Wyoming Animal Element Ranking Guidelines

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This document is indented to provide resource professionals and other interested parties with a brief presentation of how the Wyoming Natural Diversity Database generates it's Heritage Ranks for individual species within Wyoming. In general this information is a synthesis of national Natural Heritage guidelines and Wyoming-specific information added by the WYNDD Zoologist.

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Lists Maintained by WYNDD

1. Species of Concern (SOC)

This list contains all species considered to be of extremely high, high, or medium conservation concern within the state of Wyoming. Species on this list usually have S-ranks of S1 or S2. Species with ranks of S3 are often included as well if they have a high Wyoming Contribution Rank or have at least one particularly strong concern (e.g., imminent threats). There may be special cases when lower-ranked species would qualify too, such as their inclusion on federal agency lists of concern. All species on this list have adequate information to reliably place them in the state as breeders, and most of the ranking criteria fields will have valid scores. This list is generally organized phylogenetically by class for ease of reference.

2. Species of Potential or Uncertain Concern (SPUC)

This was formerly called the watch list. The term watch list created confusion among some users and was abandoned for the clearer term "species of potential or uncertain concern". This list includes species that are locally abundant regional or local endemics that currently have low threats but high intrinsic vulnerability and could graduate to the SOC list if management changes. The list could also contain species that are currently fairly secure but declining rapidly and with potentially high intrinsic vulnerability under new management scenarios (for example, sage grouse). This list would also contain species with significant data gaps and questions. Such data gaps translate into an inability to reliably rank the individual categories, resulting in ranks of uncertain (i.e., "U") in multiple categories. Moreover, this may also include species that are not reliably placed in Wyoming but to be expected, species whose presence is based on old and vague records, or species that have taxonomic questions to be resolved. For example, piping plover might fit on this list because there are no recent confirmed observations of breeding activity to indicate that it is a resident breeder in Wyoming, or observations are too sporadic to suggest permanent occupation or migration.

State Ranking Factors

1. State Abundance (SABUND)

This category is an estimate of the approximate abundance of the element in Wyoming, using the categories in the Element State Ranking (ESR) database in BCD. For animals, numbers of individuals are usually more important than area on the ground, but not always. The area requirements below are most applicable to plants, and were generated assuming no mobility and little or no area requirements for individuals beyond the plots in which they occur. They should therefore not be considered hard values when ranking animals. In general, the most restrictive measure of abundance should be used.

For reference purposes: 1 section = 1 square mile = 640 acres = 259 hectares.

A = Very Rare (e.g., black-footed ferrets, Wyoming toads, Wyoming pocket gophers, Southern Rocky Mountain boreal toads), which means at least one of the following apply:

Fewer than 1,000 individuals

Fewer than 2,000 acres (i.e., about 3 sections of occupied habitat)

Fewer than 10 miles of stream length.

B = Rare (e.g., spotted bats, boreal owls, Bighorn Mountain wood frogs) , which means at least one of the following apply:
1,000 - 3,000 individuals
2,000 - 10,000 acres (i.e., 3 - 15 sections of occupied habitat)
10 - 50 miles

C = Uncommon (e.g., leopard frogs, sage sparrow, marten) , which means at least one of the following apply:
3,000 - 10,000 individuals
10,000 - 50,000 acres (i.e., 15 – 78 sections, or 0.5 – 2 townships)
50 - 250 miles

D = Common (e.g., elk, coyote, horned lark) , which means at least one of the following apply:
over 10,000 individuals
over 50,000 acres (i.e., over 80 sections, or 2.2 townships of occupied habitat)
over 250 miles

E = Abundant (e.g., deer mouse), which means at least one of the following apply:
over 50,000 individuals
over 250,000 acres (i.e., over about 390 sections, or 10 townships of occupied habitat)
over 1,000 miles

2. Range Issues

For purposes at WYNDD, this refers to the known distribution of the element plus reasonably contiguous, suitable habitat. There are three subcategories within Range: State Range, Continental Extent, and Wyoming Context. These categories define limiting areas and limiting proportions of areas as part of the ranking procedure (e.g., "less than 3% of state territory" or "less than 8,000 square miles"). To implement the ranks, ballpark figures for these comparisons are generated in ArcView by creating coarse range maps based on published data and then calculating the approximate areas of these ranges.

State Range (SRANGE) in Wyoming

This rank describes the nature of the Wyoming distribution of the species. Enter the code for the present size of the range of the Element in the subnation, state or province.

Comments should generally describe the range (present and historic) of the Element within the subnation, state, or province using the names of counties or administrative units, ecoregions, etc. In the case of disjuncts, this should include how distant the Element Occurrences are from the nearest population elsewhere.

A = **Very small** (less than 3% of state territory), or **occasional** (element is regularly seen in the state but does not exhibit a consistent range of occupation, and regular breeding is questionable).

B = **Small** (less than 10% of state territory).

C = **Moderate** (more than 10% but less than half of state territory).

D = **Large** (more than half but less than 75% of state territory)

E = **Statewide** (more than 75% of state territory)

F = **Accidental** (Element is not reliably breeding in the state and there may be temporal gaps in occurrence where it is effectively absent from the state for some years.) Accidental species are not given a numerical S-Rank.

Continental Extent (in North America)

This rank describes the nature of the current continental distribution of the species. There are two main categories: Restricted and Widespread. The restricted category has several sub-categories as noted below.

Restricted

A = **Local Endemic**: North American range is ca. < 8,000 square miles (i.e., about 222 townships; 20,711 km^2; 2.1 x 106 ha; or 3 times the size of Natrona county). This is based on the range sizes of clear local endemics, as follows:

- Cumulative watershed area occupied by Snake River fine-spotted cutthroat trout (*Oncorhynchus clarki undescribed*) = 5,000 mi^2
- Southern Rocky Mountain population of wood frog (*Rana sylvatica undescribed*) = 3,500 mi^2
- Black Hills red-belly snake (*Storeria occipitomaculata pahasapae*) and Black Hills red squirrel (*Tamiasciurus hudsonicus dakotensis*) = 4,100 mi^2
- Breeding range of white-winged junco (*Junco hyemalis aikeni*) = 8,000 mi^2. Note the mapped breeding range of the brown-capped rosy finch (Leucosticte australis) is ca. 30,000 mi^2; however, the actual range is likely much smaller (ca. 10,000 mi2) when suitable habitat (alpine tundra) is mapped more finely.

B = **Regional Endemic**: North American range is ca. < 100,000 square miles (i.e., about the size of Wyoming; 2,800 townships; 260,000 km^2). This is based on the range sizes of clear local endemics, as follows:

- Fish: Reference taxon is the Colorado river cutthroat trout (*Oncorhynchus clarki pleuriticus*), which has a range of about 62,000 square miles.
- Amphibians: Reference taxon is the Southern Rocky Mountain boreal toad (*Bufo boreas* undescribed; historic range), which has a range of about 35,000 square miles.
- Reptiles: Reference taxon is the northern plateau lizard (*Sceloporous undulatus elongatus*), which has a range of about 88,000 square miles.
- Mammals: Reference taxon is the white-tailed prairie dog (*Cynomys leucurus*), which has a range of about 72,000 square miles.
- Birds: Reference taxon is McCown's longspur (*Calcarius mccownii*; breeding range), which has a range of about 230,000 square miles.

C = Widespread but **Patchy** populations or **Disjunct** from the main population:

- Taxa are considered patchily distributed when they exist in a metapopulation structure with low or indeterminate gene flow between neighboring population segments. This is true of most alpine adapted species in the Rocky Mountains (e.g., pikas); many boreal adapted animals (e.g., boreal owls); wetland obligates (e.g., boreal toads); bats (e.g., Townsend's big-eared bat); and a variety of other habitat specialists (e.g., western subspecies of yellow-billed cuckoo). They are essentially a collection of small disjunct populations.
- Taxa (or potential taxa) are considered disjunct when they are separated from a main, larger range of the species and it is thought gene flow is very low between the two groups. This is often a separation significant enough to warrant consideration of the disjunct population as a new subspecies. This often occurs with montane species in major mountain ranges separated by wide, low basins (e.g. the Black Hills or the Bighorn Mountains). In practice, the separation distance necessary to be considered disjunct varies by species and habitat characteristics, but something on the order of 300 miles of relatively inhospitable habitat can be viewed as a rough rule of thumb. Also, the disjunct segment must itself be fairly small … on the order of a local or regional endemic population, as defined above.

Widespread

D = **Widespread**

- Species are widespread when they have total North American ranges that are large and relatively contiguous. In this context, large is roughly greater in area than the states of Wyoming and Colorado combined (i.e., ca. > 250,000 square miles). Contiguous means that gene flow between adjacent population segments if high enough for them to be considered part of the same subspecies.

E = **Continental**

- The taxon in question has a distribution that encompasses the majority of the North American continent. For example, deer mouse or coyote.

Wyoming Context (relative to North American distribution)

This rank describes how much of the species current, extant range occurs in Wyoming.

A = **High**: Wyoming encompasses > about 20% of the taxon's North American range.

B = **Medium**: Wyoming encompasses between about 5% and 20% of the taxon's North American range.

C = **Low**: Wyoming encompasses < about 5% of the taxon's North American range.

Note that for purposes of the Wyoming Significance Rank, the Medium and Low Wyoming Context scores are lumped into one level defined as < 20% of the North American range falling in Wyoming.

D = **Very Low:** Although the taxon has been reported in Wyoming, it is thought that there are no consistently occurring breeding, wintering, or year-round populations occurring in the state. This is effectively equivalent to a State Range of Occasional or Accidental.

U = **Unknown**: Too little is know of the species distribution in Wyoming and/or rangewide to determine how much of the current range falls in the state.

3. Proportion of Range Occupied (in Wyoming)

Area of occupancy is described by IUCN (2001) for taxa as: "the area within its 'extent of occurrence' (see definition), which is occupied by a taxon, excluding cases of vagrancy (Figure 1). The measure reflects the fact that a taxon will not usually occur throughout the area of its extent of occurrence, which may contain unsuitable or unoccupied habitats. In some cases (e.g. colonial nesting sites, feeding sites for migratory taxa) the area of occupancy is the smallest area essential at any stage to the survival of existing populations of a taxon. The size of the area of occupancy will be a function of the scale at which it is measured, and should be at a scale appropriate to relevant biological aspects of the taxon, the nature of threats and the available data."

A = **Very Low**: Less than 5% of the Wyoming range is actually occupied (e.g., spotted bats)

B = **Low**: Less than 20% of the Wyoming range is actually occupied (e.g., many alpine obligate animals)

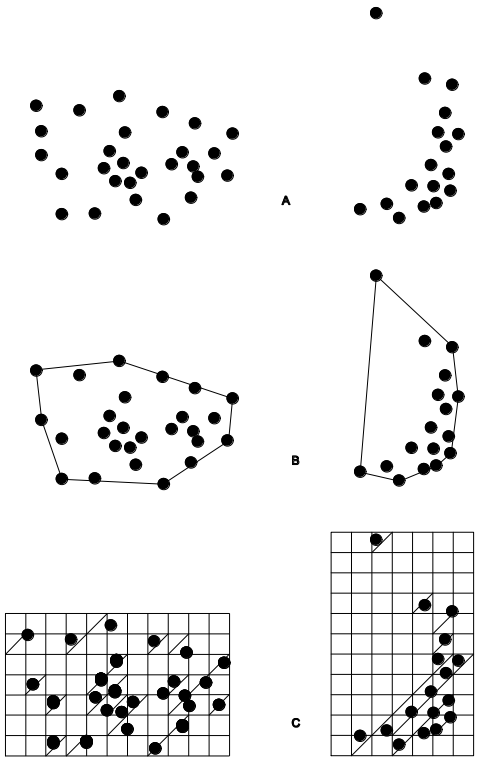
C = **Moderate**: Less than 50% of the Wyoming range is actually occupied (e.g., burrowing owl).

D = **High**: Less than 75% of the Wyoming range is actually occupied (e.g., mule deer)

E = **Complete**: The species can be expected to occupy virtually 100% of its range, usually by virtue of being an extreme habitat generalist (e.g., coyotes, deer mice).

U = **Unknown**: Too little is known of the species distribution in Wyoming and/or rangewide to determine how much of the current range is actually occupied.

Figure 1: IUCN definition of proportion of area occupied



Differences between range extent and area of occupancy (Taken from Masters et al. 2001). Two examples of the distinction between range extent and area of occupancy. (A) Is the spatial distribution of known, inferred or projected sites of present occurrence. (B) Shows one possible boundary to the range extent, which is the measured area within this boundary using a minimum convex polygon. [Note that Burgman and Fox (2001) strongly recommend the use of α-hulls rather than minimum convex polygons to estimate range extent as otherwise significant overestimates (e.g., right side of example B) may result.] (C) Shows one measure of area of occupancy, which can be achieved by the sum of the occupied grid squares.

(From IUCN 2001)

4. State Trend (STREND) in Wyoming

This category is a measure of the trends in populations within Wyoming and has two sub-categories: Historical Trend and Recent Trend. The actual state trend score is based on a qualitative assessment of the contributions of historic and regional trends to current population status in Wyoming. Usually, quantitative trend information is not available for Wyoming and anecdotal, qualitative information is sometimes available. <u>When trends specific to Wyoming are not available, make liberal inferences from regional and national trends</u>.

Historical Trend

Historical trend is a measure of the decline or increase in numbers of the target element or populations of the target element over the last century (i.e., since about 1850). Very long-term ("Paleo") trends should not factor in. Enter the appropriate single-letter code from the list below for the description which best characterizes the trend in the Element's distribution over its state range:

A = **Large decline**: decrease of over 50% in total numbers or in total occupied area.

B = **Moderate decline**: decrease of less than 50% in total numbers or in total occupied area.

C = **Stable**: Species has likely not declined in total numbers or occupied range.

D = **Increase**: Species has increased in total numbers or occupied range.

U = **Unknown**: There is insufficient data to estimate a trend in either direction.

Recent Trend

Recent trend is a measure of the decline or increase in numbers of the target element or populations of the target element over the last several decades (i.e., over some time period that extends no farther back in time than about 1950). Short-term cyclic phenomena, such as lynx-hare cycles, should not be included in this ranking, but rather might be included under the intrinsic vulnerability rank. Enter the appropriate single-letter code from the list below for the description which best characterizes the trend in the Element's distribution over its state range:

A = **Large decline**: decrease of over 50% in total numbers or in total occupied area.

B = **Moderate decline**: decrease of less than 50% in total numbers or in total occupied area.

C = **Stable**: Species has likely not declined in total numbers or occupied range.

D =**Increase**: Species has increased in total numbers or occupied range.

U = **Unknown**: There is insufficient data to estimate a trend in either direction.

5. State Threats (STHREAT)

Degree to which the Element is directly or indirectly threatened. Threats could include habitat conversion, direct exploitation of the species, influence of disease or predators, etc. This category has been divided into two subcategories: Intrinsic Vulnerability and Extrinsic Threats.

A = **Very threatened** in the state; species or community directly exploited or threatened by natural or man-made forces.

B = **Moderately threatened** state-wide; habitat or community lends itself to alternate use.

C = **Slightly threatened** state-wide; self-protecting by unsuitability for other uses.

D = **Unthreatened** on a state-wide basis, although it may be threatened in minor portions of the state.

Extrinsic Threats (in Wyoming)

Extrinsic Threats is a measure the degree and severity of human and natural impacts to the target element. These should include actual, current threats and likely, potential threats. Having habitat requirements that compete with popular human land uses is justification for a high Extrinsic Threat score.

A = Highly Threatened: Long-term persistence of the species in Wyoming is imminently threatened by current human practices (e.g., land development in its primary habitat or excessive harvest) or natural phenomena (e.g., catastrophic fires). For example, primary habitat of a species falling on major coalbed methane fields would result in a highly threatened designation.

B = Moderately Threatened: The species is currently or potentially threatened by human or natural events, and these events are likely to result in a population decline in Wyoming. However, these issues do not necessarily pose a threat of extirpation.

C = Slightly Threatened: Threats potentially exist, but are not likely to affect population numbers in the state to a great degree.

D = Unthreatened:

U = Unknown: There is insufficient knowledge of the species biology and/or how it interacts with potentially threatening situations to offer an informed opinion on how populations in Wyoming will be affected.

Intrinsic Vulnerability (Rangewide, with emphasis on Wyoming ecosystems)

Intrinsic Vulnerability is a measure of the inherent rarity of a species and its probable susceptibility to extrinsic threats in Wyoming. Factors that contribute to intrinsic vulnerability include population density, home range area requirements, fecundity, dispersal ability, pollinator limitations, competitive ability, susceptibility to hybridization, habitat fidelity, and degree of habitat specialization. Intrinsic vulnerability is scored with an emphasis on conditions in Wyoming, which may represent a subset of the species full, range-wide ecological amplitude.

A = High Vulnerability: The species is restricted to a single, narrowly defined habitat type or exhibits at least 2 of the following characteristics making it extremely susceptible to modifications in its environment: very low population density, very low mobility or dispersal ability, large home area requirements, very low fecundity, restrictive breeding biology (including pollinator limitations), or predisposition to disease.

B = Moderate Vulnerability: The species is restricted to 2-4 similar habitat types or exhibits at least one of the following characteristics making it susceptible to modifications in its environment: low population density, low mobility or dispersal ability, large home area requirements, low fecundity, restrictive breeding biology (including pollinator limitations), or predisposition to disease.

C = Low Vulnerability: The species occurs in a variety of habitat types (although usually all within a single primary biome type) or have life history traits that do not predispose them to population declines resulting from modifications in their environment. Many relatively common species in Wyoming could be given a rank of C (e.g., mule deer, buffalo grass).

D = No Vulnerability: The species occupies a wide variety of habitat types (usually across 2 or more biomes) or has life history traits that make it unusually abundant and resilient to changes in environmental conditions (such species may even increase as a result of such changes). These species have the potential to become highly abundant or displace other species. They may have characteristics such as tolerance for high population densities, small home-range requirements, high fecundity, and high tolerance to disease. Species such as deer mice fit this category, as to many invasive species, such as Canada thistle.

U = Unknown Vulnerability: We do not have enough biological information to present an informed opinion of the species intrinsic vulnerability.

Wyoming Contribution Rank Factors

The Wyoming significance rank is designed to explicitly consider how Wyoming contributes the range-wide persistence of a species. This rank is most heavily influenced by how much of a species total range is in Wyoming and how the population status of the species in Wyoming relates to the rest of North America. All else being equal, the highest ranks will be given to species for which Wyoming contains a large portion of the range and for which that portion seems to be more secure than elsewhere. The following sections give a brief definition of the Wyoming Significance Rank Decision Tree, which is attached.

Criteria 1: Native Status

I. Native: A taxon known or strongly suspected to have occurred in Wyoming or an adjacent state prior to 1800, and whose occurrence in Wyoming is known or strongly suspected to be the result of non-anthropogenic dispersal to and occupation of the state.

II. Exotic: A taxon known or strongly suspected to have not occurred in Wyoming or an adjacent state prior to 1800, and whose occurrence in Wyoming is known or strongly suspected to be the result of anthropogenic translocation (deliberate or otherwise) of individuals or propagules.

Criteria 2: Occupancy of Wyoming

I. Resident: A taxon reliably encountered in similar locations and habitats in Wyoming during the last 10 years.

II. Accidental: A taxon encountered only sporadically in non-predictable locations and habitats in Wyoming during the last 10 years.

Criteria 3: Percent of Continental Range in Wyoming

I. High: Wyoming encompasses > 20% of the taxon's North American breeding, wintering, or year-round range.

II. Medium/Low: Wyoming encompasses <20% of the taxon's North American breeding, wintering, or year-round range.

Criteria 4: Extent of Continental Range

I. Restricted: The species is a local endemic, regional endemic, or has a disjunct / fragmented population, as defined in the above-mentioned range issues section (including proportion of range occupied).

II. Widespread: The species is a widespread, as defined in the above-mentioned range issues section.

Criteria 5: Status of Wyoming populations relative to other population

Based on the previously discussed rank categories (i.e., state abundance, range issues, state trend, state protected occurrences, state threats), make a judgment on whether populations occurring in Wyoming are more or less secure (in terms of long-term persistence) than those occurring elsewhere in the species range.

I. More Secure: Populations of the species in Wyoming appear to be more secure than elsewhere in the species range.

II. Equally Secure: Populations of the species in Wyoming are at least as secure as elsewhere in their range.

III. Less Secure: Populations of the species are in greater danger of extirpation in Wyoming than elsewhere in the species range

IV. Uncertain: There is not enough information to make an educated guess regarding relative security.

State Rank Procedure

For each element, the above noted State Ranking Factors are assigned numeric values and combined additively based on the scheme presented in Attachment 1.

Wyoming Contribution Rank Procedure

For each element, the above noted Wyoming Contribution Ranking Factors used to navigate the decision tree presented in Attachment 2.

References

Master, Lawrence L., Larry E. Morse, Alan S. Weakley, Geoffrey A. Hammerson, and Don Faber-Langendoen. 2001. Heritage conservation status assessment factors: Review draft. NatureServe, Arlington, Virginia.

Attachment 1: Wyoming Animal State Ranking Worksheet

Attachment 2: Wyoming Contribution Rank Decision Tree