## Methods

The strategy is organized from broad-scale (ecotype/focus area) to fine-scale (species). However, the priorities were actually developed using methods that work from species to ecotype/focus areas. FWP's first step was to update our occurrence databases and assess updated databases to determine which native Montana species are in greatest need of conservation (Tier I). Please refer to Categorizing the Levels of Conservation Need in the introduction of this strategy for complete definitions of the tiers used in this document. Using this information, community types were identified that offer some of the greatest opportunity to conserve these Tier I species. Finally, the community types in greatest need of conservation were used to locate the areas of the state where those communities are the richest and offer some of the best opportunities for comprehensive conservation of all associated species and their habitats.

### Species

During the first year of planning, we collected as much observational data as possible from all agencies and organizations in Montana for incorporation into the existing FWP and Montana Natural Heritage Program (MNHP) Point Observation Database (POD). More than 130,000 new observations were added during this period. The updated database was used by FWP and MNHP to review the Montana Species of Concern List (except fish). In order to establish the low, declining or imperiled status of all Montana's species for this strategy, a matrix was developed that included all species occurring in Montana with their corresponding score for each of the fields listed below.

MP = Management plan (0=no, 1=yes)
CF = Current funding (0=none, 1=partial, 3=full)
CM = Current management effort (0=none, 1=group level, 2=species specific)
SC = Species of Concern rank (1=S1, 2=S2, 3=S3, 4=S4, 5=S5)
LR = Limited Montana range and secure population (0=yes, 1=no)
LT = Existing local threats (0=yes, 1=no)
I = Incidental to Montana (yes=default to Tier IV)
N = Non-native species (yes=default to Tier IV)

Tiers for conservation need had previously been identified for birds by the Partners in Flight effort and for fish by a separate FWP effort. We used these existing tier assignments to model the following equation and then calculated the original draft tier assignments for all species including land birds and fish using this equation.

$$Tier = (CF+CM+2*SC)/4+MP/4+LR-LT$$

Staff from MNHP and each of FWP's seven regions reviewed the draft tiers and recommended if species should be reassigned to a different tier. The planning

team was concerned about not including a species in Tier I that perhaps should have been and adopted rules for adjusting tier assignments. The rules required that only one FWP region indicate that any species should be assigned a greater conservation need status, such as from Tier II or Tier III to Tier I, for that species to be reassigned. However, the rules required at least two FWP administrative regions indicating that a species should be reassigned from a Tier II to a Tier III and three FWP regions indicating that a species should be reassigned from a Tier I to a Tier II before an adjustment was made.

The SWG technical and steering committees then reviewed the species tier assignments and made some final adjustments based on knowledge of future funding and management issues. All contacts from the agencies and non-governmental organizations that were invited to the October 2003 exploratory group were e-mailed the draft list, and comments were received and incorporated. The final draft of the species tier assignments was then reviewed and approved by the SWG steering committee (Table 2).

**Community Types**

Although fish and wildlife communities have never been formally established for Montana, associations were developed between species and their related habitats to the degree described in this strategy as community types. Future efforts should be made to define and validate fish and wildlife communities for Montana. To begin developing communities and identify those in greatest need of conservation, the FWP technical committee, field staff, and Habitat Montana staff determined the scales and coverages best suited for assessing the levels of community type conservation need.Three mapable coverages were selected to allow for planning at three scales: 1) the FWP Habitat Montana ecotypes, 2) USFS subsections (HUC for aquatic [*1]), and 3) GAP 50 covertypes [*2] (habitat descriptors for aquatic [*3]), (Montana Fish, Willdife & Parks 1991; Nesser et al. 1997; Fisher et al. 1998). All riparian and wetland covertypes from the GAP 50 were combined to create one covertype. The same was done for sagebrush and salt flats, shrub grassland associations, and grassland covertypes. Covertypes with minor associations such as snow and rock were removed prior to any analysis.

Fish and wildlife species addressed in the strategy were linked with the GAP covertypes to establish essential and general biological associations that are described in this strategy as community types. To accomplish this, GAP 50 and ecosystem codes were obtained from their respective GIS layers using all species locations in the POD database with a positional accuracy of less than 500 meters. These data were summarized for each species to obtain a count of occurrences within each habitat and ecosystem category, and then sorted in descending order. For each species we determined the major habitats and ecosystems utilized by each species, using ecological knowledge of that species in conjunction with the associations from POD. After the major ecosystems were

assigned, any ecosystems determined to be integral to the ecology of a particular species were designated as essential. After the major habitats were assigned, any habitats determined to be integral to the ecology of a particular species were designated as essential habitats. The newly created community types were then linked with the USFS subsections and HUCs and finally with the FWP Habitat Montana ecotypes.

GAP covertypes, such as for grasslands, one of Montana's most important habitats, are based on the amount of grass cover interpretable by remote sensing. They are not strongly associated with ecological site factors or a recognized vegetation classification like the National Vegetation Classification System. Future classifications and maps will have a stronger relationship to habitat if they are ecological and based on data that are more comprehensive. The scale of GAP coverage also is often not suitable for comprehensive mapping of wetlands and riparian areas, another significant habitat, which often occur as narrow or small areas. These habitats will be better known and managed if National Wetlands Inventory mapping or a similar product is completed for Montana.

*1 Note: We initially used USFS subsections for aquatic but later changed to HUC 4 to better represent aquatic communities.
*2 Note: For clarity of description, GAP 50 covertypes were used as a surrogate for habitat.
*3 Note: Aquatic communities were described as prairie streams, mixed source rivers, intermountain valley rivers, intermountain valley streams, mountain streams, prairie rivers, lowland lakes, lowland reservoirs, mountain lakes, and mountain reservoirs.

A habitat matrix containing all community types along with the information listed below was developed, and the following formula was used to calculate draft tiers for all community types within each subsection or HUC.

$$((S+AR+SAR+CR+CCR)/5)$$

S = Percentage of covertype in stewardship (1=private, 2=public, 3=wilderness/park)
AR = Animal richness (1=(more than 100), 2=(11 to 100), 3=(0 to 10))
SAR = Average of SWG tier ranks for animal richness (1=(0 to 2.34), 2=(2.34 to 2.647), 3=(2.647 to 3))
CR = MNHP community richness: based on National NHP community covertypes, i.e., how many Montana GAP covertypes are found in grouped community types? (1=(47 to 100), 2=(16 to 46), 3=(0 to 15))
CCR = MNHP community of concern richness: based on National NHP community of concern covertypes, i.e., how many Montana GAP covertypes of concern are found in grouped community types? (1=(10 to 17), 2=(4 to 9), 3=(0 to 3))

Staff from FWP administrative regions reviewed draft tiers that were assigned to each community type within the subsection or HUC under their authority, and adjustments to tier assignments were made. Reviewers also scored the level of threat (high, medium, or low) associated with the community type within each subsection or HUC. An average statewide tier was calculated for each community type using the staff's adjusted tier assignments for each community type within subsections and HUCs (Tables 3 and 4). Finally, these tables also describe the level of stability within each community type as either declining, stable or improving, as reviewed and revised by appropriate agency staff.

**Focus Areas**

USFS subsections and HUCs were inserted with the final statewide community type tier assignments to determine what areas contained the greatest percentage of Tier I community types. These subsections and HUCs were assigned Tier I status. Staff from FWP administrative regions were provided opportunities to review and comment on the draft focus area tier assignments. Habitat Montana, Upland Game Bird Habitat Enhancement, and Future Fisheries staff involved with administration of the programs then reviewed all adjusted draft tier assignments. Technical and steering committees reviewed and approved community and focus area tier assignments. Tier I focus areas were then organized by ecotype (Tables 5 and 6).

**Inventory**

The inventory component addresses species in greatest need of data collection in order to establish the distribution and status of that species. The inventory component was designed to help direct survey efforts toward species and groups of species that have inadequate occurrence data.

An inventory matrix was developed using the following information, and all groups of species and individual species were assigned as Tier I, II, or III (Tables 7 and 8).

IIS = Need for inventory of individual species
ISP = Need for inventory of species group (ISP 1–2.3 = Tier I, ISP 2.4–2.6 = Tier II, ISP 2.7–3 = Tier III)
IE = Inventory effort (observation points in point observation database): (0 to 100)=1, (101 to 500)=2, (more than 500)=3
I/P = Incidental/peripheral species: 1 = native incidental/peripheral, 2 = native not incidental/peripheral
ST= Sum of tier scores for all species in a given taxonomic group
SP= Number of species in a taxonomic group

IIS=(IE + I/P)/2 and ISP=ST/SP