



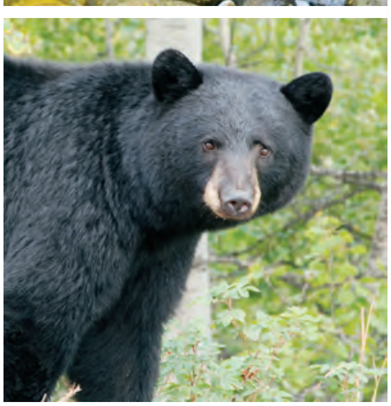

Fish and Wildlife Recommendations for Subdivision Development in Montana

A WORKING DOCUMENT

APRIL 2012

Montana Fish, Wildlife & Parks

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Fish and Wildlife Recommendations for Subdivision Development in Montana

A Working Document

This working document is intended for use by FWP biologists, local governments and developers to generate an open discussion on the implementation of consistent fish and wildlife conservation recommendations for subdivision development in Montana. The recommendations are designed to help guide fish and wildlife professionals, and to help inform municipal and county leaders and land developers. The working document does not claim to represent or prejudge any formal proposals or applications under consideration by any commission or board.

FWP invites comments and feedback from all users of this working document through October 2013.

The working document and a user feedback survey form are available on the Montana Fish, Wildlife & Parks website at **http://fwp.mt.gov**.

April 2012

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Foreword

The mission of Montana Fish, Wildlife & Parks (FWP) is to provide for the stewardship of the fish, wildlife, parks, and recreational resources of Montana while contributing to the quality of life for present and future generations. In fulfilling this mission, FWP's employees and citizen commission work in partnership with many others. We operate under a set of guiding principles, two of which are especially relevant to this project. We strive to (1) maintain the long-term viability of Montana's natural, cultural, and recreational resources; and (2) provide credible and objective information. This working document has been prepared with our mission and guiding principles in mind.

The Montana Subdivision and Platting Act authorizes local governments to solicit public agency review and comment on subdivision applications. FWP is routinely contacted in this regard. Our field biologists take their role in the subdivision process seriously, and they offer important input based on their professional knowledge and expertise.

We recognize that subdivision development can occur in ways that conserve fish and wildlife habitats, or in ways that can cause significantly adverse impacts on fish and wildlife resources. FWP wishes to help Montana communities and counties accommodate subdivisions for people *and* healthy habitats for fish and wildlife.

To achieve this goal, FWP has prepared this package of subdivision process and design recommendations. First and foremost, we have assembled this guidance for our field biologists, to enhance the consistency, reliability, and timeliness of FWP's input as a subdivision review agency. Our field biologists will use this working document to guide their participation in the subdivision process, including their preparation of application review comments. We will provide training to our field staff during the spring of 2012, and expect them to apply the recommendations that are pertinent to FWP's advisory role in the subdivision process.

This working document also contains suggestions for local planners, local government officials, and subdividers and their project teams. We hope these groups will find the subdivision planning approaches and tools offered here useful. During 2012, FWP will offer training opportunities to any interested parties.

The term "working document" reflects FWP's intention to solicit user feedback during an initial 18-month period of implementation, evaluate the effectiveness of the recommendations, and consider potential modifications to them.

Dave Risley, Administrator
Fish and Wildlife Division

Acknowledgements

These recommendations were compiled in large part by a technical working group consisting of the following biologists, land use planners, and state agency attorneys:

FWP: Gael Bissell, Kristi DuBois, Doris Fischer, Chris Hammond, Jamie Jonkel, Scott Opitz, Bill Schenk, John Vore, and Catherine Wightman. Additional FWP biologists offered input, including Kim Annis, Allison Begley, Dwight Bergeron, Chris Clancy, Mark Deleray, Vickie Edwards, Kevin Frey, Lauri Hanauska-Brown, Jeff Herbert (retired FWP), Tom Lemke (retired FWP), Glenn Phillips (retired FWP), and Alan Wood.

Local land use planners: Anne Cossit (Cossit Consulting), Dave DeGrandpre (Land Solutions), and Nancy Heil (Missoula County Rural Initiatives).

Montana Department of Commerce: Jerry Grebenc (through December 2011) and Kelly Casillas.

Others with biology and/or land use planning expertise: Brent Brock (Craighead Institute), Pete Coppolillo (formerly with Wildlife Conservation Society), Janet Ellis (Montana Audubon), Dennis Glick (Future West), and Jim Richard (retired land use planner). Additional biologists offered input, including John Carlson (U.S. Bureau of Land Management), Steve Gniadek (retired National Park Service), and Brian Martin (The Nature Conservancy).

FWP gratefully acknowledges the technical working group's extraordinary dedication and hard work spanning more than three years. We thank Alan McCormick (attorney with Garlington, Lohn & Robinson), Tara DePuy (attorney under contract with the Montana Association of Counties-Joint Powers Insurance Authority), and Mike Inman (Park County senior planner) for their thoughtful reviews of our March 2011 draft.

Additional individuals and groups were consulted during the process of assembling these recommendations, including the Governor's Task Force on Riparian Protection, Montana Natural Heritage Program, Montana Department of Transportation, more than 30 FWP personnel (mostly biologists, including our regional fisheries and wildlife managers), several additional public and private sector biologists, a land use attorney, and land use planners from the planning departments of Gallatin County, Lincoln County, Missoula City-County, Missoula County Rural Initiatives, and Yellowstone County.

Photo and Design Credits: bull trout photo—Joel Sartore (National Geographic) and Wade Fredenberg (U.S. Fish and Wildlife Service (USFWS)); dispersed and clustered development illustrations—John Vore, (FWP); line drawings—Cindie Brunner, Bob Hines (USFWS), Ron Jenkins, Darrell Pruett (USFWS), and Robert Savannah (USFWS); cover design—Luke Duran (FWP); document design—Janet Ellis (Montana Audubon); water body and grassland illustrations—Geoffrey Wyatt (Wyatt Designs).

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Introduction

Population growth and subdivision development in Montana have occurred at different rates over the decades. While we've seen a major slowdown in the past couple of years, history suggests we will again experience periods of rapid land use change to accommodate more people and shifting demands.

Subdivision development can impact a community, county, and region in a variety of ways. Benefits of subdivision development may include:

- Increased housing opportunities for new and current residents.
- Infrastructure improvements to serve a growing population.
- Jobs for engineering/design/construction workers.
- Additional commercial, industrial, and recreational space.

In some cases subdivision development can conserve, and even enhance or restore, important fish and wildlife habitats.[1]

Subdivision development can also adversely affect the social, economic, and natural environment. Of particular concern to FWP is that subdivision development may negatively impact fish, wildlife, and their habitats. For example, a subdivision may:

- Fragment a large block of open space occupied by wildlife.
- Create structural barriers to animal movement between habitat patches or their seasonal ranges.
- Reduce the ability of wildlife to survive or reproduce in an area due to disturbance factors such as buildings, roads, pets, and human activities.
- Remove riparian vegetation or introduce pollutants and sedimentation into water bodies, thereby degrading the water quality, stream stability, and natural stream processes upon which fish and wildlife populations rely.

This working document does not address the full range of adverse impacts that subdivisions can have on Montana's fish and wildlife resources. However, it does address several of FWP's concerns and offers guidance for how to avoid and reasonably minimize the impacts.

This working document is organized into four sections:

- Section I. Recommendations for the subdivision application and review process.
- Section II. Recommendations for subdivision design standards.
- Section III. Acronyms and definitions for technical terms used in this document.

[1] FWP recognizes that the Montana Subdivision and Platting Act requires local governments to review proposed subdivisions for their effects on "wildlife and wildlife habitat" [76-3-608(3)(a), MCA]. This term is widely understood to include both fish and wildlife species and habitats. However, because FWP has a Fisheries Bureau and a Wildlife Bureau, and because this document is primarily directed at FWP, the reader will find regular references to both fish and wildlife.

- Section IV. Appendices, including contact information, a set of subdivision planning tools, and the rationale and pertinent scientific references for the subdivision design recommendations.

Fish and Wildlife Recommendations for Subdivision Development in Montana provides guidance to FWP field biologists, many of whom work hard to provide pertinent and timely input into the local subdivision process. We wish to equip them with recommended approaches and a readily accessible compilation of science-based information to support their efforts. This working document also offers guidance to interested public sector planners, local officials, subdividers and their private sector planners and biologists, and members of the general public. We encourage these folks to consult with FWP field biologists during the subdivision process, to tap their professional expertise and their intimate knowledge of local fish and wildlife populations and habitat conditions. We believe these recommendations can help improve FWP's participation in the subdivision process, the efficiency of the local subdivision process, and the quality of local subdivision decisions. We are convinced that, with careful site planning and development design, subdivisions and healthy habitats can coexist.

These recommendations have been compiled by knowledgeable biologists and planners, who themselves have drawn from the best available science of wildlife biology and land use planning. At the same time, we realize this effort remains a work in progress. FWP operates on the "adaptive management" principle, which compels us to evaluate, modify, apply, and reevaluate our policies and practices on a regular basis. We offer these recommendations in a similar spirit, and look forward to receiving internal and external feedback over the next 18 months on the questions of what works, what doesn't work, what's missing, and why? An evaluation timetable and survey instrument will be made available in the spring of 2012.

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Section I. Recommendations for the Subdivision Application & Review Process

This section offers guidance on how and when FWP field biologists, or other professionally trained biologists, can most effectively and efficiently participate in the process of subdivision site selection, project design, and subdivision application review. The recommendations are also addressed to local governments and subdividers. Included with these recommendations are several suggested subdivision planning tools that, if utilized by local governments and/or subdividers, may improve their ability to identify, assess, avoid, and reasonably minimize the potentially significant adverse impacts of subdivision development on fish and wildlife.

A. Early Consultation

❖ Recommendation #1

- **Subdividers: Consult with local FWP field biologists at the earliest stage of project planning. Other professionally trained biologists, of course, may also be consulted. The ideal time to consult with biologists is *before* selecting a site for subdivision development. The next best time for early consultation with biologists is during the pre-application process.**

- **FWP field biologists: Support the site assessment and information-gathering efforts of subdividers and/or their representatives at these early project planning stages.[2]**

Rationale for Recommendation #1. If consulted before or during the pre-application process, FWP and other professionally trained fisheries and wildlife biologists can inform the subdivider of key habitat issues that may be associated with proposed subdivision development at a particular location. The sooner a subdivider gains such information, the more effectively he or she can consider fish and wildlife resources in the course of subdivision site selection and project design. A modest amount of time invested by the FWP field biologist at this early stage of project planning may save everyone—FWP, the subdivider, the subdivision administrator, and the local governing body—substantial time and money later in the subdivision process.

❖ Recommendation #2

- **Local governments and subdividers: Use the Contact Information and Web Links (see Appendix A), to access various public domain sources of fish and wildlife information, including FWP's Crucial Areas Planning System (CAPS).**

- **Local governments and subdividers: Use the *Fish & Wildlife Information Checklist* (see Appendix B.1) as a subdivision planning tool.**

[2] Some FWP regional offices have found it very helpful and efficient to designate an in-house "point person" for coordinating early subdivision planning comments and subdivision application reviews. Such a person can assist FWP field biologists and managers in compiling and issuing FWP comments in a timely manner.

- **Subdividers: Bring a completed *Checklist* to the pre-application meeting with the subdivision administrator.**

- **FWP field biologists: Support efforts by subdividers and/or their representatives to complete the *Checklist* accurately; however, it is the subdivider's job to compile information for the *Checklist* (not FWP's).**

Rationale for Recommendation #2. Both appendices can assist subdividers in the early stages of project planning and design. If subdividers tap some of the publicly available sources for biological information in the process of completing the *Checklist*, they will gain knowledge helpful to their early decisions about site selection and project design. A visit to FWP from a subdivider to review and discuss the *Checklist* will enable our local field biologists to help the subdivider focus his or her attention on any key habitat features and issues. If the subdivider brings a completed *Checklist* to the pre-application meeting, the subdivision administrator will be better able to discuss the subdivision application provisions that may pertain to the project. The subdivision administrator may also find the Contact Information and Web Links appendix useful in the review of subdivision applications.

B. Subdivision Process

❖ Recommendation #3

- **Local governments: Consider making the *Fish & Wildlife Information Checklist*, or a modified version of it, a required element of the subdivision application.**

❖ Recommendation #4

- **Local governments and subdividers: Use the *Fish & Wildlife Impact Assessment* (FWIA) (see Appendix B.2) as a tool for addressing the "wildlife and wildlife habitat" portion of the local Environmental Assessment (EA) requirement.**

- **Local governments and subdividers: Use the *Summary of Probable Impacts* (SPI) *Guidance* (see Appendix B.3) as a tool for addressing the "wildlife and wildlife habitat" portion of the local SPI requirement.**

- **FWP field biologists: Respond to subdivider and/or subdivision administrator inquiries related to the FWIA or the SPI; however, it is the subdivider's job to complete the FWIA or SPI (not FWP's).**

Rationale for Recommendations #3 and #4. The *Fish & Wildlife Information Checklist, Fish & Wildlife Impact Assessment* (FWIA), and *Summary of Probable Impacts* (SPI) *Guidance* are all planning tools that can help a subdivider (a) identify the types of species and habitats found on and in the vicinity of a proposed subdivision; (b) recognize which design standards may suit the project; (c) more accurately and thoroughly consider the potential effects of the project on fish and wildlife resources; and (d) submit a complete and sufficient application to allow the local government to undertake its subdivision review. These tools offer a means by which

FWP can more efficiently provide pertinent information to subdividers at the important stages of project design, alternatives analysis, and impact assessment. In addition, these tools can assist the subdivision administrator, planning board, governing body, and review agencies such as FWP in evaluating proposed subdivisions.

❖ Recommendation #5

- **Local governments: Consider including in local subdivision regulations a set of science-based development design standards for conserving important fish and wildlife resources.**

- **FWP field biologists: Work with local governments who are interested in doing this.**

Rationale for Recommendation #5. Few local subdivision regulations in Montana contain specific guidance on how to design a subdivision to avoid or reasonably minimize adverse impacts on important fish and wildlife resources. This lack of standards makes it difficult for a subdivider or review agency like FWP to know the local government's expectations, and it presents challenges to the local government wanting to make subdivision decisions in a consistent fashion. An adopted set of standards designed to help conserve key habitat types and species can help local subdivision regulations provide clearer guidance to everyone involved in the subdivision process. When such guidance is available, subdividers likely enjoy a more predictable decision-making environment. They know what standards their proposals must meet sooner in their project planning. Such knowledge leads to fewer surprises later in the subdivision process. For FWP field biologists, the inclusion of standards in local subdivision regulations simplifies their subdivision review role, because they know that subdivision applications are being designed from the outset with fish and wildlife resources in mind.

❖ Recommendation #6

- **Local governments who choose to adopt subdivision design standards intended to conserve fish and wildlife resources: Also consider establishing an efficient process whereby subdividers have the option to propose an alternative to the adopted standards. See Appendix B.4 for a suggested *Alternative Subdivision Design* (ASD) process.**

- **FWP field biologists: Wherever the ASD option is offered, consider closely the site-specific conditions surrounding a particular project and use your expert opinion in suggesting or commenting on alternative strategies for addressing fish and wildlife concerns.**

Rationale for Recommendation #6. There may be additional ways to meet the objectives of adopted development design standards. The recommended *Alternative Subdivision Design* (ASD) process offers the subdivider moderate flexibility and creative license in subdivision design, without the burden of a variance procedure. Where such flexibility is provided, FWP field biologists feel freer to suggest or support alternative solutions to specific project siting or project design issues. A moderately flexible subdivision design process also facilitates identification of additional strategies for achieving developments that are compatible with fish and wildlife.

Section II. Recommendations for Subdivision Design Standards

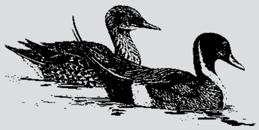
❖ Recommendation #7

- **Local governments: Consider the standards recommended below and the information contained in Appendix C: Rationale for Subdivision Design Recommendations, with Pertinent Subdivision References, in updating local subdivision regulations, conducting subdivision application reviews, requiring reasonable mitigation measures, and preparing findings of fact to support subdivision decisions.**

- **Subdividers and project teams: Use the recommended standards and Appendix C as guidance in both siting and designing proposed projects.**

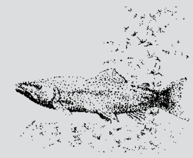
- **FWP field biologists: Use the following recommendations and Appendix C in working with subdividers and providing input to subdivision administrators and local governing bodies on subdivision applications. As necessary based on site-specific conditions, adapt these recommended design standards to suit particular situations.**

Rationale for Recommendation #7: For FWP biologists, these recommended standards and Appendix C promote timely input into the local subdivision process and foster a consistent application of habitat conservation and fish/wildlife management principles by the department. For local governments, these recommendations offer a "menu" of science-based design standards from which they can select, taking into account local conditions, values, and the habitats and species found in their area. Use of such standards, along with Appendix C, may help local governments consider subdivision impacts on "wildlife and wildlife habitat" more efficiently and effectively. For subdividers and their project teams, the guidance in this section and in Appendix C will help them create developments that coexist in harmony with fish and wildlife.



A. Water Bodies

(*see Appendix C.1 for supporting documentation*)



(1) List of Pertinent Definitions (see Section III for actual definitions)

Associated uplands, braided river, building setback, channel migration zone, cropland, development, floodplain, intermittent stream, migratory game birds, ordinary high-water mark, other water bodies, perennial stream, qualified wetland professional, reservoir, riparian area, river, shorebirds, stream, subdivision design features, surface water, vegetated buffer, water body, water-dependent use, wetland, wetland complex, and wildlife.

(2) Objectives

- Protect water quality, stream stability, natural stream processes, aquatic habitat, and fish and wildlife habitat by conserving water bodies, their associated riparian areas, and, in some situations, associated uplands.
- Retain existing wetland and riparian areas by avoiding or minimizing human disturbances associated with developments such as buildings, roads, docks, and other structures.
- Maintain the natural hydrological and ecological functions of wetlands and riparian areas by minimizing fragmentation and degradation of these sites.
- Maximize the ability for wetlands, riparian areas, and, in some situations, associated uplands, to function as fish and wildlife habitat.

(3) Applicability

These standards pertain to any subdivision development proposed on property that contains or adjoins a water body and/or its associated riparian area.[3]

(4) Recommended Design Standards

a. Apply the following vegetated buffers and building setbacks (see Figure 1):

- **Rivers:** A minimum of 250 feet of vegetated buffer plus 50 additional feet of building setback. Total building setback equals at least 300 feet from each side of a river.
- **Perennial Streams:** A minimum of 150 feet of vegetated buffer plus 50 additional feet of building setback. Total building setback equals at least 200 feet from each side of a perennial stream.

[3] These water body standards offer guidance beyond that provided by other types of water-related standards often implemented by local governments (e.g., water quality, lakeshore protection, floodplain protection, and stormwater drainage standards). These other standards can also help maintain healthy fish and wildlife habitat (e.g., if, as a result, development does not occur in the 100-year floodplain, and stormwater drainage facilities are designed and installed to minimize impacts on water quality and maintain, as much as possible, pre-development runoff condtions and hydrology).

- **Other Water Bodies:** A minimum of 100 feet of vegetated buffer plus 30 additional feet of building setback. Total building setback equals at least 130 feet from the boundary of a wetland or pond, or the ordinary high-water mark of an intermittent stream, lake, or reservoir.

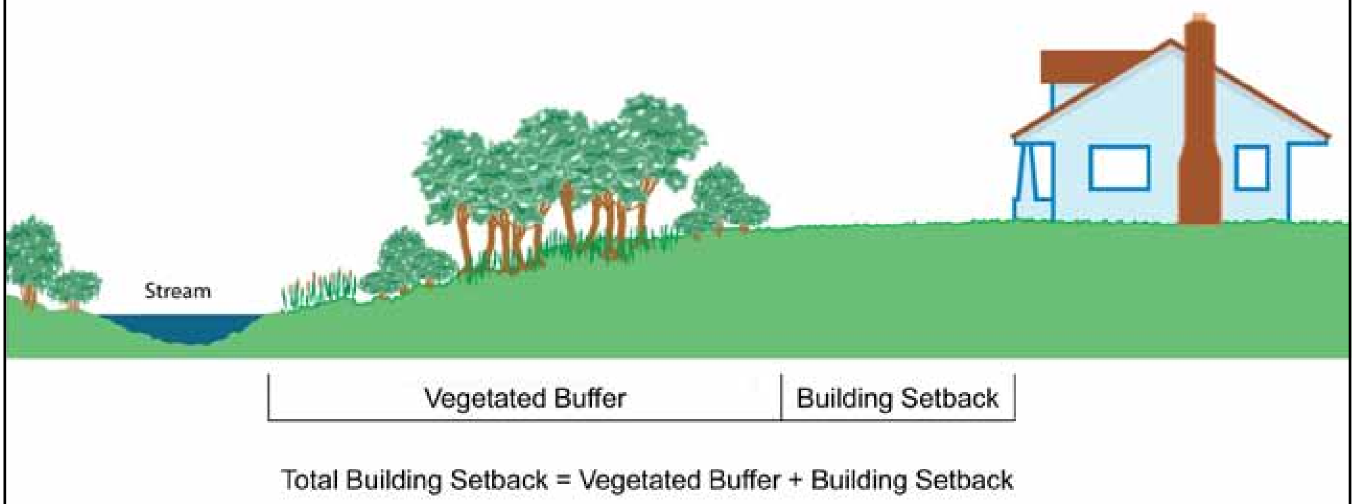


***Figure 1.** Illustration of total building setback.*

b. Measure vegetated buffer and building setback distances from all water bodies on a horizontal plane, as follows:

   - Rivers, streams, lakes, reservoirs: Measure from the ordinary high-water mark. For braided rivers, measure from the ordinary high-water mark of the outermost braid that is nearest to the proposed structure.
   - Wetlands (including ponds): Measure from the wetland's defined boundary. The outer edge of a wetland marks the boundary between the wetland and adjacent upland areas.

c. If the riparian area associated with a water body extends beyond the pertinent vegetated buffer outlined above, extend the vegetated buffer to encompass all of the riparian area.

d. If a channel migration zone (CMZ) study is completed for a river or stream for a time frame of 100 years or longer, use the CMZ maps as a guide for recommending that the total building setback be extended in order to locate development outside of the CMZ. Where the CMZ is wide and encompasses cropland, the vegetated buffer may be reduced below the minimum, but the building setback may need to increase in order to maintain an effective total building setback.

e. For wetlands, the subdivider is advised to follow one of two alternative design approaches, depending on the distance between wetlands and proposed subdivision design features:

   - Recommended Wetlands Approach #1. If any proposed subdivision design features are located 150 feet or less from a wetland, the subdivider retains a qualified wetland professional to determine the wetland's boundary in accordance with the 1987 U.S. Army

Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987), or the most current wetlands delineation manual sanctioned by the Army Corps of Engineers–Omaha District. Although the total building setback standard is a minimum of 130 feet for wetlands, this slightly larger area (150 feet) warrants professional evaluation to ensure that wetlands are not impacted by misidentified boundaries. Because wetland boundaries can be difficult to determine accurately, this standard helps ensure that the total building setback for wetlands is not encroached upon. The subdivider then includes the wetland delineation information in the subdivision application.

OR

- Recommended Wetlands Approach #2. If all proposed subdivision design features are located 150 feet or more from any wetlands, the subdivider demonstrates in the subdivision application that the subdivision design features will not encroach on the total building setback recommended for wetlands.

f. For wetlands and wetland complexes that are important for migrating game birds and/or shorebirds, biologists may recommend that the total building setback be extended to encompass specific cropland areas adjacent to the wetlands that are consistently and seasonally used by large numbers or a high diversity of these species.

g. Within the total building setback:

- Avoid the placement of homesites and other subdivision improvements (except roads and bridge abutments at river or stream crossings, designed and constructed in accordance with Natural Streambed and Land Preservation Act (310) or Stream Protection Act (124) permit requirements).
- Where disturbance does occur, incorporate effective measures to limit erosion and sedimentation.

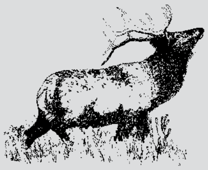
h. Within the vegetated buffer: Avoid disturbing native vegetation, except as needed to control noxious weeds (with herbicides approved for use in riparian environments), reduce accumulated fuels related to fire protection, erect fencing, remove individual trees that pose a threat to public safety, or provide the types of access described in subsections j. and k. below.

i. Within the building setback: Lawns can be planted, and native vegetation can be removed or otherwise disturbed.

j. Water-dependent uses may occur within the total building setback, as long as the impacts of design features are minimized to the greatest extent possible. Specifically, this applies to:

- Water-dependent agricultural facilities (e.g., pumps, diversion structures); and
- Water-dependent recreational facilities (e.g., nonmotorized trails, docks, boat ramps) that do not impact vegetated buffers for sensitive species (see Species of Concern, Subsection F, below).

k. Minimize the extent of subdivision roads needed to provide access to all areas proposed for development.



B. Big Game Winter Range
(*see Appendix C.2 for supporting documentation*)

(1) List of Pertinent Definitions (see Section III for actual definitions)

Big game, development, existing development, habitat fragmentation, habitat patch, habituation, line of sight, linkage, problematic concentrations, professionally trained biologist, subdivision design features, summer range, and winter range.

(2) Objectives

- Minimize habitat fragmentation and loss of winter range.
- Maintain the ability of big game animals to travel freely within a winter range habitat patch, and between winter range habitat patches and other seasonal ranges.
- Maintain FWP's ability to manage wildlife effectively and as non-habituated herds.
- Minimize the potential for subdivisions to lead to problematic concentrations of big game.
- Minimize wildlife/human conflicts, including negative impacts on adjacent properties (e.g., game damage on agricultural lands).

(3) Recommended Approach to Subdivision Design

In designing the proposed subdivision, the subdivider is encouraged to follow the four steps outlined below.[4] Local FWP wildlife biologists are encouraged, when contacted by the subdivider or the subdivider's representative, to make time for the consultation described in subsections b. and c. below.

a. Consult FWP's Crucial Areas Planning System (CAPS)[5] and/or other publicly available sources of wildlife habitat information, for a preliminary indication of whether the property proposed for subdivision may be located in or adjacent to big game winter range.

b. Consult with the local FWP wildlife biologist, or other professionally trained biologist, to verify the preliminary assessment. If consulted, the FWP biologist should provide the subdivider with a written determination of whether or not the property proposed for subdivision is located in or adjacent to big game winter range.[6]

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[4] It should be noted that the subdivider cannot be required to take any of these recommended steps.

[5] Found at **http://fwp.mt.gov/fishAndWildlife/conservationInAction/crucialAreas.html**. Click on "Explore CAPS," look under Crucial Areas Supporting Data, then Terrestrial Layers, then Terrestrial Game Quality Contributing.

[6] FWP can use the Comments section of the *Fish & Wildlife Information Checklist* (see Appendix B.1) for this purpose.

c. If the biologist determines that the property proposed for subdivision is located wholly or partially within big game winter range, consult further with the biologist for site-specific information and recommendations on minimizing the impacts of the subdivision on big game species and big game winter range. FWP recommendations may include suggestions for avoiding or strictly limiting the placement of subdivision design features in winter range. Or, based upon site-specific conditions and the extent of existing development located adjacent to or near the proposed subdivision, FWP may recommend that strict restrictions on the location of subdivision design features are not necessary. In offering recommendations, the FWP biologist should take into account the wildlife and habitat data compiled by the subdivider, any field reviews completed by other professionally trained biologists, FWP's own wildlife and habitat data, and any other applicable biological information.

d. Incorporate the biologist's recommendations into the design of the proposed subdivision.

(4) Recommended Design Standards

Whether or not the subdivision design approach recommended above is completed, the following standards pertain to any subdivision development proposed on property that contains or lies adjacent to big game winter range:

a. Cluster the subdivision design features on as small a footprint as possible, as far from winter range as possible, and as close to existing development as possible (e.g., other

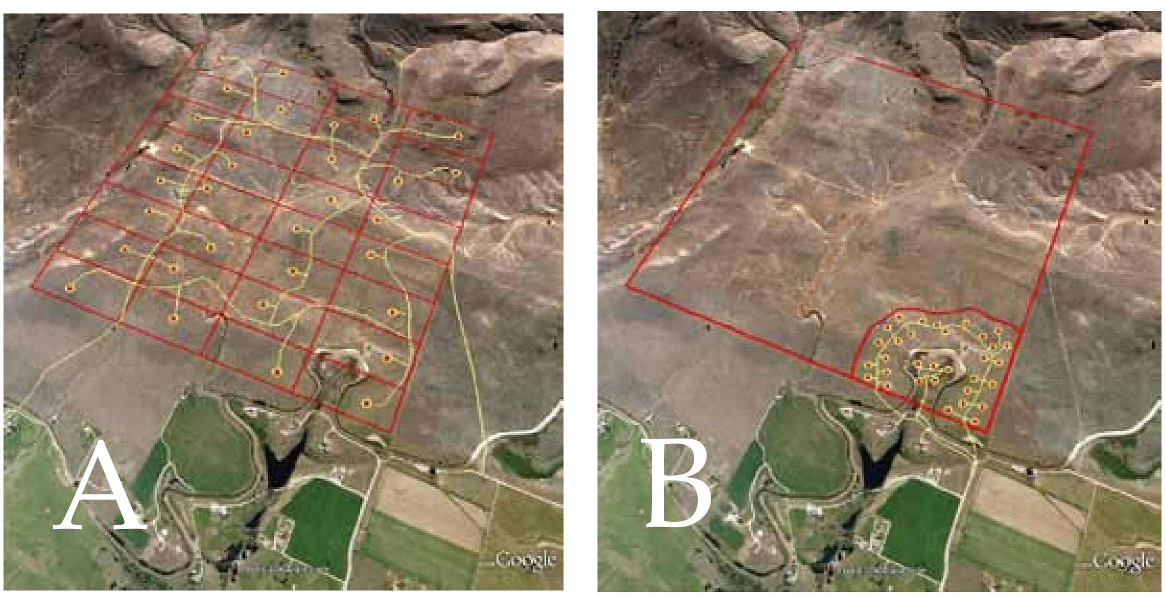


Figure 2. *Examples of dispersed and clustered development on winter range.*

Example 'A' depicts development of thirty-two 20-acre lots spread across 640 acres of winter range. Example 'B' illustrates a "clustered" design of the same thirty-two houses on 2-acre lots on 10 percent of the property, or 64 acres, situated in a corner near existing development. Clustering homes as shown in example B obviously impacts winter range much less than the dispersed development found in example A.

houses, roads, residential utilities). See Figure 2, p. 11.

b. Locate areas of proposed open space immediately adjacent to existing winter range or open space on adjacent lands, in order to maintain the functional connection with other open space and winter range on public and private lands.

c. Provide or maintain linkage within a winter range patch, between isolated patches of winter range, or between summer range (or other seasonal habitat) and winter range. Recommended linkage widths are a minimum of one (1) mile for elk and one-half (½) mile for other species. For white-tailed deer, mule deer, and moose, linkage should be along riparian corridors where present.

The local FWP wildlife biologist may recommend the number of linkages needed to maintain wildlife movement, and whether or not site-specific circumstances justify a reduced linkage width (e.g., topography and/or natural vegetation may limit line of sight distances and sufficiently alleviate noise between linkage habitat and development activity to allow undisturbed movement of wildlife).

C. Public Hunting
(*see Appendix C.3 for supporting documentation*)

(1) List of Pertinent Definitions (see Section III for actual definitions)

Building envelope, development, habituation, line of sight, problematic concentrations, and professionally trained biologist.

(2) Objectives

- Maintain FWP's ability to manage wildlife effectively.
- Maintain public hunting, including hunting with rifles, as an important tool for wildlife management.
- Maintain healthy wildlife populations.
- Minimize safety concerns of future lot owners.
- Avoid conflicts between different land uses (e.g., game damage on adjacent agricultural lands due to wildlife displacement or habituation; problematic concentrations of big game animals in the proposed subdivision due to landscaping, vegetable gardens, and the creation of a "safe haven" no-hunting zone; annoyances created by hunters and subdivision residents finding themselves in close proximity to one another).

(3) Recommended Approach to Subdivision Design[7]

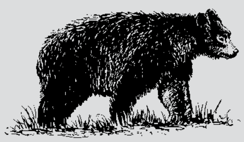
The subdivision applicant is encouraged to consult with the local FWP wildlife biologist before or during the pre-application process, on the question of whether or not development of the

[7] This approach specifically recommends the subdivider consult with FWP, since FWP is Montana's designated wildlife management agency.

subject property could affect wildlife management options and public hunting opportunities in the vicinity, and if so, how.[8] If consulted, the FWP biologist has an opportunity to evaluate the potential effect of the proposed subdivision on wildlife management options and public hunting opportunities based on review of the information compiled by the applicant, site assessments by other professionally trained biologists, FWP's own field knowledge and hunting area maps, and any other applicable information. FWP may recommend steps the subdivider can take to avoid or reasonably minimize negative impacts, such as careful building envelope locations, careful road and trail layouts, other ways of addressing line of sight issues, and the continuation of certain types of public hunting.

(4) Recommended Approach to Subdivision Review

FWP recommends that the governing body consider the effects of the proposed development on wildlife management by hunting, as part of its subdivision application review for impacts on "wildlife and wildlife habitat."[9]



D. Human/Bear Conflicts
(*see Appendix C.4 for supporting documentation*)

(1) Objectives

Minimize the potential for dangerous encounters between humans and bears, and maintain grizzly bear and black bear populations.

(2) Applicability

This standard pertains to any subdivision located in an area of high or potentially high human/bear conflict.

(3) Recommended Design Standard

Provide adequate bear-resistant facilities for garbage collection. FWP has recommended specifications for such facilities (see Appendix C.4), and the local FWP bear management specialist is encouraged to work with the subdivider to install an effective facility.

[8] It should be noted that the subdivider cannot be required to follow this recommended approach.

[9] It should be noted that the governing body cannot be required to follow this recommended approach.

E. Native Grasslands & Native Shrub Habitats

(*see Appendix C.5 for supporting documentation*)

(1) List of Pertinent Definitions (see Section III for actual definitions)

Connectivity, development, existing development, habitat fragmentation, habitat patch, native grasslands, native shrub habitats, professionally trained biologist, Species of Concern, and subdivision design features.

(2) Applicability

The standards in this subsection only apply if a native grassland or native shrub habitat patch size is larger than 25 acres.

(3) Objectives

- Minimize the fragmentation and loss of native grassland and native shrub habitat patches.
- Maintain habitat patches important to wildlife and wildlife connectivity, and minimize the loss of large habitat patches.
- Maintain native grassland and shrubland bird populations, especially Species of Concern.
- Reduce the spread of invasive, non-native species.

(4) Recommended Approach to Subdivision Design

In designing the proposed subdivision, the subdivider is encouraged to follow the four steps outlined below.[10] Local FWP wildlife biologists are encouraged, when contacted by the subdivider or the subdivider's representative, to make time for the consultation described in subsections b. and c. below.

a. Consult FWP's Crucial Areas Planning System (CAPS)[11] and/or other publicly available sources of wildlife habitat information (e.g., information from the Montana Natural Heritage Program) for a preliminary indication of whether the property proposed for subdivision may be located in one or more native grassland or native shrub habitat patches.

b. Consult with the local FWP wildlife biologist, or other professionally trained biologist, to verify the preliminary assessment and confirm the approximate boundaries of any native grassland or native shrub habitat patches on or adjacent to the property proposed for development. If consulted, the FWP biologist should provide the subdivider with a written determination of whether or not native grasslands or native shrub habitat patches are present on the property.[12]

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[10] It should be noted that the subdivider cannot be required to take any of these recommended steps.

[11] Found at **http://fwp.mt.gov/fishAndWildlife/conservationInAction/crucialAreas.html**. Click on "Explore CAPS," look under Boundary and Other Layers, then go to Montana Land Cover.

[12] FWP can use the Comments section of the *Fish & Wildlife Information Checklist* (see Appendix B.1) for this purpose.

c. If the biologist determines that the property proposed for subdivision is located wholly or partially in one or more native grassland or native shrub habitat patches, consult further with the biologist for site-specific information and recommendations on minimizing the impacts of the subdivision on the native vegetation and species likely to be using the habitat. FWP biologist recommendations may include suggestions for avoiding or strictly limiting the placement of subdivision design features in the native habitat patch. In offering these recommendations, the FWP biologist should take into account the wildlife and habitat data compiled by the subdivider, any field reviews completed by other professionally trained biologists, FWP's own wildlife and habitat data, and any other applicable biological information.

d. Incorporate the biologist's recommendations into the design of the proposed subdivision.

(5) Recommended Design Standards

Whether or not the subdivision design approach recommended above is completed, the following standards pertain to any subdivision development proposed on property that contains or lies adjacent to one or more native grassland or native shrub habitat patches:

a. If subdivision design features (e.g., buildings, roads, utilities) are located inside habitat patches, place them adjacent to, or as close as possible to, existing development located outside of the habitat patches. Cluster the subdivision design features on as small a footprint as possible. See Figure 3 below.

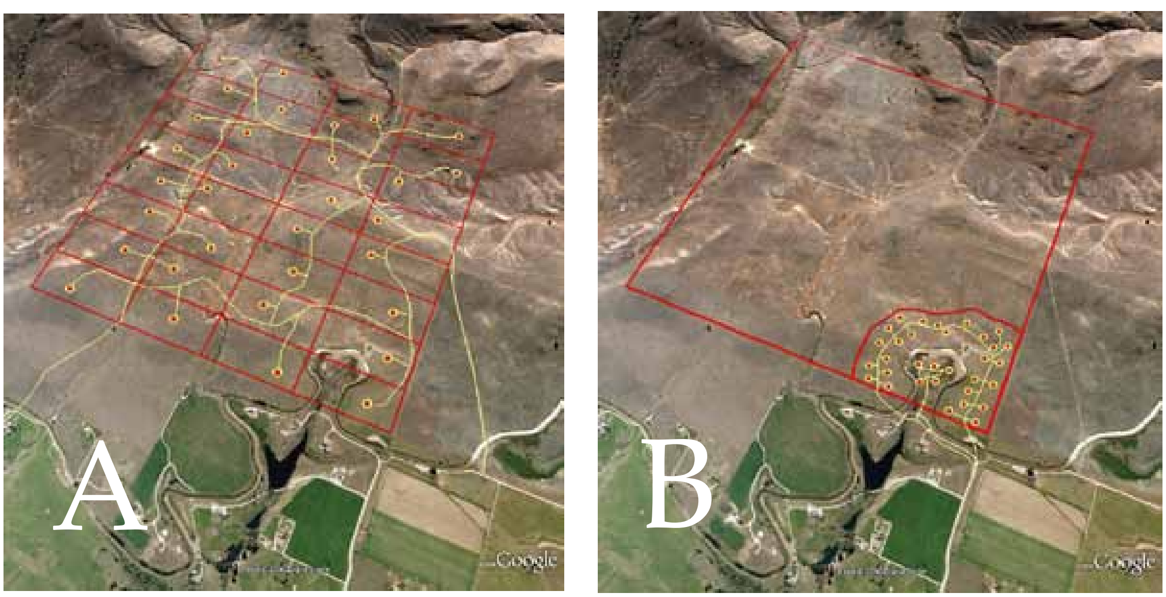


Figure 3. *Examples of dispersed and clustered development on native grasslands.*

Example 'A' depicts development of thirty-two 20-acre lots spread across 640 acres of native grasslands. Example 'B' illustrates a "clustered" design of the same thirty-two houses on 2-acre lots on 10 percent of the property, or 64 acres, situated in a corner near existing development. Clustering homes as shown in example B obviously impacts native grasslands much less than the dispersed development found in example A.

b. Locate areas of proposed open space immediately adjacent to existing native vegetation or open space on adjacent lands, in order to maintain the functional connection with other open space and native grassland and native shrub habitat patches on public and private lands.

c. Minimize the extent of subdivision roads needed to provide access to all areas proposed for development.

d. Install new utility lines underground.

e. Revegetate with native seed *after* road construction and utility installation.

f. Develop a weed control plan, approved by the local weed district, for the entire property proposed for subdivision.

(6) Additional Guidance for Minimizing Fragmentation and Maintaining Connectivity

The scientific literature provides additional guidance for addressing the first two design objectives listed under subsection (3) above. Numerical thresholds based on this science are offered and illustrated below as an additional development design option for biologists and subdivision designers to consider.

The following table would only apply to native grassland or native shrub habitat patches greater than 25 acres in size. Table 1 identifies how much of a native grassland or native shrub habitat patch could be developed and still minimize habitat fragmentation for wildlife, based upon its existing size and *regardless* of land ownership. Figures 4 and 5 provide two examples of how this guidance would be applied.

Table 1. *Recommended development limits for native grassland or native shrub habitat patches located within a proposed subdivision.*

Total Native Grassland or Native Shrub Habitat Patch Size	**Recommended Limits to Habitat Patch Development within a Proposed Subdivision**	**Subdivider is Advised to Consult FWP for Recommendations on Extent and Location of Proposed Development.**
> 25 to 100 acres	A maximum of 5% of the portion of the habitat patch located within the proposed subdivision site could be developed, and at least 25 acres of the habitat patch should remain undeveloped.	No
> 100 to 1,000 acres	A maximum of 10% of the portion of the habitat patch located within the proposed subdivision site could be developed.	Yes
> 1,000 acres	A maximum of 20% of the portion of the habitat patch located within the proposed subdivision site could be developed.	Yes

Figure 4. *Example of Table 1 guidance for a 30-acre native grassland habitat patch.*

Landowner proposes to subdivide a 160-acre parcel. The parcel contains 150 acres of cropland. The remaining 10 acres are part of a 30-acre native grassland habitat patch. Table 1 above recommends that subdivision development on the *native grassland portion* of the 160-acre parcel be limited to 0.5 acre (5 percent of 10 acres). Total acreage eligible for development on the 160-acre parcel equals 150.5 acres (150 acres of cropland plus 0.5 acre of native grassland).

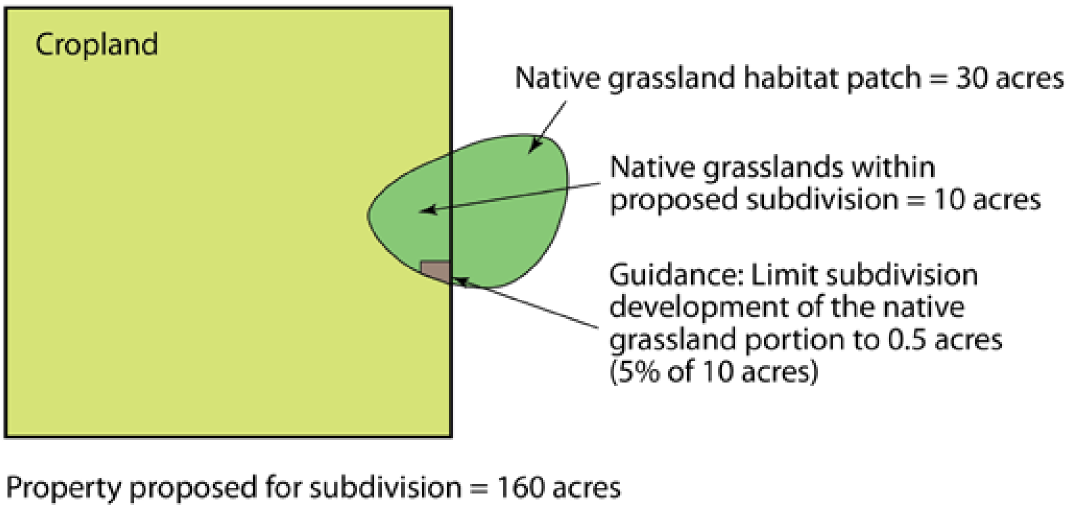
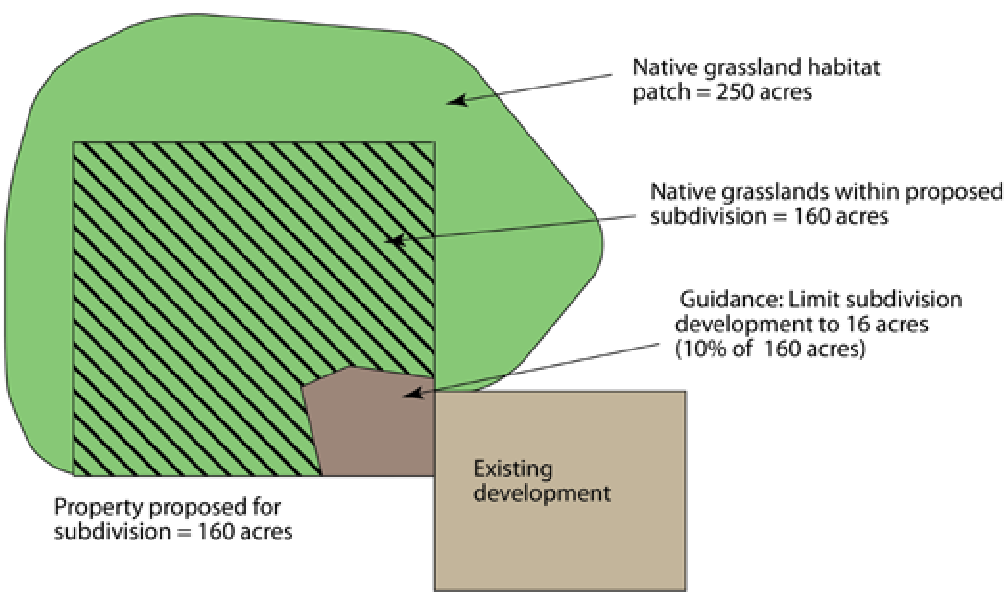
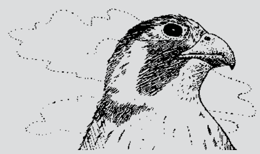


Figure 5. *Example of Table 1 guidance for a 250-acre native grassland habitat patch.*

Landowner proposes to subdivide a 160-acre parcel. The parcel is wholly contained within a 250-acre patch of native grassland. Table 1 above recommends that subdivision development on the 160-acre parcel, *all of which is native grassland*, be limited to 16 acres (10 percent of 160 acres). This example also shows how new development should be clustered as close as possible to existing development, as recommended in Subdivision Design Standard 5.a. above.





F. Selected Species of Concern

(*see Appendix C.6 for supporting documentation*)

(1) List of Pertinent Definitions (see Section III for actual definitions)

Development, habitat patch, lek, nesting site, Species of Concern, Trumpeter Swan overwintering site, vegetated buffer.

(2) Objectives

- **General Objective**. Conserve, and minimize negative impacts upon, habitats that support the survival of particular Species of Concern that are known to be vulnerable to human disturbances associated with subdivision development.

- **Specific Objectives**.

  - **Common Loon**. Protect all current and traditional Common Loon nesting sites from development and degradation from human disturbances associated with developed facilities such as buildings, roads, trails, and docks.

  - **Great Blue Heron**. Protect colonial Great Blue Heron nesting sites from human disturbances associated with developed facilities such as buildings, roads, trails, and docks.

  - **Trumpeter Swan**. Protect all current and traditional Trumpeter Swan nesting and overwintering sites from development and degradation from human disturbances associated with developed facilities such as buildings, roads, trails, and docks.

  - **Long-billed Curlew**. Maintain large blocks of breeding habitat for Long-billed Curlews by minimizing human disturbances associated with developed facilities such as buildings, roads, towers, and other infrastructure.

  - **Burrowing Owl**. Protect and conserve Burrowing Owl nests from human disturbances associated with developed facilities such as buildings and roads.

  - **Bald Eagle and Golden Eagle**. Protect and conserve Bald and Golden Eagle nests from human disturbances associated with developed facilities such as buildings, roads, and trails. Reduce the potential risk for violations associated with the Bald and Golden Eagle Protection Act.

  - **Ferruginous Hawk**. Protect and conserve Ferruginous Hawk nests from human disturbances associated with developed facilities such as buildings, roads, and trails.

  - **Peregrine Falcon**. Protect and conserve Peregrine Falcon nests from human disturbances associated with developed facilities such as buildings, roads, and trails.

  - **Greater Sage-Grouse and Sharp-tailed Grouse**. Protect Greater Sage-Grouse and Sharp-tailed Grouse lek sites from elimination or disturbances associated with subdivision development. Maintain Greater Sage-Grouse and Sharp-tailed Grouse nesting habitat found in the vicinity of lek sites.

(3) Recommended Design Standards

a. Table 2 below outlines the recommended vegetated buffers and power line standards for these selected Species of Concern.

Table 2. *Recommended vegetated buffers and power line standards for selected Species of Concern.*

Wildlife Species	Vegetated Buffer—Distance from Development	Power Line Standard
Common Loon (*Gavia immer*) nesting site	500 feet	None
Great Blue Heron (*Ardea herodias*) colonial nesting site	800 feet	Underground standard
Trumpeter Swan (*Cygnus buccinators*) nesting and overwintering sites	1,000 feet	Underground standard
Long-billed Curlew (*Numenius americanus*) nesting site	1,000 feet	None
Burrowing Owl (*Athene cunicularia*) nesting site	1,000 feet	None
Bald Eagle (*Haliaeetus leucocephalus*) nest sites	1/2 mile	Raptor standard
Golden Eagle (*Aquila chrysaetos*) nesting site	1/2 mile	Raptor standard
Ferruginous Hawk (*Buteo regalis*) nesting site	1/2 mile	Raptor standard
Peregrine Falcon (*Falco peregrinus*) nesting site	1/2 mile	None
Sharp-tailed Grouse (*Tympanuchus phasianellus*) lek	Case-by-case basis	Underground standard
Greater Sage-Grouse (*Centrocercus urophasianus*) lek	Case-by-case basis	Underground standard

b. Power Line Standards

- Underground standard. Install power lines underground if they are located within vegetated buffers for Great Blue Heron, Trumpeter Swan, Greater Sage-Grouse, and Sharp-tailed Grouse. If underground power line installation disturbs native vegetation, restore the site using native plants.
- Raptor standard. Install power lines in a manner that protects raptors from power line electrocutions if power lines are located within vegetated buffers for Bald Eagle, Golden Eagle, and Ferruginous Hawk. Raptor power line design standards can be found in *Suggested Practices for Raptor Protection on Power Lines* (APLIC 2006).[13]

In order to ensure that raptors and other birds are not electrocuted from power lines, subdividers are encouraged to install all aboveground power lines according to the standards described in *Suggested Practices for Raptor Protection on Power Lines* (APLIC 2006). This is particularly important in habitats where trees, cliffs, and other natural nesting and perching surfaces are scarce, because many birds use power poles and lines for perching, roosting, or hunting.

c. Vegetated Buffers for Greater Sage-Grouse (*Centrocercus urophasianus*) and Sharp-tailed Grouse (*Tympanuchus phasianellus*)

Greater Sage-Grouse and Sharp-tailed Grouse need a sizeable buffer from human disturbance in order to maintain their populations. If a subdivision is proposed in an area with known leks of either species, the subdivider is encouraged to consult the local FWP field biologist, or other professionally trained biologist, for a recommended vegetated buffer. If consulted, the FWP biologist should consider each situation on a case-by-case basis. Scientific studies recommend vegetated buffers from lek sites be from 1.2 to 5 miles. Recommended Greater Sage-Grouse buffers are generally larger (3 to 5 miles) than recommended Sharp-tailed Grouse buffers.

(4) Other Species of Concern

This section covers only a few of the many Species of Concern found in Montana. Where additional Species of Concern are known or predicted to occur on or in the vicinity of a proposed subdivision site, the effects of the proposed development on those other species are also pertinent to consider in the course of subdivision application and review.

[13] Avian Power Line Interaction Committee (APLIC). 2006. Suggested practices for avian protection on power lines: The state of the art in 2006. Edison Electric Institute, APLIC, and the California Energy Commission. Washington, DC, and Sacramento, CA. 207 pp.

Section III. Acronyms and Definitions

This section offers guidance to readers in understanding the abbreviations and technical terms used in this document.[14]

Acronyms

ASD = Alternative Subdivision Design
CAPS = Crucial Areas Planning System
CMZ = Channel Migration Zone
EA = Environmental Assessment
FWIA = Fish & Wildlife Impact Assessment
FWP = Montana Department of Fish, Wildlife & Parks
MCFWCS = Montana's Comprehensive Fish and Wildlife Conservation Strategy
MCA = Montana Code Annotated
SPI = Summary of Probable Impacts

Definition of Terms

Associated uplands. Grasslands, shrub-steppe, or agricultural lands near or adjacent to wetlands or wetland complexes that are used by wetland-associated birds for nesting or foraging.

Big game. The following native ungulate species: white-tailed deer, mule deer, elk, antelope, bighorn sheep, moose, and mountain goat. These species commonly make annual migrations to and/or use specific winter range areas.

Braided river. A river channel that contains a network of smaller channels separated by small islands.

Building envelope. On a lot within a subdivision, a specified area within which any and all residential, commercial, or industrial buildings can be located. The building envelope includes all buildings, driveways, outbuildings, and areas with lawns and other non-native landscaping.

Building setback (as it relates to water bodies). An area beyond the outer boundary of the vegetated buffer, where lawns can be planted, but permanent structures are prohibited.

Channel migration zone (CMZ). The area where it is reasonably foreseeable that an active channel of a river or stream could migrate, over a designated period of time, because of erosion or avulsion.[15]

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[14] Cautionary Note: The preceding recommendations were developed with the following definitions in mind. Using different definitions may alter the intended effect of the recommendations.

[15] The term "zone" in this case bears no relation to the process of zoning.

Connectivity. A measure of the ability of animals to move among separated patches of suitable habitat.

Cropland. Agricultural land used to grow and harvest plant crops for food, livestock fodder, fuel, or other economic purposes.

Development. A planned or unplanned area of structures, roads, and/or other infrastructure.

Existing development. An area where structures, roads, and/or other infrastructure are already in place to support human activities. The term also includes platted subdivisions and certificates of survey that created lots that have not yet been developed.

Floodplain. The area adjoining a watercourse or drainage that would be covered by the floodwater of a flood of 100-year frequency [76-5-103 (10), MCA].

Grasslands. See native grasslands.

Habitat. The physical features (e.g., topography, geology, stream flow) and biological characteristics (e.g., vegetation cover and other species) needed to meet the food, shelter, and reproductive needs of animal or plant species.

Habitat fragmentation, habitat patch. The division of large, contiguous areas of wildlife habitat into smaller areas (called habitat patches), isolated from one another such that animals can no longer access portions of otherwise suitable habitat or, over time, the remaining habitat can no longer maintain viable populations of some wildlife species.

Habituation. A learned behavioral response of wildlife to human developments and activities, whereby animals stop responding to repeated activities that are not accompanied by positive or negative reinforcement.

Intermittent stream. A stream or reach of a stream that is below the water table for at least some part of the year and that obtains its flow from both groundwater discharge and surface runoff (82-4-203, MCA). An intermittent stream has a defined stream bank and scoured stream bottom.

Lek. A sagebrush or grassland opening where male Greater Sage-grouse or Sharp-tailed Grouse gather for the purpose of competitive courtship displays.

Line of sight. An imaginary straight line along which an observer looks with unobstructed view. When two objects (e.g., an animal and a structure) have no topographical, vegetative, or other visual barrier between them, then they are in "line of sight" of each other.

Linkage. Suitable habitat that allows animal movement within a winter range patch, between isolated patches of winter range, or between summer range (or other seasonal habitat) and winter range. Linkages are sufficiently wide to allow natural movement of animals without being impeded by disturbances associated with development.

Migratory game birds. Migratory birds that are classified as game animals in the State of Montana, including wild ducks, geese, brant, swans, cranes, rails, coots, and snipes (87-2-101, MCA).

Native grasslands. Vegetation communities where native grass is predominant. They include native prairie grasslands in eastern Montana and intermountain/foothill grasslands in western Montana. Native prairie grasslands in eastern Montana are dominated by native bunchgrass and rhizomatous (having a horizontal stem that produces roots and shoots) grass species. Annual precipitation varies widely but averages 10 to 14 inches, and vegetation is relatively short. Intermountain/foothill grasslands in western Montana are broad mountain valleys containing primarily native bunchgrasses. Annual precipitation averages 15 inches per year, and grassland vegetation is of moderate height in average precipitation years. Prairie or intermountain grassland communities can occur adjacent to sagebrush steppe and/or riparian communities.

Native shrub habitats. Vegetation communities where sagebrush is predominant: sagebrush shrub-steppe and sagebrush shrublands. Sagebrush shrub-steppe is scattered primarily throughout western and central Montana and is co-dominated by shrubs (5 to 20 percent shrub cover, primarily sagebrush) and perennial grasses. Sagebrush shrublands are dominated by sagebrush (20 to 80 percent sagebrush cover) and are found primarily in mountain valleys of the southwestern corner and along the southern border of the state.

Nesting site. The location where a bird has laid and incubated its eggs within the last 12 months. Many birds build nests (e.g., Common Loon, Great Blue Heron, Trumpeter Swan, eagles and hawks); some birds use burrows (e.g., Burrowing Owl) or a shallow depression on the ground (e.g., Long-billed Curlew).

Ordinary high-water mark. The line that surface water impresses on land by covering it for sufficient periods to cause physical characteristics that distinguish the area below the line from the area above it. Characteristics of the area below the line may include, but are not limited to, deprivation of the soil of substantially all terrestrial vegetation and destruction of the soil's agricultural vegetative value. A floodplain adjacent to surface waters is not considered to lie within the surface waters' high-water mark (23-2-301, MCA).

Other water bodies. An intermittent stream, lake, reservoir, wetland, or pond. The term does not include perennial streams and rivers.

Perennial stream. A stream or part of a stream that, under normal precipitation conditions, flows throughout the year. Streams dewatered during part of the year by irrigation or other withdrawals, but which would flow throughout the year without said withdrawals, are perennial streams.

Problematic concentrations. In subdivisions, unnaturally dense assemblies of big game animals for an unnaturally extended period of time, such that they become habituated to human presence, more vulnerable to disease, less wild, unavailable for population control via hunting, and/or a potential nuisance, problem, or threat to subdivision residents and/or their neighbors.

Professionally trained biologist. An individual with a minimum of a bachelor's degree in a fisheries or wildlife-related field and professional experience in applying current biological knowledge to on-the-ground stewardship and management of the resource and its environment, or an individual meeting the requirements of a Certified Wildlife Biologist (by The Wildlife Society) or a Certified Fisheries Professional (by the American Fisheries Society).

Qualified wetland professional. An individual with a minimum of a bachelor's degree in a water resource–related field and practical field experience with wetlands, or an individual meeting the requirements of Professional Wetland Scientist certification (by the Society of Wetland Scientists).

Reservoir. A lake or pond (natural or human made) where water is collected and used for storage. The term includes water stored behind a dam on a river or stream.

Resource inventory. A survey conducted in a given area to identify its wildlife species, wildlife habitats, and habitat conditions.

Riparian area. A riparian area is an area of transition between a water body (e.g., stream or wetland) and upland area. Riparian areas have one or both of the following characteristics: (1) distinctly different vegetative species than adjacent areas; and (2) species similar to adjacent areas but exhibiting more vigorous or robust growth forms.

River. A perennial flowing stream identified on a U.S. Geological Survey map as a river. The term does not include any lake or reservoir located on a river.

Shorebirds. Various wading bird species in the order Charadriiformes that frequent the shores of coastal or inland waters, wetlands, mudflats, or plains, including sandpipers, plovers, avocets, curlews, killdeer, or stilts.

Shrub habitats. See native shrub habitats.

Species of Concern. Native wildlife species that are considered to be "at risk" due to declining population trends, threats to their habitats, and/or restricted distribution. A list of such species, called the Montana Animal Species of Concern, is produced jointly by the Montana Natural Heritage Program and Montana Fish, Wildlife & Parks. This list includes Threatened & Endangered Species. A current list can be obtained at **http://mtnhp.org/about/daily_news.asp**.

Stream. A body of water with a current, confined within a bed and stream banks. Depending on its locale or certain characteristics, a stream may be referred to as a branch, channel, creek, river, or tributary. See intermittent stream and perennial stream for definitions of those terms.

Subdivision design features. The physical elements of a subdivision development, including houses and other buildings, roads, and other infrastructure.

Suitable habitat. Habitat that meets the survival and reproductive needs of a species, allowing for a stable or growing population over time.

Summer range. Areas where big game tend to concentrate during late spring, summer, and early fall, commonly May through October. These areas are considered a subset of overall year-round big game habitat.

Surface water. Any water located above the surface of the land, or the bed of any stream, lake, reservoir, wetland, or other body of surface water. All other water is considered groundwater.

Threatened & Endangered Species. Species that are "listed" by the U.S. Fish and Wildlife Service (USFWS) for protection under the Endangered Species Act. An endangered species is in danger of extinction throughout all or a significant portion of its range; a threatened species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. A current list can be downloaded at **http://fwp.mt.gov/fishAndWildlife/species/**.

Trumpeter Swan overwintering site. Lakes, ponds, or streams where Trumpeter Swans are viewed regularly between December 15 and February 15.

Vegetated buffer (as it relates to water bodies and Species of Concern).

- **From a water body.** A natural, undisturbed strip or "greenbelt" along the shorelines of a river, stream, or other water body. The term does not include lawns and non-native landscaping.
- **From a bird nesting site, Trumpeter Swan overwintering area, or lek.** A natural, undisturbed strip or "greenbelt" separating the nesting site, Trumpeter Swan overwintering site, or lek from the proposed building envelopes and other subdivision design features (e.g., roads and power lines). Agricultural land (cropland and rangeland) may count toward the vegetated buffer of bird nesting sites, Trumpeter Swan overwintering areas, and leks.

Water body. A river, perennial or intermittent stream, lakes, reservoir, wetland, or pond.

Water-dependent use. An activity that must physically be located in, on, over, or adjacent to water in order to conduct its primary purpose and which, therefore, cannot be located inland (e.g., boat ramp, fishing access site, etc.). A proposed use will not be considered water-dependent if either the use can function away from the water or if the water body proposed is unsuitable for the use. Uses, or portions of uses, that can function on sites not adjacent to the water are not considered water-dependent regardless of the economic advantages that may be gained from a waterfront location (e.g., houses, motels, long-term parking).

Wetland. An area that is inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and which under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Wetland complex. A grouping of wetlands of different sizes and permanence that are in close proximity, and the uplands between and adjoining these wetlands.

Wildlife. A mammal, bird, reptile, amphibian, fish, mollusk, crustacean, or other animal that is not domesticated or tamed.[16] The term does not include feral animals, which are animals and any offspring that have escaped captivity and become wild (including dogs, cats, and Eurasian ferrets).

Winter range. Areas where big game tend to concentrate during winter, commonly November through April. These areas are considered a subset of overall year-round big game habitat.

[16] This definition is consistent with Section 87-1-801, MCA, which defines wildlife as "all species of animals including but not limited to mammals, birds, fish, reptiles, amphibians, mollusks, and crustaceans."

Section IV. Appendices

Appendix A

Contact Information and Web Links for FWP, Montana Natural Heritage Program, and U.S. Fish and Wildlife Service

Montana Fish, Wildlife & Parks

Headquarters: 1420 East 6th Avenue, Helena, MT 59620, (406) 444-2535

Home Page: http://fwp.mt.gov/

Crucial Areas Planning System (CAPS)

http://fwp.mt.gov/fishAndWildlife/conservationInAction/crucialAreas.html

CAPS is a Web-based mapping tool intended to provide useful information during the early planning stages of development projects, conservation opportunities, and environmental reviews.

CAPS offers data on:

- Aquatic species and habitats
- Terrestrial species and habitats
- Development and infrastructure (energy and housing)
- Designated lands
- Land cover
- Examples of FWP recommendations for energy, transportation, and residential development planning in different types of habitat
- Local FWP biologist contact information

CAPS is not a substitute for a site-specific evaluation of fish, wildlife, and recreational resources. There is still no substitute for consulting with local FWP biologists to gain a better understanding of conditions and management challenges in a particular area of the state—but CAPS will help you start smart.

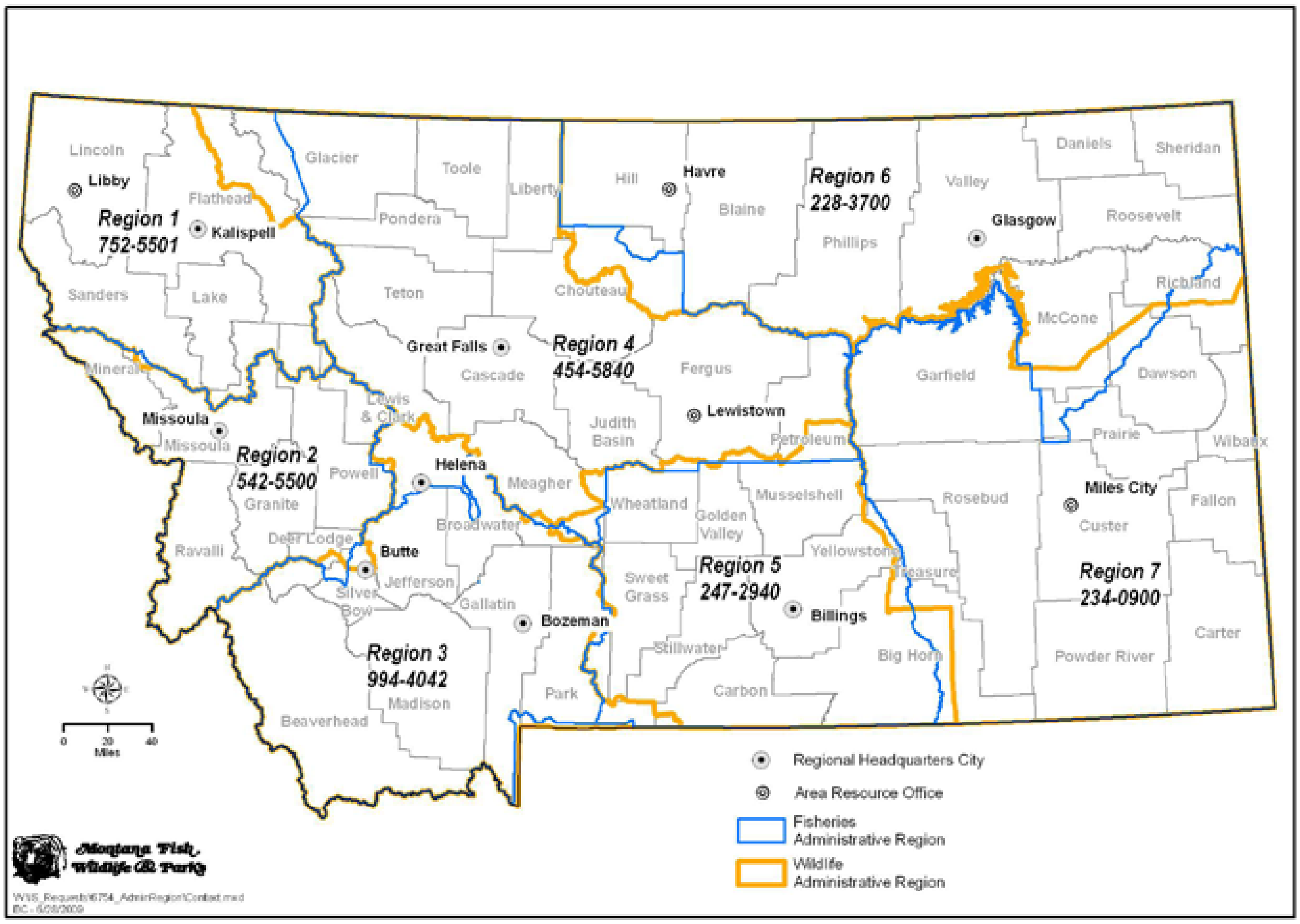
GIS Data

http://fwp.mt.gov/doingBusiness/reference/gisData/dataDownload.html

GIS data layers include:

- Administrative boundaries (e.g., hunting districts)
- Lands owned and managed by FWP (e.g., wildlife management areas, fishing access sites, state parks)
- Fish distribution and habitat
- Wildlife distribution and habitat

FWP Regional Office Telephone Numbers and Addresses



Region 1: 490 North Meridian Road, Kalispell, MT 59901

Region 2: 3201 Spurgin Road, Missoula, MT 59804

Region 3: 1400 South 19th Avenue, Bozeman, MT 59718

Region 4: 4600 Giant Springs Road, Great Falls, MT 59405

Region 5: 2300 Lake Elmo Drive, Billings, MT 59105

Region 6: 54078 U.S. Highway 2 West, Glasgow, MT 59230

Region 7: 352 I-94 Business Loop, P.O. Box 1630, Miles City, MT 59301

Montana Natural Heritage Program

Headquarters: 1515 East 6th Avenue, Helena, MT 59620, (406) 444-5354

Home Page: http://mtnhp.org/

Montana Field Guides

http://fieldguide.mt.gov/

The *Montana Animal Field Guide* provides information on identification, habitat, ecology, reproduction, range, and distribution of Montana's animals. The guide is a collaborative effort between the Montana Natural Heritage Program and Montana Fish, Wildlife & Parks.

The *Ecological Systems Field Guide* for Montana includes a general description or summary of the systems found in Montana (e.g., forest and woodland, grassland, wetland and riparian systems), diagnostic characteristics, similar systems, spatial pattern, environment, general vegetation, specific plant alliances and associations, dynamic processes, management and restoration considerations, and associated animal species.

Natural Heritage Tracker Mapping Tool

http://mtnhp.org/Tracker/

The Natural Heritage Tracker Mapping Tool provides observation information for animal and plant species. Tracker displays documented occurrences of Montana's animals and plants in grid cells representing ¼ of a degree of latitude by ¼ degree of longitude (an area equivalent to that covered by four 1:24,000-scale topographic maps). Registered users can also add observations using the Tracker. A variety of different base maps and reference layers are available on the mapping service.

Natural Heritage Map Viewer

http://mtnhp.org/mapviewer/

This tool is an interactive Web mapping service that allows users to view, identify, and/or generate a summary report of land cover types, geo-referenced photos, and different categories of land management. Animal and plant species observations and range maps are also available.

U.S. Fish and Wildlife Service

Offices

- Montana Ecological Services Field Office in Helena: 585 Shepard Way, Helena, MT 59601, (406) 449-5225, **http://www.fws.gov/montanafieldoffice/**
- Kalispell Ecological Services Sub-Office: 780 Creston Hatchery Road, Kalispell, MT 59901, (406) 758-6868

Montana Website: http://www.fws.gov/mountain-prairie/es/Montana/index.htm

Appendix B
Subdivision Planning Tools

Preface

These recommended tools can help (1) subdividers locate and design their projects to avoid or reasonably minimize the negative impacts of development on "wildlife and wildlife habitat"; (2) subdivision administrators and local officials evaluate proposed subdivisions for potentially significant adverse impacts on "wildlife and wildlife habitat"; (3) give FWP field biologists an opportunity to offer pertinent information and recommendations in a focused, efficient manner; and (4) all subdivision process participants ensure that fish and wildlife resources are adequately and effectively considered.

There are four planning tools offered in this appendix:

1. *Fish & Wildlife Information Checklist*
2. *Fish & Wildlife Impact Assessment*
3. *Summary of Probable Impacts Guidance*
4. *Alternative Subdivision Design*

1. *Fish & Wildlife Information Checklist*

Purpose and Use

This form is intended to help the subdivision applicant identify important fish and wildlife species and their habitats on or near the property of interest. FWP encourages the subdivider to complete the form at the earliest stage of project planning, before making any site location and design decisions. Consultation with local FWP biologists is strongly advised at this early stage. Other professionally trained biologists may, of course, also be consulted. FWP biologists are encouraged to review the completed *Checklist* for accuracy. Subdividers should not expect FWP to complete the form for them.

The local government may wish to utilize this form in its subdivision process. The form can be modified to reflect locally important fish and wildlife resources.

Additional sheets may be attached as necessary to provide more complete information.

— — — — — — — — — —

Owner of Record: ____

____

Legal Description of Project Location: ______________________________

____

Signature and Date of Owner or Owner Representative: ________________

____

____

Comments: ____

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____

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____

Commenter Signature & Date: ______________________________

Habitat Factors	Yes	No	Maybe	If Yes or Maybe, Describe Habitat	Identify Source(s) of Information
Project is within 300 feet of a water body and/or its associated riparian area.					
Project is in one or more big game winter ranges.					
Project could impact FWP's ability to use public hunting as a wildlife management tool on the site and/or within a one-mile radius.					

Habitat Factors	Yes	No	Maybe	If Yes or Maybe, Describe Habitat	Identify Source(s) of Information
Project is in an area with a high or potentially high level of human/bear conflict (black or grizzly bear).					
Project is in one or more native grass-land or native shrub habitat patches (patch size > 25 acres).					
Project is within 500 feet of Common Loon nesting site.					

Habitat Factors	Yes	No	Maybe	If Yes or Maybe, Describe Habitat	Identify Source(s) of Information
Project is within 800 feet of Great Blue Heron colonial nesting site.					
Project is within 1,000 feet of Trumpeter Swan nesting or over-wintering site.					
Project is within 1,000 feet of Long-billed Curlew nesting site.					
Project is within 1,000 feet of Burrowing Owl nesting site.					

Habitat Factors	Yes	No	Maybe	If Yes or Maybe, Describe Habitat	Identify Source(s) of Information
Project is within ½ mile of Bald Eagle nesting site.					
Project is within ½ mile of Golden Eagle nesting site.					
Project is within ½ mile of Ferruginous Hawk nesting site.					
Project is within ½ mile of Peregrine Falcon nesting site.					
Project is within 5 miles of Greater Sage-Grouse lek.					

Habitat Factors	Yes	No	Maybe	If Yes or Maybe, Describe Habitat	Identify Source(s) of Information
Project is within 2 miles of Sharp-tailed Grouse lek.					
Project is within the range of other Species of Concern.					
Project is in other important habitat (e.g., upland game bird habitat, or agricultural lands that are seasonally used by migratory waterfowl).					

2. *Fish & Wildlife Impact Assessment*

Purpose and Use

A *Fish & Wildlife Impact Assessment* (FWIA) is a technical report that identifies the fish and wildlife species and habitats found on and in the vicinity of the proposed subdivision site, evaluates the potential effects of one or more subdivision development designs on these natural resources, and identifies steps that the subdivider can take to reasonably minimize potentially significant adverse impacts. Subdivision applications that are locally required to include an Environmental Assessment (EA) are recommended to include a FWIA as part of the EA. Consultation with local FWP biologists or other biologists may be helpful at the EA stage of project design. FWP biologists are encouraged to review the completed FWIA for accuracy. However, subdividers should not expect FWP to complete the FWIA for them.

Recommended Elements

FWP recommends that a FWIA include the following elements:

1. Be prepared by one or more professionally trained biologists.
2. Identify the following, and map the information where appropriate:
   a. The project planning area, including the proposed subdivision site *and* a one-half-mile radius around it.
   b. Existing land uses in the project planning area.
   c. The species of fish and wildlife, including Species of Concern, that use all or part of the project planning area on a year-round, seasonal, or periodic basis.
   d. Existing vegetation types, aquatic habitats, and wildlife habitats in the project planning area (e.g., water bodies and their associated riparian habitat, big game winter range, native grassland or native shrub habitats, and areas used by black or grizzly bears).
   e. Whether, and to what extent, the project planning area functions as part of a larger habitat that supports wildlife throughout the year.
   f. Areas that currently provide an opportunity for hunting.
   g. Any applicable standards (e.g., fish and wildlife–related design standards included in local subdivision regulation requirements).
   h. *Fish & Wildlife Information Checklist*.
3. Where fish and wildlife resources on all or part of the project planning area are unknown, include results of a resource inventory conducted by a professionally trained biologist.

Time inventories of bird Species of Concern to coincide with the nesting and breeding seasons of species known or predicted to occur in the project planning area.[1]

4. Assess the following, taking any applicable fish and wildlife standards into account: Whether, and to what extent, the proposed development design(s) under consideration may:

   a. Contribute to habitat loss, habitat fragmentation, linkage disturbance, or other degradation in the quality of habitat.

   b. Contribute to the population decline or displacement of one or more individual fish or wildlife species.

   c. Impact the opportunity to hunt (e.g., through displacement of big game, creation of conflicts between adjoining land uses, or loss of hunting opportunities on the proposed subdivision site).

   d. Create or increase the potential for human/bear conflicts within the proposed subdivision.

5. Address whether, and to what extent, the proposed development's potentially significant adverse impacts on "wildlife and wildlife habitat" may be mitigated using appropriate design techniques.

The FWIA may propose additional measures for avoiding, reasonably minimizing, or mitigating the potentially significant adverse impacts of the subdivision on "wildlife and wildlife habitat," both during construction and after full build-out (e.g., building site relocations, housing density reductions).

— — — — — — — —

Note: If a local government chooses to incorporate a FWIA requirement into its EA procedures, it may also wish to specify the geographic areas or other circumstances that automatically exempt a subdivider from the FWIA requirement. Exemption from the FWIA does not relieve the subdivider of the responsibility to address "wildlife and wildlife habitat" in the EA.

[1] Those conducting or receiving the results of a Species of Concern inventory are encouraged to share the data with the Montana Natural Heritage Program (see Appendix A for contact information).

3. Summary of Probable Impacts Guidance

Purpose and Use

FWP's *Summary of Probable Impacts* (SPI) *Guidance* is a simplified version of the FWIA. The locally required SPI portion of a subdivision application can include this guidance. FWP biologists are encouraged to review the completed SPI for accuracy. However, subdividers should not expect FWP to complete the SPI for them.

Recommended SPI Guidance

FWP recommends that the SPI address the following in summary form:

1. The species of fish and wildlife, including Species of Concern, that use all or part of the project planning area (proposed subdivision site plus a one-half-mile radius around it) on a year-round, seasonal, or periodic basis.
2. Existing vegetation, aquatic habitats, and wildlife habitats in the project planning area (e.g., water bodies and their associated riparian habitat, big game winter range, native grassland or shrubland habitats, areas used by black or grizzly bears).
3. The proposed subdivision's potential impacts on "wildlife and wildlife habitat," both during construction and at full build-out, taking any applicable fish and wildlife habitat standards into account.

4. *Alternative Subdivision Design*

Purpose and Use

The *Alternative Subdivision Design* (ASD) process outlined below may be of interest to local governments that adopt subdivision design standards for conserving important fish and wildlife resources. This process offers the subdivider some flexibility and promotes creativity in subdivision design, with one important stipulation*: The proposed design meets or exceeds the objectives of the adopted design standard.*

Recommended ASD Process

The ASD is not subject to the traditional variance process. The subdivider submits an ASD as part of the subdivision application. Subdividers interested in utilizing the ASD process are encouraged to consult with the local FWP field biologist, or another professionally trained biologist, and the subdivision administrator about the viability of the proposed ASD, well in advance of submitting a subdivision application and preliminary plat for review. With an ASD process in place, FWP biologists offering early input to a subdivider or commenting on a particular subdivision application can more freely consider alternatives to the adopted design standard, while still meeting the purposes of the standard.

1. Recommended procedure for subdividers who are locally required to complete an Environmental Assessment (EA) and who wish to propose an ASD.

   Retain a professionally trained biologist to conduct a *Fish & Wildlife Impact Assessment* (FWIA). Evaluate the proposed ASD as part of the FWIA, and include science-based information indicating that "wildlife and wildlife habitat" will be conserved as effectively, or more effectively, than if the prescribed standard was used. Based upon the findings of the FWIA, the subdivider may recommend a design standard different from that contained in the local subdivision regulations. The FWIA containing the ASD evaluation is submitted with the subdivision application and preliminary plat.

2. Recommended procedure for subdividers who are not locally required to complete an EA, but who wish to propose an ASD.

   Retain a professionally trained biologist to address "wildlife and wildlife habitat" in the *Summary of Probable Impacts* (SPI). Evaluate the proposed ASD as part of the SPI, and include science-based information indicating that "wildlife and wildlife habitat" will be conserved as effectively, or more effectively, than if the prescribed standard was used. Based upon the findings of the SPI, the subdivider may recommend a design standard different from that contained in the local subdivision regulations. The SPI containing the ASD evaluation is submitted with the subdivision application and preliminary plat.

3. Staff Recommendation

   In his or her review of the subdivision application and preliminary plat, the subdivision administrator provides a recommendation to the subdivider, the governing body, and, if applicable, the planning board, as to whether or not the proposed ASD meets or exceeds the intent of the "wildlife and wildlife habitat" standard that otherwise applies to the project.

4. Governing Body Determination

   The governing body makes the final determination as to whether the proposed ASD meets or exceeds the intent of the adopted standard.

Examples of *Alternative Subdivision Designs*

- Adopted standard may require subdivision development features to avoid all winter range found on-site. ASD proposes clustered development on this winter range and permanent conservation of an equivalent area of off-site winter range that is located within one mile of the proposed subdivision and that provides habitat as or more important than that found on the proposed subdivision site.
- Adopted standard may prescribe a vegetated buffer to protect Ferruginous Hawk nesting sites. ASD proposes using platted building envelopes to locate homesites closer than the prescribed buffer distance, but behind a topographic feature (e.g., a knoll or knob) that will shield the nesting site from the proposed development.

Appendix C
Rationale for Subdivision Design Recommendations, with Pertinent Scientific References

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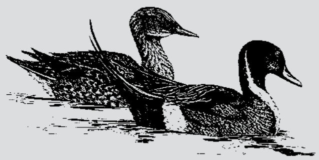
Preface

In keeping with its mission to "provide for the stewardship of fish, wildlife, parks and recreational resources of Montana while contributing to the quality of life for present and future generations," the Fish and Wildlife Division of Montana Fish, Wildlife & Parks has assembled *Fish and Wildlife Recommendations for Subdivision Development in Montana: A Working Document*, to guide FWP field biologists as they respond to requests for information and input into the local subdivision application and review process. The recommendations offer a science-based approach that local governments, developers, their project team members, and citizens in Montana may also find useful in their efforts to consider the effects of proposed subdivisions on species and habitats.

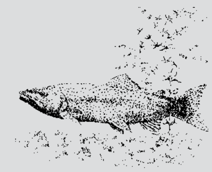
This Appendix describes the reasoning and rationale behind the recommended subdivision design standards found in the *Working Document*, and it outlines the scientific literature and professional biologist opinions that support each recommendation. The level of scientific research and general understanding about these topics varies, depending upon species and habitat type. In some instances, knowledge about the impacts of human development on fish and wildlife is found in peer-reviewed documents; in other cases, we must rely upon the professional experience of trained field biologists. Regardless of the existing research and data, it is widely recognized that more studies are needed to better understand all the factors involved in accommodating subdivisions for people *and* healthy habitats for fish and wildlife.

In order to help ensure that all *Working Document* users have the same basic understanding of the various habitat types and species, this Appendix also provides background information about them. With feedback from its own biologists and other users of the recommended design standards, FWP intends to evaluate, modify, and perhaps expand the standards over time as resources allow, and as knowledge of the interactions between people and wildlife grows.

FWP welcomes the opportunity to work with developers, local governments, and others in monitoring pre- and post-subdivision development conditions and expanding our collective understanding of the effects of different subdivision developments on Montana's fish and wildlife, and their habitats.



Appendix C.1. Water Bodies



This section contains information about the recommended subdivision design standards for water bodies.

Water bodies and their associated habitats are important to protect from new development. These areas are a limited element on the landscape (less than 4 percent of the state), yet they support the greatest concentration of wildlife species in Montana (Montana's Comprehensive Fish and Wildlife Conservation Strategy (MCFWCS) 2005), including:

- Over *one third* (196 species) of our state's terrestrial wildlife species—mammals, birds, reptiles, and amphibians—are considered "riparian/wetland obligates," which means they depend upon these areas for some part of their life cycle (MCFWCS 2005);
- Almost *half* (265 species) of Montana's terrestrial wildlife species are known to use or frequent wetland or riparian habitats (MCFWCS 2005); and
- *All* of Montana's 85 fish species depend on water bodies, especially rivers, streams, and lakes (Holton and Johnson 2003).

Montana's water bodies are also critical to the state's economy, public health and welfare, and the quality of life of citizens and communities.

Habitat Description

Montana's water bodies include rivers, streams, lakes, ponds, reservoirs, and wetlands. Their associated habitats serve as unique transition zones between aquatic and terrestrial environments. In an arid state like Montana, this combination supports more plant and animals than anywhere else in the state (MCFWCS 2005).

There are generally two main habitats associated with water bodies: riparian areas and wetlands. Although Montana's riparian and wetland communities vary widely depending on the area of the state and elevation where they are located, they generally represent the green zones along rivers, streams, lakes, ponds, and reservoirs and include potholes, wet meadows, marshes, and fens. These two habitat types are described below:

Riparian areas are plant communities contiguous to rivers, streams, lakes, ponds, reservoirs, or drainage ways. They have one or both of the following characteristics: (1) vegetative species distinctively different from adjacent areas; and/or (2) species similar to adjacent areas but exhibiting more vigorous or robust growth forms (U.S. Fish and Wildlife Service 1997). Riparian areas are commonly associated with a valley. The width of the valley often determines the extent of the riparian area: some are narrow strips, while others can be quite broad. Water flows associated with riparian areas can be perennial (all seasons of the year), intermittent (for several weeks or months per year), or ephemeral (only in response to precipitation events) (Wenger 1999). This community type includes cottonwood forests, riparian shrublands (e.g., alder, willow, birch, or red-osier dogwood), and riparian coniferous forests (floodplain and streamside forests dominated by coniferous tree species) (Casey 2000).

Wetlands are areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support—and that under normal circumstances do support—a prevalence of vegetation typically adapted for life in saturated soil conditions (Federal Register 1982). Wetlands are generally characterized by one or more of the following features:

- Water at or near the land surface all or part of the year;
- Soils that are poorly drained and develop certain soil characteristics (e.g., blue-green or gray color, or rotten egg smell) due to the presence of water and absence of oxygen; and
- The presence, at least occasionally, of water-loving plants (hydrophytes).

The term wetland is a catchall that includes swamps, marshes, bogs, fens, and lowlands covered with shallow and sometimes intermittent or ephemeral water. The term also includes wet meadows, potholes, sloughs, and some stream overflow areas. In addition, shallow lakes and ponds, usually with emergent vegetation, are included in the definition. Although permanent waters deeper than 6½ feet are not technically considered wetlands, the term does include the shallow edges of these deeper water bodies (Windell et al. 1986; Hansen et al. 1995).

Typical Locations in Montana

Wetlands and riparian areas are found throughout Montana in association with water bodies. The Wetland and Riparian Mapping Center located at the Montana Natural Heritage Program is currently mapping these areas (see **http://mtnhp.org/nwi/**).

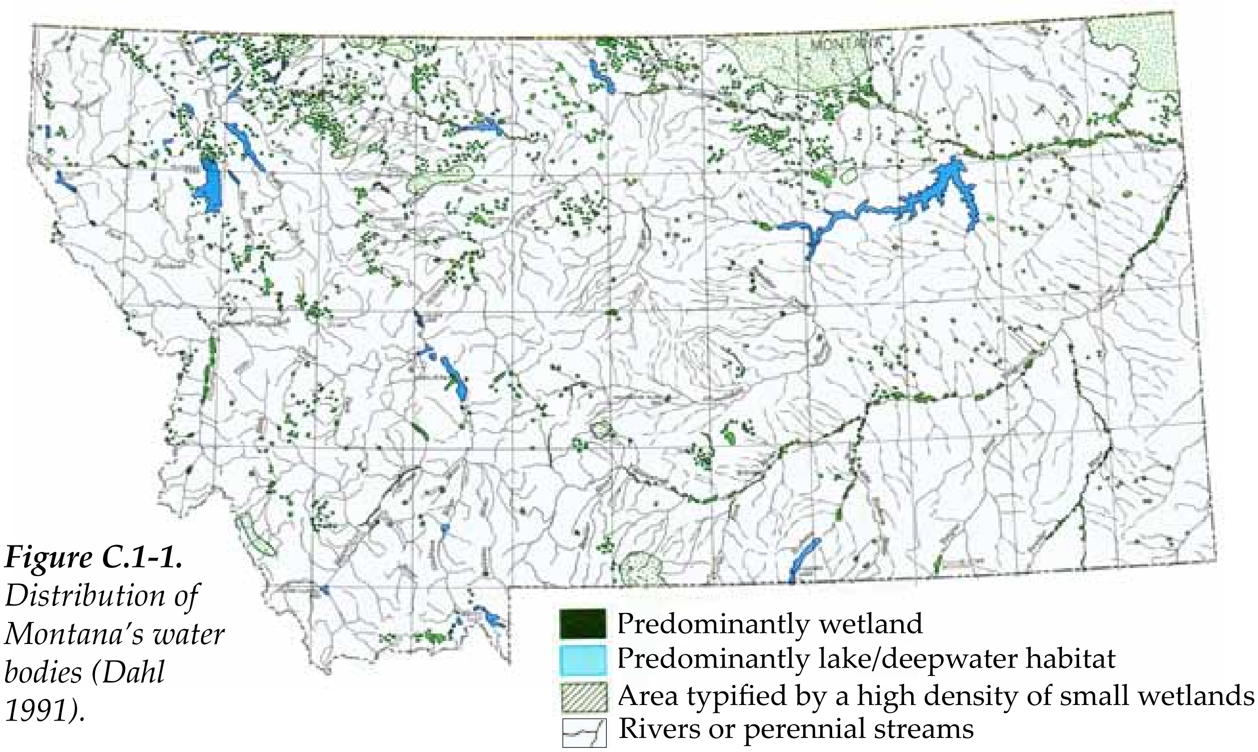


Figure C.1-1. Distribution of Montana's water bodies (Dahl 1991).

Objectives of Recommended Design Standards

- Protect water quality, stream stability, natural stream processes, aquatic habitat, and fish and wildlife habitat by conserving water bodies, their associated riparian areas and, in some situations, associated uplands.
- Retain existing wetlands and riparian areas by avoiding or minimizing human disturbances associated with developments such as buildings, roads, docks, and other structures.
- Maintain the natural hydrological and ecological functions of wetlands and riparian areas by minimizing fragmentation and degradation of these sites.
- Maximize the ability for wetlands, riparian areas, and, in some situations, associated uplands, to function as wildlife habitat.

Conservation Status

Riparian and wetland habitats associated with water bodies are considered a Montana Tier 1 ecosystem (ecosystem in greatest need of conservation) in Montana's Comprehensive Fish and Wildlife Conservation Strategy (MCFWCS 2005). Although these habitats occupy an estimated 3.94 percent of the state, almost half of Montana's terrestrial vertebrate species (mammals, birds, reptiles, or amphibians) use riparian and wetland habitat community types (265 species out of the total 551 terrestrial vertebrate species found in Montana), with 196 of these species being essentially associated (i.e., 196 species of wildlife, 36 percent of the state's total, depend on riparian and wetland communities for their existence).

Impacts from Development

Wetlands and riparian areas are easily degraded by land use changes from subdivision activities and associated development. New development near water can involve degradation and/or removal of native vegetation, including replacement of wetland/riparian vegetation with buildings, pavement, roads, and manicured plantings. This loss of natural vegetation and impact to wetlands and riparian areas is usually permanent. The effects of urban and commercial developments can result in:

- loss and/or degradation of wetland and riparian habitat;
- loss of woody debris and other structures important to the function of streams;
- degradation of stream channels and natural stream processes;
- reduction of water quality;
- habitat fragmentation; and
- introduction and spread of nonnative species.

As more and more people choose to build homes, live and recreate, or otherwise utilize the land next to Montana's streams, rivers, lakes, and ponds, these areas are impacted—often to the detriment of the very qualities that attracted buyers in the first place. Many of the impacts to wetlands and riparian areas could be avoided by land use planning decisions made at the local level (e.g., Knutson and Naef 1997; Ellis and Richard 2008).

Recommended Standards

The following design standards are recommended for water bodies and their associated habitats:

(1) These standards pertain to any subdivision development proposed on property that contains or adjoins a water body and/or its associated riparian area.[1]

(2) Apply the following vegetated buffers and building setbacks (see Figure C.1-2):

- **Rivers:** A minimum of 250 feet of vegetated buffer plus 50 additional feet of building setback. Total building setback equals at least 300 feet from each side of a river.
- **Perennial Streams:** A minimum of 150 feet of vegetated buffer plus 50 additional feet of building setback. Total building setback equals at least 200 feet from each side of a perennial stream.
- **Other Water Bodies:** A minimum of 100 feet of vegetated buffer plus 30 additional feet of building setback. Total building setback equals at least 130 feet from the boundary of a wetland or pond, or the ordinary high-water mark of an intermittent stream, lake, or reservoir.

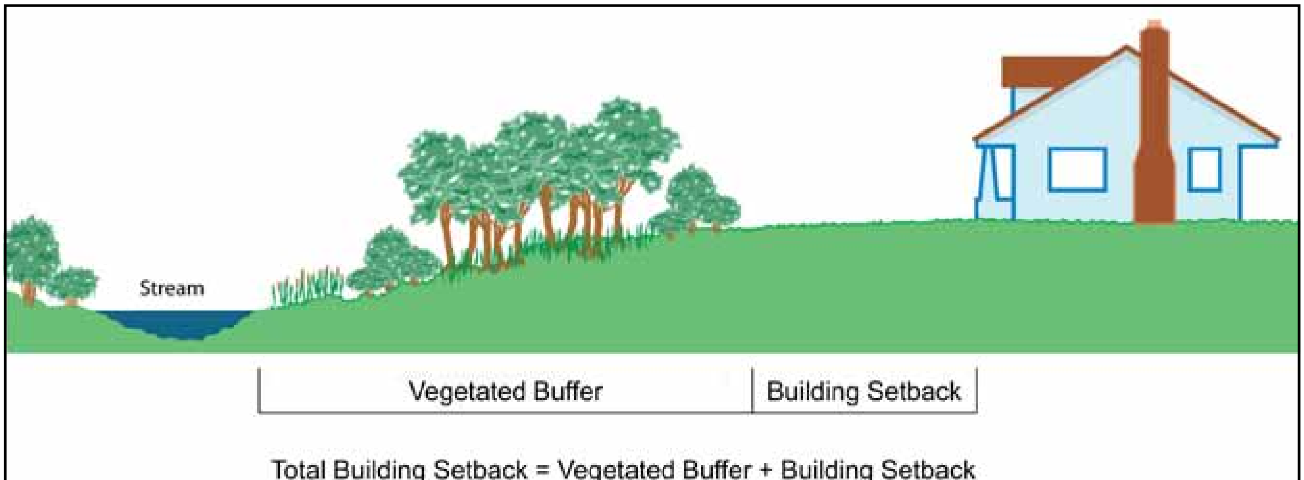


Figure C.1-2. *Illustration of total building setback*

[1] These water body standards offer guidance beyond that provided by other types of water-related standards often implemented by local governments (e.g., water quality, lakeshore protection, floodplain protection, and stormwater drainage standards). These other standards can also help maintain healthy fish and wildlife habitat (e.g., if, as a result, development does not occur in the 100-year floodplain, or stormwater drainage facilities are designed and installed to minimize impacts on water quality and maintain, as much as possible, pre-development runoff conditions and hydrology).

(3) Measure vegetated buffer and building setback distances from all water bodies on a horizontal plane, as follows:

- Rivers, streams, reservoirs, and lakes: Measure from the ordinary high-water mark. For braided rivers, measure from the ordinary high-water mark of the outermost braid that is nearest to the proposed structure.
- Wetlands (including ponds): Measure from the wetland's defined boundary. The outer edge of a wetland marks the boundary between the wetland and adjacent upland areas.

(4) If the riparian area associated with a water body extends beyond the pertinent vegetated buffer outlined above, extend the vegetated buffer to encompass all of the riparian area.

(5) If a channel migration zone (CMZ) study is completed for a river or stream for a time frame of 100 years or longer, use the CMZ maps as a guide for recommending that the total building setback be extended in order to locate development outside of the CMZ. Where the CMZ is wide and encompasses cropland, the vegetated buffer may be reduced below the minimum, but the building setback may need to increase in order to maintain an effective total building setback.

(6) For wetlands, the subdivider is advised to follow one of two alternative design approaches, depending on the distance between wetlands and subdivision design features:

- Recommended Wetland Approach #1. If any proposed subdivision design features are located 150 feet or less from a wetland, the subdivider retains a qualified wetland professional to determine the wetland's boundary in accordance with the 1987 U.S. Army Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987), or the most current wetlands delineation manual sanctioned by the Army Corps of Engineers–Omaha District. Although the total building setback is 130 feet for wetlands, this slightly larger area (150 feet) warrants professional evaluation to ensure that wetlands are not impacted by misidentified boundaries. Because wetland boundaries can be difficult to determine accurately, this standard helps ensure that the total building setback for wetlands is not encroached upon. The subdivider then includes the wetland delineation information in the subdivision application.
- Recommended Wetland Approach #2. If all proposed subdivision design features are located 150 feet or more from any wetlands, the subdivider demonstrates in the subdivision application that the subdivision design features will not encroach on the total building setback recommended for wetlands.

(7) For wetlands and wetland complexes that are important for migratory game birds and/or shorebirds, biologists may recommend that the total building setback be extended to encompass specific cropland areas adjacent to the wetlands that are consistently and seasonally used by large numbers or a high diversity of these species.

(8) Within the total building setback:

- Avoid the placement of homesites and other subdivision improvements (except roads and bridge abutments at river or stream crossings, designed and constructed in accordance with Natural Streambed and Land Preservation Act (310) or Stream Protection Act (124) permit requirements).

- Where disturbance does occur, incorporate effective measures to limit erosion and sedimentation.

(9) Within the vegetated buffer: Avoid disturbing native vegetation, except as needed to control noxious weeds (with herbicides approved for use in riparian environments), reduce accumulated fuels related to fire protection, erect fencing, remove individual trees that pose a threat to public safety, or provide the types of access described in #11 and #12 below.

(10) Within the building setback: Lawns can be planted, and native vegetation can be removed or otherwise disturbed.

(11) Water-dependent uses may occur within the total building setback, as long as the impacts of design features are minimized to the greatest extent possible. Specifically this applies to:

- Water-dependent agricultural facilities (e.g., pumps, diversion structures); and
- Water-dependent recreational facilities (e.g., nonmotorized trails, docks, boat ramps) that do not impact vegetated buffers for sensitive species (see Selected Species of Concern, Appendix C.6 below).

This provision does not exempt a subdivider from needing to comply with other pertinent local regulations, such as lakeshore protection regulations or floodplain management regulations.

(12) Minimize the extent of subdivision roads needed to provide access to all areas proposed for development.

Substantial Evidence for Water Body Recommendations

In order to more easily describe the rationale and scientific evidence for the water body recommended standards, the standards have been divided into twelve provisions. Each provision is stated below, followed by the substantial evidence supporting that provision, including pertinent scientific studies and professional opinions.

Provision 1. "Vegetated Buffer." Specific distances are designated for vegetated buffers from rivers, streams, lakes, ponds, reservoirs, and wetlands. For rivers, a minimum of 250 feet of vegetated buffer should be maintained; for perennial streams, a minimum of 150 feet of vegetated buffer should be maintained; and for other water bodies, a minimum of 100 feet of vegetated buffer should be maintained.

Substantial Evidence for Provision 1

There is much scientific literature on the need for vegetated buffers to protect wildlife and wildlife habitat along rivers, perennial streams, and other bodies of water. Riparian and wetland buffers have gained wide acceptance, including in Montana, as tools for maintaining wildlife habitat and providing other benefits to people and the environment (e.g., Environmental Law Institute 2008; Knutson and Naef 1997; Wenger 1999; Ellis and Richard 2008).

The following studies and professional opinions justify the vegetated buffer distances recommended under this design standard:

- The mean width of all wildlife studies reviewed indicates that 88 meters (287 feet) is required to protect wildlife habitat (Knutson and Naef 1997).
- "Scientific studies recommend that, in order to protect wildlife and wildlife habitat, 300-foot (100-meter) stream vegetated buffers be maintained. Certain wildlife species need a larger vegetated buffer" (Ellis 2008, Part 3, p. 7).
- "While narrow buffers offer considerable habitat benefits to many species, protecting diverse terrestrial riparian wildlife communities requires some buffers of at least 100 meters (300 feet)" (Wenger 1999, p. 3).
- "The most common recommendation in the literature on wildlife (most of which focuses on birds) is for a 100 m (300 ft) riparian buffer" (Wenger 1999, p. 47).
- Subdivision development can cause significant, permanent loss and degradation to wetlands, water bodies, and their associated riparian areas. One of the most effective tools available to local governments interested in minimizing loss and degradation to these areas is to set back structures and protect buffers with native vegetation (Ellis 2008, Parts 1, 2 & 3).
- "In order to balance development with effective natural resource protection, a rational strategy for protecting aquatic resources must be developed. It appears that the use of buffers will continue to be an important element of this strategy. To accomplish this, scientifically based criteria for establishing buffer requirements must be utilized by resource agencies" (Castelle et al. 1994, p. 878).

Provision 2. Use a "building setback" as part of the "total building setback." This provision recommends specific distances (50 feet or 30 feet) for building setbacks. The building setback is located between the vegetated buffer and any houses or other buildings.

Substantial Evidence for Provision 2

- "The building setback is designed to protect the vegetated buffer from human disturbance that could diminish the effectiveness of the buffer. Examples of human disturbance include dumping refuse or yard waste; cutting, mowing, or burning vegetation; filling areas; trampling vegetation; and recreational vehicle use. Direct human disturbance affects both the habitat provided by the vegetated buffer and the wildlife species that are dependent on the buffer" (Clancy et al. 2012, p. 2).
- "A 50-foot backyard is a reasonable distance to conduct most activities associated with a residential or commercial subdivision. As an example, most families use the area between their home and the vegetated buffer for lawns, play areas, swing sets, picnic tables, vegetable gardens, landscaping, etc." (Clancy et al. 2012, p. 3).

- Human disturbance can decrease the size of the vegetated buffer over time (Cooke 1992, p. 6):
    - o "More than 90% of the buffers examined for this study did not remain in a pristine state after the surrounding land use change was initiated. Of those buffers altered, 76% were altered in a negative manner."
    - o "Buffers less than 50 feet in width showed a 95% increase in alteration of the buffer," but "where the buffer was greater than 50 feet, only 35% showed alteration."
    - o "Of the 21 sites examined, 18 were shown to have reduced buffer zones between one and eight years later."

- "Lawns should not be considered part of the vegetated buffer. With their shallow roots, lawns are not particularly effective at absorbing and retaining water, especially during heavy rains" (Ellis 2008, Parts 1, 2 & 3, p. 2).

- "The building setback should be wide enough to prevent degradation of the vegetated buffer…As a result, the building setback should extend at least 25–50 feet beyond the vegetated buffer" (Ellis 2008, Part 1, p. 2).

Provision 3. The vegetated buffer and building setback are measured from (1) the ordinary high-water mark for rivers, streams, lakes, and reservoirs; and (2) the defined boundary of a wetland (including ponds).

Substantial Evidence for Provision 3

- The ordinary high-water mark is a well-known standard described in the Montana Code Annotated (23-2-301, MCA).

- "Riparian buffers are most commonly established by measuring the setback from the ordinary high water mark of a watercourse . . . When no ordinary high water mark is discernible, [vegetative buffers and building] setbacks are usually measured from the top of the stream bank . . . Wetland buffers are typically determined by measuring from the edge of a wetland's boundary" (Ellis and Richard 2008, p. 4–10).

- "There are a number of alternative approaches to setting the buffer distance [for a wetland]—usually defined in feet measured horizontally from the edge of the defined wetland" (Environmental Law Institute 2008, p. 10).

Provision 4. If the riparian area associated with a water body extends beyond the pertinent vegetated buffer, extend the vegetated buffer to encompass all of the riparian area.

Substantial Evidence for Provision 4

- Wildlife dependent on riparian habitat need "habitat connectivity; vegetation diversity in terms of age, plant species composition, and vegetation layers; vegetation vigor; abundance of snags and woody debris; unimpeded occurrences of natural disturbances and minimization of human-induced disturbances; an irregular shape; and a width that is adequate to retain riparian habitat functions" (Knutson and Naef 1997, p. xii).

- "Because riparian habitat supports the greatest number of species compared to other habitats, its protection can provide a significant benefit to fish and wildlife in developed landscapes" (Knutson and Naef 1997, p. 69).

- "When riparian habitat is lost or severely altered without mitigation, the downward trend of fish and wildlife populations continues. Only by retaining existing habitat and restoring degraded areas will the trend of reduced habitat quality for fish and wildlife be slowed or reversed" (Knutson and Naef 1997, p. 94).

- "For wildlife, [riparian] buffers must provide enough room for animals to take shelter, find food, successfully raise young, and hide from predators. While narrow buffers offer habitat benefits to many species, most wildlife—especially birds and larger mammals—depend upon riparian areas that are a minimum of 300 feet wide (Wenger, 1999) . . . As desirable as they may be, 300- or 600-foot-wide buffers are not practical on all streams in most areas. One recommendation to accommodate this issue involves including at least a few wide (300–1,000 foot) riparian sections and large blocks of upland habitat along narrower protected corridors" (Ellis and Richard 2008, p. 4–9).

Provision 5: If a channel migration zone (CMZ) study is completed for a river or stream for a time frame of 100 years or longer, use the CMZ maps as a guide for recommending that the total building setback be extended in order to locate development outside of the CMZ.

Substantial Evidence for Provision 5

When available, CMZ maps should be used when evaluating subdivisions:

CMZ maps help landowners and river and stream managers avoid or reduce adverse impacts to buildings, roads, and infrastructure, as well as fish and wildlife habitat. The following studies and professional opinions justify using CMZ maps as recommended under this design standard:

- "CMZ delineations help reduce risks to human communities by guiding development in and along river systems away from such areas. Limiting development within CMZs also reduces the costs of repairing or replacing infrastructure and major civil works that might otherwise be threatened or damaged by channel migration. Additionally, CMZ delineations can provide guidance in reducing degradation and loss of critical aquatic and riparian habitats, helping assure that fluvial process[es] are accommodated and that the river landscape is not permanently degraded or disconnected from the river by development" (Rapp and Abbe, 2003, p. 1).

- "It is important to fish and wildlife that natural disturbances (e.g., flooding, channel meandering) occur unimpeded and that human-induced disturbances are minimized. Fish and wildlife that use riparian and associated aquatic systems have evolved with continual yet generally low-level natural disturbances. Natural frequencies and magnitudes of disturbances enhance habitat diversity and provide key resources to riparian and aquatic areas (e.g., woody debris, nutrients). Disturbances caused by human activities often occur more frequently and are of greater magnitude than natural disturbances" (Knutson and Naef 1997, p. 80).

- "Stream meander is crucial to the maintenance of aquatic habitat because as a stream cuts through its valley, it builds instream complexity by developing floodplains and cutbanks. This natural process of erosion and deposition increases exposure of overhanging woody material and coarse sediments imbedded in the banks, both of which, in turn, increase instream habitat complexity" (Robins 2002, p. 7).

What is a Channel Migration Zone Map?

Rivers and streams found in Montana's valleys and plains meander—or migrate—laterally across the landscape. Channel migration can occur gradually, as a river erodes one bank and deposits sediment along another. It can also occur as an abrupt shift of the channel to a new location, called an avulsion, which may happen during a single flood event (Rapp and Abbe, 2003). A channel migration zone (CMZ) is the area where it is reasonably foreseeable that an active channel of a river or stream could migrate during a time period—usually 100 years—because of erosion or avulsion. These maps are developed using a variety of previously developed data, including historic aerial photography and digital elevation data. The goal is to interpret past and current channel conditions in order to predict future channel behavior and identify areas at risk of rapid channel movement and/or flooding due to natural stream processes.

As of January 2012, 100-year channel migration zone maps have been completed on the following streams and rivers in Montana:

- Big Hole River, from its headwaters on the Montana/Idaho border to its mouth near Twin Bridges (Thatcher and Boyd 2005);
- Clark Fork River, from the confluence of the Bitterroot River to Huson (Applied Geomorphology and DTM Consulting 2009);
- Flathead River, from the Old Steel Bridge downstream to Flathead Lake (Boyd et al. 2010a);
- Prickly Pear Creek (Lewis & Clark County), from Lake Helena upstream to the Lewis & Clark County line (Thatcher et al. 2011);
- Tenmile Creek (Lewis & Clark County), from its confluence with Prickly Pear Creek, upstream to Interstate 15 (Thatcher et al. 2011);
- Ruby River, from Ruby Reservoir downstream to the Beaverhead River (Boyd et al. 2010b); and
- Yellowstone River, from Gardiner near Yellowstone National Park to its confluence with the Missouri River in McKenzie County, North Dakota (Thatcher et al. 2009).

Reports completed on the above CMZ projects are excellent sources of information on the methods, science, and uses of CMZ studies and mapping.

Channel migration zone maps should be developed for a 100-year time frame or longer:

- "[A] 100-year time frame was selected for the life of the CMZ. This criteria for projected channel movement was adopted because of the ecological implications of a 100-year time frame, as well as the fact that a 100-year CMZ has been most commonly adopted by other mapping efforts . . . As the oldest cottonwood trees in the riparian zone are on the order of 100 years old, this time frame is considered likely to provide conditions necessary to develop diverse riparian age classes and locally support mature riparian forest" (Thatcher et al. 2009, p. 4).

- CMZ maps need to be science-based tools that look at long-term migration patterns for rivers and streams. "The principal goal of delineating the Channel Migration Zone (CMZ)—the area where a stream or river is susceptible to channel erosion—is to predict areas at risk for future channel erosion due to fluvial processes" (Rapp and Abbe 2003, p. 1).

- FEMA's regional guidance for mapping CMZs recommends a 100-year design life as described by Rapp and Abbe 2003 (FEMA 2010).

- Regarding the use of longer time frames for CMZ studies, the Federal Emergency Management Agency (FEMA 1999, p. 134) noted, ". . . uncertainty is greater for long time frames. On the other hand, a very short time frame for which uncertainty is much reduced may be useless for floodplain management because of the minimal erosion expected to occur."

Figures C.1-3 through C.1-6 provide three examples of how to apply the CMZ and riparian area standards (Provisions 4–6).

Figure C.1-3. *CMZ map showing three cross sections.*

This figure shows a map of a river (blue) with native riparian vegetation (green) and cropland (brown). The CMZ boundary is marked by a broken line. Three cross sections are also marked: #1, #2, and #3. Each cross section represents a different example, illustrated on p. C-17. In all cases, a landowner proposes to subdivide a parcel along the south side of a river where a 400-foot CMZ has been mapped.

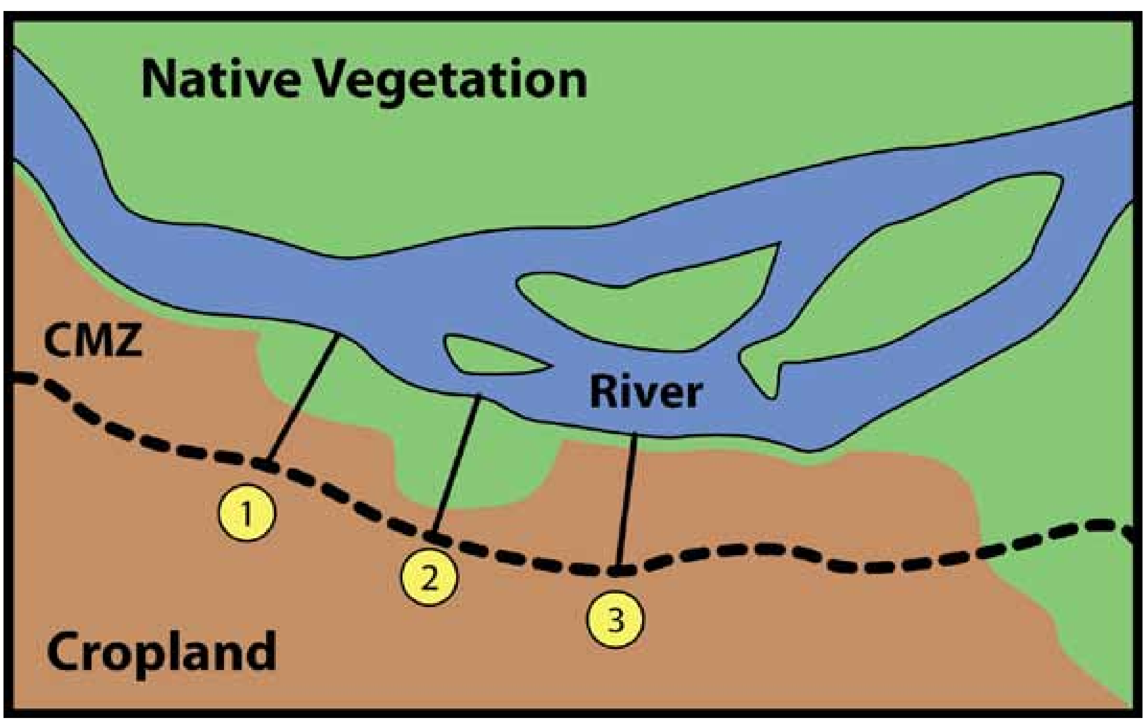


Figure C.1-4. *Illustration of CMZ/riparian example—cross section #1.*

In the 400-foot CMZ illustrated below, 250 feet is a native riparian area and the remainder is cropland. The recommended standard is that all buildings be placed outside the CMZ *and* outside of the riparian area. In this example, the vegetated buffer is 250 feet and the building setback is 150 feet, for a total building setback of 400 feet.

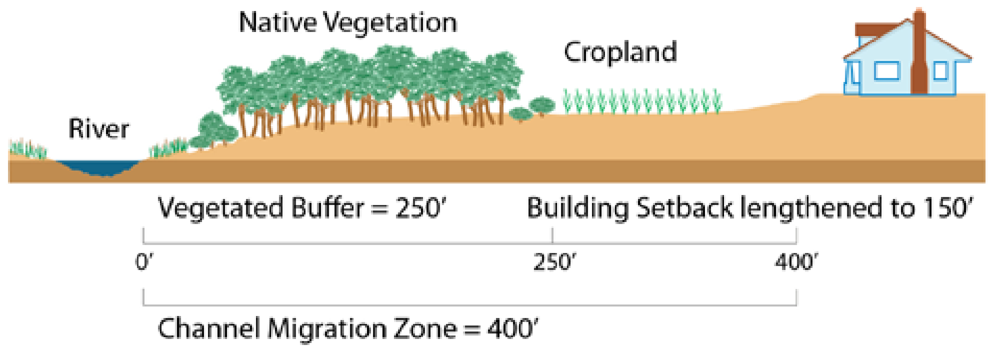


Figure C.1-5. *Illustration of CMZ/riparian example—cross section #2.*

In the 400-foot CMZ illustrated below, all 400 feet is a native riparian area. The recommended standard is that all buildings be placed outside the CMZ *and* outside of riparian area. In this example, the vegetated buffer is 400 feet and the building setback is 50 feet, for a total building setback of 450 feet.

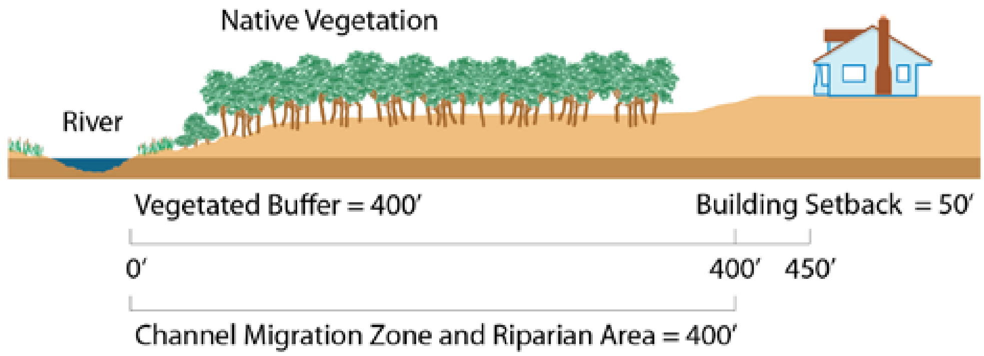
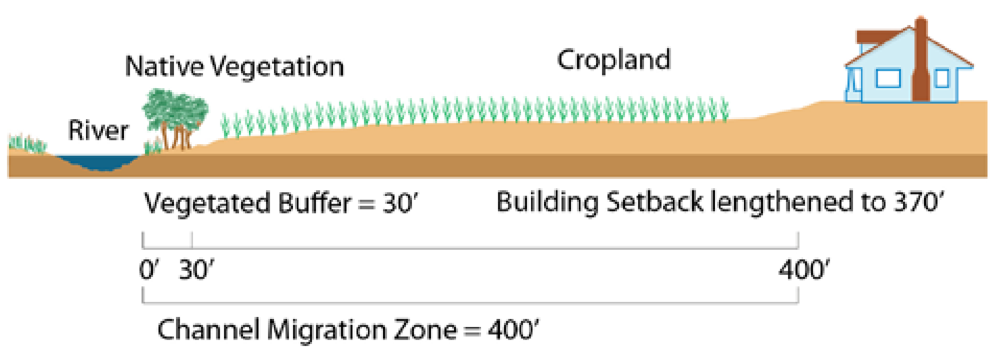


Figure C.1-6. *Illustration of CMZ/riparian example—cross section #3.*

In the 400-foot CMZ illustrated below, only 30 feet is a native riparian area; cropland makes up the rest of the CMZ. The recommended standard is that all buildings be placed outside the CMZ. In this example, the vegetated buffer is reduced to 30 feet and the building setback is increased to 370 feet, for a total building setback of 400 feet.



Provision 6. Where the CMZ is wide and encompasses cropland, the vegetated buffer may be reduced below the minimum, but the building setback may need to increase in order to maintain an effective total building setback.

Substantial Evidence for Provision 6

An important purpose in using CMZ maps and locating development out of the CMZ is to maintain natural stream processes, which sustain significant riparian and aquatic habitats. For this reason, it is recommended that development be located outside the CMZ even where cropland—and not native vegetation—occupies the CMZ.

The following studies and professional opinions justify the recommendation to maintain natural stream processes by locating development out of the CMZ:

- "Sediment recruitment, transport, and deposition resulting from channel migration and erosion is the primary mechanism of aquatic and terrestrial habitat formation along Montana's large prairie rivers. Retention of natural, unrestricted channel migration will allow continued formation of important habitats on these rivers. The endangered pallid sturgeon and other native fish and wildlife species will benefit from retaining these natural dynamics and habitat-formation processes" (MT FWP 2010, p. 1).

- "[T]he long-term health of streams, fish, and aquatic habitat requires maintaining natural stream processes—which includes natural erosion processes. In a healthy valley stream or river, banks erode naturally and the material is deposited elsewhere, which in turn builds banks and their associated floodplain. As a result of this natural process, the location of the stream channel changes over time. If given space, meandering streams create a pattern where outside bends of the stream are dominated by cut banks (caused by natural erosion), and inside bends are dominated by sand or gravel bars (where sediment is deposited)" (Ellis 2008, p. 7).

- "Habitat complexity is a result of stream meander and floodplain processes caused by periodic flooding. This results in a mosaic of habitat types within riparian buffers. These naturally complex systems offer an array of niches for wetland and terrestrial species, and thus lead to high levels of species diversity. Therefore, maintenance of the basic natural disturbance regime—flooding—is essential to the protection/enhancement of a riparian buffer for wildlife habitat. The literature is filled with research on the requirements of riparian buffers for various species" (Robins 2002, p. 8).

Provision 7. In order to ensure that wetlands are protected, two alternative design approaches are offered, depending on how close the wetland and the subdivision design features are located to each other. Recommended Wetland Approach #1: If any proposed subdivision design features are located within 150 feet of a wetland, the subdivider retains a qualified wetland professional to determine the wetland's boundary. Or, Recommended Wetland Approach #2: If the wetland is more than 150 feet from all subdivision design features, the subdivider demonstrates that the wetland's total building setback will not be encroached upon.

Substantial Evidence for Provision 7

This provision is designed to ensure that the total building setback for wetlands is not encroached upon by subdivision design features. Although the total building setback is a minimum of 130 feet for wetlands, a slightly larger area (e.g., 150 feet) should be evaluated to ensure that wetlands are not impacted by misidentified boundaries. Wetland boundaries are often challenging to delineate.

The following studies and professional opinions justify the recommended approaches for determining wetland boundaries established under this design standard:

- "There are a number of alternative approaches to setting the buffer distance [for a wetland]—usually defined in feet measured horizontally from the edge of the defined wetland" (Environmental Law Institute 2008, p. 10).

- For wetlands, "[b]uffer widths toward the upper end of this range [30 m or 98 feet] appear to be the minimum necessary for maintenance of the biological components of many wetlands. . . ." (Castelle et al. 1994, p. 881).

- "The upland area surrounding the wetland is essential to its survival and functionality. If a wetland area cannot absorb the stormwater it normally absorbs, the chances of flooding will increase further downstream; if the wetland cannot serve as home for wetland species and vegetation, community values and quality of life will be impaired. Local governments that have wetlands within their boundaries have the opportunity to conserve these resource lands and to control or compensate for activities and development that might impair their benefits to the community and the environment . . . Some ordinances prescribe a fixed nondisturbance wetland buffer, and then prescribe an additional setback distance for structures from the edge of the wetland buffer. The idea is that the prescribed nondisturbance buffer protects the wetland, and that buildings should not be constructed on the buffer's edge if a functional buffer is to be maintained" (Environmental Law Institute 2008, p. 2).

- "Where wildlife needs are factored into the design, VFS [Vegetated Filter Strips] or buffers in urban areas can add to the species diversity of the urban environment by providing wildlife nesting and feeding sites, in addition to serving as a pollution control measure" (Environmental Protection Agency 2005, p. 15).

Provision 8. For wetlands and wetland complexes that are important for migratory game birds and/or shorebirds, biologists may recommend that the total building setback be extended to encompass specific cropland areas adjacent to the wetlands that are consistently and seasonally used by large numbers or a high diversity of these species.

Substantial Evidence for Provision 8

Croplands located on uplands adjacent to wetlands and wetland complexes are important for migratory game birds and some shorebirds:

- "During fall and winter, dabbling ducks such as mallard, pintail, and green-winged teal depend greatly on agricultural grains for high energy food. Mallards consume about 100 grams of waste grain per day during this period, and average-sized geese need twice this amount. Most grains are consumed after crops are harvested, when waste corn and small grains become available. . . . Corn, wheat, barley, rye, oats, grain sorghum, millet, soybeans, field peas, and buckwheat are used as waterfowl food crops . . ." (Ringelman 1991, p. 24).

- ". . . Geese from the Hi-line breeding populations, which nest in eastern Wyoming, eastern Montana, southeastern Alberta, and southwestern Saskatchewan, begin migrating into north-central Colorado in late October . . . Cereal grains become an increasingly important component in their diet during fall . . ." (Ringelman 1991, p. 6).

- "During migrations, cultivated grains are major food items (Lewis 1977; Kauffeld 1982; Tacha et al. 1994). Cranes often feed in grain fields in the spring before nest sites thaw and again in late summer after the young fledge (Armbruster 1987). Important grains include barley in Idaho and Wyoming (Drewien 1973; Lockman et al. 1987) and wheat in Colorado (Bieniasz 1979). Cultivated grains provide the necessary fat stores required during migrations and are accessible with minimum energy expenditures (Tacha et al. 1987)." (Subcommittee on Rocky Mountain Greater Sandhill Cranes 2007, p. 3)

- Shorebird use of cropland is documented in management plans. For example: "Agricultural Field Habitat. Hay fields are used by shorebird species, for foraging sites (e.g., Long-billed Curlew and Killdeer) and for nesting (e.g., Killdeer, Wilson's Phalarope, and Long-billed Curlew). Killdeer nest in association with agriculture wherever freshwater is available" (Oring et al. 2000, p. 5).

- "Long-billed curlews migrating through the interior of North America use fallow, plowed, wheat, and alfalfa fields, sparsely vegetated areas such as prairie dog colonies, low grassland fields, shallow wetlands, and lake and reservoir edges for foraging and roosting (Paulson 1993; Shane 2005; D.S. Stolley, pers. comm.; E.A. Young, pers. comm.). Many agricultural sites used by curlews have center pivot irrigation systems (Shane 2005)." (Fellows and Jones 2009, p. 9)

- "They [Long-billed Curlew] commonly nest in hayland, cropland, fallow or stubble fields (D. Casey, pers. comm.). During migration, birds use agricultural fields, grazed pastures, wetlands, and mudflats (Putnam and Kennedy 2005)." (Montana State Summary in Fellows and Jones 2009, p. 33)

- Killdeer during the breeding season frequent "open areas, especially sandbars, mudflats, heavily grazed pastures, and such human-modified habitats as cultivated fields, athletic fields, airports, golf courses, graveled or broken-asphalt parking lots, and graveled rooftops." During spring and fall migration, "Mudflats left by receding floodwaters and human-made wetlands such as sewage lagoons and reservoirs are favored stopover and feeding areas, as are gravel bars in rivers, fallow agricultural fields, and broad expanses of open, closely mowed grassy areas such as sod farms and golf courses, particularly when wet" (Jackson and Jackson 2000).

Migratory game birds and shorebirds are impacted by human disturbance. Keeping areas free from human disturbance may require buffers that shield wetlands and wetland complexes:

- "Prolonged and extensive disturbances may cause large numbers of waterfowl to leave disturbed wetlands and migrate elsewhere. These movements can be local in areas of plentiful habitat or more distant and permanent in areas of sparse habitat, and may result in shifts in flyway migration patterns. Extensive disturbances on migration and wintering areas may limit use by waterfowl below the carrying capacity of wetlands" (Youmans 1999, p. 3.5).

- "Make shorebird-migration-staging areas 'disturbance-free' during periods of use (Morrison and Harrington 1979)" (Youmans 1999, p. 3.11).

- "Disturbance of shorebirds on nesting, feeding, and roosting areas may significantly reduce survival and reproductive success" (Brown et al. 2001, p. 31).

- "Overall Management Guidelines for Montana Waterfowl:
  Fortunately, numbers of breeding waterfowl usually increase in response to reduction or elimination of human disturbances. For the benefit of waterfowl, human disturbances must be minimized or eliminated. Management techniques that reduce human disturbances of waterfowl include:

  1. Increasing the quantity, quality, and distribution of foods to compensate for energetic costs from disturbances.
  2. Establishing screened buffer zones around important waterfowl breeding, roosting, and feeding areas.
  3. Reducing the number of roads and access points to limit accessibility to important waterfowl habitats.
  4. Reducing the sources of loud noises and rapid movements of vehicles and machines" (Youmans 1999, p. 3.8).

- "Human activity causes wintering waterfowl to expend energy to avoid humans at a time in their annual cycle when energy conservation is important to survival, migration, and breeding reserves. Understanding the effects of recreational activities on waterfowl is important to managing natural resource areas where migratory birds depend on wetland habitat for resting and feeding"(Pease et al. 2005, p. 103).

- "Increases in home development and subdivisions are negatively impacting some pre-migration staging habitats in portions of eastern ID, western WY, and southwestern MT" (Subcommittee on Rocky Mountain Greater Sandhill Cranes 2007, p. 29).

Provision 9. Within the total building setback, (1) avoid the placement of homesites and other subdivision improvements (except roads and bridge abutments at river or stream crossings); and (2) where disturbance does occur, incorporate effective measures to limit erosion and sedimentation.

Substantial Evidence for Provision 9

Avoid the placement of homesites and other subdivision improvements within the total building setback:

- Subdivision development can cause significant, permanent loss and degradation to wetlands, water bodies, and their associated riparian areas. One of the most effective tools available to local governments interested in minimizing loss and degradation to these areas is to set back structures and protect buffers with native vegetation (Ellis 2008, Parts 1, 2 & 3).

- "The building setback is designed to protect the vegetated buffer from human disturbance that could diminish the effectiveness of the buffer. Examples of human disturbance include dumping refuse or yard waste; cutting, mowing, or burning vegetation; filling areas; trampling vegetation; and recreational vehicle use. Direct human disturbance affects both the habitat provided by the vegetated buffer and the wildlife species that are dependent on the buffer" (Clancy et al. 2012, p. 2).

- "When riparian habitat is lost or severely altered without mitigation, the downward trend of fish and wildlife populations continues. Only by retaining existing habitat and restoring degraded areas will the trend of reduced habitat quality for fish and wildlife be slowed or reversed" (Knutson and Naef 1997, p. 94).

Additional justification for this provision can be found above under Provisions 1, 2, 4, and 5.

Where disturbance occurs in the total building setback, incorporate effective measures to limit erosion and sedimentation:

- "Excess amounts of sediment can have numerous deleterious effects on water quality and stream biota. For a full discussion of this topic, refer to Waters 1995 and Wood and Armitage 1997. The following brief list summarizes the major sediment effects:
    - o Sediment in municipal water is harmful to humans and to industrial processes.
    - o Sediment deposited on stream beds reduces habitat for fish and for the invertebrates that many fish consume.
    - o Suspended sediment reduces light transmittance, decreasing algal production.
    - o High concentrations of fine suspended sediments cause direct mortality for many fish.
    - o Suspended sediments reduce the abundance of filter-feeding organisms, including mollusks and some arthropods.
    - o Sedimentation reduces the capacity and the useful life of reservoirs" (Wenger 1999, p. 11).

- "The loss of riparian vegetation due to urbanization: 1) degrades stream conditions through increased erosion of banks that are no longer armored with roots and debris from natural vegetation, 2) removes a source of logs and organic debris that stabilize streams and provide a source of food and nutrients, 3) increases stream temperatures through shade removal, and 4) reduces the capacity of the riparian area to filter incoming sediments and pollutants" (Klein 1979). (Knutson and Naef 1997, p. 69)

- "Natural vegetated buffers are important to water quality, because the longer runoff is detained in a buffer, the fewer pollutants will enter the stream. Physically, plants act as a barrier, slowing down water flow, giving sediments and other contaminants time to settle out of runoff, and allowing more water to move into the soil. Plant roots trap sediments and other contaminants in shallow groundwater, take up nutrients, hold banks in place, and prevent erosion" (Ellis 2008, Part 1, p. 4).

- "In addition to being sensitive to water pollutants, fish can be extremely intolerant of sediment in the stream. Sediments come from a variety of sources, including natural and human-driven stream bank erosion, agricultural fields, exposed earth at construction sites and on dirt roads, and other activities that remove vegetation and expose soil" (Ellis 2008, Part 2, p. 8).

Provision 10. Avoid disturbing the vegetated buffer except as needed to "control noxious weeds (with herbicides approved for use in riparian environments), reduce accumulated fuels related to fire protection, erect fencing, remove individual trees that pose a threat to public safety, or provide access . . ."

Substantial Evidence for Provision 10

- Wildlife dependent on riparian habitat characteristics need "habitat connectivity; vegetation diversity in terms of age, plant species composition, and vegetation layers; vegetation vigor; abundance of snags and woody debris; unimpeded occurrences of natural disturbances and minimization of human-induced disturbances; an irregular shape; and a width that is adequate to retain riparian habitat functions" (Knutson and Naef 1997, p. xii).

- "As a general rule, all sources of contamination should be excluded from the buffer. These include: land disturbing activities, impervious surfaces . . . septic tank drain fields, waste disposal sites, [and] application of pesticides and fertilizer (except as necessary for buffer restoration)" (Wenger 1999, p. 48).

- ". . . [S]treamside buffers must provide enough room for wildlife to take shelter, find food, successfully raise young, and hide from and avoid predators" (Ellis 2008, Part 3, p. 5).

- It is equally important to protect rivers and small tributary streams with adequate vegetated buffers because small tributaries provide essential habitat for many terrestrial wildlife species; "contribute steady amounts of clean, cooler water to mainstem rivers; filter sediments and pollutants; play a key role in the retention and absorption of flood and storm water in a watershed; are an important water source, especially during low flow periods of the year; are a major source of woody debris and other organic matter necessary for aquatic organisms; and provide critical spawning sites for many fish species" (Ellis 2008, Part 2, p. 6).

- Vegetated buffers are known to protect water quality, as specified in the following review studies:
  - o To protect water quality overall, "a 100 ft [30 meter] fixed-width riparian buffer is recommended for local governments that find it impractical to administer a variable-width buffer" (Wenger 1999, p. 47).
  - o Scientific studies indicated that to protect water quality, vegetated buffers should be between 24 and 42 meters (78 and 138 feet) (Knutson and Naef 1997).
  - o "[W]ider buffers (> 50 m) [> 167 feet] more consistently removed significant portions of nitrogen entering a riparian zone" (Mayer et al. 2005, p. iv).

Provision 11. The following water-dependent uses may occur within the total building setback, as long as the impacts of design features are minimized to the greatest extent possible: water-dependent agricultural facilities (e.g., pumps, diversion structures); and water-dependent recreational facilities (e.g., nonmotorized trails, docks, boat ramps) that do not impact vegetated buffers for sensitive species (see Selected Species of Concern recommended design standards or Appendix C.6).

Substantial Evidence for Provision 11

Water-dependent agricultural and recreational facilities must be located adjacent to a body of water or they cannot be used for their specific purpose (i.e., it makes no sense to build a boat ramp 130 feet or more from the water).

The concept of "water-dependent" use has been adopted by the U.S. Army Corps of Engineers, which regulates the filling of wetlands, streams, and other water bodies under Section 404 of the Clean Water Act (Clean Water Act, 40 CFR 230.10[a][3]). The Corps conducts a "water dependency test" for projects it reviews:

- Structures such as boat docks, irrigation intake structures, bank stabilization structures, etc. are considered water-dependent activities. These structures cannot function if they are built on uplands away from a water body; their ability to function is tied to their proximity to a water body. Other water-dependent structures include boat ramps, fishing access sites, fishing piers, marinas, facilities needed to service boats (e.g., marinas, fuel sales for boats, boat repair), facilities that generate electricity from water, and agricultural facilities directly related to removing (e.g., diverting, pumping) water out of a water body (e.g., pumps, diversion structures) (Ankersen and Ruppert 2006).

- Projects such as houses, garages, golf courses, most roads, etc. are *not* considered water-dependent because these structures can be built on uplands away from a water body to accomplish the same result. They function independently of water bodies. The category also includes all housing (e.g., apartment buildings, condominiums, etc.), hotels, motels, restaurants, warehouses, manufacturing facilities, dry boat storage for boats that can be transported by trailer, long-term parking, parking for persons not participating in a water-dependent activity, boat sale facilities, and agricultural facilities that are not directly related to removing water from a water body (e.g., barns, outbuildings) (Ankersen and Ruppert 2006).

The Corps uses the "water-dependent activity" test to prevent the filling of water bodies unnecessarily. Projects that are water-dependent are allowed to proceed as long as impacts are minimized and/or mitigated; projects that are not water- dependent that would impact water bodies are scrutinized at a much higher standard than those that are water-dependent. Likewise, in this provision of the recommended water body design standards, water-dependent activities may occur within the total building setback as long as the impacts of design features are minimized as much as possible. Many state and local governments use the term "water-dependent use" as a tool for managing land use activities along waterfronts (Ankersen and Ruppert 2006).

Provision 12. Minimize the extent of subdivision roads needed to provide access to all areas proposed for development.

Substantial Evidence for Provision 12

- "Road crossings and other breaks in the riparian buffer effectively reduce buffer width to zero and allow sediment and other contaminants to pass directly into the stream (Swift 1986). Buffer crossings, or even just narrow points in the buffer, may be the locations of the majority of contaminant transport to the stream (Weller et al. 1998). All buffer crossings should be minimized, but when they are necessary, Schueler (1995) suggests the following guidelines:
    - o Crossing width should be minimized
    - o Direct (90 degree) crossing angles are preferable to oblique crossing angles
    - o Construction should be capable of surviving 100-year floods
    - o Free-span bridges are preferable to culvertizing or piping the stream" (Wenger 1999, p. 51).
- "The number of stream crossings should be minimized. Stream crossings should be perpendicular to the stream and they should minimize actual contact with the stream (e.g., use long-span bridges). Crossings or stream contact points should be designed to minimize disturbance to stream banks, streambeds, and other sediment-producing situations (Sachet 1988)" (Knutson and Naef 1997, p. 110).

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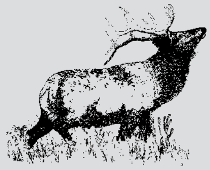

Appendix C.2. Big Game Winter Range

This section contains information about the recommended subdivision design standards for big game winter range. These standards are designed to apply to the following native ungulate species: white-tailed deer, mule deer, elk, antelope (also known as pronghorn), bighorn sheep, moose, and mountain goat.

Habitat Descriptions and Locations

Big game winter range represents the area where deer, elk, antelope, bighorn sheep, moose, and mountain goat spend the snowy, cold months of the winter. This habitat exists when elevation, slope, aspect, and vegetation combine to produce an area that provides animals with food, protection from harsh weather conditions, and security. Consequently, winter range is limited in size. "Animals that may have occupied thousands of acres of summer/fall range can be seasonally confined to relatively restricted geographic areas on which forage is limited and environmental conditions can cause physiological stress" (Youmans 1999, p. 6.3). This limited habitat area is generally found at lower elevations (mountain foothills and valley floors) (Vore 2012).

Winter range can shift locations in different years, depending on the weather and other factors, "including annual variations in habitat quality, animal population fluctuations, and winter severity that concentrates animals differently from year to year . . ." (Vore 2012, p. 4). This shifting helps ensure that during the most severe winters, critical winter range areas have not been degraded by concentrated use year after year.

Big game animals can travel long distances to reach their winter range. Although many animals migrate less than 30 miles to reach winter range, some big game animals travel 100 miles or more. For example, antelope have been known to migrate over 250 miles from Canada to reach winter range in north-central Montana. Consequently, it is important to maintain connectivity between areas used during different seasons of the year. If the winter is severe, big game animals can be concentrated on small, core winter range areas. If a winter is mild, animals can be spread out across the landscape (Vore 2012).

Winter range varies in different parts of Montana and from species to species; the following general descriptions and maps characterize big game winter range in Montana according to species and region. However, it should be noted that "[t]here are, of course, exceptions to these broad generalizations, which underscores the importance of area-specific surveys and analyses" (Vore 2012, p. 3).

Figures C.2-1 through C.2-7 (below) depict the general and winter/general ranges of the state's big game animals. General range refers to areas predictably occupied by the species for part or all of its year-long range. Winter/general range indicates that populations of this species tend to concentrate in these areas during the winter season; however, these areas are also considered part of the General Range. Weather extremes can have a large influence on winter distribution in any given year (Online FWP GIS Data 2012).

Legend for Figures C.2-1 through C.2-7.	**General Range** **Winter/General Range**	**NOTE: Wildlife distribution is not delineated by MT Fish, Wildlife & Parks within Indian Reservations and National Parks.**

Elk and Deer

- Southwestern Montana.
    - o Elk. Winter range typically occurs on south- and west-facing, low-elevation grasslands (see Figure C.2-1). Elk generally prefer areas with adjacent timber, which is used for bedding (Vore 2012).

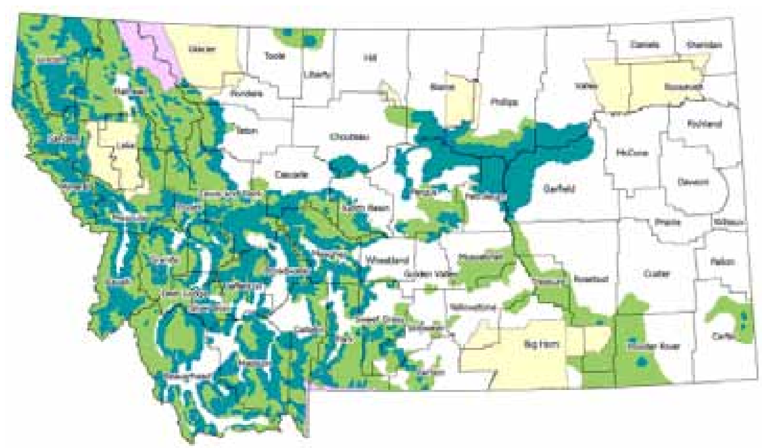

Figure C.2-1. Map showing general range and winter/general range of ***Elk*** *in Montana (FWP GIS 2012).*

    - o Mule deer. Winter range is similar to that used by elk, but it usually has a stronger shrub component, such as sagebrush, bitterbrush, or mountain mahogany (Vore 2012) (see Figure C.2-2).
    - o White-tailed deer. Winter range is typically associated with low-elevation agricultural lands (see Figure C.2-3). In addition, these deer use valley bottoms with associated brush and trees for cover. They may also use dense forests with a canopy cover that provides shelter from deep snow (Vore 2012).

- Northwestern Montana. In the forested northwestern part of the state, elk and deer winter range typically has a conifer overstory and shrubby understory, and is located below 5,000 feet in elevation.

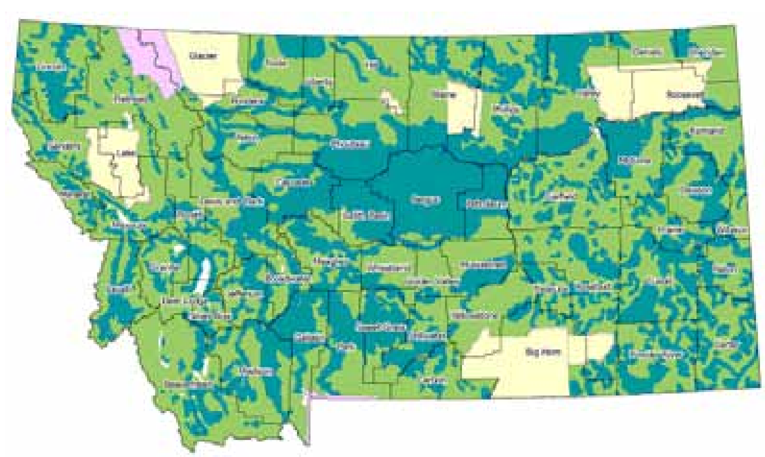

Figure C.2-2. Map showing general range and winter/general range of ***Mule Deer*** *in Montana (FWP GIS 2012).*

- Eastern Montana.
    - o Elk prefer winter range in the more rugged breaks habitat, where junipers

- and ponderosa pines offer vegetative cover (Vore 2012).
- o Mule deer "prefer topography such as the coulees and more rugged terrain," where sagebrush is extremely important for food and cover (Vore 2012, p. 4).

Moose

Winter range is generally located in the western third of the state (see Figure C.2-4). Winter range is dominated by willow flats and mature coniferous forests. Besides willows, moose sustain themselves during the winter months on serviceberry, chokecherry, and red dossier dogwood. Of all Montana's ungulates, moose can most easily negotiate deep snow (MT Field Guide 2012).

Mountain Goat

Winter range is generally found on the steep, south-facing slopes of northwestern, west-central, southwestern, and south-central Montana mountains (see Figure C.2-5). Preferred winter terrain consists of cliffs, south-facing canyon walls, and windblown ridgetops with sparse snow cover. Goats will sometimes utilize subalpine forest (MT Field Guide 2012).

Bighorn Sheep

Winter range for this species is diverse and includes the badlands and breaks of eastern Montana, high alpine mountains of south-central Montana, lower foothills

Figure C.2-3. *Map showing general range and winter/general range of **White-tailed Deer** in Montana (FWP GIS 2012).*

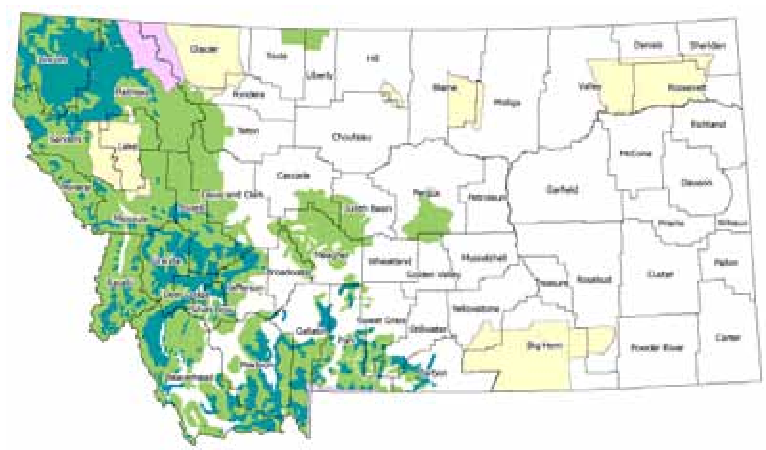

Figure C.2-4. *Map showing general range and winter/general range of **Moose** in Montana (FWP GIS 2012).*

Figure C.2-5. *Map showing general range and winter/general range of **Mountain Goat** in Montana (FWP GIS 2012).*

of southwestern Montana, and the intermountain valleys and higher elevations of northwestern Montana (see Figure C.2-6). Typical winter range is found on low-elevation, south-facing slopes that provide vegetative cover for escape in close proximity to foraging areas. The snowpack tends to be less than 25 cm (approximately 10 inches) (FWP Bighorn 2010).

Antelope (Pronghorn)

Antelope spend their winters predominantly in the open, rolling sagebrush and grasslands found east of the Front Range and, to a lesser degree, the intermountain valleys of southwestern Montana (see Figure C.2-7). Sensitive to snow depths, antelope seek areas with less snow accumulation and move south during severe winter weather (MT Field Guide 2012; Yoakum 2004; Vore 2012). In eastern Montana, sagebrush is an extremely important source of food and cover (Vore 2012).

Figure C.2-6. *Map showing general range and winter/general range of* ***Bighorn Sheep*** *in Montana (FWP GIS 2012).*

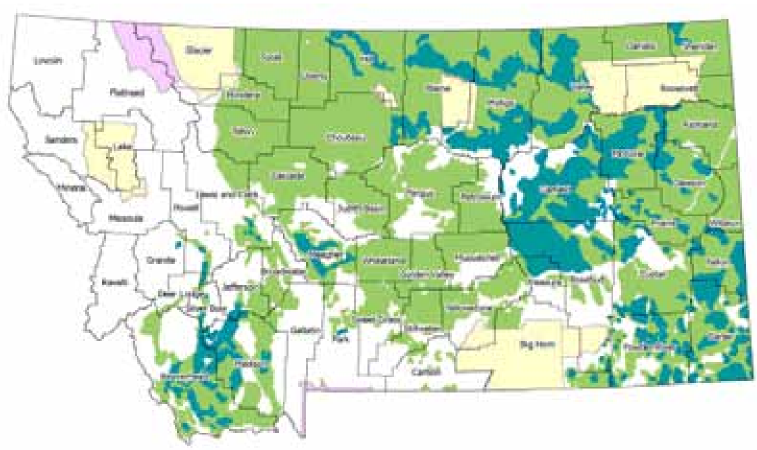

Figure C.2-7. *Map showing general range and winter/general range of* ***Antelope*** *in Montana (FWP GIS 2012).*

Objectives of Recommended Design Standards

- Minimize habitat fragmentation and loss of winter range.
- Maintain the ability of big game animals to travel freely within a winter range habitat patch, and between winter range habitat patches and other seasonal ranges.
- Maintain FWP's ability to manage wildlife effectively and as non-habituated herds.
- Minimize the potential for subdivisions to lead to problematic concentrations of big game.
- Minimize wildlife/human conflicts, including negative impacts on adjacent properties (e.g., game damage on agricultural lands).

Conservation Status

Winter range has traditionally been considered one of the most significant limiting factors for many big game species. This habitat type occupies a small percentage of each big game animal's home range, where forage is limited and environmental conditions can cause physiological stress. The importance of this habitat to big game animals cannot be overstated.

- "Wildlife biologists across Montana recognize the value of big game winter range; it is finite, biologically important, and likely to be lost without careful planning and resource management. In fact, there is no seasonal range more important to big game than winter range, and no bigger permanent threat to winter range—especially in western Montana—than housing development." (Vore 2012, p. 1)
- "In the final analysis there is one important point: *All* winter range is important to the long-term survival of big game populations." (Vore 2012, p. 4)
- "The threat of unplanned, unregulated development on ungulate winter range should be a real concern to managers, policy-makers, and the general public who appreciate and value native ungulates in the West . . . Though we cannot return these areas to pre-European settlement conditions, we can manage new growth to ensure that ungulates remain a significant part of the western landscape." (Polfus 2011, p. 94)

Impacts from Development

The main impacts to big game winter range from development include habitat fragmentation, creation of source-sink dynamics,[2] disruption of wildlife movements and migration, effects associated with roads, changes to the vegetation community that impact forage and cover, effects associated with domestic pets, impacts associated with recreation and other human-wildlife conflicts, and more (Glennon and Kretser 2005). Specific impacts of subdivisions and housing development on big game animals and their winter ranges are outlined below in more detail.

Big Game Generally

- "Development and subdivisions on big game winter range may render this critical habitat as unsuitable for big game use, unsuitable for big game management, or both. Such subdivisions often convert functional undeveloped winter range into a series of disconnected and unusable habitat fragments. Functional undeveloped winter ranges are large unfragmented landscapes of suitable habitat where big game can live in a natural wild state during the winter (generally November through April). The characteristics of functional winter range include the following factors: (1) animals can use the habitat undisturbed; (2) animals can move easily to and from summer range; (3) animals do not create conflicts with people and domesticated pets; (4) traditional human use and enjoyment of the animals is maintained; and (5) all options for effective

[2] The term "source-sink dynamics" refers to the link between the "source" and "sink" habitats of a species' population. "Source habitats occur where reproduction and recruitment are positive, and therefore new emigrants are produced, while sink habitats occur where within-habitat reproduction is insufficient to balance local mortality, and these populations therefore would not persist without influx of immigrants from source populations (Pulliam 1988). Without adequate dispersal between sources and sinks, populations in sink habitat can become locally extinct." (Glennon and Kretser 2005, p. 12)

big game management, including hunting with rifles, can be employed if desired" (Vore 2012, p. 11).

- "Subdivisions can affect the way that wintering big game uses habitat a mile or more away (McIntyre and Hobbs 1999; Sime 1999) . . . Houses, roads, people, dogs, and other human activity often limit or preclude big game use of winter range" (Vore 2012, p. 8).
- Pets are often associated with subdivisions. Loose dogs have been known to "chase, harass, injure, and kill big game, and can range up to three to five miles from the nearest house (Sime 1999; Sime and Schmidt 1999)." (Vore 2012, p. 8)
- "Because big game animals live significantly off their stored fat reserves during winter, if they are harassed or disturbed, they burn fat more quickly and have a lower chance of surviving the winter. The negative effect of disturbing big game on winter range is well known (Geist 1971; Lyon 1979; Parker et al. 1984; Cassirer et al. 1992), and is the primary reason winter ranges on MFWP wildlife management areas are closed during the winter . . . It may take many years and generations for animal populations to respond to development as individual animals die, find other areas, or adapt. As a result, the actual total impact of a development on winter range may not be fully realized for decades (McIntyre and Hobbs 1999; Hansen et al. 2005)" (Vore 2012, p. 8).
- "If given a choice, big game will avoid houses (Vogel 1989; Storm et al. 2007; Cleveland 2010). Consequently, where development is placed on winter range makes a significant difference (Duerkson et al. 1996). Subdivisions placed in unfragmented blocks of winter range and not adjacent to other development and infrastructure have a much greater negative impact on wildlife than do new houses situated next to existing development" (Vore 2012, pp. 8–9).
- "If big game populations are to be protected long-term in Montana, any evaluation of a proposed subdivision must consider likely future cumulative effects from future development on big game winter range (Odum 1982). Continued application of 'small decisions made singly' with regard to subdivisions and development eventually results in isolated relic winter range patches with little connectivity to other habitat and a generally highly modified matrix (Theobald et al. 1997; McIntyre and Hobbs 1999; Glennon and Kretser 2005; Hansen et al. 2005). Small populations of big game may still manage to survive, but often in conflict with humans and only if the remaining winter range is not developed further" (Vore 2012, p. 9).
- "When housing reaches the point when there are no 'undeveloped' areas left, big game can no longer choose to avoid houses and either must adapt or leave . . . One of the impacts of human development on big game is that these animals may habituate to people, and the habituation of wildlife creates new problems . . . Habituation of big game to development is a problem for at least six important reasons: "(1) it 'cheapens' people's perceptions of big game; (2) big game often come into conflict with people; (3) it can change the ecology and native habitat use of a big game population; (4) it can severely limit wildlife management options; (5) it can impact hunting and other wildlife-related recreational opportunities over a large area, including the big game's entire year-round home range; and (6) such negative interactions with wildlife may undermine people's attitudes toward conservation" (Vore 2012, p. 9).

- "A subtle and often unrealized aspect of rural subdivisions is that they can change the year-round ecology of big game animals, causing animals over time to abandon nearby traditional winter ranges and become residents, potentially year-round residents, in and around subdivisions (Berger 2007; Haggerty and Travis 2006; Hebblewhite et al. 2006; Hurst and Porter 2008; Klopper et al. 2005; McClure and Bissonette 1996; Thompson and Henderson 1998; Whittaker and Knight 1998)." (Vore 2012, p. 10)
- "Some species (e.g., elk) avoid roads and roadside areas, thereby reducing available habitat. Other species are negatively affected by roads because of increased stress during critical periods (e.g., wintering deer)" (Knutson and Naef 1997, p. 108).
- The most effective tool for managing big game populations is hunting, particularly hunting with rifles. However, hunting with rifles, as well as archery hunting, is often not a viable option in and around subdivisions because of safety reasons. In addition, some subdivision residents may oppose hunting in general, and nearly all residents do not want hunted animals dying on or near their property (Thompson and Henderson 1998).

Deer

- "White-tailed deer populations have expanded in the last century and display high adaptability to human activity . . . deer often select high quality forage near residential structures and benefit from reduced predation rates and a lack of hunting by humans in close proximity to developments. White-tailed deer may display greater avoidance of human disturbance during sensitive biological seasons. In some situations, white-tailed deer habitat use has declined with increasing housing densities. Habituated white-tailed deer impact humans through the spread of diseases, increased deer-vehicle collisions, attacks on humans and alterations to plant structure and community composition. Human attitudes and perceptions of white-tailed deer in urban environments can limit wildlife management options such as hunting" (Polfus 2011, p. vii).
- "Mule deer populations in the West have declined in recent decades. Though research has not isolated the confounding factors involved in the declines, it is probable that residential development has played a significant role. Mule deer are known to display behavioral escape responses such as avoidance, decreased flight initiation distances, and other behavioral reactions to human activity and recreation. Studies indicate that mule deer often avoid roads and industrial infrastructure. In some cases, avoidance of human disturbance can increase energy expenditure and may impact individual survival during the winter. Because mule deer utilize flexible migration behaviors to maximize resources and decrease predation pressure, development in migration corridors can have significant consequences. Like white-tailed deer, mule deer can also become habituated to urban areas" (Polfus 2011, p. viii).
- "Studying white-tailed and mule deer in the Gallatin Valley, Vogel (1989, p. 410) found that in relation to an increase in density of housing and the associated increase in human activity, 'The most important response was decreased use of the developed area by deer.' Significantly, he also found (ibid.) 'a pronounced effect of houses at low housing densities,' with deer use falling precipitously as housing density increased from one house per 640 acres to one house per 60 acres. Deer use continued to decline at higher

housing densities, but at a lower rate" (Vore 2012, p. 7).

- The greatest threat to mule deer habitat and populations "comes from development on and adjacent to major winter ranges (Mackie and Pac 1980). Because mule deer distribute themselves and exhibit fidelity to specific sites, loss of these regions can have profound implications on mule deer occurrence in different areas and other seasons (Mackie and Pac 1980; McClure et al. 2005)." (Krausman et al. 2008, p. 87)

Elk

- "Elk initially respond to human disturbance with increased vigilance, flight responses and behavioral avoidance, all of which have the potential to increase winter energy expenditure. In northern climates, decreases in energy reserves during winter can lower survival. Therefore, development has potential to lead to severe population level declines in elk . . . large developments, such as ski areas, can alter elk distributions during sensitive periods such as fawning, leading to decreased reproductive success. Without direct negative pressure from humans, elk can and will habituate to human activity. Habituated elk are associated with crop depredation, overgrazing, property damage, injury to humans, disease transmission, and an eventual decline in migratory behavior. Elk also react to pressure from hunting by humans by moving to areas with hunting restrictions such as private lands. As hunter-friendly ranches are increasingly transformed into subdivisions, more land is available as a refuge for elk during the hunting season. This reduces the ability of managers to control elk populations, further escalating problems with habituation." (Polfus 2011, p. viii).
- "A number of studies have shown that elk change their distribution and habitat use more in response to humans than to wolves (Gude et al. 2006b; Proffitt et al. 2009; Proffitt et al. 2010). Cleveland (2010), studying elk use of a winter range in the Wildland/Urban Interface (WUI) near Missoula, found that elk preferred areas at least three-quarters of a mile from houses" (Vore 2012, p. 8).
- Montana FWP wildlife managers have identified several factors that accelerate the problem of elk habituation to human presence. These factors include situations where elk recognize and use areas of human presence as a sanctuary from hunting, and where humans occupy elk winter range (Thompson and Henderson 1998).

Bighorn Sheep

- "Historic declines in bighorn sheep are likely due to expansion of urban development, resource extraction, disease, competition with domestic livestock and habitat fragmentation . . . Mountain sheep are highly vigilant and exhibit a number of overt behavioral reactions in response to human disturbance. Where human development intersects sheep range, roads may act as a barrier to movement, especially when highways bisect migration routes or corridors to important seasonal mineral lick sites . . . Disease and parasite levels have also increased following human disturbance. Evidence of habituation to temporally and spatially predictable human activity has been documented in certain situations. Protection and maintenance of mountain sheep habitat is essential to prevent extirpations similar to those observed in the past century" (Polfus 2011, pp. viii–ix).

- Residential and resort developments have had a major impact on some of the critical seasonal ranges of bighorn sheep, including winter and lambing ranges. Impacts include direct loss of habitat, fragmentation of habitats, and displacement of bighorns to less productive habitats. In addition, the potential for disease transmission becomes a management challenge when "hobby" farmers introduce domestic sheep in or adjacent to the wild sheep habitat (FWP Bighorn 2010).
- "When development occurs adjacent to and in mountain sheep habitat, sheep often decline and ultimately can become extinct" (Krausman et al. 2008, p. 109).

Antelope (also called Pronghorn)

- ". . . (R)esearch on the impacts of human disturbance on pronghorn indicates that pronghorn increase vigilance, flight responses and behavioral avoidance near human activity. Pronghorn need large contiguous areas with relatively few physical barriers to complete seasonal migrations. Energy development, transportation infrastructure, fencing and rural residential development are all threats to pronghorn migration. Mitigating the effects of residential development in critical migration bottlenecks should receive priority conservation. Pronghorn can habituate to certain levels of disturbance, especially when not hunted or harassed. During severe winters pronghorn may select agricultural lands which can reduce or eliminate migratory behavior . . . In general, pronghorn persistence is dependent on large-scale, multi-jurisdictional initiatives to protect critical migration corridors and winter ranges" (Polfus 2011, p. viii).

Recommended Approach to Subdivision Design

In designing the proposed subdivision, the subdivider is encouraged to follow the four steps outlined below. Local FWP wildlife biologists are encouraged, when contacted by the subdivider or the subdivider's representative, to make time for the consultation described in subsections b. and c. below.

a. Consult FWP's Crucial Areas Planning System (CAPS) and/or other publicly available sources of wildlife habitat information, for a preliminary indication of whether the property proposed for subdivision may be located in or adjacent to big game winter range.

b. Consult with the local FWP wildlife biologist, or other professionally trained biologist, to verify the preliminary assessment. If consulted, the FWP biologist should provide the subdivider with a written determination of whether or not the property proposed for subdivision is located in or adjacent to big game winter range.

c. If the biologist determines that the property proposed for subdivision is located wholly or partially within big game winter range, consult further with the biologist for site-specific information and recommendations on minimizing the impacts of the subdivision on big game species and big game winter range. FWP recommendations may include suggestions for avoiding or strictly limiting the placement of subdivision design features in winter range. Or, based upon site-specific conditions and the extent of existing development located adjacent to or near the proposed subdivision, FWP may recommend that strict restrictions on the location of subdivision design features are not necessary. In offering recommendations, the FWP biologist should take into account the wildlife and habitat data compiled by the subdivider, any field reviews completed by other professionally trained biologists, FWP's own wildlife and habitat data, and any other applicable biological information.

d. Incorporate the biologist's recommendations into the design of the proposed subdivision.

Recommended Standards

Whether or not the subdivision design approach recommended above is completed, the following standards pertain to any subdivision development proposed on property that contains or lies adjacent to big game winter range:

a. Cluster the subdivision design features on as small a footprint as possible, as far from winter range as possible, and as close to existing development as possible (e.g., other houses, roads, residential utilities) (see Figure C.2-8).

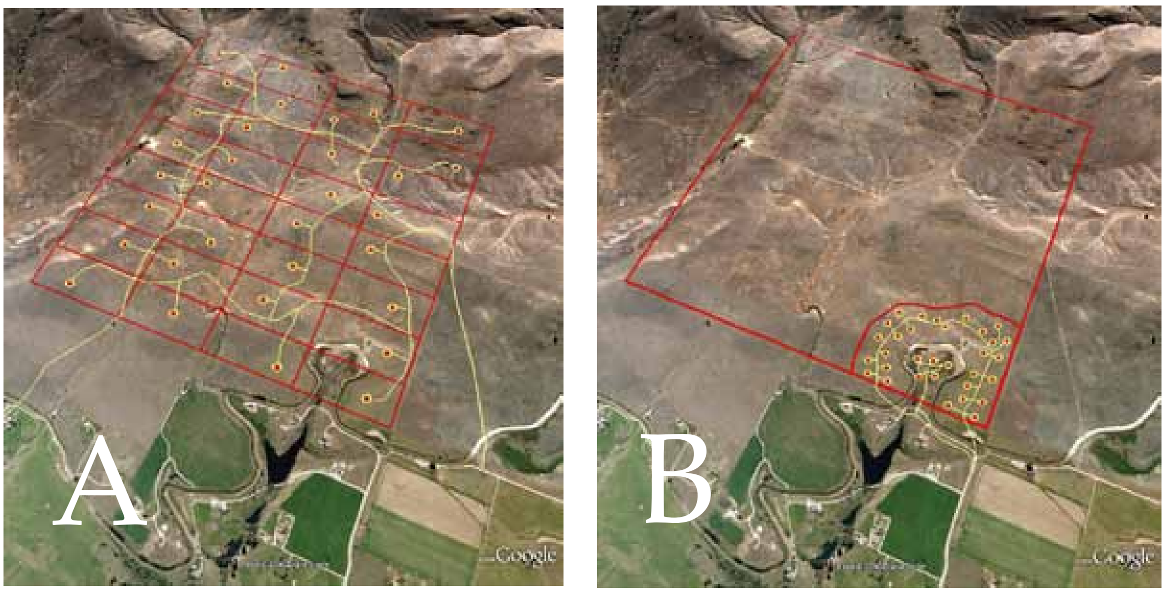

Figure C.2-8. *Examples of dispersed and clustered development on winter range.*

Example 'A' depicts development of thirty-two 20-acre lots spread across 640 acres of winter range. Example 'B' illustrates a "clustered" design of the same thirty-two houses on 2-acre lots on 10 percent of the property, or 64 acres, situated in a corner near existing development. Clustering homes as shown in example B obviously impacts winter range much less than the dispersed development found in example A.

b. Locate areas of proposed open space immediately adjacent to existing winter range or open space on adjacent lands, in order to maintain the functional connection with other open space and winter range on public and private lands.

c. Provide or maintain linkage within a winter range patch, between isolated patches of winter range, or between summer range (or other seasonal habitat) and winter range. Recommended linkage widths are a minimum of one (1) mile for elk and one-half (½) mile for other species. For white-tailed deer, mule deer, and moose, linkage should be along riparian corridors where present.

The local FWP wildlife biologist may recommend the number of linkages needed to maintain wildlife movement, and whether or not site-specific circumstances justify a reduced linkage width (e.g., topography and/or natural vegetation may limit line of sight distances and sufficiently alleviate noise between linkage habitat and development activity to allow undisturbed movement of wildlife).

Substantial Evidence for Big Game Winter Range Recommendations

In order to more easily describe the rationale and scientific evidence for the big game winter range recommended standards, the standards have been divided into three provisions. Each provision is stated below, followed by the substantial evidence supporting that provision, including pertinent scientific studies and professional opinions.

Provision 1. Recommended Approach to Subdivision Design. In designing the proposed subdivision, the subdivider is encouraged to follow the four steps outlined below:

a. Consult FWP's Crucial Areas Planning System (CAPS) and/or other publicly available sources of wildlife habitat information, for a preliminary indication of whether the property proposed for subdivision may be located in or adjacent to winter range.

b. Consult with the local FWP wildlife biologist, or other professionally trained biologist, to verify the preliminary assessment.

c. If the biologist determines that the property proposed for subdivision is located wholly or partially within big game winter range, consult further with the biologist for site-specific information and recommendations on minimizing the impacts of the subdivision on big game species and big game winter range. FWP recommendations may include suggestions for avoiding or strictly limiting the placement of subdivision design features in winter range. Or, based upon site-specific conditions and the extent of existing development located adjacent to or near the proposed subdivision, FWP may recommend that strict restrictions on the location of subdivision design features are not necessary. In offering recommendations, the FWP biologist should take into account the wildlife and habitat data compiled by the subdivider, any field reviews completed by other professionally trained biologists, FWP's own wildlife and habitat data, and any other applicable biological information.

d. Incorporate the biologist's recommendations into the design of the proposed subdivision.

Substantial Evidence for Provision 1

- CAPS is an easy-to-use informational and early planning tool that subdividers can use to identify important habitats in a given area. CAPS helps developers begin early to consider the potential effects of a proposed subdivision on wildlife and wildlife habitat. This system is free and available to any person with Internet access. CAPS will provide useful, initial information about whether a property proposed for subdivision might be located in big game winter range. CAPS can also give developers a general idea about the impacts a subdivision might have on identified habitats and species. Additional data sources of value during the early stage of subdivision site planning and design include FWP's individual GIS data layers, the *Montana Animal Field Guide,* and the *Ecological Systems Field Guide* (see Appendix A) (Online FWP CAPS 2012).

- However, "CAPS is not a substitute for a site-specific evaluation of fish, wildlife, and recreational resources. There is still no substitute for consulting with local FWP biologists to gain a better understanding of conditions and management challenges in a particular area of the state—but CAPS will help you start smart." An FWP biologist with knowledge of a property is the best authority for determining whether a property proposed for subdivision is located in big game winter range. FWP and other professionally trained biologists may also be familiar with whether or not a given property functions as habitat that supports one or more native grassland or native shrub species, especially Species of Concern (Online FWP CAPS 2012).

- "Early discussions with MFWP are important when developing in or near big game winter range. Before laying out any lot boundaries and designing other features for a subdivision proposed in big game winter range, the developer or landowner should consult with a local MFWP wildlife biologist to discuss the type, topography, vegetation, and other features of the particular winter range and a subdivision design that could minimize impacts" (Vore 2012, p. 11).

- "The direct and indirect effects of exurban development on ungulate winter range vary by region, ungulate and predator species, specific habitat type, and development structures" (Polfus 2011, p. 2). Such variations have pointed FWP wildlife managers toward taking a more site-specific approach to evaluating the opportunity to avoid or mitigate the impacts of a particular residential development proposal.

- "The effect of subdivision on big game winter range needs to be evaluated at the local level, not at the hunting district or larger level . . . Too often, the effects of a subdivision on big game are evaluated at too broad a scale to be relevant to the local herds" (Vore 2011, p. 11).

- "At the smaller site scale, [land use] guidelines suggest buffering development, reducing exotic species, reducing fencing and other barriers to movement, reducing noise and light disturbance, controlling domestic pets, maintaining connected patches of undeveloped land and *assessing site level habitat conditions* [italics emphasis added]" (Polfus 2011, p. ix).

Provision 2. Cluster the subdivision design features on as small a footprint as possible, as far from winter range as possible, and as close to existing development as possible (e.g., houses, roads, residential utilities). Also, locate areas of proposed open space immediately adjacent to existing winter range or open space on adjacent lands, in order to maintain the functional connection with other open space and winter range on public and private lands.

Substantial Evidence for Provision 2

- ". . . Clustered developments decrease fragmentation and perforation of habitats due to roads and houses, leaving the remainder of the landscape in a condition more suitable for wildlife sensitive to elevated human densities . . . The case for clustering is made by numerous researchers (Arendt 1997; Theobald et al. 1997; Maestas et al. 2001; Odell and Knight 2001; Glennon 2002; Hansen et al. 2002; Odell et al. 2003; Glennon and Porter 2005)." (Glennon and Kretser 2005, pp. 29–30)

- "Exurban lands are traditionally developed by subdividing them into a grid of parcels ranging from 5 to 40 acres. From an ecological perspective, this dispersed type of development effectively maximizes the individual influence of each home on the land (Lenth et al. 2006) . . . [A] single house situated in the wrong place can have a greater impact than several houses clustered together so that houses are within the 'zone of influence' of each other and the entire cluster is placed thoughtfully on the landscape . . . If development is planned on or near big game winter range, the best option for wildlife is to build the houses and roads on a small portion of the landscape near and adjacent to existing development and leave as much land as possible undisturbed, unfragmented, and protected" (Vore 2012, p. 12).

- "*All* winter range is important to the long-term survival of big game populations . . .[W]e have already lost a significant amount of the functional winter range that was present when Europeans first arrived" (Vore 2012, pp. 4–5).

- ". . . In areas with significant resources, where low densities are appropriate, the development impact of, for example, five homes on 200 acres should be minimized by establishing maximum lot sizes of one to two acres, leaving the remaining 190–195 acres intact" (Glennon and Kretzer 2005, p. 30).

- In their study of the cumulative effects of seven different hypothetical subdivision designs on wildlife habitat, Theobald et al. (1997) found that "[T]he overall subdivision pattern is often a stronger indicator of total disturbance zone area than density . . . [A] clustered subdivision design (25% developed area), even with a density four times higher than the dispersed design, results in a substantially lower total disturbance zone area than a dispersed regular patterned subdivision" (Glennon and Kretser 2005, p. 27).

- McIntyre and Hobbs (1999) describe wildlife habitat, including big game winter range, as a continuum of landscape alteration, with "intact" habitat characterized as "more than 90 percent of original habitat remaining, high connectivity, and low modification of remaining habitat" (Vore 2012, p. 13).

- "By clustering homes in a small area, conservation development reduces the overall footprint by minimizing the influence of each house on the ecosystem. Thus, large-scale impacts on open spaces and agricultural lands can be mitigated. However, there is growing concern that these strategies may neglect important high quality wildlife habitat. New research indicates that the configuration of development (i.e., where clustered development occurs on the landscape) is at least as important, if not more important, than simply conserving open space.

  Land use guidelines can help facilitate the development of policies and regulations needed to guide decisions on how to design developments and regulate their influence on wildlife . . . At the smaller site scale, guidelines suggest buffering development, reducing exotic species, reducing fencing and other barriers to movement, reducing noise and light disturbance, controlling domestic pets, maintaining connected patches of undeveloped land and assessing site level habitat conditions . . . To protect winter range, development should be clustered in areas near existing development to leave as much high quality winter range undeveloped as possible" (Polfus 2011, p. ix).

- "A study on the effects of housing on mule deer and white-tailed deer in the Gallatin Valley of Montana showed a sharp decline in the mule deer population at low housing densities and little further impact on the population as the houses became more dense (Vogel (1989) . . . Vogel recommended increasing the density of housing in already developed areas, as opposed to low-density development in new areas" (Glennon and Kretzer 2005, p. 25).

- "Developers may describe the designation of 'open space' within a proposed subdivision as suitable wildlife habitat. However, often these are areas between houses or are developed for recreational uses such as golf courses, trail systems, and other activities. Because of their small size and location, such open spaces are seldom functional winter range . . . Big game winter range is particularly vulnerable to the impacts of exurban development because big game animals need large, contiguous blocks of unfragmented habitat" (Vore 2012, p. 7).

- "If given a choice, big game will avoid houses (Vogel 1989; Storm et al. 2007; Cleveland 2010). Consequently, where development is placed on winter range makes a significant difference (Duerkson et al. 1996). Subdivisions placed in unfragmented blocks of winter range and not adjacent to other development and infrastructure have a much greater negative impact on wildlife than do new houses situated next to existing development" (Vore 2012, pp. 8–9).

- "Subdivisions can affect the way that wintering big game uses habitat a mile or more away (McIntyre and Hobbs 1999; Sime 1999) . . . Houses, roads, people, dogs, and other human activity often limit or preclude big game use of winter range" (Vore 2012, p. 8).

- Pets are often associated with subdivisions. Loose dogs have been known to "chase, harass, injure, and kill big game, and can range up to three to five miles from the nearest house (Sime 1999; Sime and Schmidt 1999)." (Vore 2012, p. 8)

Provision 3. Provide or maintain linkage within a winter range patch, between isolated patches of winter range, or between summer range (or other seasonal habitat) and winter range. Recommended linkage widths are a minimum of one (1) mile for elk and one-half (½) mile for other species. For white-tailed deer, mule deer, and moose, linkage should be along riparian corridors where present.

Substantial Evidence for Provision 3

- ". . . Many species that require large areas to maintain functional populations will need to move among remaining habitat patches to survive, whether many small patches or several large patches remain. The location of patches relative to one another and the connectivity among patches will play a critical role in their survival. Isolation of habitat fragments from one another can ultimately lead to population declines" (Hilty et al. 2006, p. 38).

- "Many ungulate species move back and forth each year from montane summer habitat to valley winter habitat, sometimes passing through naturally constricted areas. Blockage of such passageways could eliminate a population from a region" (Hilty et al. 2006, p. 170).

- "A good deal of research supports the importance of continuous corridors as opposed to corridors that are bisected by roads or other activities . . ." (Hilty et al. 2006, p. 182).

- ". . . The preponderance of data indicates that wider corridors are generally more effective for maintaining connectivity" (Hilty et al., 2006, p. 189).

- "Corridors . . . are intended to permit the direct spread of many or most taxa from one region to another . . . They should facilitate foraging movements, seasonal migrations, dispersal and recolonization, and escape from disturbance... In general, the wider the corridor, the better" (ELI 2003, p. 23).

- "Developers may describe the designation of 'open space' within a proposed subdivision as suitable wildlife habitat. However, often these are areas between houses or are developed for recreational uses such as golf courses, trail systems, and other activities. Because of their small size and location, such open spaces are seldom functional winter range . . . Big game winter range is particularly vulnerable to the impacts of exurban development because big game animals need large, contiguous blocks of unfragmented habitat" (Vore 2012, p. 7).

- Human disturbance within one-half (½) mile (800 meters) of bighorn sheep habitat, especially during the winter and through mid-June, contributes to displacement and population decline. A key habitat requirement is freedom from human disturbance; a buffer of one-half (½) mile to one mile between habitat and human disturbance factors is recommended (WA DOW 1991).

- A recent study of elk response to human activities *(North Hills, Missoula Valley)*, found that elk selected areas approximately one (1) mile (1,600 meters) from houses and moved quickly through areas approximately one-half (½) mile (800 meters) from houses. A "conservative minimum" of an 0.93-mile buffer (1,500 meters) was recommended between subdivisions to ensure movement corridors remain functional (Cleveland 2010).

- The following linkage width was recommended as a "best management practice" when incorporating a trail system, with people and their pets on leashes, into an area of wildlife linkage: "Each strand of the linkage design must be broad (typically 1–2 km [0.62 to 1.2 miles wide] for most of its length) to allow a designated trail system without compromising the usefulness of the linkage for wildlife" (Beier et al. 2008).

- ". . . Conserving and enhancing connectivity usually requires more than a single, minimum-size corridor" (Hilty et al. 2006, p. 196).

- "Riparian areas with dense and structurally diverse vegetation provide thermal and hiding cover for ungulates. Thermal cover is provided with a canopy of > 12 m (39 ft) in height and at least 70 percent tree canopy coverage. This cover is important year-round, especially during winter when riparian areas may be the only habitat where snow does not render the habitat unsuitable for ungulates such as deer, elk, and moose. These mammals also use riparian areas for fawning and calving. Deer and elk populations that migrate between summer and winter ranges commonly utilize riparian areas for these movements" (Knutson and Naef 1997, p. 38).

- The online *Montana Field Guide* (2012) identifies riparian areas as among the habitats important to white-tailed deer, mule deer, and moose:
    - White-tailed deer habitat. "River and creek bottoms; dense vegetation at higher elevations; sometimes open bitterbush hillsides in winter. In western MT, mature subclimax coniferous forest, cool sites, diversity, and moist sites important in summer (Leach 1982). In winter prefer dense canopy classes, moist habitat types, uncut areas, and low snow depths (Berner 1985)."
    - Mule deer habitat. "Grasslands interspersed with brushy coulees or breaks; riparian habitat along prairie rivers; open to dense montane and subalpine coniferous forests, aspen groves. Varies between areas and seasons. In prairie, uses breaks, badlands, and brushy draws. In mountain foothills, Mule Deer are widely distributed in summer in forest and subalpine. In winter use lower elevation open shrub-dominated slopes" (Pac 1976, Mackie et al. 1982).
    - Moose habitat. "Variable. In summer, mountain meadows, river valleys, swampy areas, clearcuts. In winter, willow flats or mature coniferous forests. Best ability of any Montana ungulate to negotiate deep snow. Coniferous cover, uneven plant age composition and willows important components. Some Moose may be yearlong willow flat residents (Stone 1971). Closed canopy stands may be important in late winter (Mattson 1985)."

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Appendix C.3. Public Hunting

As Montana's population grows, new or expanding subdivisions impact the hunting of wildlife and, consequently, wildlife and wildlife habitat. When a new subdivision is developed in an area where hunting has traditionally occurred, conflicts can arise. This section contains information about the recommended subdivision design standards pertaining to public hunting.

Description

Hunting is an important tradition in Montana, as well as an important management tool for certain wildlife populations (especially game animals). Hunting seasons are currently conducted in the state for most game animals (deer, elk, moose, antelope, mountain sheep, mountain goat, mountain lion, bear, and wild buffalo), migratory game birds (waterfowl, including wild ducks, geese, and swans; cranes; coots; common snipe; and mourning doves), and upland game birds (grouse, pheasant, gray partridge, wild turkey, and chukar). Montana Fish, Wildlife & Parks (FWP) manages all wildlife in the state, including the hunting of wildlife. More information on current hunting regulations and seasons can be found at: http://fwp.mt.gov/hunting/.

Location

Hunting takes place throughout Montana on public and private land, in uplands as well as along rivers and streams. Hunters need to have permission to hunt on private land. They do *not* need permission to hunt on most public land, including U.S. Forest Service, Bureau of Land Management, and state school trust lands. Migratory bird hunters also do not need permission to hunt on land below the high-water mark on rivers and streams.

Objectives of Recommended Design Standards

- Maintain FWP's ability to manage wildlife effectively.
- Maintain public hunting, including hunting with rifles, as an important tool for wildlife management.
- Maintain healthy wildlife populations.
- Minimize safety concerns of future lot owners.
- Avoid conflicts between different land uses (e.g., game damage on adjacent agricultural lands due to wildlife displacement or habituation; problematic concentrations of big game animals in the proposed subdivision due to landscaping, vegetable gardens, and the creation of a "safe haven" no-hunting zone; annoyances created by hunters and subdivision residents finding themselves in close proximity to one another).

Conflicts between Subdivision Development and Hunting

New subdivisions in an area where hunting has traditionally occurred can negatively impact hunters, wildlife, and wildlife habitat; in turn, hunting in close proximity to new subdivisions can negatively impact the residents. Areas of conflict are outlined below.

Examples of how hunting may impact subdivisions, especially in rural areas:

- Subdivision residents living near a river and its associated sloughs and wetlands may encounter and object to lawful waterfowl hunting and the associated discharge of shotguns from a half hour before sunrise through sunset, during the season, which can run from September into January.
- Subdivision residents living close to public lands (e.g., state wildlife management areas, school trust lands, federal waterfowl production areas, and national wildlife refuges) may experience and object to the sights and sounds of big game, upland game bird, and migratory game bird hunting during the various hunting seasons.
- "Some subdivision residents may oppose hunting in general, and nearly all residents do not want animals dying on or near their property" (Thompson and Henderson 1998). (Vore 2012, p. 10)
- Habituated game animals can cause several types of problems in residential settings, from personal property damage and landscape/garden destruction to expensive animal/vehicle collisions. It is not easy or cheap to keep unwanted game animals away (Vore 2012).

Examples of how subdivisions may impact hunting and, as a result, wildlife and wildlife habitat:

- New subdivisions where hunting is discouraged or prohibited can become safe havens for wild animals. Big game may be drawn to those safe havens, habituate to people, and end up in conflict situations that do not end well for the animals. "Habituation of big game to development is a problem . . . : (1) it 'cheapens' people's perception of big game; (2) big game often come into conflict with people; (3) it can change the ecology and native habitat use of a big game population; (4) it can severely limit wildlife management options; (5) it can impact hunting and other wildlife-related recreational opportunities over a large area, including the big game's entire year-round home range; and (6) such negative interactions with wildlife may undermine people's attitudes toward conservation" (Vore 2012, p. 9).
- Hunting with rifles (and even archery hunting) near residential dwellings can become impossible because of public safety reasons and covenant restrictions (Vore 2012).
- "Hunting becomes a less viable management tool due to increased restricted areas surrounding new exurban development" (Harden et al. 2005; Haggerty and Travis 2006). (Polfus 2011, p. 13)
- Big game winter range becomes less functional, as FWP's ability to use hunting as a wildlife management tool is reduced (Vore 2012).

The following discussion more fully explains how subdivision development can restrict FWP's use of public hunting as an important tool for wildlife management, and how such restriction in turn can impact wildlife and wildlife habitat.

It is not uncommon for the covenants of residential subdivisions in rural or suburban areas to prohibit hunting on the subdivided lands (see Examples of Subdivision Covenants in Montana, under References section below). When hunting is removed as a tool for managing wildlife populations in a given area, game animals can become more numerous and more vulnerable to disease as they habituate to human presence, find safety and security among the houses, and enjoy easy access to food sources such as residential landscaping and/or the hayfields of neighboring agricultural producers (Byron 2009). In some cases, these animals become nuisances, even safety threats, and need to be killed. In 2003, the Montana legislature gave communities the ability to create an urban wildlife management plan, in cooperation with FWP, in order to handle urban wildlife problems. The City of Helena, for example, has adopted and implemented a plan that authorizes local officials to trap and lethally remove a targeted number of mule deer residing within city limits (Lemon 2006). Other communities rely upon archery hunters as the primary tool to manage deer inside city limits.

Game damage occurs when animals like elk, deer, and antelope concentrate on private farms and ranches and damage crops and property. The potential for farmers and ranchers to suffer game damage increases where big game concentrations are facilitated by residential subdivisions next door. In response to this management issue, FWP has had to institute game damage hunts and management seasons in an attempt to address such situations (FWP website 2012).

For perhaps obvious reasons, locating a residential subdivision next door to an area where the hunting of big game, upland game birds, and/or waterfowl occurs can cause conflicts between residents on the one hand, and hunters and FWP wildlife managers on the other. Subdivision residents upset with the occurrence of shooting next door may seek to restrict the hunting activity on FWP wildlife management areas and block management areas, state school trust lands, federal lands, and other adjacent lands and waters. Conversely, the noise of shotgun fire may disturb some subdivision residents, and occasional stray bullets can threaten their safety or damage their homes. Within the boundaries of at least one wildlife management area, FWP has had to restrict the area where public hunting can occur, in response to the complaints of neighboring residents (FWP 2007, 2008, 2010).

When subdivision development locates in winter range and curtails FWP's ability to employ hunting, "the most effective tool for managing big game populations" (Vore 2012, p. 10), the quality of that winter range is diminished. To keep functional winter range working as healthy habitat available at the right time of year to support big game populations, FWP must be able to employ ". . . all options for effective big game management, including hunting with rifles . . ." (Vore 2012, p. 11).

Recommended Standards

The recommended standards offer a suggested approach to subdivision design, and a suggested approach to subdivision review.

Approach to Subdivision Design

The subdivision applicant is encouraged to consult with the local FWP wildlife biologist before or during the pre-application process, on the question of whether or not development of the subject property could affect wildlife management options and public hunting opportunities in the vicinity, and if so, how. If consulted, the FWP biologist has an opportunity to evaluate the potential effect of the proposed subdivision on wildlife management options and public hunting opportunities, based on review of the information compiled by the applicant, site assessments by other professionally trained biologists, FWP's own field knowledge and hunting area maps, and any other applicable information. FWP may recommend steps the subdivider can take to avoid or reasonably minimize negative impacts, such as careful building envelope locations, careful road and trail layouts, other ways of addressing line of sight issues, and the continuation of certain types of public hunting.

Approach to Subdivision Review

FWP recommends that the governing body consider the effects of the proposed development on wildlife management by hunting, as part of its subdivision application review for impacts on "wildlife and wildlife habitat."

Substantial Evidence for Public Hunting Recommendations

This section offers the rationale and substantial evidence supporting the recommended public hunting standards, including pertinent scientific studies and professional opinions.

- ". . . [H]unting is an important tool for wildlife management. Hunting gives resource managers a valuable tool to control populations of some species that might otherwise exceed the carrying capacity of their habitat and threaten the well-being of other wildlife species, and in some instances, that of human health and safety" (USFWS 2010).

- "Wildlife professionals with resource management agencies want the public to understand that, besides being a legitimate and closely regulated activity, hunting and trapping are also important wildlife management tools that help them maintain healthy ecosystems and wildlife populations. Professionally managed hunting and trapping are key tools helping them achieve an acceptable balance between wildlife populations and human tolerance for the problems sometimes caused by wildlife" (IAFWA 2005).

- In a recent article discussing concerns about elk feeding grounds and brucellosis transmission from bison and elk to cattle in the Yellowstone area, Montana's state veterinarian Marty Zaluski noted the health risks that result when large elk herds congregate on private lands where hunting is not allowed: "You put any animals in close concentration, you're going to exacerbate these disease issues" (Brown 2010, p. 1).

- The projectile range of firearms varies from less than one mile to more than five miles (FWP website 2012). Besides the fact that bullets and pellets may travel a significant distance beyond the boundaries of an area where hunting occurs, there are noise and other factors that may be perceived to conflict with residential land use. Two examples of FWP review comments on proposed subdivision applications where the potential for subdivision-hunting conflict exists are provided below:

1. FWP Region 2, Missoula area. ". . . Because the Bitterroot River is very close to this subdivision, there is the potential for possible conflicts between waterfowl hunters and subdivision residents. The discharge of shotguns may create some concern by subdivision residents, and lawful waterfowl hunting can occur from early morning until sunset, and the season can run from September into January" (FWP 2007, p. 1).

2. FWP Region 1, Kalispell area. ". . . The entire WPA (Waterfowl Production Area, located adjacent to this particular proposed subdivision) is open to rifle and shotgun hunting during the legal hunting seasons . . . Placing development or trails within approximately 300 feet of the public land boundary puts these people or homes at risk of being impacted by shotgun fire . . . None of the [proposed] buffers are adequate to completely mitigate use of a rifle for hunting. There is little or no forest or other vegetation or topography that would deter bullets if discharged towards the development. This presents a clear risk to public safety within the proposed development or raises the question of whether the area within a mile of the development can continue to be hunted using rifles . . . If the development is built, hunters' ability to hunt portions of the WPA in a responsible manner will be limited" (FWP 2008, p. 5).

- In nearly all cases, Montana state law prohibits the hunting of game animals or game birds "on, from, or across any public highway or the shoulder, berm, or barrow pit right-of-way of any public highway, defined in 61-1-101, in the state"[3] (MCA 2010). Arizona state law prohibits "the discharge of a firearm while taking wildlife within one-fourth mile of an occupied farmhouse or other residence, cabin, lodge, or building without permission of the owner or resident."[4] Similarly, the Administrative Rules of the Montana Department of Natural Resources and Conservation prohibit the discharge of firearms on state lands within one-quarter mile of an inhabited dwelling or outbuilding without permission of the inhabitant (DNRC 2012).

- In an e-mail conversation during June 2008, FWP wildlife managers considered whether or not they could recommend a "safe" distance between the boundary of land where hunting occurs and the structures or roads of an adjacent subdivision. Their conclusion was that each proposed subdivision should be evaluated on a case-by-case basis, so that the physical lay of the land can be taken into account. Key points from this discussion included:

    1. "There's really no standard distance (within reason) that will be 'safe' in all situations. And to try and spell out all the situations that might occur is impossible" (FWP e-mail 2008).

[3] 87-6-403, MCA. The sole exception is found in 87-2-803(4), MCA, which allows a person who is certified by FWP as disabled to be issued a permit to hunt from a vehicle, along a non-state or non-federal highway.

[4] 17-309.4., ARS.

2. "We have been able to influence some subdivision in R3 [FWP Region 3] with regard to placement of houses or cluster of houses in the subdivision development process on large proposed developments. The two scenarios involved houses or clusters of houses that were to be placed adjacent to publicly accessible State Land or a ranch that is in block management. We argued for moving a cluster and/or house placement that took into account 'line of sight' from the State Land and/or BM area. Our arguments were based on the fact that the subdivider wouldn't be the one dealing with the safety issue in the future. It would be the individual lot owner, us, and the adjacent landowner. We argued (successfully) that now, in subdivision and lot layout, would be the time to minimize management conflicts in the future by being thoughtful in the above. I agree . . . that there is NO set distance . . . it all depends on topography, etc. (if topography even exists), which is a subdivision by subdivision effort where appropriate" (FWP e-mail 2008).

- "We had to close a portion of a popular wma [Kuhns Wildlife Management Area in FWP Region 1] due to homes popping up on the boundary" (FWP e-mail 2010).

- FWP conducts game damage hunts and management seasons in order to prevent or alleviate the negative impacts of game damage on landowners, primarily agricultural producers. Whereas game damage hunts are a response to game damage, "A management season is a proactive measure to prevent or reduce potential damage caused by large concentrations of game animals resulting from seasonal migrations, extreme weather conditions, *restrictive public hunting access on adjacent or nearby properties* [italics emphasis added], or other factors" (FWP website 2012).

- The Wyoming Fish and Game Department recognizes that "increasing human populations with their expanding housing subdivisions and new agricultural lands have dramatically reduced big game habitat, forcing some of these animals to feed on agricultural crops for survival. Resulting big game depredation to lands and property can be minimal or substantial . . . Hunting is the most effective method for reducing depredation losses to big game species. Hunting in or near the depredated fields removes those animals causing damage and discourages others from using the area" (WY 1994, pp. 1 and 5).

- Residential growth on the urban fringe has created urban wildlife problems in several Montana communities. The congregation of ungulates in large groups is associated with disease, influx of predators, and human conflicts (Lemon 2006).

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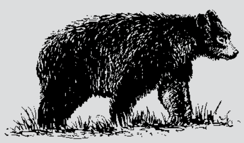

Appendix C.4. Human/Bear Conflicts

This section contains information about the recommended subdivision design standard for addressing human/bear conflicts. The recommendation pertains to both grizzly and black bears.

Habitat Descriptions and Locations

Grizzly and black bear habitat requirements and distribution information are described below.

Grizzly Bear

Grizzly Bear Habitat Requirements

In Montana, grizzly bears primarily use meadows, seeps, riparian zones, mixed shrub fields, closed timber, open timber, sidehill parks, snow chutes, and alpine slab-rock habitats. Habitat use is highly variable between areas, seasons, local populations, and individuals. Grizzlies have a large vegetative component (more than half) to their diet, but also feed on carrion, fish, large and small mammals, insects, fruit, grasses, bark, roots, mushrooms, and (where available) garbage, birdseed, fruit trees, pet and livestock feed, agricultural crops, and many other human-related food sources. They often cache food and guard it. Annual home ranges in the Swan Mountains in Montana averaged almost 200 square miles for males and about 50 square miles for females; adult home ranges were larger than those for subadults (MT Field Guide 2012; Jonkel, FWP 2012).

Grizzly Bear Locations in Montana

Grizzly bear distribution in Montana is primarily within, but not limited to, three recovery zones: the Yellowstone area in northwest Wyoming, eastern Idaho, and southwest Montana; the Northern Continental Divide Ecosystem of north-central Montana; and the Cabinet-Yaak area of northwest Montana and northern Idaho (USFWS 2010) (see Figure C.4-1).

Grizzly bears sometimes travel long distances. They do not actually migrate, although they often exhibit discrete elevational movements from spring to fall, following seasonal food availability. They are generally at lower elevations in spring and higher elevations in midsummer and winter (MT Field Guide 2012).

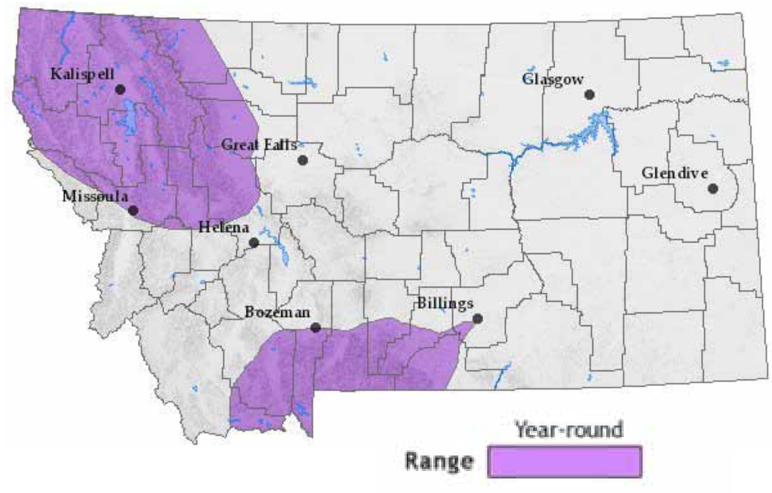

Figure C.4-1. *Map showing the year-round general distribution of* ***Grizzly Bear*** *in Montana. Additional observations have been documented in western, central, and eastern Montana (MT Field Guide 2012).*

Black Bear

Black Bear Habitat Requirements

Although black bears in Montana prefer habitat similar to grizzly bears, they are more prone to occupying closed canopy areas. Black bears inhabit dense forests, riparian areas, open slopes, or avalanche chutes during spring green-up. Habitat use is tied to seasonal food availability and plant life cycles: Bears forage in dry mountain meadows in early spring; snow slides, stream bottoms, and wet meadows in early and midsummer; and berry and whitebark pine areas in fall. These bears are known to eat grasses, sedges, berries, fruits, inner bark of trees, insects, honey, eggs, carrion, rodents, occasional ungulates (especially young), and (where available) garbage, birdseed, fruit trees, pet and livestock feed, agricultural crops, and many other human-related food sources. (MT Field Guide 2012; Jonkel, FWP 2012).

Black Bear Locations in Montana

Black bears are widespread in Montana. They occupy forests and riparian areas in the western third and the southern part of the state (See Figure C.4-2). Black bears are nonmigratory, but they sometimes exhibit long-distance movements.

Figure C.4-2. *Map showing the year-round general distribution of* ***Black Bear*** *in Montana (MT Field Guide 2012).*

Objectives of Recommended Design Standard

- Minimize the potential for dangerous encounters between humans and bears.
- Maintain grizzly bear and black bear populations.

Conservation Status

Grizzly bears are classified as a Tier I species by Montana Fish, Wildlife & Parks (Greatest Conservation Need; MCFWCS 2005); Listed Threatened species by the U.S. Fish and Wildlife Service under the Endangered Species Act; threatened species by the U.S. Forest Service; Montana Species of Concern rank of S2/S3 by the Montana Natural Heritage Program (at risk because of very limited and/or potentially declining population numbers, range, and/or habitat; MT Field Guide 2012); and "sensitive species" by the Bureau of Land Management (MT Field Guide 2012).

Black bears are classified as a Tier III species by Montana Fish, Wildlife & Parks (Lower Conservation Need, MCFWCS 2005); and a Montana Species of Concern rank of S5 by the Montana Natural Heritage Program (not vulnerable in most of its range, MT Field Guide 2012).

Impacts from Development

Development and recreational use of bear habitat cause bear/human conflicts and unnatural bear behaviors such as human food conditioning and habituation. Human-habituated and human food–conditioned bears are more likely to come into conflict with people due to their increased proximity to, and associated lack of wariness around, people. Such bears are regarded as nuisances and/or threats to public safety, and are therefore at greater risk of removal or being killed. They also have an increased vulnerability to hunters, poachers, and motor-vehicle accidents (Bears and People: Bear-Human Conflict 2001).

Bears take advantage of whatever food is available in their home range. They are attracted by sights, sounds, memories, and particular smells—and they can learn to associate residential sites with garbage, fruit trees, or other human-related food sources. If they are rewarded with an easy meal, they learn very quickly to repeat behaviors and will start frequenting residential areas. This is especially true with garbage (Bear Aware 2010; Jonkel, FWP 2012). Merkle (2011) studied human-bear interactions (HBIs) in Missoula, Montana, during 2003–2008 and found that nearly half of total HBIs (453 out of 917) were due to anthropogenic attractants. Garbage was responsible for two-thirds (284) of the attractant-related interactions.

Photo credit: Bear Aware 2010

Wild bears normally have a fear of people. If they are allowed to forage for food near humans, they can quickly become habituated to human presence and become bolder in their actions. Human encounters with both black bears and grizzlies often lead to humans feeling threatened. Although aggression toward people and human injury is rare, incidents may occur during a surprise encounter, the protection of cubs, a defense of a food cache, or when bears have become accustomed to obtaining food associated with humans. Once a bear learns to forage near people, it is usually too late to discourage the bear. And because wildlife enforcement protocol requires that bears that pose a threat to people be destroyed, too often *"a fed bear becomes a dead bear"* (Bear Aware 2010).

Recommended Standard

This standard pertains to any subdivision located in an area of high or potentially high human/bear conflict: Provide adequate bear-resistant facilities for garbage collection. FWP has recommended specifications for such facilities (see p. C-60), and the local FWP bear management specialist is encouraged to work with the subdivider to install an effective facility.

Substantial Evidence for the Human/Bear Conflicts Recommendation

The human/bear conflicts standard is based on a large volume of scientific research calling for garbage storage practices that prevent grizzly and black bears from accessing human food sources. This section offers the rationale and substantial evidence supporting the recommended standard, including pertinent scientific studies and professional biologist opinions.

- Given that development and recreational use in bear habitat have been identified as the causes of bear-human conflict, preventing and/or reducing conflict necessarily means managing human activity and behavior (Bears and People: Bear-Human Conflict 2001).

- Montana state law prohibits people from purposefully using food and garbage to attract bears and other animals. The law recognizes that supplemental feed attractants can result in an artificial concentration of bears and other animals that "... may potentially contribute to the transmission of disease or that constitutes a threat to public safety" (87-6-216(c), MCA).

- The 2010–2014 Strategic Plan of the Interagency Grizzly Bear Committee (IGBC) identifies a set of grizzly bear recovery goals, which state that (1) the public understands the need to properly store bear attractants; and (2) all landowners carry out consistent, effective food and garbage storage practices. The IGBC has developed recommendations for bear-resistant solid waste containers and site fencing, in order to help prevent bear-human conflict over food.

- The solution to preventing bear-human conflict is to keep garbage and other human-provided food sources away from bears. Humans can live near bears without conflict, if the humans are required to secure food and garbage, and if this requirement is enforced. "From our long-term dataset with collared bears in the Lake Tahoe Basin, we documented on multiple occasions that once entire homeowner associations and neighborhoods installed bear-resistant garbage containers, bears ended up leaving those areas for regions that were not 'bear-proofed' . . . The provision of bear-resistant containers at private residences, businesses, and public lands was the single most effective management tool for reducing conflicts between bears and people in our study site. We have had similar observations in the Adirondacks, Yosemite, and New Mexico" (Beckmann et al. 2008).

- During 2008, within the Greater Yellowstone Ecosystem, 80 percent of all grizzly bear conflicts on private land were associated with garbage, grain, birdseed, and property damage. Property damage conflicts are most often associated with anthropogenic (unnatural) foods and bears having previously received unsecured food rewards. Keeping unnatural foods properly secured is crucial to minimizing bear/human conflicts (Gunther et al. 2008).

- In its subdivision review comments, FWP routinely suggests "Living With Wildlife" covenants encouraging landowners in bear country to contain or remove all attractants such as stored grain, pet food, birdseed, livestock feed, and garbage (FWP 2008). FWP recommends the use of bear-resistant garbage containers that are kept indoors or in some other secured area, including behind electric fencing. Frequently, such recommendations are incorporated into homeowner association covenants that are recorded along with a subdivision final plat. However, it is a well-known fact in the land use planning community that covenants are inconsistently implemented and enforced. FWP biologists regularly observe poor residential garbage management practices, and as a result, every year they must relocate or remove food-conditioned bears (Jonkel, FWP 2009–2010).

- "Successful management of human-bear interactions involves a combination of strategies. The best solution by far is to reduce or eliminate the availability of anthropogenic food sources" (Beckmann et al. 2004; Spencer et al. 2007). ". . . Education alone isn't enough. Regulations that require the use of bear-resistant containers must be in place to significantly reduce food-raiding incidents" (Beckmann 2009).

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Specifications for Adequate Bear-Resistant Garbage Collection Facilities in Subdivisions[5]

Options include:

1. Garbage is stored inside a centralized bear-resistant enclosure.
   Examples of bear-resistant enclosures include: (A) a structure that has a roof and sides that a bear cannot get into; or (B) a garbage collection site with perimeter electric fencing.

Figure C.4-3. Illustrations of (A)-type Bear-Resistant Enclosures

Figure C.4-4. Illustrations of (B)-type Bear-Resistant Enclosures

[5] Specifications outlined by FWP bear management specialists and assembled by FWP land use planning specialist, 2012.

Examples of adequate electric fencing include:[6]

- Six-foot-high chain link fencing with three lines of barbed wire at the top (making it closer to seven to eight feet high), and flush (or buried) in the ground with one or two hotwires on the outside (chain link is the ground); or,
- A single electric fence with a minimum of five electrical lines (three hot, two ground—alternating hot/ground), appropriately spaced to prevent animals from going under or climbing over them.
- The fence charger with at least a full joule of output with solar-powered charger or direct current charger.
- Electricity to be on during nighttime hours with gates closed.
- Gatekeeper to open/close access gates and to turn on/off electricity.

2. Garbage is stored inside bear-resistant containers at a centralized location. Each container must be fully enclosed, with a lid approved by the Interagency Grizzly Bear Committee (IGBC)[7] or approved by FWP. The lid of each container must have a latching mechanism or other device of sufficient design and strength to prevent access of the contents by bears.

3. Optimal arrangement: Garbage is stored inside bear-resistant containers at a centralized location, either (a) with adequate perimeter electric fencing or (b) inside a bear-resistant structure.

4. Other waste management options may be considered in consultation with the local FWP bear management specialist.

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[6] For further information, see "Bears and Electric Fencing: A starter's guide for using electric fencing to deter bears," written by Kim Annis, FWP Bear Management Specialist. Accessed January 9, 2012, at: **http://fwp.mt.gov/fwpDoc.html?id=48893**.

[7] Contact the Living with Wildlife Foundation (LWWF) for a listing of IGBC-tested products. Accessed January 9, 2012, at: **http://www.lwwf.org/bear resistant product test results.htm**. Additional information is available at: **http://www.lwwf.org/Living%20with%20Predators_resource_guides.htm**.

Appendix C.5. Native Grasslands and Native Shrub Habitats

Native grasslands and native shrub habitats are important to protect from new development because many of the wildlife species associated with these habitats occupy large territorial ranges, are vulnerable to human disturbances, and disappear from the landscape if habitat patches become too small or fragmented. In fact, approximately 21 percent of the mammals, birds, reptiles, and amphibians associated with these two habitat types are considered Species of Concern in the State of Montana (MT Field Guide 2012). In addition, these habitats are difficult—if not impossible—to restore once native vegetation has been removed.

Habitat Descriptions and Locations

Because of the distinctions between native grasslands and native shrub habitats, they are described separately in this section:

Native Grasslands

Native grasslands include native prairie grasslands in eastern Montana and intermountain/foothill grasslands in western Montana.

Prairie Grasslands

Prairie grasslands are the native grasslands found in the eastern two-thirds of Montana. This habitat is also referred to as mixed-grass prairie (MT Field Guide 2012) and/or plains grasslands (Montana's Comprehensive Fish and Wildlife Conservation Strategy (MCFWCS) 2005).

Prairie Grasslands Description

Prairie grasslands in eastern Montana are part of America's Great Plains region. This habitat type is generally found on high, rolling land, on some scattered hills, and in wide river valleys. Prairie grasslands are dominated by native bunchgrass and rhizomatous (having a horizontal stem that produces roots and shoots) grass species. This habitat experiences short, hot summers and long, cold winters. Precipitation ranges from 10 to 16 inches, with most of the precipitation occurring

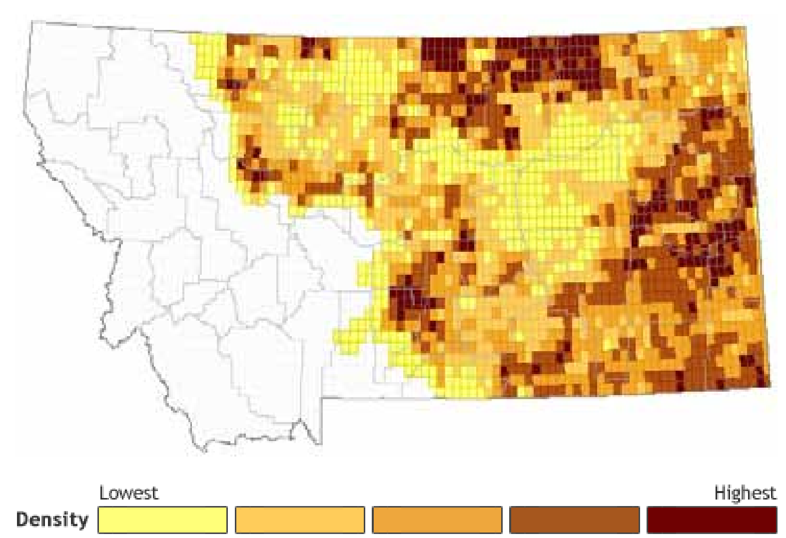

Figure C.5-1. *Map showing the general location of prairie grasslands identified in Montana (MT Field Guide 2012).*

during the late spring and early summer months. The growing season averages 115 days, ranging from 100 days on the Canadian border to 130 days on the Wyoming border. Wildlife associated with this habitat include approximately 69 species of mammals (18 are Species of Concern, which is 26 percent of the mammals associated with this habitat type); 121 species of birds (20 are Species of Concern, or 17 percent of the birds associated with this habitat type); and 16 species of reptiles and amphibians (7 are Species of Concern, or 44 percent of the reptiles and amphibians associated with this habitat type) (MT Field Guide 2012; MCFWCS 2005).

Prairie Grasslands Location in Montana

Native prairie grasslands occur on the plains of eastern Montana, where wetlands, sand prairie, lakes, and potholes are absent (see Figure C.5-1).

Intermountain/Foothill Grasslands

Intermountain/foothill grasslands are predominantly found in the western third of Montana. These grasslands are also referred to as Rocky Mountain Lower Montane, Foothill, and Valley Grasslands (MT Field Guide 2012).

Intermountain/Foothill Grasslands Description

Most of this native grassland type can be characterized by different combinations of six or seven major grass species (dominated by bunchgrasses and fescues), accompanied by a number of subordinate grass and forb species. Less than 10 percent of the habitat is covered by shrubs. Plant community composition is influenced primarily by total annual precipitation, yearly precipitation distribution, and soil characteristics. The climate of intermountain/foothills grasslands varies considerably throughout the state. It is semiarid, with precipitation averaging from 11.5 to 16.5 inches per year. Grassland vegetation is of moderate height in average precipitation years. Wildlife associated with this habitat include approximately 73 species of mammals (15 are Species of Concern, which is 21 percent of the mammals associated with this habitat type); 124 species of birds (17 are Species of Concern, or 14 percent of the birds associated with this habitat type); and 19 species of reptiles and amphibians (7 are Species of Concern, or 37 percent of the reptiles and amphibians associated with this habitat type) (MT Field Guide 2012; MCFWCS 2005; Casey 2000).

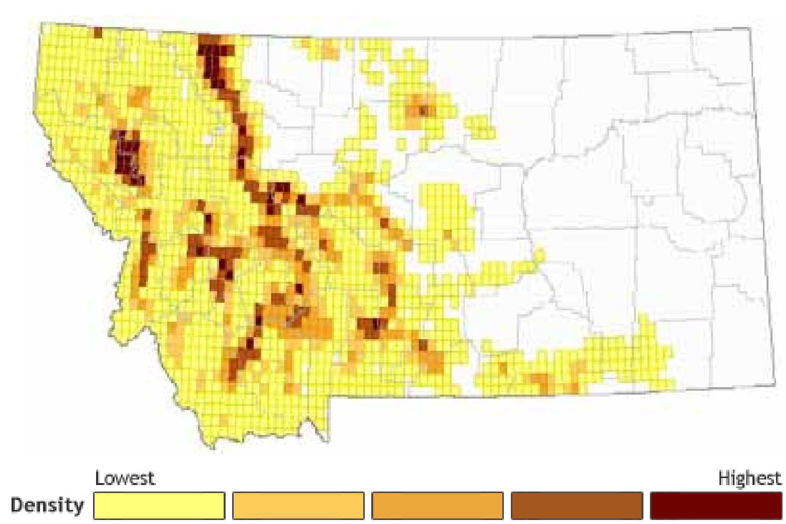

Figure C.5-2. *Map showing the general location of intermountain/ foothill grasslands identified in Montana (MT Field Guide 2012).*

Intermountain/Foothill Grasslands Location in Montana

In western Montana, intermountain/foothill grasslands are found in the Flathead, Mission, Missoula, and Bitterroot valleys. This habitat is also found in the North Fork of the Flathead River in Glacier National Park and the Tobacco Plains north of Eureka in northwestern Montana. East of the Continental Divide, this system in found at lower elevations along the eastern edge of Glacier National Park, on the Blackfeet Indian Reservation, and south along the Rocky Mountain Front to west-central Montana. Pockets of this habitat are also found in eastern Montana island mountain ranges. These grasslands are generally found at elevations between 1,800 and 5,400 feet (MT Field Guide 2012) (see Figure C.5-2).

Native Shrub Habitats

Native shrub habitats include sagebrush shrub-steppe in eastern Montana and sagebrush shrublands located in southwestern Montana.

Sagebrush Shrub-steppe

Sagebrush shrub-steppe is the name given to the native sagebrush and grass associations found in eastern Montana. It is also referred to as shrub grassland and/or mixed shrub/grass associations (MCFWCS 2005). Additionally, this habitat type can be divided into types of shrub-steppe, including big sagebrush steppe and montane sagebrush steppe (MT Field Guide 2012).

Sagebrush Shrub-steppe Description

Sagebrush shrub-steppe is composed of sagebrush (5 to 20 percent shrub cover) interspersed with native grasses. The predominant sage species throughout sagebrush habitats in the state is basin big sage, although Wyoming big sage, mountain big sage, and black sage, or rubber rabbitbrush, can be co-dominant (MT Field Guide 2012; MCFWCS 2005; Casey 2000). Wildlife associated with this habitat include approximately 73 species of mammals (21 are Species of Concern, which is 29 percent of the mammals associated with this habitat type); 113 species of birds (12 are Species of Concern, or 11 percent of the birds associated with this habitat type); and 19 species of reptiles and amphibians (7 are Species of Concern, or 37 percent of the reptiles and amphibians associated with this habitat type) (MT Field Guide 2012; MCFWCS 2005; Casey 2000).

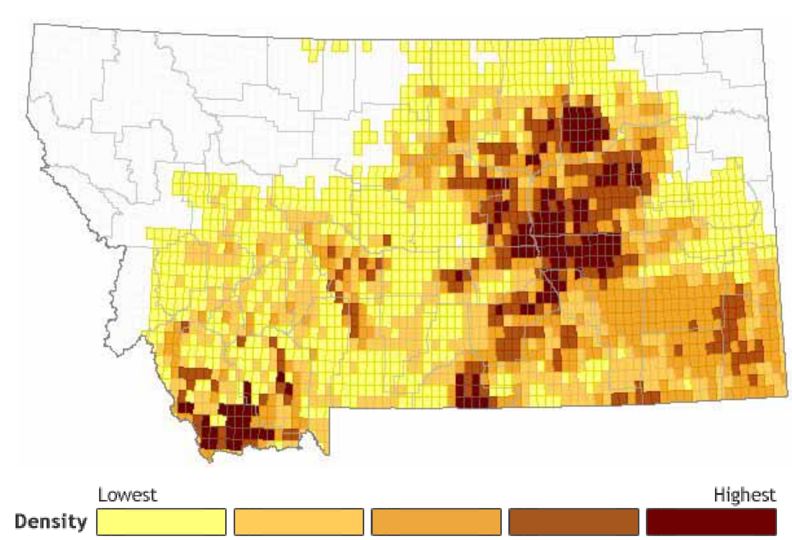

Figure C.5-3. Map showing the general location of sagebrush shrub-steppe identified in Montana (MT Field Guide 2012).

Sagebrush Shrub-steppe Location in Montana

In Montana, sagebrush shrub-steppe occurs throughout the central and southeastern part of the state. It is also found within the island mountain ranges of the north-central and south-central portions of the state. It dominates the landscape of southwestern Montana, from valley bottoms to subalpine ridges, and is found as far north as Glacier National Park (MT Field Guide 2012) (see Figure C.5-3).

Sagebrush Shrublands

Sagebrush shrubland is the name given to sagebrush-dominated habitat. It is also referred to as sagebrush (MCFWCS 2005). Additionally, sagebrush shrubland can be divided into different types, including big sagebrush shrubland and low sagebrush shrubland (MT Field Guide 2012).

Sagebrush Shrublands Description

Sagebrush shrublands are composed of relatively pure sagebrush (20 to 80 percent sagebrush cover). The predominant sage species throughout sagebrush habitats in the state is basin big sage, although Wyoming big sage, mountain big sage, and black sage, or rubber rabbitbrush, can be co-dominant. It occurs on sites that are gently to moderately sloping, especially on dry, windswept hills and ridges. Elevation ranges from 3,750 feet in the Pryor Mountains and 4,000 feet in the Canyon Ferry area, up to 7,200 feet in southwestern Montana (MT Field Guide 2012; MCFWCS 2005; Casey 2000). Wildlife associated with this habitat include approximately 55 species of mammals (11 are Species of Concern, which is 20 percent of the mammals associated with this habitat type); 44 species of birds (8 are Species of Concern, or 18 percent of the birds associated with this habitat type); and 13 species of reptiles and amphibians (5 are Species of Concern, or 38 percent of the reptiles and amphibians associated with this habitat type) (MT Field Guide 2012; MCFWCS 2005; Casey 2000).

Sagebrush Shrubland Location in Montana

Most sagebrush shrubland in the state occurs in southwest and central Montana. At the northern end of its range, it occurs on the north flank of the Elkhorn Mountains near Helena. It is well represented in the Tobacco Root and Ruby Mountains, and occurs in other scattered locations in southwestern Montana. It is also found on the eastern side of the Beartooth range on outwash fans and lower slopes, and the southerly-facing side of the Pryor Mountains (MT Field Guide 2012) (see Figure C.5-4).

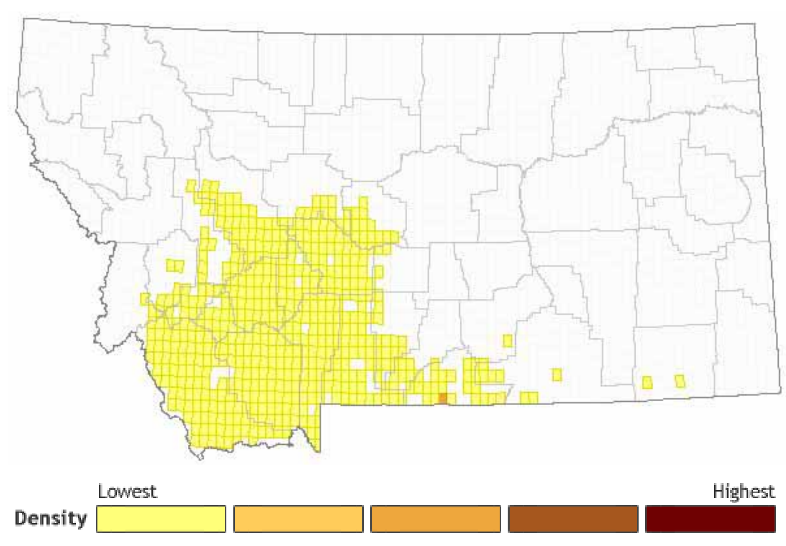

Figure C.5-4. Map showing the general location of sagebrush shrublands identified in Montana (MT Field Guide 2012).

Objectives of Recommended Design Standards

- ▶ Minimize the fragmentation and loss of native grassland and native shrub habitat patches.
- ▶ Maintain habitat patches important to wildlife and wildlife connectivity, and minimize the loss of large habitat patches.
- ▶ Maintain grassland and shrubland bird populations, especially Species of Concern.
- ▶ Reduce the spread of invasive, non-native species.

Conservation Status

Native grassland and native shrub habitat types are considered a Tier 1 ecosystem, or ecosystem in greatest need of conservation, in Montana's Comprehensive Fish and Wildlife Conservation Strategy (MCFWCS 2005). Many of the species associated with these habitats are vulnerable to human disturbance:

- Of the 219 species of mammals, birds, reptiles, and amphibians associated with native grasslands and native shrub habitats in Montana, 46 species (21 percent) are on the Montana Animal Species of Concern list (MT Field Guide 2012).
- Breeding grassland bird species are showing some of the steepest population declines of all landbirds in North America (Rich et al. 2004).
- Native grasslands provide habitat for Sprague's Pipit, currently listed as a Candidate Species under the Endangered Species Act (USFWS Federal Register 75: 56028–56050).
- Shrub-nesting landbird species comprise the largest number of Species of Continental Importance in the Intermountain West area of the United States and Canada. In Montana there are five (83 percent of total) Species of Continental Importance in shrub-steppe habitat (Rich et al. 2004).
- Native shrub habitats are occupied by the Greater Sage-Grouse, currently listed as a Candidate Species under the Endangered Species Act (USFWS Federal Register 75: 13959–14008).

Impacts from Development

Two top conservation concerns for native grasslands and native shrub habitats in Montana are (1) habitat loss, degradation, and fragmentation; and (2) invasive plant species. Contributing factors include various types of human activity, such as energy and residential developments, conversion of native habitat to agriculture, range management practices, unmanaged recreational uses, and loss of natural fire disturbance (MCFWCS 2005). Additionally:

- Risks to the sustainability of bird populations in North America include the shrinking of native prairies. Active conservation concerns include habitat loss and nest destruction due to expansion of farms, urban development, transportation, and other linear development (Wendt et al. 2006).
- Roads and infrastructure fragment native habitat patches. Recent research indicates that fragmentation caused by noise (e.g., road traffic) far exceeds the physical footprint of the source (e.g., the actual road) (Barber et al. 2009).

- Overhead power lines represent threats to avian and other small mammal species that depend upon native grasslands and native shrub habitats in two respects: (1) Corvids (crows, ravens, magpies, and jays) and raptors are drawn to overhead power lines as effective lookouts and hunting perches (Lammers and Collopy 2007); and (2) collisions between birds and overhead power lines can take a significant toll on grassland- and shrub-dependent avian species like prairie grouse (Wolfe et al. 2007).
- Invasion of non-native grasses and forbs is one of the greatest threats to grassland and shrubland bird habitat (Paige and Ritter 1999; Gillihan et al. 2001).
- Residential development often leads to increases in pets—and ". . . unrestrained pets can have a negative impact on nesting birds . . ." (Faaborg et al. 1995, p. 368).

Once native vegetation is removed or severely degraded, these habitats are difficult—if not impossible—to restore:

- ". . . [O]nce the prairie is destroyed, restoration requires several centuries" (Schramm 1990). (Sampson and Knopf 1994, p. 418).
- It may take more than 30 to 50 years to restore organic matter, soil carbon, and soil nitrogen of native prairies and grasses (Fuhlendorf et al. 2002).
- "Ecological restoration methods have not been developed specifically for the shortgrass prairie as they have for the tallgrass (true) prairie" (Askins et al. 2007, p. 19).
- "Most grassland-restoration experiments are conducted as research projects on small plots using expensive and labor-intensive methods, so it is unlikely that large restoration activities will be undertaken in the near future" (Askins et al. 2007, p. 30).
- When prairie species are replaced by introduced, non-native species (e.g., crested wheatgrass), these areas are difficult, if not impossible, to restore. Based on research in the northern Great Plains, grassland restoration ". . . faces two major obstacles: the contingency of native grass establishment on unpredictable precipitation, and competition from introduced species." Results indicate the establishment and survivorship of native species is related to summer precipitation, but existing introduced species are strong competitors, even with the application of herbicides (Bakker et al. 2003, p. 1).
- "For some species, there is no way to rectify their loss because a commercial seed source is not available and procedures for establishment are unknown. If severe degradation has occurred and natural recovery is unlikely, managers must develop restoration programs with the goal of establishing the most ecologically stable community that can exist on the site to protect the soils, maintain the desirable native species that remain, and prevent further degradation. Use of introduced species should not be excluded, but their inclusion requires a greater understanding of their growth form, persistence, effect on native species, and value as food or cover for wildlife" (Hoffman and Thomas 2007, p. 98).
- "Active restoration involves the physical removal of competitive species, preparation of seed beds, and seeding of desired species. A number of species are usually planted, and it is essential to understand the requirements for successful establishment for each species included in the seed mixture (Monsen 2005). Seeds of some species may need to

be broadcast while seeds of other species may need to be drilled into the soil at various depths. Lack of attention to all aspects of site preparation and seeding practices could result in widespread failures" (Hoffman and Thomas 2007, p. 98).

- "Rehabilitation and restoration techniques to transform lands currently dominated by invasive annual grasses into quality Greater Sage-Grouse habitat are largely unproven and experimental. Several components of the process are being investigated with varying success" (Pyke 2011, p. 543).
- "Availability and cost of native seed are major obstructions to use of native seeds in revegetation projects (McArthur 2004). The difficulties and vagaries of collecting, growing, and selling native seeds that have not been used historically within sagebrush ecosystems tends to raise prices and increase risks to both sellers and buyers (Bermant and Spackeen 1997; Currans et al. 1997; Roundy et al. 1997; Dunne 1999) relative to tested and released plants that are widely available" (Currans et al. 1997). (Pyke 2011, p. 544)
- "Success is not guaranteed when conducting Greater Sage-Grouse habitat restoration projects in semiarid environments. The only guarantee is that annual weather conditions can vary widely and these often dictate success of restoration projects" (Pyke 2011, p. 544).
- "Grasses and forbs may respond within 1 to 3 years if soils and seed sources permit recovery or restoration, but return to a shrub-dominated community often requires > 20–30 years, and landscape restoration may require centuries or longer (Hemstrom et al. 2002). Even longer periods may be required for sage-grouse to use recovered or restored landscapes" (Knick et al. 2011, p. 251).

Recommended Approach to Subdivision Design (where native grassland or native shrub habitat patch size is larger than 25 acres)

In designing the proposed subdivision, the subdivider is encouraged to follow the four steps outlined below. Local FWP wildlife biologists are encouraged, when contacted by the subdivider or the subdivider's representative, to make time for the consultation described in subsections b. and c. below.

a. Consult FWP's Crucial Areas Planning System (CAPS) and/or other publicly available sources of wildlife habitat information (e.g., information from the Montana Natural Heritage Program), for a preliminary indication of whether the property proposed for subdivision may be located in one or more native grassland or native shrub habitat patches.

b. Consult with the local FWP wildlife biologist, or other professionally trained biologist, to verify the preliminary assessment and confirm the approximate boundaries of any native grassland or native shrub habitat patches on or adjacent to the property proposed for development. If consulted, the FWP biologist should provide the subdivider with a written determination of whether or not native grassland or native shrub habitat patches are present on the property.

c. If the biologist determines that the property proposed for subdivision is located wholly or partially in one or more native grassland or native shrub habitat patches, consult further with the biologist for site-specific information and recommendations on minimizing the impacts of the subdivision on the native vegetation and species likely to be using the habitat. FWP biologist recommendations may include suggestions for avoiding or strictly limiting the placement of subdivision design features in the native habitat patch. In offering these recommendations, the FWP biologist should take into account the wildlife and habitat data compiled by the subdivider, any field reviews completed by other professionally trained biologists, FWP's own wildlife and habitat data, and any other applicable biological information.

d. Incorporate the biologist's recommendations into the design of the proposed subdivision.

Recommended Standards (where native grassland or native shrub habitat patch size is larger than 25 acres)

Whether or not the subdivision design approach recommended above is completed, the following standards pertain to any subdivision development proposed on property that contains or lies adjacent to one or more native grassland or native shrub habitat patches:

a. If subdivision design features (e.g., buildings, roads, utilities) are located inside habitat patches, place them adjacent to, or as close as possible to, existing development located outside of the habitat patches. Cluster the subdivision design features on as small a footprint as possible (see Figure C.5-5).

b. Locate areas of proposed open space immediately adjacent to existing native vegetation or open space on adjacent lands, in order to maintain the functional connection with other open space and native grassland and native shrub habitat patches on public and private lands.

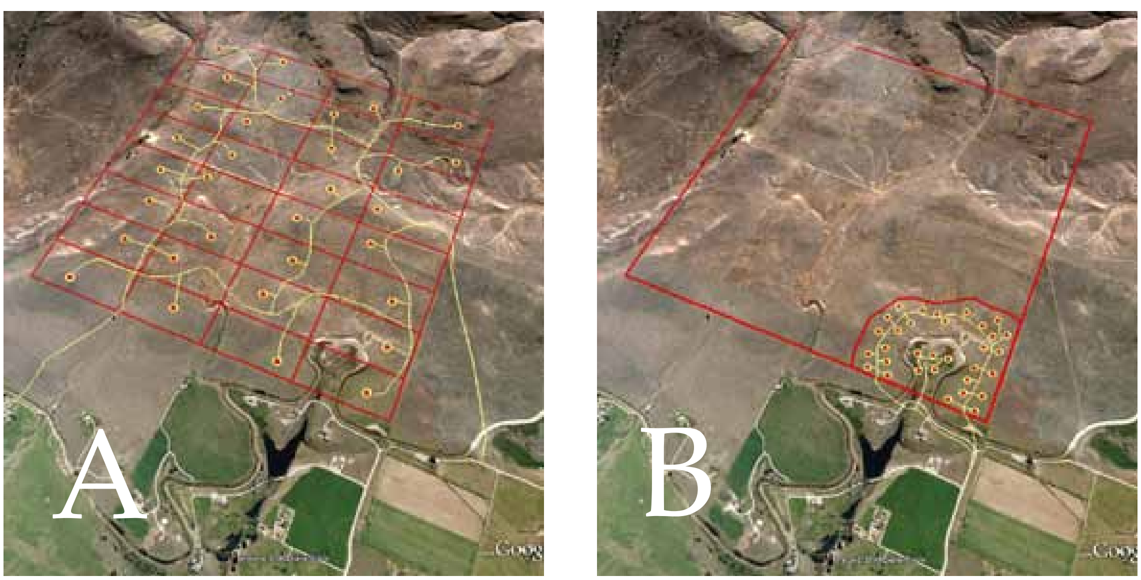

Figure C.5-5. *Examples of dispersed and clustered development on native grasslands.*

Example 'A' depicts development of thirty-two 20-acre lots spread across 640 acres of native grasslands. Example 'B' illustrates a "clustered" design of the same thirty-two houses on 2-acre lots on 10 percent of the property, or 64 acres, situated in a corner near existing development. Clustering homes as shown in example B obviously impacts native grasslands much less than the dispersed development found in example A.

c. Minimize the extent of subdivision roads needed to provide access to all areas proposed for development.
d. Install new utility lines underground.
e. Revegetate with native seed *after* road construction and utility installation.
f. Develop a weed control plan, approved by the local weed district, for the entire property proposed for subdivision.

Additional Guidance for Minimizing Fragmentation and Maintaining Connectivity

The scientific literature provides additional guidance for addressing the first two design objectives listed on page C.5-66 above. Numerical thresholds based on this science are offered and illustrated below, as an additional development design option for biologists and subdivision designers to consider.

Table C.5-1 below would only apply to native grassland or native shrub habitat patches greater than 25 acres in size. The table identifies how much of a native grassland or native shrub habitat patch could be developed and still minimize habitat fragmentation for wildlife, based upon its existing size and *regardless* of land ownership.

Table C.5-1. *Recommended development limits for native grassland or native shrub habitat patches located within a proposed subdivision*

Total Native Grassland or Native Shrub Habitat Patch Size	Recommended Limits to Habitat Patch Development within a Proposed Subdivision	Subdivider is Advised to Consult FWP for Recommendations on Extent and Location of Proposed Development.
> 25 to 100 acres	A maximum of 5% of the portion of the habitat patch located within the proposed subdivision site could be developed, and at least 25 acres of the habitat patch should remain undeveloped.	No
> 100 to 1,000 acres	A maximum of 10% of the portion of the habitat patch located within the proposed subdivision site could be developed.	Yes
> 1,000 acres	A maximum of 20% of the portion of the habitat patch located within the proposed subdivision site could be developed.	Yes

Substantial Evidence for Native Grassland and Native Shrub Habitat Recommendations

In order to more easily describe the rationale and scientific evidence for the native grassland and native shrub habitat recommended standards, the standards have been divided into six provisions. Each provision is stated below, followed by the rationale and substantial evidence supporting that provision, including pertinent scientific studies and professional biologist opinions.

Provision 1. Recommended Approach to Subdivision Design. In designing the proposed subdivision, the subdivider is encouraged to follow the four steps outlined below:

(a) Consult FWP's Crucial Areas Planning System (CAPS) and/or other publicly available sources of wildlife habitat information (e.g., information from the Montana Natural Heritage Program), for a preliminary indication of whether the property proposed for subdivision may be located in one or more native grassland or native shrub habitat patches.

(b) Consult with the local FWP wildlife biologist, or other professionally trained biologist, to verify the preliminary assessment and confirm the approximate boundaries of any native grassland or native shrub habitat patches on or adjacent to the property proposed for development. If consulted, the FWP biologist should provide the subdivider with a written determination of whether or not native grasslands or native shrub habitat patches are present on the property.

(c) If the biologist determines that the property proposed for subdivision is located wholly or partially in one or more native grassland or native shrub habitat patches, consult further with the biologist for site-specific information and recommendations on minimizing the impacts of the subdivision on the native vegetation and species likely to be using the habitat. FWP biologist recommendations may include suggestions for avoiding or strictly limiting the placement of subdivision design features in the native habitat patch. In offering these recommendations, the FWP biologist should take into account the wildlife and habitat data compiled by the subdivider, any field reviews completed by other professionally trained biologists, FWP's own wildlife and habitat data, and any other applicable biological information.

(d) Incorporate the biologist's recommendations into the design of the proposed subdivision.

Substantial Evidence for Provision 1

- CAPS is an easy-to-use informational and early planning tool that subdividers can use to identify important habitats in a given area. CAPS helps developers begin early to consider the potential effects of a proposed subdivision on wildlife and wildlife habitat. This system is free and available to any person with Internet access. CAPS will provide useful, initial information about whether a property proposed for subdivision might be located in native grasslands or native shrub habitats. CAPS can also give developers a general idea about the impacts a subdivision might have on identified habitats and species. Additional data sources of value during the early stage of subdivision site planning and design include FWP's individual GIS data layers, the *Montana Animal Field Guide*, and the *Ecological Systems Field Guide* (see Appendix A) (FWP website 2012).

- However, "CAPS is not a substitute for a site-specific evaluation of fish, wildlife, and recreational resources. There is still no substitute for consulting with local FWP biologists to gain a better understanding of conditions and management challenges in a particular area of the state—but CAPS will help you start smart." A FWP biologist with knowledge of a property is the best authority for determining whether a property proposed for subdivision is located in native grasslands or native shrub habitats. FWP and other professionally trained biologists may also be familiar with whether or not a given property functions as habitat that supports one or more native grassland or native shrub species, especially Species of Concern (FWP website 2012).

- Grassland and shrub habitats are difficult—if not impossible—to restore. Therefore, it is important to carefully plan before impacts are made to these habitat types (e.g., Askins et al. 2007; Bakker et al. 2003; Fuhlendorf et al. 2002; Hoffman and Thomas 2007; Pyke 2011; Knick et al. 2011; Sampson and Knopf 1994).

- "Grasses and forbs may respond within 1 to 3 years if soils and seed sources permit recovery or restoration, but return to a shrub-dominated community often requires > 20–30 years, and landscape restoration may require centuries or longer (Hemstrom et al. 2002). Even longer periods may be required for sage-grouse to use recovered or restored landscapes." (Knick et al. 2011, p. 251)

- "Some area-sensitive obligate grassland species (and also some habitat specialists) require large unbroken blocks of grassland habitat with little or no interspersion with other habitat types. For this reason, it is crucial to consider landowner objectives, local landscape features and management potential, and area-wide population goals of target grassland species in the area when planning management actions for grassland birds. Consultation with state and Federal wildlife agencies and review of established grassland bird priorities for the region (e.g., Partners in Flight Bird Conservation Plans—see **www.partnersinflight.org**) can assist in this process" (Wildlife Habitat Management Institute 1999, p. 4).

- Native grasslands and native shrublands are two of Montana's habitats in greatest need of conservation. One of the top two conservation concerns for these habitats is habitat loss, degradation, and fragmentation. Contributing factors include various types of human activity, such as energy and residential developments, conversion of native habitat to agriculture, range management practices, unmanaged recreational uses, and loss of natural fire disturbance (MCFWCS 2005).

- "Native grassland and shrub habitats are relatively rare on the landscape in Montana, as much of the land has already been converted to agriculture or development. Thus, the conservation of remaining habitats is critical to the persistence of the bird species that depend on them. Some habitat patches are more important than others; hence, our goal is to provide guidelines for conserving critical habitat patches and encouraging development elsewhere. In general, we encourage development in areas that are already dominated by nonnative vegetation" (Wightman 2012, p. 3).

- ". . . Odell et al. (2003) discuss the benefits of clustering, pointing out that clustered developments decrease fragmentation and perforation of habitats due to roads and houses, leaving the remainder of the landscape in a condition more suitable for wildlife sensitive to elevated human densities. For example, if houses on a large parcel of land were clustered on a small portion of its acreage with the remaining acres left undisturbed, wildlife communities would likely be characterized by a higher proportion of human sensitive species (Odell et al. 2003). . . . The case for clustering is made by numerous researchers (Arendt 1997; Theobald et al. 1997; Maestas et al. 2001; Odell and Knight 2001; Glennon 2002; Hansen et al. 2002; Odell et al. 2003; Glennon and Porter 2005)." (Glennon and Kretser 2005, pp. 29–30)

Provision 2. Prevent habitat patch fragmentation by placing proposed subdivision design features (e.g., buildings, roads, utilities) adjacent to, or as close as possible to, existing development located outside of the habitat patches. Cluster the subdivision design features on as small a footprint as possible. Also, locate areas of open space immediately adjacent to existing native vegetation or open space on adjacent lands, in order to maintain the functional connection with other open space and native grassland and native shrub habitat patches on public and private lands.

Substantial Evidence for Provision 2

- ". . . [H]abitat fragmentation occurs when a large, fairly continuous tract of a vegetation type is converted to other vegetation types or land uses such that only scattered fragments of the original vegetation type remain." In addition to direct habitat loss, fragmentation can increase the amount of edge habitat, which can lead to increased nest predation, parasitism, and interspecific competition [competition between individuals of two or more *different* species for the same resource], and reduced pairing and nest success (Faaborg et al. 1995, p. 358).

- Habitat fragmentation results in quantitative and qualitative loss of habitat for native species (Temple and Wilcox 1986).

- "The composition and spatial configuration of a landscape can independently or in combination affect ecological processes including species' distributions and biotic interactions (Dunning et al. 1992)." (Freemark et al. 1995, p. 384)

- Research has identified at least 22 bird species associated with grassland or shrub habitats that are sensitive to patch size or fragmentation (Freemark et al. 1995).

- ". . . [D]ensity and richness of the grassland bird community are associated with landscape features. Studies elsewhere have found that the context in which the patch is situated affects the density of birds found in the patch" (Sample et al. 2003, p. 368).

- "The human-induced mosaic is characterized also by a strong contrast between patches and by the appearance of long edges" (Farina 2003, p. 183).

- Roads and infrastructure fragment native habitat patches. Research indicates that fragmentation caused by noise (e.g., road traffic) far exceeds the physical footprint of the source (e.g., the actual road) (Barber et al. 2009).

Provision 3. Minimize the extent of subdivision roads needed to provide access to all areas proposed for development.

Substantial Evidence for Provision 3

- Roads and infrastructure fragment native habitat patches. Research indicates that fragmentation caused by noise (e.g., road traffic) far exceeds the physical footprint of the source (e.g., the actual road) (Barber et al. 2009).

- "Roads and trails are implicated in dispersal of exotic species (Larson et al. 2001). Roads are also associated with direct mortality of birds (e.g., 20–37 percent of Burrowing Owl mortality; Haug et al. 1993) as well as changes in habitat and ecological function (Forman 2000; Trombulak and Frissell 2000). Songbird numbers were 20–50 percent lower within 100 m [328 feet] of gravel roads in Saskatchewan (Sutter et al. 2000) and Wyoming (Ingelfinger 2001). Assuming a similar zone of effect, Forman (2000) estimated that 16.7 percent of rural areas in the United States are influenced by roads. The zone of effect may be larger, because grassland songbirds continued to increase with distance from roads out to 2 km [1.2 miles] (Koper and Schmiegelow 2006b)." (Askins et al. 2007, p. 22)

- "Roads are a source of habitat fragmentation as well as a source for animal mortality and the movement of exotic plant species, among other impacts (Trombulak and Frissell 2000). Birds have been found to avoid roads with heavy traffic volumes (Reijnen et al. 1996) as well as low traffic volumes along dirt roads (Ingelfinger and Anderson 2004)" (Cariveau 2007, p. 1).

- "The connecting infrastructure of roads, motorized trails, railways, power lines, and communications corridors fragment or remove sagebrush land cover (Leu et al., this volume, chapter 13). The ecological impact of roads and motorized trails include: (1) increased mortality of wildlife from collisions with vehicles, (2) modification of animal behavior because of habitat changes or noise disturbance, (3) alteration of physical environment, (4) alteration of chemical environment through leaching or erosion, (5) spread of exotic and invasive plant and wildlife, and (6) increased habitat alteration and use by humans (Forman and Alexander 1998; Forman 2000; Trombulak and Frissell 2000; Ouren et al. 2007). Unpaved roads fragment sagebrush landscapes as well as provide disturbed surfaces that facilitate spread of invasive plant species (Belcher and Wilson 1989; Gelbard and Belnap 2003)." (Knick et al. 2011, p. 219)

- "Over 8,400,000 people live within 3 miles of sagebrush. As infrastructure expands to support population growth, sagebrush is fragmented into small, isolated patches, ultimately making the landscape unsuitable for sage-grouse. Ninety-five percent of the sagebrush within the sage-grouse range is within 1.5 miles of a road. Roads can influence predator movements, introduce invasive species, increase wildfire potential from human activities, and exacerbate other factors that may adversely affect sage-grouse" (USGS 2009, p. 3).

Provision 4. Install new utility lines underground.

Substantial Evidence for Provision 4

- Overhead power lines represent threats to avian and other small mammal species that depend upon native grasslands and native shrub habitats in two respects: (1) Corvids (crows, ravens, jays, and magpies) and raptors are drawn to overhead power lines as effective lookouts and hunting perches (Lammers and Collopy 2007); and (2) collisions between birds and overhead power lines can take a significant toll on grassland- and shrub-dependent avian species like prairie grouse (Wolfe et al. 2007).

- "Power line poles along transmission corridors provide nest and perching opportunities for Common Ravens (*Corvus corax*), American Crows (*C. americanus*), and raptors (Reinert 1984; Knight and Kawashima 1993; Steenhof et al. 1993; Lammers and Collopy 2007). Ravens are primary predators on sage-grouse and other prairie grouse nests (Manzer and Hannon 2005; Coates et al. 2008) and can travel > 10 km [6.2 miles] from these locations (Boarman and Heinrich 1999). Collisions with power lines, in addition to increased predation risk, were a primary source of mortality for lowland populations of sage-grouse in Idaho (Beck et al. 2006)." (Knick et al. 2011, p. 245)

- "F. Hall (2004 pers. comm.) in a Lassen County, CA, study on Greater Sage-Grouse has recently documented significant impacts from overhead power transmission and communication distribution lines to this species out to 3.7 mi (6 km)" (Manville 2004, p. 10).

- "The Service [USFWS] asserts that by avoiding or minimizing construction of wind facilities [and their associated infrastructure, which includes power lines and roads] in native prairie grasslands and native sage-steppe habitats, grassland- and sage-dependent native songbird species would be protected and habitat fragmentation would be avoided" (Manville 2004, p. 13).

Provision 5. Revegetate with native seed *after* road construction and utility installation. Also, develop a weed control plan, approved by the local weed district, for the entire property proposed for subdivision.

Substantial Evidence for Provision 5

- One of the top two conservation concerns for native grasslands and native shrub habitats in Montana is invasive plant species. Contributing factors include various types of human activity, such as energy and residential developments, conversion of native habitat to agriculture, range management practices, unmanaged recreational uses, and loss of natural fire disturbance (MCFWCS 2005).

- Invasion of non-native grasses and forbs is one of the greatest threats to grassland and shrubland bird habitat (Paige and Ritter 1999; Gillihan et al. 2001).

- "Grassland birds disappear or decline once the native cover is removed (Johnson and Schwartz 1993a, b; McMaster and Davis 2000) or replaced with hay (Dale et al. 1997; McMaster et al. 2005)." (Askins et al. 2007, p. 22)

- "Invasion by exotic plants (Wilson and Belcher 1989; Robbins and Dale 1999; Scheiman et al. 2003; Grant et al. 2004) reduces avian occupancy of grassland." (Askins et al. 2007, p. 22)

- To avoid and mitigate the impacts of wind energy projects on wildlife, it is recommended that development occur on already disturbed lands and use existing transmission corridors and roads. The temporary impacts of construction (e.g., road and utility installation) on grass, CRP, or shrub-steppe habitats can be mitigated by implementing a restoration plan for the impacted area. A restoration plan should include reseeding with appropriate vegetation and noxious weed control (Washington Dept. of Fish and Wildlife 2009).

Provision 6: Additional guidance is provided for minimizing fragmentation and maintaining connectivity of native grassland and native shrub habitat patches. This guidance spells out recommended limits on development for habitat patches in three categories: (1) more than 25 acres to 100 acres (develop no more than 5 percent *and* keep at least 25 acres of the habitat patch undeveloped); (2) more than 100 acres to 1,000 acres (develop no more than 10 percent); and (3) more than 1,000 acres (develop no more than 20 percent). It should be noted that under this additional guidance, habitat patch size is determined by the existing size of the habitat patch (not the historic size). In addition, the habitat patch can cross land ownership lines because it is based on where specific habitat types are located and not on who owns a parcel of land.

Substantial Evidence for Provision 6

- Many species of grassland songbirds require at least 25 acres of native grassland habitat to occupy a patch. The rate of bird incidence increases exponentially as patch size increases to at least 100 acres for some species and more than 1,000 acres for other species (Askins et al. 2007).

- For grassland breeding birds, species richness is maximized when patches are large (more than 50 hectare or more than 100 acres) and shaped so that they provide abundant interior areas, free from the impacts of edges (Helzer and Jelinski 1999).

- Research has documented that grassland songbird abundance decreases severely when the sum of all urban activities was more than 5 percent of 100 acres (Haire et al. 2000).

- Shrub-steppe obligate songbird species tend to require larger patches (e.g., more than 320 acres for Sage Sparrows) of native shrublands (Paige and Ritter 1999).

- Raptors that use grassland and shrub habitats typically require at least 750 to 5,000 acres of foraging habitat during the nesting season (Casey 2000; Larsen et al. 2004).

- Long-billed Curlews occupy home ranges approximately 35 acres in size (Casey 2000).

- Sprague’s Pipits require a minimum of 358 acres (average) of native grassland habitat patches (Davis 2004).

- “In general, large patches better sustain wildlife populations and ecosystem functions over time than small patches” (Environmental Law Institute 2003, p. 7).

- Risks to the sustainability of bird populations in North America include the shrinking of native prairies. Active conservation concerns include habitat loss and nest destruction due to expansion of farms, urban development, transportation, and other linear development (Wendt et al. 2006).

- One of the top two conservation concerns for native grasslands and native shrub habitats in Montana is habitat loss, degradation, and fragmentation. Contributing factors include various types of human activity, such as energy and residential developments, conversion of native habitat to agriculture, range management practices, unmanaged recreational uses, and loss of natural fire disturbance (MCFWCS 2005).

- “Patches smaller than 25 acres tend to provide little grassland habitat for most grassland [bird] species. Research has also documented that grassland bird abundance decreases significantly when the sum of all urban activity is 5 percent of 100 acres (Haire et al. 2000), and urbanization shifts the bird community toward more nonnative species and fewer native species (Marzluff 2001).” (Wightman 2012, p. 3)

- Shrub-associated birds tend to have larger home ranges than grassland birds, suggesting a similar pattern of increased densities at larger patch sizes” (Wightman 2012, p. 3).

- “Limiting subdivision development to 5 percent or less of 25- to 100-acre patches in grassland and shrub habitat is important for maintaining bird populations. Patches of this size are critical for many species and cannot withstand much fragmentation or urbanization” (Wightman 2012, p. 3).

- “[I]t is reasonable to assume that birds can withstand development of somewhat greater percentages as patch size increases, as long as fragmentation is minimized by clustering development to one side of the patch. Limiting subdivision development to 10 percent of 100- to 1,000-acre patches would allow for some development while maintaining larger landscapes for avian species with larger patch size requirements (e.g., Sprague’s Pipits, Long-billed Curlew)” (Wightman 2012, p. 4).

- “Some birds have relatively large patch requirements (750–200,000 acres; e.g., raptors, grouse). It is imperative that some large patches are maintained across the landscape for these species. Allowing development on 20 percent of patches greater than 1,000 acres in size would allow for some development while retaining relatively large patches for wildlife” (Wightman 2012, p. 4).

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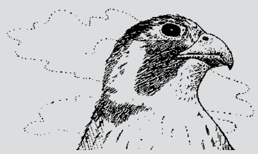
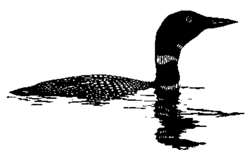


Appendix C.6. Selected Species of Concern

This section contains information about the recommended subdivision design standards for selected Species of Concern.

Species of Concern are native wildlife species that are at risk due to declining population trends, threats to their habitats, restricted distribution, and/or other factors. Montana Fish, Wildlife & Parks and the Montana Natural Heritage Program jointly designate Montana Species of Concern, which is not a statutory or regulatory classification. Rather, these designations provide information that can help resource managers and others make proactive decisions regarding species conservation. A current Species of Concern list can be obtained at: **http://mtnhp.org/SpeciesOfConcern/?AorP=a**.



Common Loon (*Gavia immer*)

Habitat Requirements

Common Loons have three primary needs for breeding: nesting sites, nursery areas, and foraging areas. In Montana, Common Loons generally do not nest on lakes smaller than 13 acres in size or over 5,000 feet in elevation (Skaar 1990). Small islands are preferred for nesting, but herbaceous shoreline areas (especially promontories) are also selected for nesting (Skaar 1990). The highest nest success in Montana was observed on lakes less than 60 acres in size, with only one Common Loon pair territory situated in a complex of quality feeding lakes (Paugh 2006). Nursery areas are important to protect. These areas are typically shallow, sheltered areas within a Common Loon territory with abundant insects and small fish that provide a secure location to raise loon chicks (Hammond 2009).

Typical Locations in Montana

Common Loons occur throughout Montana, but breeding is generally confined to the northwestern corner of the state; they rarely overwinter in the state (see Figure C.6-1). About 200 loons, including about 62 nesting pairs, use the state on an annual basis (Hammond 2009).

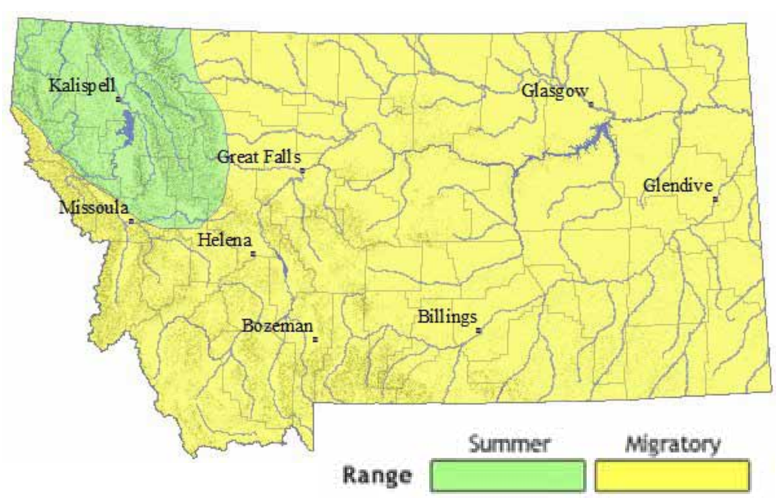


Figure C.6-1. *Map showing the general distribution of Common Loons in Montana, including nesting and migration areas (MT Field Guide 2012).*

Objective of Recommended Design Standard

- Protect all current and traditional Common Loon nesting sites from development and degradation from human disturbances associated with developed facilities such as buildings, roads, trails, and docks.

Conservation Status

Common Loons are classified as a Tier I species by Montana Fish, Wildlife & Parks (Greatest Conservation Need; MCFWCS 2005); Priority Level I by Montana Partners in Flight (declining population trends and/or Montana is of high importance for the population; Casey 2000); Montana rank S2 by the Montana Natural Heritage Program (at risk because of very limited and/or potentially declining population numbers, range, and/or habitat; MT Field Guide 2012); and a "sensitive species" by both the Bureau of Land Management and the U.S. Forest Service in Montana (MT Field Guide 2012).

Impacts from Development

Because loons exhibit strong year-to-year fidelity to previous nest sites, there is a high probability that they will reuse nests and nurseries if these areas are not developed or degraded. The most significant changes that occur in breeding areas are shoreline development and increased recreational use. Shoreline development impacts habitat for loons by degrading vegetation that provides important cover, increasing predators associated with humans (e.g., dogs, cats, skunks, and raccoons), and increasing overall human activity (Evers 2007). The probability of nest success decreases with increased shoreline development and recreational activity, though some loon pairs show an ability to habituate to human activities (Heimberger et al. 1983). Human and dog disturbance can play an important role in nest failures. As nesting lakes become more developed, shoreline nesting sites can be lost. Loons are highly intolerant of human activity in their nesting territory: One study found that 60 percent of nest departures of incubating loons was due to human disturbance (Kelly 1992); a second study found that cottages within almost 500 feet (150 meters) of a nest drastically lowered hatching success (Heimberger et al. 1983).

Recommended Standard

Maintain a 500-foot vegetated buffer between Common Loon nesting sites and subdivision design features.

Substantial Evidence for Common Loon Recommendation

Common Loons can reuse nests from year to year. Consequently, protection of known nesting and nursery areas is essential. The following scientific studies and professional opinions justify the recommended standard:

- "Erect no structures within 150 m (492 ft) of [Common Loon] nest sites" (Knutson and Naef, 1997, p. 168).

- Avoid construction of a building, road, trail, public access, dock, or any development within 500 feet of existing, historical, and potential nest sites on active nesting lakes or lakes with nesting in the last five years (Hammond 2009).

- “Common loons are very susceptible to nest disturbance. They are intolerant of recurrent disturbance within 150 m (492 ft) of nest sites . . . Erect no structures within 150 m (492 ft) of nesting sites. Avoid building within this distance year-round to maintain a permanent buffer around nests” (Lewis et al. 1999, p. 1–4).

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Great Blue Heron (*Ardea herodias*)

Habitat Requirements

Great Blue Herons live near most types of water, including wetlands, streams, and rivers. They generally forage in slow-moving, calm water and are known to eat fish, amphibians, invertebrates, reptiles, mammals, and birds (MT Field Guide 2012).

Nesting occurs in colonies, primarily in riparian areas, but also in drier uplands. In areas where trees are not available, herons occasionally nest on the ground on islands (MT Field Guide 2012). Nests are usually constructed in the tallest trees available, typically at heights ranging from 29 to 85 feet (9 to 26 meters).

It is important to have nesting sites in close proximity to suitable foraging habitat: Although Great Blue Herons may forage up to 18 miles (29 kilometers) from a colony, most forage within 1 to 3 miles (2 to 5 kilometers) of the colony (Butler 1992; Quinn and Milner 2004).

Figure C.6-2. *Map showing the general distribution of Great Blue Herons in Montana (MT Field Guide 2012).*

Typical Locations in Montana

In Montana, Great Blue Herons are found statewide during the breeding season, typically at lower elevations near rivers, streams, and wetlands. They are also known to overwinter in the state (see Figure C.6-2).

Objective of Recommended Design Standards

- Protect colonial Great Blue Heron nesting sites from human disturbances associated with developed facilities such as buildings, roads, trails, and docks.

Conservation Status

Great Blue Herons are a Species of Concern in Montana. They are considered a species potentially at risk because of limited and/or declining numbers, range, and/or habitat (S3) by Montana Fish, Wildlife & Parks and the Montana Natural Heritage Program (MT Field Guide 2012).

Impacts from Development

Great Blue Herons are generally known to be sensitive to human disturbance. They are colonial breeders, most vulnerable to disturbance during the nesting season. Additionally, heron rookeries can become targets for vandalism. Nesting areas have been abandoned in response to housing and industrial development, road construction, vehicle traffic, and repeated human intrusions. It should be noted that some colonies located in close proximity to existing human activities may tolerate some disturbance (Butler 1992; Knutson and Naef 1997; Quinn and Milner 2004).

Recommended Standards

Maintain an 800-foot vegetated buffer between Great Blue Heron colonial nesting areas and subdivision design features. Within the vegetated buffer, install power lines underground.

Substantial Evidence for Great Blue Heron Recommendations

Great Blue Heron colonies usually exist in the same location for many years (Butler 1995). Consequently, protection of known colonial nesting sites is essential. The following scientific studies and professional opinions justify the recommended standards:

- "Establishment of buffer distances will be influenced by factors pertaining to a specific heron colony. Whenever possible, a minimum habitat protection buffer of 250 to 300 m (820–980 ft) from the peripheries of a colony should be established" (Knutson and Naef, 1997, p. 169).

- "We recommend the establishment of permanent, year-round minimum protection areas (buffers) of 250–300 m (820–984 ft) from the peripheries of colonies (Bowman and Siderius 1984; Quebec 1986 in Kelsall 1989; Vos et al. 1985; Buckley and Buckley 1976; Pullin 1988; Short and Cooper 1985; Parker 1980). All human activities likely to cause colony abandonment should be restricted in this buffer year-round." (Quinn and Milner 2004, p. 3-3)

- "To protect colonies from human disturbance, most studies reviewed by Butler (1992) recommended a minimum 300 m (984 ft) buffer zone from the periphery of colonies in which no human activity occurs during the courtship and nesting season (15 February to 31 July)" (Quinn and Milner 2004, p. 3-3).

- "The high casualty rate for great blue herons suggests this species is vulnerable to power line collisions . . . these birds may not see or be able to avoid objects they approach in flight. Great blue herons often fly at dawn or dusk, when visibility is poor, so behavior may influence their vulnerability. We recommend that this species be given special attention in impact analyses of proposed transmission lines near rookeries or other areas they frequent" (Rusz et al. 1986, p. 444).

- "Large, less maneuverable birds are more vulnerable to collisions with power lines, including Great Blue Herons (*Ardea herodias*) . . ." (Manville 2005, p. 1055).

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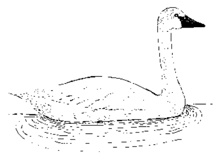

Trumpeter Swan (*Cygnus buccinators*)

Habitat Requirements

Trumpeter Swan breeding habitat consists of unpolluted marshes, ponds, lakes, reservoirs, and slow-moving rivers with little fluctuation in the water level. Ponds and marshes are typically less than 4 feet (1.2 meters) deep, with substantial, diverse aquatic plant communities, aquatic insects, and other invertebrates. Nesting sites generally consist of structures such as muskrat lodges, abandoned beaver lodges, sedge hummocks, islands, or other similar structures (Casey 2000). Swans sometimes show a preference for water bodies with a highly irregular shoreline (Mitchell and Eichholz 2010). The territory defended by breeding adult swans has been documented to be between 3.7 and 250 acres in size, often with only one pair breeding per pond (Mitchell and Eichholz 2010).

Non-breeding habitat for Trumpeter Swans consists of large and small lakes and ponds in southwestern Montana. During the winter these birds use habitat in areas where water does not freeze and food is plentiful and accessible, moving to new locations if conditions become too severe (Montana's Comprehensive Fish and Wildlife Conservation Strategy (MCFWCS) 2005). All water bodies used by Trumpeter Swans need to have approximately 300 feet (100 meters) of open water in order for the birds to take off in flight (Mitchell and Eichholz 2010).

Typical Locations in Montana

Trumpeter Swans are found in Montana throughout the year (see Figure C.6-3). This species historically bred throughout much of western Montana, but now is found breeding in the Greater Yellowstone Ecosystem (including Red Rock Lakes/Centennial Valley) and on the Rocky Mountain Front (MT Field Guide 2012). The non-breeding range of these swans is limited to several areas in the southwestern part of the state (Beaverhead, Gallatin, and Madison Counties). In winter, distribution of these birds is concentrated around Ennis Lake, the Madison River complex, Hebgen Lake, and the surrounding area (MCFWCS 2005). Work to reestablish a population has been initiated on the Flathead Reservation south of Kalispell and in the Upper Blackfoot drainage (Casey 2000; MT Field Guide 2012).

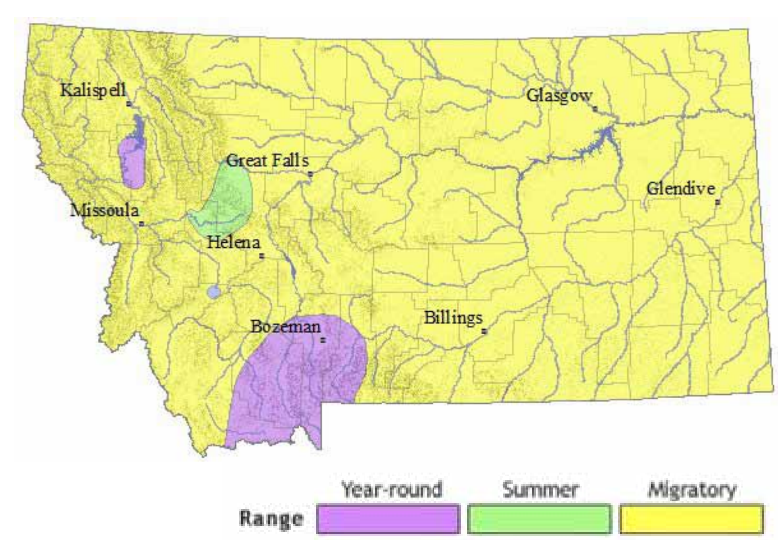

Figure C.6-3. *Map showing the general distribution of Trumpeter Swans in Montana, including breeding and overwintering areas (MT Field Guide 2012).*

Objective of Recommended Design Standards

- Protect all current and traditional Trumpeter Swan nesting and overwintering sites from development and degradation from human disturbances associated with developed facilities such as buildings, roads, trails, and docks.

Conservation Status

Trumpeter Swans are a Species of Concern in Montana. They are classified as a Tier I species by Montana Fish, Wildlife & Parks (Greatest Conservation Need; MCFWCS 2005); Priority Level I by Montana Partners in Flight (declining population trends and/or Montana is of high importance for the population; Casey 2000); Montana rank S3 by the Montana Natural Heritage Program (potentially at risk because of limited and/or declining numbers, range, and/or habitat; MT Field Guide 2012); and a "sensitive species" by both the Bureau of Land Management and the U.S. Forest Service in Montana (MT Field Guide 2012).

Impacts from Development

Managing biologists have identified the following threats to Trumpeter Swans: rapid increases in human populations and development in the Greater Yellowstone area; habitat destruction and fragmentation; and lack of protection for core nesting, migration, and winter habitats (Pacific Flyway Council and U.S. Fish & Wildlife Service 2003).

Trumpeter Swans are sensitive to human disturbance, and they exhibit strong year-to-year fidelity to both previous nest sites and wintering habitat (Mitchell and Eichholz 2010; Slater 2006). Because there is a high probability that these birds will reuse specific lakes and ponds, it is important to protect these areas from development and degradation. Swans are sensitive to bird watching, photography, boating, float-plane use, and other activities in or near nesting areas. These activities may cause nest failures or cygnet loss (Mitchell and Eichholz 2010). Additionally, activities that disrupt winter foraging or cause excessive energy loss may cause fatality or loss of reproductive potential because of poor condition (Mitchell and Eichholz 2010).

Trumpeter Swans are vulnerable to collisions with power lines, wind turbines, communications towers, and other structures (Pacific Flyway Council and U.S. Fish & Wildlife Service 2003). It is recommended that power lines be relocated underground in areas adjacent to nesting and brood-rearing locations (MCFWCS 2005).

Recommended Standards

Maintain a 1,000-foot vegetated buffer between Trumpeter Swan nesting and overwintering sites and subdivision design features. Within the vegetated buffer, install power lines underground.

Substantial Evidence for Trumpeter Swan Recommendations

Trumpeter Swans use the same locations for nesting and wintering for many years (Mitchell and Eichholz 2010; Slater 2006). Consequently, protection of known nesting and overwintering sites is essential. The following scientific studies and professional opinions justify the recommended standard:

- "Where wildlife viewing areas are desired, such sites should be located > 300 m [984 feet] from a trumpeter swan nest, and be hidden in vegetation or designed to minimize noise and visibility of users" (Henson and Grant 1991, p. 255).

- "No long term development (roads, wells, pipelines, etc.) within 500 m [1,640 feet] of the high water mark on identified lakes or water bodies [used by Trumpeter Swans]" (Alberta Fish and Wildlife Division 2001, p. 2).

- Trumpeter Swans are vulnerable to power line collisions. Montana's Comprehensive Fish and Wildlife Conservation Strategy specifically recommends to "relocate power lines underground in areas adjacent to [Trumpeter Swan] nesting and brood rearing locations" (MCFWCS 2005, p. 293).

- "Large, less maneuverable birds are more vulnerable to collisions with power lines, including Great Blue Herons (*Ardea herodias*), cranes (*Grus* spp.), swans (*Cygnus* spp.) . . . Line collisions resulted in . . . 44 percent mortality of fledged Trumpeter Swans (*C. buccinator*) in Wyoming (Lockman 1988) . . ." (Manville 2005, p. 1055)

- "Electrocution resulting from collisions with power lines is thought to be a significant source of mortality for Trumpeter Swans. Several studies report high mortality from power lines and wire fences (Lockman et al. 1987; Gillette 1990; Lockman 1990). In the Grande Prairie area, 6–10 swan electrocutions are reported annually, but the actual number of deaths from electrocution is likely much higher (D. Hervieux, pers. comm.)." (James 2000, p. 12)

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Long-billed Curlew (*Numenius americanus*)

Habitat Requirements

In Montana, Long-billed Curlews are usually found in native prairies and grasslands. Their habitat depends on the presence of short grasses, predominantly where vegetation is 4 to 12 inches (10 to 30 centimeters) tall. During the breeding season they are found in "the simplest, most open habitat available" as they are "avoiding trees, tall weedy vegetation, and tall dense shrubs . . ." (Fellows and Jones 2009). While wet habitats are not known to be necessary for nesting, water does seem to be important, especially for fledgling birds who must feed themselves; many nests have been located in arid habitats relatively close to a water source (Casey 2000; Fellows and Jones 2009).

Typical Locations in Montana

Long-billed Curlews breed in suitable habitat throughout Montana, although they are more common east of the Rocky Mountains. These birds do not overwinter in the state (see Figure C.6-4) (MT Field Guide 2012; MCFWCS 2005).

Objective of Recommended Design Standard

- Maintain large blocks of breeding habitat for Long-billed Curlews by minimizing human disturbances associated with developed facilities such as buildings, roads, towers, and other infrastructure.

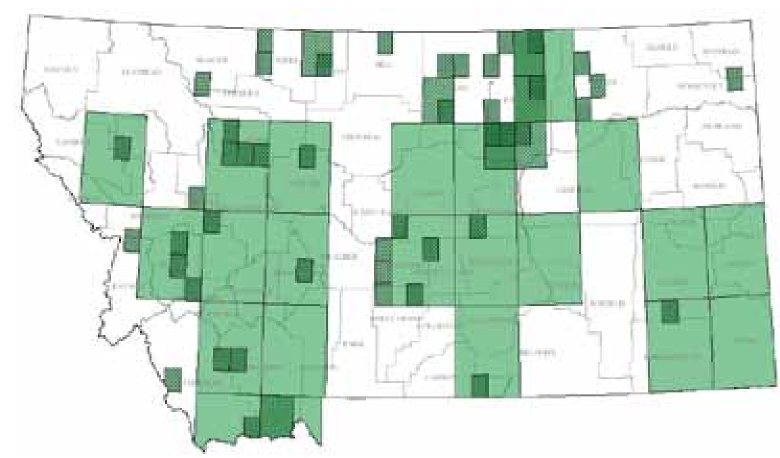

Figure C.6-4. Map showing the known locations of Long-billed Curlew breeding areas identified in Montana. Darker colors represent more nesting sites (MT Field Guide 2012).

Conservation Status

Long-billed Curlews are a Species of Concern in Montana; it is estimated that 19 percent of the world's population of Long-billed Curlew nest in Montana (Montana Natural Heritage Program and Montana Department of Fish, Wildlife & Parks 2010). They are classified as a Tier I species by Montana Fish, Wildlife & Parks (Greatest Conservation Need; MCFWCS 2005); Priority Level II by Montana Partners in Flight (Species in Need, lesser threat or stable/increasing population; Casey 2000); Montana rank S3B by the Montana Natural Heritage Program (the breeding population of the species in Montana is potentially at risk because of limited and/or declining numbers, range, and/or habitat; MT Field Guide 2012); and a "sensitive species" by the Bureau of Land Management (MT Field Guide 2012).

Impacts from Development

This species is considered at risk because of loss and/or fragmentation of habitat, population declines in some areas, and human disturbance during nesting (e.g., Fellows and Jones 2009; Dechant et al. 2003; Saalfeld and Conway 2008). Several resource management plans developed by western states indicate that conservation of curlew habitat requires minimizing the conversion of native prairie to urban development, including subdivisions (e.g., MCFWCS 2005; Fellows and Jones 2009; Wyoming Game and Fish Department 2005).

Recommended Standard

Maintain a 1,000-foot vegetated buffer between Long-billed Curlew nesting areas and subdivision design features.

Substantial Evidence for Long-billed Curlew Recommendation

Protection of areas used by Long-billed Curlews is critical for their conservation. Many individuals return to the same breeding sites year after year. This trend has specifically been documented on the Rocky Mountain Front (Fellows and Jones 2009). Consequently, protection of known nesting areas is essential. The loss of native grasslands in nesting areas is the primary threat to curlew populations. The following scientific studies and professional opinions justify the recommended standard:

- "Habitat areas need to be more than three times as large as a long-billed curlew's territory, which averages about 14 hectares (34.6 acres), in order for curlews to use them" (MCFWCS 2005, p. 327). Three times the average curlew territory of 34.6 acres is approximately 104 acres, or 4,521,528 square feet; the radius of a 104-acre circular buffer protecting a curlew nesting site is 1,200 feet (see Figure C.6-5).

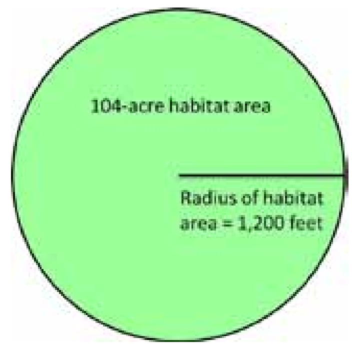

Figure C.6-5. *Illustration showing the radius of a circular 104-acre Long-billed Curlew habitat area (radius = 1,200 feet)*

- "Long-billed Curlews seem to require large blocks of grasslands. Bicak et al. (1982) found that territories averaged 14 ha [hectare] in size and were set in a[n additional] buffer zone of from 300 to 500 m [984–1,640 feet] of grassland" (Casey 2000, p. 51).

- The setback distance by land use category for human structures (e.g., well site, power line, pipeline, building, road) is recommended to be 200 meters (656 feet) from a Long-billed Curlew nest site. "Setback distances are based on what experts believe are the thresholds at which human disturbance is likely to cause degradation and possible abandonment of key wildlife areas/sites" (Alberta Fish and Wildlife Division 2001, p. 3).

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Burrowing Owl (*Athene cunicularia*)

Habitat Requirements

In Montana, Burrowing Owls are found in open grasslands where abandoned burrows dug by mammals such as ground squirrels (*Spermophilus* spp.), prairie dogs (*Cynomies* spp.), and badgers (*Taxidea taxus*) are available. Black-tailed prairie dog (*Cynomys ludoviscianus*) and Richardson's ground squirrel (*Spermophilus richardsonii*) colonies provide the primary and secondary habitat for Burrowing Owls in Montana (Klute et al. 2003; Restani et al. 2001). The burrows may be enlarged or modified, making them more suitable. Burrowing Owls spend much time on the ground or on low perches such as fence posts or dirt mounds.

Typical Locations in Montana

Burrowing Owls have been observed throughout the state, but are more common east of the Continental Divide where there is more grassland habitat available for nesting and prey species (see Figure C.6-6). In Montana, Burrowing Owls are closely tied to prairie dog habitat (e.g., Klute 2003; Restani et al. 2001; Restani et al. 2008).

Objective of Recommended Design Standard

- Protect and conserve Burrowing Owl nests from human disturbances associated with developed facilities such as buildings and roads.

Conservation Status

Burrowing Owls are a Species of Concern in Montana. They are classified as a Tier I species by Montana Fish, Wildlife & Parks (Greatest Conservation Need; MCFWCS 2005); Priority Level I by Montana Partners in Flight (highest priority species, Montana has a clear obligation to implement conservation; Casey 2000); Montana rank S3B by the Montana Natural Heritage Program (the breeding population of the species in Montana is potentially at risk because of limited and/or declining numbers, range, and/or habitat; MT Field Guide 2012); and a "sensitive species" by the U.S. Forest Service and Bureau of Land Management (MT Field Guide 2012).

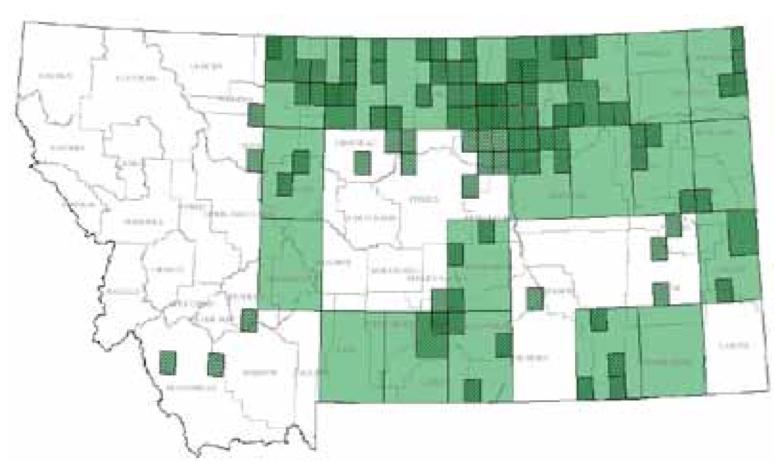


Figure C.6-6. *Map showing the general distribution of known Burrowing Owl nesting areas identified in Montana. Darker colors represent more nesting sites (MT Field Guide 2012).*

Impacts from Development

Urban development is one of the important factors limiting Burrowing Owl populations through the destruction of nesting habitat (Casey 2000; Nicholoff 2003). Urbanization increases the risk of mortality from vehicles, humans, and domestic and feral animals (Klute et al. 2003). One study estimated that 20 percent of damaged Burrowing Owl burrows within the study site were caused by dogs and 65 percent by humans (Haug et al. 1993). Additionally, reproductive success at sites where home construction occurs is significantly less than at sites next to construction or where construction is not taking place (Haug et al. 1993). Although research suggests that Burrowing Owls can benefit from high prey densities around homes, increases in human-caused nest failures and declines in the number of young fledged at successful nests in heavily developed areas offset the advantages of abundant prey (Millsap and Bear 2000).

Recommended Standard

Maintain a 1,000-foot vegetated buffer between Burrowing Owl nesting areas and subdivision design features.

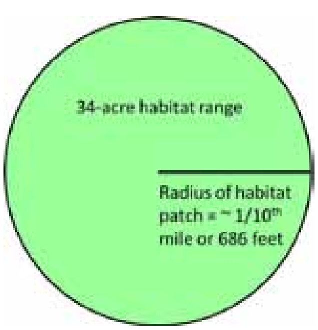
Substantial Evidence for Burrowing Owl Recommendation

Burrowing Owls can reuse nests from year to year (Nicholoff 2003). Consequently, protection of known nesting areas is essential. The following scientific studies and professional opinions justify the recommended standard:

- The setback distance by land use category for human structures (e.g., well site, power line, pipeline, building, road) is 500 meters (1,640 feet equals approximately one-third mile) for a Burrowing Owl nest site. "Setback distances are based on what experts believe are the thresholds at which human disturbance is likely to cause degradation and possible abandonment of key wildlife areas/sites" (Alberta Fish and Wildlife Division 2001, p. 3).

- "Maintain habitat conditions within ¼ to ½ mile (0.4 to 0.8 km [or 1,320 to 2,640 feet]) of known Burrowing Owl nest sites in an undisturbed manner . . . Protect all known nest burrows, as the same burrow will often be reused in subsequent years . . . Maintain a buffer zone of ¼ to ½ mile (0.4 to 0.8 km) around Burrowing Owl nest burrows. Limit insecticide use, rodent control, and human disturbances in these buffer zones" (Nicholoff 2003).

- "Home ranges for Burrowing Owls in Saskatchewan were found to be 0.14 to 4.81 square kilometers; with 95% of all movements within 600 meters [1,970 feet equals approximately one-third mile] of the nest burrow (Haug and Oliphant 1990)." (MT Field Guide 2010) Burrowing owl home ranges of 0.14 to 4.81 square kilometers are 34 to 1,188 acres in size, or 1,481,040 to 51,749,280 square feet; the radius of a 34- to 1,188-acre circular buffer protecting a Burrowing Owl nesting site is 686 to 4,058 feet (approximately one-tenth to three-quarters of a mile) (see Figure C.6-7 below).



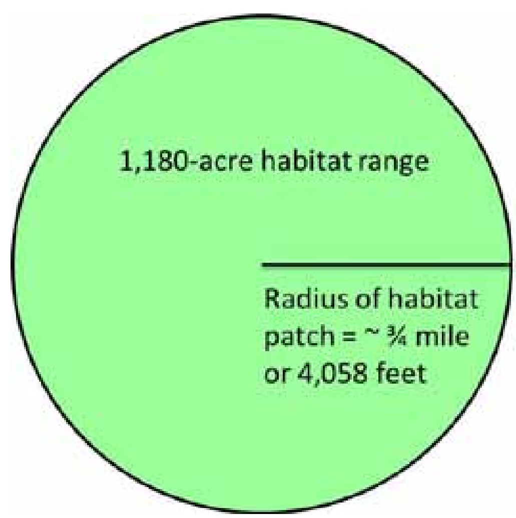


Figure C.6-7. *Illustrations showing the radii of circular Burrowing Owl habitat ranges found in Saskatchewan: (above left) a 34-acre range (radius = 686 feet) and (above right) a 1,180-acre range (radius = 4,058 feet)*

- "Radii of 600 m [1,969 feet] . . . had biological significance because burrowing owls spent approximately 95% of their time foraging within 600 m of nests (Haug and Oliphant 1990) . .." (Restani et al. 2008, p. 980)

- Before fall migration, young Burrowing Owls were found between 20 to 300 meters (66 tp 984 feet) from their nest burrow, with an average distance of 350 feet (107.5 meters) plus or minus 68 feet (20.6 meters) (Davies and Restani 2006).

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Bald Eagle (*Haliaeetus leucocephalus*) and Golden Eagle (*Aquila chrysaetos*)

Habitat Descriptions and Locations

Bald and Golden Eagle habitat requirements and distribution information are described below.

Bald Eagle

Bald Eagle Habitat Requirements

Throughout their range, Bald Eagles select territories with tall snags or live trees with horizontal limbs capable of supporting large, heavy nests and providing perches and roosts. They have also been known to nest in short trees and on human-made structures (e.g., osprey platforms, cellular towers), cliffs, and other substrates. In Montana, Jensen (1988) documented Bald Eagles nesting in the following tree species: ponderosa pine, black cottonwood, plains cottonwood, narrowleaf cottonwood, western larch, Douglas fir, and lodgepole pine. Nest trees averaged 99.7 feet in height and 37.8 inches in diameter at breast height (DBH). The average distance from the nest to water was 738 feet (Jensen 1998).

Bald Eagle Locations in Montana

Bald eagles occur year-round throughout Montana (see Figure C.6-8). Breeding distribution is generally associated with the availability of nesting habitat near lakes and large rivers (MT

Figure C.6-8. *Map showing the year-round, statewide distribution of Bald Eagles in Montana. (MT Field Guide 2012).*

Field Guide 2012). As of 2008, there were approximately 490 Bald Eagle nesting territories in Montana (FWP unpublished data).

Golden Eagle

Golden Eagle Habitat Requirements

Throughout their range, Golden Eagles are most commonly associated with arid, open habitat with a dominant vegetation of shrubs and grasses where they hunt for food. In Montana these eagles eat primarily jackrabbits, ground squirrels, and carrion (dead animals). They nest on cliffs and in large trees, where nests are sometimes over six feet in diameter. Occasionally they nest on power poles. Golden Eagles nest in the same territory year after year, and the same pair often uses the same nest year after year. These eagles also may use different nests within the territory in different years (MT Field Guide 2012; Kochert et al. 2002).

Figure C.6-9. *Map showing the year-round, statewide distribution of Golden Eagles in Montana (MT Field Guide 2012).*

Golden Eagle Locations in Montana

Golden Eagles occur year-round throughout Montana (see Figure C.6-9). Breeding distribution is generally associated with the availability of suitable nest sites near open country, such as grasslands, mountain meadows, and sagebrush shrub/steppe, which is used for foraging. They are found from low (sea level) to high (11,900 feet) elevations (MT Field Guide 2012; Kochert et al. 2002).

Objectives of Recommended Design Standards

- Protect and conserve Bald and Golden Eagle nests from human disturbances associated with developed facilities such as buildings, roads, and trails.
- Reduce the potential risk for violations associated with the Bald and Golden Eagle Protection Act. A description of this act follows.

Bald and Golden Eagle Protection Act

This legislation prohibits destruction or disturbance of Bald and Golden Eagles or their nests. Penalties can be imposed for failure to comply with this act. A copy of the Bald and Golden Eagle Protection Act is available at **http://www.fws.gov/le/pdffiles/BEPA.pdf**. The U.S. Fish and Wildlife Service (USFWS) describes the Act as follows:

> "The Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c) . . . prohibits anyone, without a permit issued by the Secretary of the Interior, from 'taking' bald [or golden] eagles, including their parts, nests, or eggs . . . The Act defines 'take' as 'pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb . . .' '[D]isturb' means 'to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle; 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.
>
> "In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death, or nest abandonment.
>
> "A violation of the Act can result in a fine of $100,000 ($200,000 for organizations), imprisonment for one year, or both, for a first offense. Penalties increase substantially for additional offenses, and a second violation of this Act is a felony" (USFWS 2010).

Recommendations for reducing the potential of violating the Bald and Golden Eagle Protection Act when conducting activities in Bald Eagle habitat can be found in the *Montana Bald Eagle Management Guidelines* (Montana Bald Eagle Working Group 2010). A limited number of permits allowing take or disturbance of a Bald or Golden Eagle or their nest may be issued by the USFWS. Potential applicants are strongly encouraged to contact FWP prior to applying for a federal take permit. A state permit may also be required.

Conservation Status

Both Bald and Golden Eagles are Species of Concern in Montana:

- **Bald Eagles** are classified as a Tier I species by Montana Fish, Wildlife & Parks (Greatest Conservation Need; MCFWCS 2005); Priority Level II by Montana Partners in Flight (Species in Need; Casey 2000); Montana rank S3 by the Montana Natural Heritage Program (potentially at risk because of limited and/or declining numbers, range, and/or habitat; MT Field Guide 2012); and a "sensitive species" by the Bureau of Land Management. Bald Eagles are no longer listed as a threatened species under the Endangered Species Act. Instead, they are listed as "recovered and being monitored" (MT Field Guide 2012).

- **Golden Eagles** are classified as a Tier II species by Montana Fish, Wildlife & Parks (Moderate Conservation Need; MCFWCS 2005); Montana rank S3 by the Montana Natural Heritage Program (potentially at risk because of limited and/or declining numbers, range, and/or habitat; MT Field Guide 2012); and a "sensitive species" by the Bureau of Land Management (MT Field Guide 2012).

Impacts from Development

More than 80 percent of the Bald Eagle territories in Montana occur in counties with increasing human populations. Human population growth often translates into increased development. As development in Montana increases, the potential for disturbance-related impacts to eagles also increases. The response of Bald Eagles to disturbance is variable and closely associated with the type of activity, proximity to the eagle, and the visibility of the disturbance activity, but not all activity disturbs eagles (Anthony et al. 1994; Anthony and Isaacs 1989; Arnett et al. 2001; Becker 2002; Call 1979; Chandler et al. 1995; Fraser et al. 1985; Grier et al. 1983; Grubb et al. 2002; Grubb and King 1991; Richardson and Miller 1997; Stalmaster and Kaiser 1999; Steidl and Anthony 1996). Some seemingly benign human activities, such as hiking, may have greater potential to disturb Bald Eagles than watercraft, vehicles, or loud activities (Grubb and King 1991). However, disturbance may result when human activity is unusually loud (e.g., fireworks or construction activities) or the activity breaks from the normal pattern of human use in the vicinity of the nest.

Less is known about the impacts of human disturbance on Golden Eagles. In a study of Golden Eagles, 85 percent of all known nest losses were attributed to human disturbance (Boeker and Ray 1971). In addition, Golden Eagles have been known to abandon their nests because of human activity. Abandoned nesting territories in a California research project had more dwellings within one mile and higher human populations within three miles, than territories that continued to be occupied (Kochert et al. 2002).

Impacts on eagles and other raptors from human disturbance have been well documented:

> "Human disturbances near nest sites have resulted in the abandonment of the nest; high nestling mortality due to overheating, chilling, or desiccation when young are left unattended; premature fledging; and ejection of eggs or young from the nest (Bent 1938; Woffinden 1942; Boeker and Ray 1971; Snow 1974; Fyfe and Olendorff 1976; Call 1979; Swenson 1979; Craighead and Mindell 1981; Suter and Joness 1981; Postovit and Postovit 1987; Palmer 1988; Tella et al. 1996; Anderson and Squires 1997). Raptors which successfully nest during a disturbance may abandon the nesting territory the year following the disturbance (Fyfe and Olendorff 1976; Platt 1977; Ratcliffe 1980; White and Thurow 1985) . . ." (Romin and Muck 1999, p. 7)

Recommended Standards

Maintain a one-half mile vegetated buffer between any Bald or Golden Eagle nests and subdivision design features. Within the vegetated buffer, install power lines according to the raptor standards established by the Avian Power Line Interaction Committee (APLIC 2006).

Substantial Evidence for Bald and Golden Eagle Recommendations

Bald and Golden Eagles usually nest in the same territory annually. Bald Eagles often nest in the same nest for many years (e.g., MT Field Guide 2012; Watson and Rodrick 2000). Golden Eagles can also use the same nest year after year (MT Field Guide 2012). However, both of these birds can have multiple nests in a territory and may use different nests from year to year. Consequently, protection of both occupied and unoccupied nests is essential. The following scientific studies and professional opinions justify the recommended standards:

Bald Eagles

- The following buffer distance is recommended for Bald Eagles in the absence of a visual buffer:

  "½ mile for the following activities:

  - o Any activity that will result in more than one house or permanent construction to include commercial use, buildings 3 or more stories high, activity that would increase human use, or project with a footprint greater than ½ acre.
  - o Construction of new marinas with routine use by 6 or more boats.
  - o Any use of explosives or activities that produce extremely loud noise, such as blasting, use of jackhammers or gravel crushing equipment, or fireworks.
  - o Forest management activities that include harvesting and heavy truck traffic in areas that don't normally have that type of activity.
  - o Construction of new above ground power and utility lines" (Montana Bald Eagle Working Group 2010, p. 7).

- For Bald Eagles ". . . we recommend that human activities within 800 m (one-half mile) of nests be restricted from 1 January to 31 August of each year" (Anthony and Isaacs 1989, p. 158).

- "We suggest a minimum, generic, primary zone of approximately 600 m [three-eighths mile] around breeding bald eagles. Beyond this distance response frequency was generally below 30%. A 1,200-m [three-quarters mile] secondary buffer zone would accommodate most of the distant responses from vehicle, noise, and aircraft disturbance. Typically, no human activity is permitted at any time within a primary protection zone. Within a secondary buffer zone, limited, nonpermanent activity may be allowed during the nonbreeding season (Mathisen et al. 1977; U.S. Fish and Wildlife Service 1981)." (Grubb and King 1991, p. 509)

- "Median distances recommended for buffer zones for nesting raptors . . . bald eagle = 500 m [S‡mile] (range = 250–800 m [approximately 820–2,625 feet (½ mile)], n = 5) . . ." Note that "n = 5" refers to the *number* of studies used to determine the recommended median buffer zone distance (Richardson and Miller 1997, p. 635).

- For Bald Eagle nest sites there should be "[n]o surface occupancy (beyond that which historically occurred in the area) within ¼ mile radius of active nests. . . . Seasonal restriction to human encroachment within ½ mile radius of active nests from October 15 through July 31." Surface occupancy is defined as "[a]ny physical object that is intended to remain on the landscape permanently or for a significant amount of time. Examples include houses, oil and gas wells, tanks, wind turbines, roads, tracks, etc." Human encroachment is defined as "[a]ny activity that brings humans in the area. Examples include driving, facilities maintenance, boating, trail access (e.g., hiking, biking), etc." (Colorado Division of Wildlife 2008, pp. 2 and 5).

- For Bald Eagles "... [b]uffers between 100–1,200 m (330–4,000 ft) have been recommended throughout the United States to protect the integrity of nest trees and stands (Mathison et al. 1977; U.S. Fish and Wildlife Service 1982, 1986; Fraser et al. 1985; Anthony and Isaacs 1989; Grubb and King 1991; Grubb et al. 1992). Nests and nest trees must be protected year-round, since bald eagles typically use and maintain the same nests year after year. In addition, nests that appear to be abandoned also need protection, since bald eagles often construct alternate nests that are used periodically" (Watson and Rodrick 2000, p. 9-9).

Golden Eagles

- "Accelerated commercial and urban development was attributed to golden eagle nesting declines along the Colorado Front Range (Boeker 1974)." (Romin and Muck 1999, p. 7)

- "Median distances recommended for buffer zones for nesting raptors . . . golden eagle = 800 m [½ mile] (range = 200–1,600 m [approximately 660–5,250 feet (1 mile)], n = 3) . . ." Note that "n = 3" refers to the *number* of scientific studies used to determine the recommended median buffer zone distance (Richardson and Miller 1997, p. 635).

- [I]t is recommended that shrub stands be preserved within 3 km (1.9 mi) of golden eagle nests (Kochert et al. 1999). This distance accounted for 95% of eagle movements measured during the breeding season in western Idaho (Marzluff et al. 1997) . . . Avoid new development and human activities near nest sites (especially between 15 February and 15 July)." (Watson and Whalen 2003, pp. 8-3 and 8-7)

- For Golden Eagles there should be "[n]o surface occupancy (beyond that which historically occurred in the area) within ¼ mile radius of active nests. . . . Seasonal restriction to human encroachment within ½ mile radius of active nests from December 15 through July 15." Surface occupancy is defined as "[a]ny physical object that is intended to remain on the landscape permanently or for a significant amount of time. Examples include houses, oil and gas wells, tanks, wind turbines, roads, tracks, etc." Human encroachment is defined as "[a]ny activity that brings humans in the area. Examples include driving, facilities maintenance, boating, trail access (e.g., hiking, biking), etc." (Colorado Division of Wildlife 2008, pp. 2 and 5).

Both Bald and Golden Eagles

- Spatial buffers of one (1) mile for Bald Eagles nests and one-half (½) mile for Golden Eagles nests are recommended (Romin and Muck 1999).

- The federal Bald and Golden Eagle Protection Act (see section above) is designed to protect the nests of these birds from human activity by prohibiting anyone without a permit to "take" ("pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb") Bald and Golden Eagles. Under the Act, the term "disturb" means "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle; (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." This definition also covers impacts that result from "human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death or nest abandonment" (USFWS 2010).

- "In a summary of eagle mortalities from the early 1960s to the mid-1990s, electrocution accounted for 25% of golden eagle and 12% of bald eagle deaths (Franson et al. 1995). Electrocution accounted for 0.5% of deaths in a study of raptor mortality (n = 409) in California from 1983 to 1994 (Morishita et al. 1998). Of bald eagles banded in the Yellowstone area (n = 49), 20% died from electrocution or collision with power lines (Harmata et al. 1999). In Florida, 17% of bald eagle mortalities (n = 309) from 1963 to 1994 were due to electrocution (Forrester and Spalding 2003). Electrocution also accounted for 6% of eagle mortalities (n = 274) from a rehabilitation database in Florida from 1988 to 1994 (Forrester and Spalding 2003). Electrocution was the cause of death for 11.5% of bald and golden eagles evaluated (n = 546) from 1986 to 1998 in western Canada (Wayland et al. 2003). Of 61 eagles killed in the Diablo Range of the Altamont Pass Wind Resource Area, California, from 1994 to 1997, 16% were electrocuted (Hunt et al. 1999). The frequency of electrocutions and associated outages has been dramatically reduced in areas where concerted efforts have been made to retrofit or replace hazardous poles… using recommendations from previous editions of *Suggested Practices*." Note that "n =" refers to the total *number* of birds (total number of dead eagles, total number of eagles banded, etc.) in a specific scientific study (e.g., the above reference to "n = 49" refers to the following: Of the 49 Bald Eagles banded in the Yellowstone area, 20 percent (or 10 Bald Eagles) died from electrocution or collision with power lines (APLIC 2006, p. 11).

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Ferruginous Hawk (*Buteo regalis*)

Habitat Requirements

In Montana, Ferruginous Hawks commonly nest in sagebrush and grasslands. Nests can be on the ground, in trees, or on rocky outcrops. Although they do not nest in agricultural fields, these hawks will nest in close proximity to capitalize on more abundant prey associated with edge habitats (MT Field Guide 2012).

Typical Locations in Montana

Ferruginous Hawks in Montana are generally associated with native prairie grasslands (prairie grasslands, including mixed-grass prairie) and native shrub habitats (e.g., shrub-grasslands, grass-sagebrush complex, and sagebrush shrub-steppe habitats) (Ensign 1983; Restani 1989; Restani 1991; Wittenhagen 1992; Black 1992; Atkinson 1992; Atkinson 1993) (see Figure C.6-10).

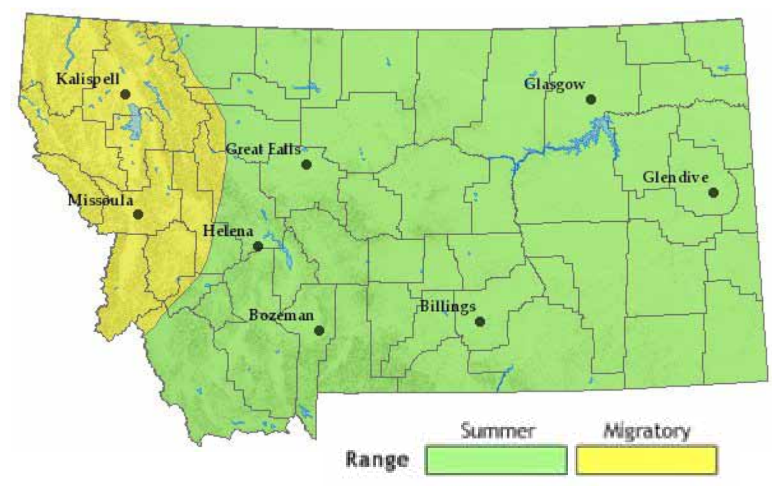

Figure C.6-10. *Map showing the general distribution of Ferruginous Hawks in Montana, including nesting and migration areas (MT Field Guide 2012).*

Objective of Recommended Design Standards

- Protect and conserve Ferruginous Hawk nests from human disturbances associated with developed facilities such as buildings, roads, and trails.

Conservation Status

Ferruginous Hawks are a Species of Concern in Montana. They are classified as a Tier II species by Montana Fish, Wildlife & Parks (Moderate Conservation Need; MCFWCS 2005); Priority Level II by Montana Partners in Flight (Species in Need; Casey 2000); Montana rank S3 by the Montana Natural Heritage Program (potentially at risk because of limited and/or declining numbers, range, and/or habitat; MT Field Guide 2012); and a "sensitive species" by the Bureau of Land Management (MT Field Guide 2012).

Impacts from Development

Ferruginous Hawks are sensitive to disturbance, including low-level disturbance. For example, White and Thurow (1985) found 33 percent of Ferruginous Hawk nests were abandoned after low-level human disturbances. "Low-level disturbance" for their studies meant nesting birds were disturbed once per day, and the humans left the area as soon as the birds flushed. Ferruginous Hawks are known to abandon nests even when mildly disturbed during nest building or incubation (March 1 through May 31). Additionally, studies show that disturbed nests fledge fewer young, and they often are not reoccupied the year following disturbances (Richardson et al. 1999). Ferruginous Hawks are especially sensitive to human disturbance during incubation, even more so than other raptors. Out of 107 Ferruginous Hawk nests in southern Idaho, no nests were located next to houses (White and Thurow 1985). In addition, researchers found that Ferruginous Hawk tolerance to disturbance did not increase over time, as is the case with many birds, but actually decreased as they were continually exposed to disturbance, resulting in increased flushing distances (White and Thurow 1985). In addition, only 52 percent of the territories that contained disturbed nests were occupied the following year, compared to 93 percent of territories containing undisturbed, control nests (White and Thurow 1985).

Recommended Standards

Maintain a one-half mile vegetated buffer between Ferruginous Hawk nests and any subdivision design features. Within the vegetated buffer, install power lines according to the raptor standards established by the Avian Power Line Interaction Committee (APLIC 2006).

Substantial Evidence for Ferruginous Hawk Recommendations

Ferruginous Hawks are documented to reuse the same nest from year to year. These hawks can have multiple nests in a territory. Sometimes two or more nests are built or refurbished without being used in a particular year (White and Thurow 1985; Bechard and Schmutz 1995). The following studies and professional opinions justify the recommended standards:

- In south-central Idaho, 33 percent of the Ferruginous Hawk nests that were subject to low-level disturbance were abandoned. Those disturbed nests that successfully fledged young produced significantly fewer young than undisturbed nests (White and Thurow 1985).

- "Brief human access and intermittent ground-based activities should be avoided within a distance of 250 m (820 ft) of [Ferruginous Hawk] nests during the hawks' most sensitive period (1 March to 31 May) (White and Thurow 1985). Prolonged activities (0.5 hr to several days) should be avoided, and noisy, prolonged activities should not occur within 1 km (0.6 mi) of nests during the breeding season (1 March to 15 August) (Suter and Joness 1981)." (Richardson et al. 1999, p. 7-3)

- "Avoid construction within 1.6 km (1 mi) of [Ferruginous Hawk] nest sites" (Richardson et al. 1999, p. 7-6).

- "Median distances recommended for buffer zones for nesting raptors . . . ferruginous hawk = 500 m [S‡mile] (range = 200–800 m [approximately 660–2,625 feet (½ mile)], n = 3) . . ." Note that "n = 3" refers to the *number* of scientific studies used to determine the recommended median buffer zone distance (Richardson and Miller 1997, p. 635).

- Spatial buffers of one-half mile are recommended for Ferruginous Hawk nests (Romin and Muck 1999).

- For Ferruginous Hawk nests: "[n]o surface occupancy (beyond that which historically occurred in the area) within ½ mile radius of active nests. Seasonal restriction to human encroachment within ½ mile radius of active nests from February 1 through July 15. This species is especially prone to nest abandonment during incubation if disturbed." Surface occupancy is defined as "[a]ny physical object that is intended to remain on the landscape permanently or for a significant amount of time. Examples include houses, oil and gas wells, tanks, wind turbines, roads, tracks, etc." Human encroachment is defined as "[a]ny activity that brings humans in the area. Examples include driving, facilities maintenance, boating, trail access (e.g., hiking, biking), etc." (Colorado Division of Wildlife 2008, pp. 2 and 5).

- "Buteos accounted for 21.4% of electrocuted raptors found in Utah and Wyoming (n = 547), and included red-tailed hawks (7.5%), Swainson's hawks (5.9%) (*Buteo swainsoni*), ferruginous hawks (1.6%) (*B. regalis*), rough-legged hawks (0.2%) (*B. lagopus*), and unidentified buteos (6.2%) (Liguori and Burruss 2003)…In a 2004 survey of poles in the Butte Valley of California, buteos accounted for 50% of suspected electrocutions (n = 18)…" (APLIC 2006, p. 12). Note that Ferruginous Hawks are a Buteo, which refers to the genus name of closely related medium-sized raptors with a robust body and broad wings.

- "The frequency of electrocutions and associated outages has been dramatically reduced in areas where concerted efforts have been made to retrofit or replace hazardous poles… using recommendations from previous editions of *Suggested Practices.*" (APLIC 2006, p. 11)

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Peregrine Falcon (*Falco peregrinus*)

Habitat Requirements

Peregrine Falcon nests are typically situated on ledges of vertical cliffs, often with a sheltering overhang. Ideal locations include undisturbed areas with a wide view, near water, and close to plentiful prey. Substitute man-made sites can include tall buildings, bridges, rock quarries, and raised platforms (MT Field Guide 2012).

Typical Locations in Montana

Peregrine Falcons are distributed throughout the state, but are most commonly associated with habitat that provides cliffs for nest sites and abundant prey (see Figure C.6-11).

Objective of Recommended Design Standard

- Protect and conserve Peregrine Falcon nests from human disturbances associated with developed facilities such as buildings, roads, and trails.

Conservation Status

Peregrine Falcons are a Species of Concern in Montana. They are classified as a Tier II species by Montana Fish, Wildlife & Parks (Moderate conservation need; MCFWCS 2005); Priority Level II by Montana Partners in Flight (Species in Need; Casey 2000); Montana rank S3 by the Montana Natural Heritage Program (Potentially at risk because of limited and/or declining numbers, range and/or habitat; MT Field Guide 2012); and a "sensitive species" by the Bureau of Land Management and U.S. Forest Service. Peregrine Falcons were listed as an endangered species from 1970 to 1999. They are currently classified as "recovered and being monitored" (MT Field Guide 2012).

Figure C.6-11. *Map showing the year-round, statewide distribution of Peregrine Falcons in Montana (MT Field Guide 2012).*

Impacts from Development

Peregrine Falcons are directly impacted by development through the loss of their nesting habitat in close proximity to water as well as through the loss of foraging habitat. Additionally, increased disturbance near nesting cliffs can cause increased time away from the nest leading to cooled or overheated eggs, chick deaths from starvation, and/or abandonment of a territory. Nesting

Peregrine Falcons vary greatly in their responsiveness to human activities, but are almost always more sensitive to disturbance from above their nest than from below. Birds in remote locations are the most reactive; those in urban areas can become habituated to human activity. Researchers have documented where historically used eyries (nests) were abandoned because of human encroachments or increased levels of nearby activity (White et al. 2002).

Recommended Standard

Maintain a one-half mile vegetated buffer between Peregrine Falcon nests and subdivision design features.

Substantial Evidence for Peregrine Falcon Recommendation

Peregrine Falcons can reuse nests from year to year. If they move nest locations, they usually locate close by, often within the same cliff face (White et al. 2002). Consequently, protection of known nesting areas is essential. The following scientific studies and professional opinions justify the recommended standard:

- "Median distances recommended for buffer zones for nesting raptors . . . peregrine falcon = 800 m [½ mile] (range = 800–1,600 m [approximately 2,625–5,250 feet (1 mile)], n = 5) . . ." Note that "n" is the *number* of studies used to determine the recommended median buffer zone distance (Richardson and Miller 1997, p. 635).

- For Peregrine Falcons "[n]o surface occupancy (beyond that which historically occurred in the area) within ½-mile radius of active nests. . . . Seasonal restriction to human encroachment within ½ mile of the nest cliff(s) from March 15 to July 31. Due to propensity to relocate nest sites, sometimes up to ½ mile along cliff faces, it is more appropriate to designate 'Nesting Areas' that encompass the cliff system and a ½ mile buffer around the cliff complex." Surface occupancy is defined as "[a]ny physical object that is intended to remain on the landscape permanently or for a significant amount of time. Examples include houses, oil and gas wells, tanks, wind turbines, roads, tracks, etc." Human encroachment is defined as "[a]ny activity that brings humans in the area. Examples include driving, facilities maintenance, boating, trail access (e.g., hiking, biking), etc." (Colorado Division of Wildlife 2008, pp. 3 and 5).

- "[H]uman access along the cliff rim [where Peregrine Falcons are nesting] should be restricted within 0.8 km (0.5 mi) of the nest from March through the end of June . . . Human activities on the face of, or immediately below, nest cliffs should be restricted from 0.4–0.8 km (0.25–0.5 mi) of the nest during this time . . . [new] facilities should not be established within 0.4–0.8 km (0.25–0.5 mi) of the eyries…" (Hays and Milner 1999, p. 11-2). (The nest of a Peregrine Falcon is sometimes called an eyrie.)

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Greater Sage-Grouse (*Centrocercus urophasianus*) Sharp-tailed Grouse (*Tympanuchus phasianellus*)

Habitat Descriptions and Locations

Greater Sage-Grouse and Sharp-tailed Grouse are sometimes referred to as prairie grouse. Their habitat requirements and distribution information is described below.

Greater Sage-Grouse

Greater Sage-Grouse Habitat Requirements

Sage-grouse depend on sagebrush (*Artemisia* spp.), primarily big sagebrush, for food and cover throughout the year. In eastern Montana, where close interspersion of wintering, nesting, and brood-rearing habitat rarely require large seasonal movements, sage-grouse are essentially nonmigratory. Some sage-grouse in southwestern Montana are migratory, moving between separate summer and winter areas.

The following seasonal habitats are important for sage-grouse:

- Breeding Habitat. Males employ elaborate courtship displays in the spring to attract females to central communal display grounds called "leks." Leks are key activity areas and most often consist of clearings surrounded by sagebrush cover. Research in central Montana reported a 20 to 50 percent (average of 32 percent) sagebrush canopy cover at feeding and loafing sites in the vicinity of leks. Because of the importance and sometimes obvious location of leks, other habitats used by prairie grouse (nesting habitat, wintering habitat, etc.) are measured in terms of their proximity to the leks (MT Sage-grouse Working Group (MT SGWG) 2005).

- Nesting Habitat. Sage-grouse depend upon sagebrush for nesting cover, and in turn, the quality of nesting cover directly influences nest success. Successful nesting requires that nests are concealed, which is generally provided by a combination of shrub and residual grass cover. Sage-grouse most frequently select nesting cover with a sagebrush canopy of 15 to 31 percent. Research findings in a nonmigratory population in central Montana suggest that about two-thirds of nests occur within two miles of a lek (MT SGWG 2005).

- Brood-Rearing Habitat. Brood-rearing habitat is concentrated in areas providing abundant, diverse, succulent forbs, which are an important summer food source for young sage-grouse. Research in central Montana indicates that sage-grouse broods prefer relatively open stands of sagebrush during summer, generally with a canopy ranging from 1 to 25 percent. Later in the summer, as the palatability of forbs declines, sage-grouse move to moist areas that still support succulent vegetation, including alfalfa fields, roadside ditches, and other moist sites. In southwest Montana, these grouse often move to intermountain valleys during late summer where forbs remain succulent through summer and early fall, and where the sagebrush canopy varies from 8.5 to 14 percent (MT SGWG 2005).

- Winter Habitat. Sage-grouse generally select relatively tall and large expanses of dense sagebrush during winter. Wintering areas in central Montana include sagebrush stands on relatively flat sites with a 20 percent canopy and an average height of 10 inches. The importance of shrub height increases with snow depth. Thus, snow depth can limit the availability of wintering sites to sage-grouse (MT SGWG 2005).

Greater Sage-Grouse Locations in Montana

Sage-grouse depend on sagebrush steppe. In fact, their distribution closely follows that of sagebrush, primarily big sagebrush (*Artemisia tridentata*). In Montana these birds are found in the eastern half and southwest corner of the state (see Figure C.6-12). In eastern Montana, where wintering, nesting, and brood-rearing habitat is relatively close in proximity, sage-grouse are essentially nonmigratory. In southwestern Montana, some sage-grouse are migratory, moving between separate summer and winter areas. Historically, sage-grouse occupied the Bitterroot Valley in western Montana. (MCFWCS 2005).

Figure C.6-12. *Map showing the year-round distribution of Greater Sage-Grouse in Montana (MT Field Guide 2012).*

Sharp-tailed Grouse

Sharp-tailed Grouse Habitat Requirements

Sharp-tailed Grouse habitat is primarily native grasslands interspersed with native shrub- and brush-filled coulees. These grouse prefer stands of intermixed tree and shrub grasslands for food, rest, escape, cover, and winter survival. They inhabit breeding grounds from mid-March to mid-April, nest from mid-May to mid-June, rear broods from June to September, and inhabit wintering areas from mid-October to mid-December (MT Field Guide 2012).

The following seasonal habitats are important for Sharp-tailed Grouse in Montana:

- Breeding Habitat. Males employ elaborate courtship displays in the spring to attract females to central communal display grounds called "leks." Sharp-tailed Grouse leks are located in native grasslands with low, sparse vegetation allowing good visibility and unrestricted movement, especially areas near dense herbaceous vegetation. Because of the importance and sometimes obvious location of leks, other habitats used by prairie grouse (nesting habitat, wintering habitat, etc.) are measured in terms of their proximity to the leks (NatureServe 2011).

- Nesting Habitat. Nests have been detected approximately 160 feet to 1 mile (50 to 1,600 meters) from leks, with 75 percent within 0.6 mile (1 kilometer) of a lek site. High-quality nesting habitat is structurally diverse, containing stands of grasses, shrubs, and forbs. Nests are generally surrounded by vegetation that is at least 6 to 12 inches (15 to 30 centimeters) tall (NatureServe 2011).

- Winter Habitat. During the winter, Sharp-tailed Grouse favor patches of deciduous trees and shrubs in upland and riparian areas, which provide food and protective cover. Although these grouse will feed on cultivated grain crops during the winter, deciduous shrubs and trees (e.g., water birch) appear to be critical when snow conditions are such that access to wheat is restricted (Schroeder and Tirhi 2003).

Sharp-tailed Grouse Locations in Montana

Sharp-tailed grouse are found predominantly east of the Continental Divide. Until recently, these grouse were found west of the Continental Divide in larger mountain valleys with extensive native bunchgrass-shrub stands. However, they have been extirpated, or nearly extirpated, from this historic range (see Figure C.6-13). Overwintering areas still include northwest Montana (MT Field Guide 2012).

Figure C.6-13. *Map showing the current year-round distribution of Sharp-tailed Grouse in Montana (MT Field Guide 2012).*

Objectives of Recommended Design Standards

- Protect Greater Sage-Grouse and Sharp-tailed Grouse lek sites from elimination or disturbances associated with subdivision development.
- Maintain Greater Sage-Grouse and Sharp-tailed Grouse nesting habitat found in the vicinity of lek sites.

Conservation Status

Both Greater Sage-Grouse and Sharp-tailed Grouse are Species of Concern in Montana:

- **Greater Sage-Grouse** are classified as a Tier I species by Montana Fish, Wildlife & Parks (Greatest Conservation Need; MCFWCS 2005); Priority Level I by Montana Partners in Flight (declining population trends and/or Montana is of high importance for the population; Casey 2000); Montana rank S2 by the Montana Natural Heritage Program (at risk because of very limited and/or potentially declining population numbers, range, and/or habitat; MT Field Guide 2012); and a “sensitive species” by both the Bureau of Land Management and the U.S. Forest Service in Montana (MT Field Guide 2012). In March 2010, the U.S. Fish and Wildlife Service placed the Greater Sage-Grouse on the list of “candidate” species and will propose it for protection under the Endangered Species Act as funding and priorities dictate (USFWS 2010b).

- **Sharp-tailed Grouse** are classified as a Tier III species by Montana Fish, Wildlife & Parks (Lower Conservation Need; MCFWCS 2005). However, west of the Continental Divide, these grouse have an S1 Montana rank by the Montana Natural Heritage Program (species at high risk because of extremely limited and/or rapidly declining population numbers, range, and/or habitat; MT Field Guide 2012) and a Priority Level II by Montana Partners in Flight (viability of the species or a portion of the species habitat in the state is threatened by one or more activities; MT Field Guide 2012). East of the Continental Divide, Sharp-tailed Grouse have a S4 rank (species is apparently secure, although it may be quite rare in parts of its range and/or suspected to be declining; MT Field Guide 2012).

Impacts from Development

As development in Montana increases, the potential for disturbance-related impacts to prairie grouse also increases. Specific ways that Greater Sage-Grouse and Sharp-tailed Grouse are impacted by development appear below.

Greater Sage-Grouse

- "In recent years the greater sage-grouse has lost 44 percent of its habitat due to agriculture; urban development; energy extraction, generation, and transmission; invasive weeds, pinion-juniper tree encroachment, and wildfire. The human footprint across the area where greater sage-grouse live is large and becoming larger as the country strives for energy independence, agriculture, development, and other, often competing uses" (USFWS 2010a, p. 2).

- "Urban and exurban development also have direct and indirect negative effects on sage-grouse, including direct and indirect habitat losses, disturbance, and introduction of new predators and invasive plant species. Given current trends in the Rocky Mountain west, urban and exurban development is expected to continue. Infrastructure such as power lines, roads, communication towers, and fences continue to fragment sage-grouse habitat. These sources of fragmentation likely will increase into the future. Fragmentation of sagebrush habitats through a variety of mechanisms including those listed above has been cited as a primary cause of the decline of sage-grouse populations. The negative effects of habitat fragmentation on sage-grouse are diverse and include reductions in the following: lek persistence, lek attendance, winter habitat, recruitment, yearling annual survival, and female nest site choice. Habitat fragmentation is believed to be a primary cause of sage-grouse decline and in some areas has already led to population extirpation. Fragmentation is expected to continue into the foreseeable future and will continue to threaten the persistence of greater sage-grouse populations" (NatureServe 2011).

- Conservation concerns include conversion of native sagebrush grassland to cropland, non-native pasture, or residential development; fragmentation of sagebrush grasslands (e.g., structural developments, roads, urban sprawl); and vulnerability to West Nile virus (MCFWCS 2005).

- "... Greater Sage-grouse have low tolerance to human disturbance such as roads (Lyon and Anderson 2003; Holloran and Anderson 2005; Aldridge and Boyce 2007), oil and gas development (Braun et al. 2002; Lyon and Anderson 2003; Holloran and Anderson 2005; Aldridge and Boyce 2007; Walker et al. 2007; Doherty et al. 2008), and exurban development (Aldridge et al. 2008) especially during the breeding season. The human footprint is most intense at low elevation near valley floors (Leu et al. 2008) and may have a disproportionate effect on sage-grouse populations that depend on low to mid-elevation habitat" (Leu and Hanser 2011, p. 271).

Sharp-tailed Grouse

- For Sharp-tailed Grouse "... housing developments and agriculture have eliminated large portions of habitat required for shelter, protection from predators, night roosting, and spring nesting" (MT Field Guide 2012).

- "At leks, males are tolerant of a variety of disturbances but are displaced by human presence. Females are more susceptible to various types of disturbance than males. Disturbance of leks appears to limit reproductive opportunities and may result in regional population declines (Baydack and Hein 1987)." (NatureServe 2011)

- "Although rural developments may continue to provide some habitats for CSTG [Columbian Sharp-tailed Grouse, a subspecies found in western Montana] in contrast to total urban conversion, dwellings, roads, fences, utility lines, pets, and increased human activities that are part of any development generally render the habitat of marginal value to CSTG. Studies of other prairie grouse suggest they exhibit a behavioral aversion to structures (Pitman et al. 2005). The potential consequence of such behavior is that a single home placed in CSTG habitat may effectively reduce habitat availability to a much greater distance than might superficially appear" (Hoffman and Thomas 2007, p. 80).

- "Disturbances to [Sharp-tailed Grouse] leks appear to limit reproductive opportunities and may result in regional population declines (Baydack and Hein 1987)." (Connelly et al. 1998)

Prairie Grouse in General

- "All species of grouse have strongholds in natural ecosystems (Johnsgard 1973; Storch 2000). Maintaining healthy grouse populations requires large, relatively undisturbed, natural landscapes. Whereas some grouse species can tolerate a moderate degree of habitat disturbance and can even use and benefit from artificially created habitats, the healthiest grouse populations are associated with extensive natural landscapes exposed to natural disturbance regimes (Johnsgard 1973; Storch 2000)." (Hoffman and Thomas 2007, p. 67)

- Roads and overhead power lines associated with human development present threats of various sorts. The following excerpt addresses energy development impacts on Greater Sage-Grouse, but the infrastructure impacts described are similar to those found in residential development, and they point out sensitivities to human disturbance that are exhibited by both species of grouse.

"Energy development and its infrastructure may negatively affect sage-grouse populations via several different mechanisms. Mechanisms responsible for cumulative impacts that lead to population declines depend in part on the magnitude and extent of human disturbance. We quantified changes in landscape features detrimental to sage-grouse that result from energy development. Males and females may abandon leks if repeatedly disturbed by raptors perching on power lines near leks (Ellis 1984), by vehicle traffic on nearby roads (Lyon and Anderson 2003), or by noise and human activity associated with energy development (Braun et al. 2002; Holloran 2005; Kaiser 2006). Collisions with power lines and vehicles, and increased predation by raptors may increase mortality of birds at leks (Connelly et al. 2000a; Lammers and Collopy 2007). Roads and power lines may also indirectly affect lek persistence by altering productivity of local populations or survival at other times of the year. Sage-grouse mortality associated with power lines and roads occurs year-round (Aldridge and Boyce 2007), and artificial ponds created by development (Zou et al. 2006b) that support breeding mosquitoes known to vector West Nile virus (Walker et al. 2007b) elevate risk of mortality from disease in late summer (Walker and Naugle, this volume, chapter 9). Sage-grouse may also avoid otherwise suitable habitat as development increases (Lyon and Anderson 2003; Holloran 2005; Kaiser 2006; Doherty et al. 2008)." (Naugle 2011, pp. 491–92)

Recommended Standards

- Greater Sage-Grouse and Sharp-tailed Grouse need a sizeable buffer from human disturbance in order to maintain their populations. If a subdivision is proposed in an area with known leks of either species, the subdivider is encouraged to consult the local FWP biologist, or other professionally trained biologist, for a recommended vegetated buffer. If consulted, the FWP biologist should consider each situation on a case-by-case basis. Scientific studies recommend vegetated buffers from lek sites be from 1.2 miles to 5 miles. Recommended Greater Sage-Grouse buffers are generally larger (3 to 5 miles) than recommended Sharp-tailed Grouse buffers.
- Within the vegetated buffer, install power lines underground.

Substantial Evidence in Support of Greater Sage-Grouse and Sharp-tailed Grouse Recommendations

Established Greater Sage-Grouse and Sharp-tailed Grouse leks may be used for many years, although their exact location may shift over time and smaller satellite leks can form in the vicinity of historic leks (NatureServe 2009). The following scientific studies and professional opinions justify the recommended standards:

Greater Sage-Grouse

- "Distances between nest sites and nearest leks average 1.1 to 6.2 kilometers [0.7–3.8 miles], but females may move more than 20 kilometers [12.4 miles] from a lek to nest.

In Colorado, generally stayed within 6 kilometers [3.7 miles] of the lek (Schoenberg 1982)." (NatureServe 2011)

- The vegetation within 2 miles (3.2 kilometers) of occupied leks of nonmigratory populations should be protected. For migratory populations, leks generally are associated with nesting habitats, but the migratory birds may move more than 11 miles (18 kilometers) from leks to nest sites. Thus, protection of habitat within 2 miles of leks may not protect most of the important nesting areas (Connelly et al. 2000).

- "Over 8,400,000 people live within 3 miles of sagebrush. As infrastructure expands to support population growth, sagebrush is fragmented into small, isolated patches, ultimately making the landscape unsuitable for sage-grouse . . . Ninety-five percent of the sagebrush within the sage-grouse range is within 1.5 miles of a road. Roads can influence predator movements, introduce invasive species, increase wildfire potential from human activities, and exacerbate other factors that may adversely affect sage-grouse" (USGS 2009, p. 3).

- In recent years, extensive research has been conducted on the impacts of energy development on Greater Sage-Grouse. These energy development guidelines help inform the less-studied consideration of guidelines for residential or commercial development in sagebrush habitats. For example, the Oregon Department of Fish and Wildlife recommends a three-mile habitat protection area of no-development around occupied leks:

  "The concept of establishing "no disturbance" habitat protection areas (or buffers) around lek sites or other important habitats [for prairie grouse] dates back more than 40 years, and has evolved over time as the body of scientific knowledge has grown. The first set of published guidelines for sage-grouse management recommended a 2-mile buffer (Braun et al. 1977), [because] at the time it was thought most nesting occurred within that distance. Connelly et al. (2000) provided an updated set of guidelines, which included a considerable amount of data from radio-telemetry studies to make a recommendation of 2–3 mile buffer, but recognized that nesting habitats could be as far as 11 miles from leks.

  More recently Colorado (Colorado Steering Committee 2008) and Wyoming (Governor's Executive Order 2008) adopted a 4-mile buffer to protect sage-grouse breeding habitat. These buffers were based on regional radio-telemetry data that indicated 80% of nesting occurred within 4 miles of leks. Thus, 20% of the nesting population in these regions may be compromised.

  In Oregon, a 3-mile habitat protection radius around lek sites protects 80% of the nesting habitat used by female sage-grouse (data from 493 nest sites in Oregon)…" (Oregon Department of Fish and Wildlife 2009, p. 8).

- "Generally sagebrush habitat and mesic (e.g., wet meadows, seeps, springs) sites within 3 miles of a lek is suitable for breeding and brood-rearing (Connelly et al. 2000). While both lek habitat and nesting habitat can be reclaimed, the biological dynamic that occurs between female nest site selection and their movement patterns that drive males to establish a lek in these areas of female use (Bradbury et al. 1989), has yet to be restored by human actions. Given the uncertainty and risk involved in trying to mitigate for the loss (i.e., reclaim/restore) of these habitat and biological dynamics, protection of these areas is paramount." (Oregon Department of Fish and Wildlife 2009, p. 3)

- "Utility wires can also create hazards for sage-grouse (Borell 1939). Wind turbines should not be located in habitat known to be occupied by sage-grouse because this species avoids vertical structures and is sensitive to habitat fragmentation (U.S. Fish and Wildlife Service 2003). In grouse habitat, avoid placing turbines within 8 km (5 mi) of known leks (U.S. Fish and Wildlife Service 2003). The expansion of roads near shrub-steppe habitat used by grouse leads to habitat loss and fragmentation, direct mortality (Braun 1998), and the spread of invasive weeds. Consequently, limitations should be placed on the expansion of roads within grouse habitat." (Schroeder et al. 2003, p. 17-7)

- "Avoid building power lines, wind turbines, and other tall structures within 3 kilometers (1.9 miles) of grouse habitat or within 8 km (5 miles) of leks" (Schroeder et al. 2003, p. 17-13).

- "Power lines provide additional hunting perches for raptors in otherwise treeless areas. Power lines most likely impact grouse near leks, in brood-rearing habitat, and in wintering areas that also support large numbers of wintering raptors. Construction of new power lines contributes to habitat degradation when accompanied by new roads or other infrastructure, e.g., pipelines, fences, etc. Utilities commonly make power poles safe for raptors to use as perches, which poses a dilemma in sage-grouse habitat" (MT SGWG 2005, p. vi).

- For transmission lines in sage-grouse habitat: ". . . Use existing utility corridors and rights-of-ways to consolidate activities to reduce habitat loss, degradation, and fragmentation by new construction. Where topographically possible, install new power lines within existing power line corridors or highway rights-of-way . . . In some cases power lines should be buried to minimize the disturbance" (Hagen 2011, p. 114).

Sharp-tailed Grouse

- "The area within 2.5 kilometers (1.5 miles) of an active breeding lek is believed to be critical to management of nesting and brood-rearing habitats (Saab and Marks 1992; Giesen and Connelly 1993)." (NatureServe 2011)

- "Vegetation removal should be discouraged within 2 km (1.2 mi) of active or potential lek sites, especially during the breeding season (Giesen and Connelly 1993; Washington Department of Fish and Wildlife 1995) . . . Vegetation manipulation should be avoided . . . within 2 km (1.2 mi) of active or potential lek sites, within 100 m (328 ft) of streams, or within winter habitat." (Schroeder and Tirhi 2003, p. 16-3)

- "[A]void vegetation manipulation within the breeding complex (defined as the lek and all land within a 2-km [1.2 miles] radius)" (Hoffman and Thomas 2007, p. 97).

- "The breeding complex (lek and nesting areas) includes all lands within a 2-km radius [1.25 miles] of lek sites. Vegetation manipulation should be avoided within these complexes because of their importance for nesting and brood-rearing. Disturbance of vegetation that has long-term (i.e., > 5 yr) effects on mountain shrub habitats used during winter should be avoided if shrubs constitute < 10% of cover within occupied areas" (Connelly et al. 1998).

Prairie Grouse in General

- "Raptor-proofing techniques [to minimize perching by raptors] might include placing power lines underground . . ." (Schroeder et al. 2003, p. 17-7; and Schroeder and Tirhi 2003, p. 16-5).

- In the context of wind energy development planning, the U.S. Fish and Wildlife Service (Service or FWS) recommends a 5-mile buffer from occupied prairie grouse leks. "The intent of the Service's recommendation for a 5-mile zone of protection is to buffer against increased mortality (both human-caused and natural), against habitat degradation and fragmentation, and against disturbance. In considering our recommendation, FWS recognizes major declines in populations and habitats of prairie grouse. All species of prairie grouse are in varying stages of decline—some populations declining precipitously—requiring a major focus on direct human impacts, disturbance from structures, and fragmentation of habitats. While wind plants are new additions to prairie grouse habitats in the Midwest and West, cumulative impacts from human development and exploitation must be assessed with great care and considerable detail" (Manville 2004, p. 12).

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