Speotyto cunicularia*	G4TU	S2	S3B	NA[c]	1,4

Table 5.1. Forty species of conservation concern identified for regional assessment in the Great Basin Ecoregion and Nevada with their global and state rankings.[a]

Common name	Scientific name	Global rank	State rank			Source[b]
			California	Nevada	Utah	
Gray flycatcher	*Empidonax wrightii*	G5	S5	S4B	S4S5B	1
Sage thrasher	*Oreoscoptes montanus*	G5	S5	S5B	S4S5B,SAN	1,2
Loggerhead shrike	*Lanius ludovicianus*	G4	S4	S3	S3S4N,S4B	1
Sage sparrow	*Amphispiza belli*	G5	G?	S4B,S4N	S3S4	1,2
Black-throated sparrow	*Amphispiza bilineata*	G5	S?	S5B	S2N,S5B	1
Lark sparrow	*Chondestes grammacus*	G5	S?	S4B	S2N,S5B	1
Green-tailed towhee	*Pipilo chlorurus*	G5	S?	S5B	S4B	1
Vesper sparrow	*Pooecetes gramineus*	G5	S?	S4B	S2N,S5B	1
Brewer's sparrow	*Spizella breweri*	G5	S?	S4?B	S4S5B	1,2
Brewer's blackbird	*Euphagus cyanocephalus*	G5	S?	S5B	S4S5	1
Mammals						
Merriam's shrew	*Sorex merriami*	G5	S3	S3	S2?	1
Kit fox	*Vulpes macrotis*	G4	S3S4	S4	S3	1
Pronghorn	*Antilocapra americana*	G5	S4	S5	S4	1
Wyoming ground squirrel	*Spermophilus elegans nevadensis*	G5	NA	S5	S2S3	1
Merriam's kangaroo rat	*Dipodomys merriami*	G5	S5	S5	S3	1
Chisel-toothed kangaroo rat	*Dipodomys microps*	G5	S4	S5	S3	1,2
Ord's kangaroo rat	*Dipodomys ordii*	G5	S3S4	S4	S5	1,2
Dark kangaroo mouse	*Microdipodops megacephalus*	G5	S3S4	S2	S2	1,2
Little pocket mouse	*Perognathus longimembris*	G5	S5	S5	S3	1
Northern grasshopper mouse	*Onychomys leucogaster*	G5	S3S4	S5	S4S5	1
Sagebrush vole	*Lemmiscus curtatus*	G5	S4	S5	S3S4	1,2

Table 5.1. Forty species of conservation concern identified for regional assessment in the Great Basin Ecoregion and Nevada with their global and state rankings.[a]

Common name	Scientific name	Global rank	State rank			Source[b]
			California	Nevada	Utah	
White-tailed jackrabbit	*Lepus townsendii*	G5	S3	S5	S3S4	1
Pygmy rabbit	*Brachylagus idahoensis*	G4	S3	S4?	S2S3	1,2

[a] Rankings are those used by NatureServe (http://www.natureserve.org/explorer/) and are as follows: G = Global rank indicator, based on worldwide distribution at the species level; T = Global trinomial rank indicator, based on worldwide distribution at the infraspecific level; S = State rank indicator, based on distribution within the state at the lowest taxonomic level; 1 = Critically imperiled due to extreme rarity, imminent threats, and/or biological factors; 2 = Imperiled due to rarity and/or other demonstrable factors; 3 = Rare and local throughout its range, or with very restricted range, or otherwise vulnerable to extinction; 4 = Apparently secure, though frequently quite rare in parts of its range, especially at its periphery; 5 = Demonstrably secure, though frequently quite rare in parts of its range, especially at its periphery; R = Reported from the state, awaiting firm documentation ; U = Unrankable; present and possibly in peril, but not enough data yet to estimate rank; ? = Not yet ranked at the scale indicated (G, T, or S); B = Breeding status within the state; rank for breeding occurrences only; N = Non-breeding status within the state; rank for non-breeding occurrences only; SA = Accidental occurrence.

[b] Sources included: 1) the analysis reported in this document; 2) Nachlinger et al. 2001; 3) Nevada Natural Heritage Program 2002; and 4) Utah Division of Wildlife Resources 1998.

[c] NA = not applicable (i.e., the species does not occur in that state).

Table 5.2. Sources of range maps used for 40 species of conservation concern that were included in our regional assessment in the Great Basin Ecoregion and Nevada.

Common name	Scientific name	Source
Amphibians		
Great Basin spadefoot[a]	*Scaphiopus intermontanus*	Stebbins 1985
Reptiles		
Great Basin collared lizard	*Crotaphytus insularis*	Stebbins 1985
Long-nosed leopard lizard	*Gambelia wislizenii*	Stebbins 1985
Desert horned lizard	*Phrynosoma platyrhinos*	Stebbins 1985
Sagebrush lizard[a]	*Sceloporus graciosus*	Stebbins 1985
Desert spiny lizard	*Sceloporus magister*	Stebbins 1985
Night snake	*Hypsiglena torquata*	Stebbins 1985
Striped whipsnake[a]	*Masticophis taeniatus*	Stebbins 1985
Longnose snake	*Rhinocheilus lecontei*	Stebbins 1985
Ground snake	*Sonora semiannulata*	Stebbins 1985
Birds		
Ferruginous hawk	*Buteo regalis*	Bechard and Schmutz 1995
Swainson's hawk	*Buteo swainsoni*	England et al. 1997
Northern harrier	*Circus cyaneus*	MacWhirter and Bildstein 1996
Prairie falcon[a]	*Falco mexicanus*	Steenhoff 1998
Greater sage-grouse	*Centrocercus urophasianus*	Schroeder unpublished map
Short-eared owl	*Asio flammeus*	Holt and Leasure 1993
Western burrowing owl	*Speotyto cunicularia*	Haug et al. 1993
Gray flycatcher[a]	*Empidonax wrightii*	Sterling 1999
Sage thrasher	*Oreoscoptes montanus*	Reynolds et al. 1999
Loggerhead shrike	*Lanius ludovicianus*	Yosef 1996
Sage sparrow	*Amphispiza belli*	Martin and Carlson 1998
Black-throated sparrow	*Amphispiza bilineata*	Johnson et al. 2002
Lark sparrow	*Chondestes grammacus*	Martin and Parrish 2000
Green-tailed towhee	*Pipilo chlorurus*	Dobbs et al. 1998
Vesper sparrow	*Pooecetes gramineus*	Jones and Cornely 2002
Brewer's sparrow[a]	*Spizella breweri*	Rotenberry et al. 1999
Brewer's blackbird[a]	*Euphagus cyanocephalus*	Martin 2002
Mammals		
Merriam's shrew	*Sorex merriami*	Zeveloff 1988
Kit fox	*Vulpes macrotis*	McGrew 1979
Pronghorn	*Antilocapra americana*	O'Gara 1978
Wyoming ground squirrel	*Spermophilus elegans nevadensis*	Zegers 1984
Merriam's kangaroo rat	*Dipodomys merriami*	Zeveloff 1988
Chisel-toothed kangaroo rat	*Dipodomys microps*	Zeveloff 1988
Ord's kangaroo rat	*Dipodomys ordii*	Garrison and Best 1990
Dark kangaroo mouse	*Microdipodops megacephalus*	Zeveloff 1988
Little pocket mouse	*Perognathus longimembris*	Zeveloff 1988
Northern grasshopper mouse	*Onychomys leucogaster*	McCarty 1978
Sagebrush vole	*Lemmiscus curtatus*	Carroll and Genoways 1980

Table 5.2. Sources of range maps used for 40 species of conservation concern that were included in our regional assessment in the Great Basin Ecoregion and Nevada.

Common name	Scientific name	Source
White-tailed jackrabbit	*Lepus townsendii*	Zeveloff 1988
Pygmy rabbit	*Brachylagus idahoensis*	Green and Flinders 1980

[a]Species occurs throughout the assessment area.

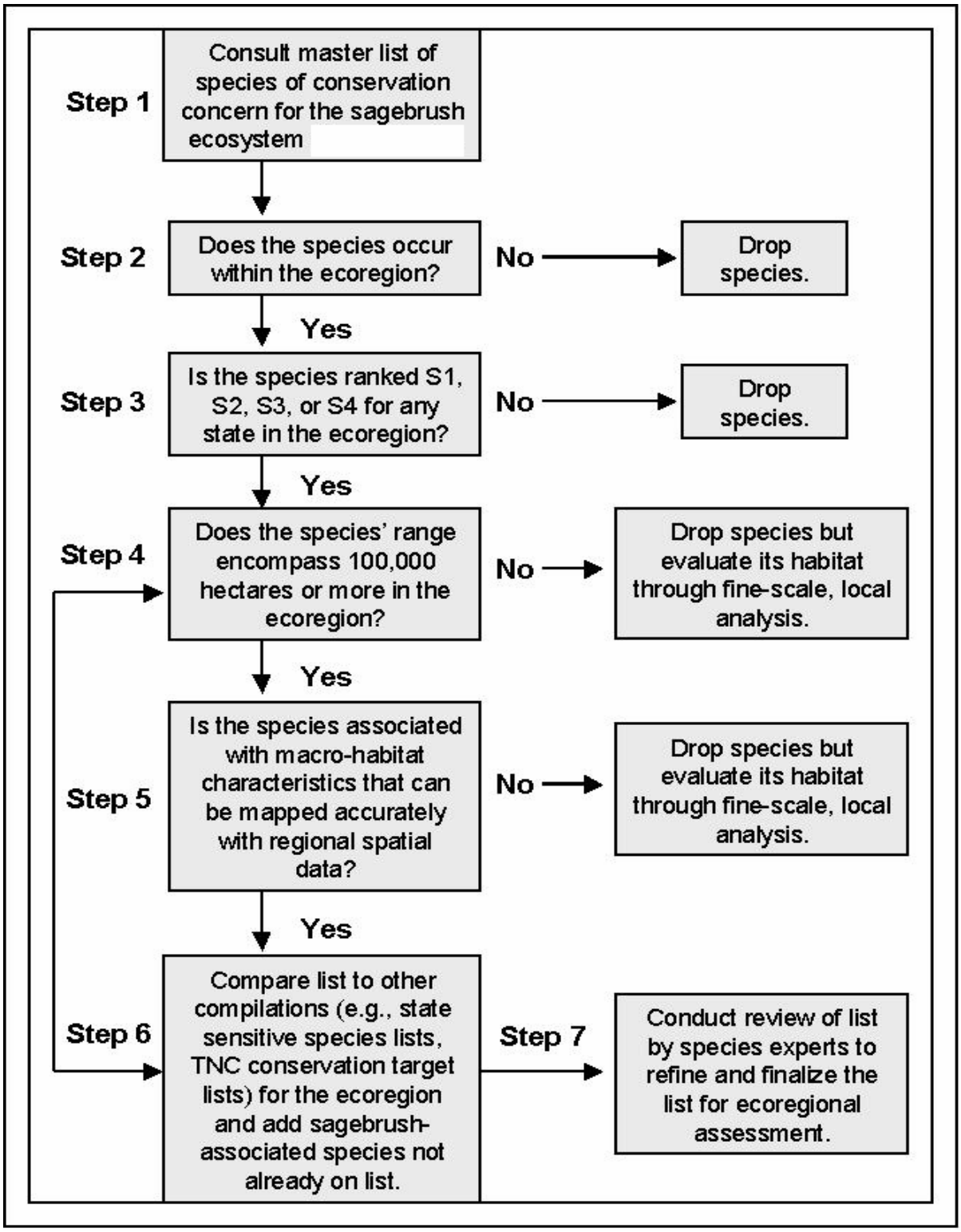

Fig. 5.1. Process for identifying species of conservation concern for regional assessments of sagebrush habitats (from Wisdom et al. 2003) that was used to select species for assessment in the Great Basin Ecoregion and Nevada.