

## **PRIORITY HABITATS: INFORMATION, ISSUES, AND RECOMMENDATIONS**

### **Riparian Habitat Group**

#### ***Plains/Basin Riparian***

##### **1) Describe the habitat:**

**a) Historic conditions:** Prior to the influence of European American settlers, riparian areas were probably limited to river and creek sides (fewer trees occurred away from the direct influence of the river or stream). Areas that were influenced by beaver ponds were more extensive in width and changes were more dynamic. Also, prior to the construction of dams for flood control, irrigation, and hydroelectric power, seasonal flood regimes were very important to cottonwood and willow regeneration. Wildlife ungulate pressure on riparian habitat was most likely cyclic and not constant. More diverse age classes of cottonwoods and willows occurred. More braided river channels with oxbows and gravel bars were present. The flatter terrain of the plains and basins led to the deposition of alluvial soils over sometimes broad floodplains.

**b) Present conditions:** Dominated by cottonwoods, elderberry, buffaloberry (several species), introduced Russian olive, boxelder, willow (several species), green ash, American elm, snowberry, chokecherry, Virginia creeper, and grasses/rushes/sedges; occurs in a lower elevation setting. Streamflow regulation, fire suppression, agriculture, irrigation, livestock grazing, and other human activities have created a riparian habitat that is quite different from that of presettlement times, and the riparian zone has been altered more extensively than any other landscape. Unregulated rivers still have flood zones, although water for irrigation is removed. Decadent cottonwoods with little or no regeneration occur in some or many areas, but woodlands are now more common along some rivers than in presettlement times. Irrigated areas may cause more wet meadows and wetlands, and may encourage cottonwood and willow development through higher water tables. Encroachment of nonnative species including Russian olive, tamarisk, and weed invasions (leafy spurge, thistle) is a problem. Drying of sites caused by changes in channel morphology, regulated water flows, irrigation withdrawals, and urbanization is a concern.

##### **2) Identify the issues:**

**a) Use:** We have working rivers in this state! Recreation, irrigation, livestock grazing, wildlife use, urbanization, and hydroelectricity are major uses.

**b) Access:** Most plains/basin riparian habitat is in private ownership, which keeps large numbers of people from impacting the habitat. Riparian areas are where people

focus their activities; when we have access to them we use them heavily. High intensity impacts in accessible sites are a concern.

**c) Problems:** Incompatible livestock grazing; high intensity recreation; flood control and irrigation, which cause a drop in the water table and create stands of decadent cottonwoods with little or no regeneration; stream bank stabilization, which reduces braiding and the flood zone and narrows the stream channel; encroachment of nonnative species (including Russian olive, tamarisk, and weed invasions like leafy spurge and thistle); drying of sites (caused by changes in channel morphology, regulated water flows, irrigation withdrawals, and urbanization); unnaturally high wildlife ungulate populations; and urbanization (planting exotics; loss of habitat diversity; domestic dogs and cats; exotic wildlife like European Starlings and House Sparrows; increased predators like skunks, raccoons, and red foxes).

**d) What has been the cause of change to the habitat:** Declines in densities and abundance of cottonwood forests can be attributed mainly to reduced stream flow and changes in the rates of channel migration and sedimentation following damming, and incompatible livestock grazing. Increased water salinity, groundwater pumping, water developments, channelization, stream control, stream bank stabilization, increased human pressure, land clearing, urbanization, and increased occurrence of fire have also contributed to the stress.

### **3) Priority bird species in Plains/Basin Riparian habitat in Wyoming:**

**Level I:**

Bald Eagle  
Swainson's Hawk

Lewis' Woodpecker  
Willow Flycatcher  
Cassin's Kingbird  
MacGillivray's Warbler

**Level II:**

Black-billed Cuckoo  
Yellow-billed Cuckoo  
Western Screech-Owl  
Eastern Screech-Owl  
Black-chinned Hummingbird  
Broad-tailed Hummingbird

**Level III:**

Red-headed Woodpecker  
Northern Rough-winged Swallow  
Ovenbird  
Lazuli Bunting  
Bullock's Oriole

## ***Montane Riparian***

### **1) Describe the habitat:**

**a) Historic conditions:** Habitat was greatly influenced by beaver; dominant species probably included willows, alder, dogwood, Rocky Mountain maple, and water birch; more of an aspen component as stringers came down to and blended with actual riparian habitat.

**b) Present conditions:** Dominated by willows, alder, dogwood, Rocky Mountain maple, and water birch; can include narrowleaf cottonwood, spruce, and sedges/rushes; occurs in a mountain setting. Changes between historic and present conditions are not as great as in Plains/Basin Riparian habitat, but nevertheless, streamflow regulation, fire suppression, agriculture, irrigation, livestock grazing, and other human activities have created a riparian habitat that is quite different from that of presettlement times. Conifers are more of an associated component as aspen stringers become crowded out. Less beaver influence and more focused grazing and browsing by both wildlife ungulates and livestock.

### **2) Identify the issues:**

**a) Use:** Recreation and accessibility have increased over historic use; increased road intrusion, receives more focused use by all user groups (livestock, wildlife, recreation).

**b) Access:** Where there is access for humans, areas that have less use are due to topographic limitations; accessible areas are heavily used.

**c) Problems:** Increased recreation (outfitters/guides, pack trips, hikers, off-road vehicles, etc.), incompatible livestock grazing, and timber harvest operations (road building, sedimentation, down-cutting, channelization, and habitat loss due to impacts).

**d) What has been the cause of change to the habitat:** Higher density of trees causing transpiration and reducing the underground aquifer; fire suppression; beaver removal; and increased human use.

### **3) Priority bird species in Montane Riparian habitat in Wyoming:**

#### **Level I:**

Bald Eagle

American Dipper  
MacGillivray's Warbler  
Wilson's Warbler

#### **Level II:**

Harlequin Duck  
Calliope Hummingbird  
Broad-tailed Hummingbird  
Willow Flycatcher  
Hammond's Flycatcher  
Cordilleran Flycatcher

#### **Level III:**

Veery  
Lazuli Bunting  
Bullock's Oriole

## *Best Management Practices*

### **Wyoming Partners In Flight Best Management Practices for Riparian Areas to Benefit Birds in Wyoming.**

#### Introduction

Riparian areas—lands adjacent to creeks, streams, rivers, ponds, and lakes where the vegetation is strongly influenced by the presence of water—are both ecologically and economically important. Water quality, biological diversity, wildlife habitat, agricultural and ranching productivity, timber production, water and power sources, recreation, and basic aesthetics are all vital functions of riparian areas. In the western United States, riparian habitat covers only about 2% of the land surface, but it is the single most productive type of wildlife habitat and benefits the greatest number of species. For example, more than 75% of all wildlife species in southeastern Wyoming depend on riparian habitats, and in the western United States, more bird species rely on riparian habitats than all other western rangeland vegetation types combined. Besides providing crucial wildlife habitat, healthy riparian areas provide many important ecological functions—they store water and recharge aquifers, filter chemical and organic wastes, trap sediment, build and maintain streambanks, reduce soil erosion, and produce plants. Water, soil, vegetation, and landform are components of the riparian area that must be considered for successful management. In a healthy riparian ecosystem, the four are in balance and mutually support one another.

From an avian perspective, healthy riparian areas are critical as nesting, wintering, and migratory habitat, and the number and diversity of birds in riparian areas is a direct indication of ecosystem health. Approximately 73 of Wyoming's avian species have been identified as using riparian habitats. Some of these, such as the Yellow-billed Cuckoo and Willow Flycatcher, are among the most imperiled of the migratory species in Wyoming and the West. The best way to help the largest number of birds in Wyoming is to maintain or improve the condition of vegetation in riparian areas to represent diverse, healthy plant communities. The greatest species richness (the number of different species and individuals) is positively associated with tall deciduous trees, high densities of medium to large diameter trees, low densities of small trees, and a high relative forb cover. The highest density of nesting pairs of birds is associated with good canopy cover, a high diversity of tree species, lack of conifer tree dominance, and low relative grass cover. This type of plant diversity in riparian areas will be ideal for bird populations, will help maintain water quality and reduce soil erosion, and will provide forage for livestock and wildlife.

Many of the Best Management Practices (BMPs) for riparian areas fall into major categories of land use such as Grazing, Forestry, Engineering, Recreation, etc. The recommended BMPs are broken out into categories for convenience, although some are general enough to cross into other categories.

### General

- 1) Manage riparian areas for stable, non-eroding banks; good water quality; stable, year-round flows; and sustainable use without abuse over the long-term.
- 2) Manage riparian areas from a watershed perspective. Ensure that riparian areas are continuous along the entire drainage and are as wide as the soil and water table will allow riparian vegetation to exist. This will reduce habitat fragmentation, which will help ease predation and cowbird nest parasitism.
- 3) Consider both long- and short-term impacts and/or benefits of any activities within or adjacent to riparian areas. Recreation, development, and improper grazing in riparian areas can reduce the multi-aged, multi-layered structure, including snags (standing dead trees) and diseased trees, most beneficial to birds.
- 4) Provide multiple layers of plants, or “vertical vegetation structure”, in woody riparian habitats. Many bird species nest and forage within 10 feet (3 m) of the ground, so it is critical to have sufficient amounts of vegetation at that level. Healthy woody riparian areas have young trees and shrubs that provide this layer.
- 5) Manage for a stable or increasing population of native woody species. Ensure that all age classes are present (seedling, young, mature, and decadent), with more seedlings present than decadent plants, and more young plants than mature ones.
- 6) Manage for a variety of locally native plants. Different plant species host different insect populations, which provide food for a variety of bird species.
- 7) When planting trees, select native species and avoid Russian olive and tamarisk (salt cedar). These exotic woody plants are vigorous species that can be established easily in many areas, but they out-compete native plants and host relatively few insect species. Most birds avoid foraging in Russian olive and tamarisk trees, so they have little value as wildlife habitat and can quickly degrade existing native wildlife habitat. In areas of widespread invasions where native trees and shrubs are scarce, removal of these invaders in sections, followed by replanting with natives, may be better than a onetime, wide-scale removal. This should allow any wildlife using Russian olive or tamarisk to gradually switch to native vegetation.

8) Develop conservation partnerships between landowners, land managers, and private organizations. While landowners need to derive income from the land, this can often be compatible with maintaining regional biological diversity, depending on how the land is used and what land management tools are employed. Identify the habitat needs of the birds in the area and the economic needs of the landowner so a baseline need is established. Important habitat on private land can be protected with conservation easements. In some cases, landowners can derive income from hunters, birders, and naturalists who visit the region.

9) Regularly monitor birds to see how the management plan is working, and redirect efforts if necessary (with special emphasis for species that seem to be declining). Implement riparian habitat monitoring programs to establish baseline data and identify changes in habitat quality (both positive and negative) through time. Use standardized methods to monitor the habitats and sensitive species in an area, before and at several-year intervals after treatments are applied, to aid in making proper land management decisions in the future.

### Grazing

Livestock grazing is one of the most extensive human-caused influences on riparian areas in the western United States. Proper stocking levels and grazing regimes can be effective habitat management tools and compatible with riparian area maintenance and improvement. However, improper grazing practices in riparian areas can eliminate vegetation and associated wildlife, widen stream channels, cause soil erosion, increase sediment load in the stream channel, increase stream water temperature, encourage invasion of noxious plants, change streambank configuration, and lower surrounding water tables. The degraded condition of many riparian areas and watersheds in the West is from uncontrolled grazing that occurred in the late 19<sup>th</sup> and early 20<sup>th</sup> centuries; today's successful manager can learn from past mistakes. Grazing systems, like deferred-rotation, rest-rotation, high intensity-low frequency, and short-duration, combine periods of use with nonuse, and can be effective management tools to increase animal productivity and achieve habitat objectives. From a management perspective, vegetation is usually the component over which the manager has the most control, that is the easiest to manipulate, and that responds the fastest to human influences. Birds typically do not respond to the presence of livestock, but rather to the impacts that livestock grazing has on vegetation. These Best Management Practices for grazing focus on protecting riparian areas during crucial growing periods.

1) Grazing management plans should be developed and evaluated on a case-by-case basis by the managing agency or landowner because no single grazing strategy will fit all situations. Include riparian area management as an integral part of each grazing management plan. Determine site-specific riparian area objectives and tailor the grazing management plan to help meet the objectives. Consider the site's specific

factors of concern, such as bank instability or loss of woody plants; the site's potential and capability; its suitability for grazing livestock and the type of stock best suited to the area; and the ideal grazing strategy, including the time, place, amount, duration, and intensity of grazing. Monitor the effects of each grazing strategy on the riparian area to check progress toward the objectives. Record how key riparian plant species, the overall riparian ecosystem, and key upland plant species respond to grazing management (annual photographs taken from the same point are helpful).

2) Maintain proper stocking rates and livestock distribution to protect riparian ecosystems. Incompatible grazing can have harmful long-term effects on survival and regeneration of tree and shrub seedlings; can negatively influence the species, structure, and health of riparian vegetation; and can cause soil compaction, bank trampling, and degraded water quality from waste materials and excessive soil in the water. Manage grazing intensity at a level that will maintain the composition, density, and vigor of desired plants and will not damage riparian soils, streambanks, or water quality.

3) Limit the amount of time livestock spend in pastures with riparian areas. This can be a significant factor in the condition of the riparian area. Base the length of the grazing period within a riparian zone on the areas livestock are actually using, not the entire pasture. If needed, add more rest to grazing cycles to increase plant vigor, allow streambanks to regenerate, or encourage more desirable plant species composition.

4) Sagebrush that grows up to the edge of an existing or historical stream channel is evidence of chronic problems. If grazing is the cause, livestock should be managed more intensively to remove the negative impacts, or other interventions should be considered until the water table has been restored and mesic (moisture-loving) plant species reestablish themselves on the site. At that point, grazing may be used as a management tool. Both birds and livestock will ultimately benefit.

5) Exclude livestock from riparian areas with high risk and poor recovery potential when there is no practical way to protect those riparian areas while grazing adjacent uplands.

6) Fencing can isolate riparian areas into one or a few pastures; other pastures should be exclusively uplands. This can simplify management intended to protect riparian areas. If animal movement can be controlled by herding, turning water on or off, or some other method, fencing may not be necessary. However, fencing may be the best alternative for rapid restoration of riparian ecosystems. When fencing riparian areas to exclude livestock, make sure all riparian plant community types are included in the enclosure. Fences that parallel a stream should be located well outside the riparian zone so that animals trailing along the fence will not be impacting the streambanks and riparian vegetation.

7) If riparian areas are fenced to exclude livestock, provide access to a short, straight, stable section of stream with a gentle bank as a livestock watering site (water gap). Avoid installing water gaps where streambanks bend and curve; this is where the water flow puts additional pressure on the banks, and livestock trampling can cause significant streambank damage and excessive sediment in the waterway.

8) Manage pastures with riparian habitat as separate units in a rotation grazing system. Where feasible, use a deferred-rotation or rest-rotation system, whereby no pasture is grazed the same season (spring, summer, or fall) two years in a row. A year of rest for each riparian pasture every three to four years is beneficial for long-term riparian habitat maintenance. In some areas, use of these pastures late in the grazing season by cows with calves will produce the best use of upland forage resources and reduce impacts on riparian areas.

9) Where possible, avoid keeping livestock in holding pastures (where livestock are held for prolonged periods for winter feeding or calving) in riparian areas. If this is unavoidable, do not regard the vegetation in a holding pasture as forage; provide adequate supplemental feed. Provide ease of access for livestock to water, or provide off-stream watering sites. Direct herd pressure to the most resistant areas of the field through placement of supplements.

10) Control the timing of grazing to keep livestock off streambanks when they are most vulnerable to damage (when the ground is saturated) and to coincide with the physiological needs of target plant species. Also, sheep may be favored in areas prone to bank damage, since sheep are lighter-weight and cause less damage to streambanks.

11) Ensure adequate residual vegetation cover is left after grazing; this is essential for maintaining riparian ecosystem health. Instead of focusing on how much vegetation can be removed, focus on how much and what type of vegetation should be left to ensure that the riparian area is able to perform its functions (reducing water flow speed, trapping sediment, bank building, and erosion protection). The vegetation present at the end of the growing season or at the end of a grazing period, whichever comes last, is what will be available during the next runoff period. (Projections of residual vegetation should also consider seasonal wildlife use prior to runoff.)

12) Spring grazing may increase the herbaceous component of the understory, which is very important for ground foraging and seed eating birds, and reduce browsing pressure on woody species, which are essential for maintaining riparian functions. However, grazing must be completed in time for the plants to regrow, at least 60 to 75% of current growth should be retained (no more than 25 to 40% removed), and at least 6 inches (15 cm) of stubble height should remain (special situations, such as critical fisheries habitats or easily eroded streambanks, may require leaving stubble heights greater than 6 inches). Spring grazing may be beneficial where livestock can be

attracted to the uplands by succulent herbaceous plants, when cool temperatures may not drive livestock into riparian areas and may discourage loitering in the cooler riparian zone, where saturated soil in the riparian area may discourage livestock from entering, or where well-drained soils reduce the risk of compaction. Spring grazing may be detrimental where wet soils increase the potential negative impacts of soil compaction, bank trampling, and erosion; when repeated grazing of the area occurs, which may reduce plant vigor and change plant composition; and where grazing can adversely affect birds and other wildlife in the area.

13) Hot season grazing (mid- to late summer) in riparian areas should be avoided. During this period, livestock are especially likely to concentrate in riparian areas and can seriously degrade the vegetation and stream channel. Once the upland forage cures, livestock should be moved to a pasture without riparian areas or regularly herded out of riparian areas.

14) Light fall grazing can help maintain functioning riparian areas if at least 60 to 70% of plant growth remains (use is no more than 30 to 40%), no significant consumption of willows and other shrubs occurs, and stubble heights of 4 to 6 inches (10 to 15 cm) are retained (special situations, such as critical fisheries habitats or easily eroded streambanks, may require leaving stubble heights greater than 6 inches). Fall grazing may be beneficial when riparian vegetation consists of herbaceous (grass/forb) species rather than woody (tree/shrub) species; where cool season grasses provide palatable forage in upland areas; when off-stream water is available near forage; or when cooler temperatures draw livestock out of riparian areas. Fall grazing may be detrimental when it negatively impacts woody species; when regrowth does not occur until the following spring, which may affect the ability of the vegetation to fulfill their riparian functions during spring runoff; and when incentives to draw livestock away from riparian areas are not available. Advantages of fall grazing include less impact on wildlife habitat, reduced conflicts with ground nesting birds, and less soil compaction and streambank trampling due to drier soils. Also, since most plants have completed their growth cycle by this time, grazing will not adversely affect plant development.

15) Winter grazing may be the least detrimental to riparian health and may improve livestock distribution and plant response. This strategy focuses on plants when they are dormant so it allows total rest during the growing season, which promotes plant vigor and production of seeds and roots. Winter grazing may be beneficial where soil type makes compaction and streambank trampling during other seasons likely; when the pasture is large enough to supplemental feed and water livestock well away from the stream; where drainages are colder than surrounding uplands or open, south-facing slopes are available, which decrease riparian area use by livestock; and when recovery of deteriorated uplands and riparian areas is needed. Winter grazing may be detrimental where damage to woody species can occur from browsing, rubbing, or

trampling; and where grazing of dead standing vegetation can reduce riparian functions the following spring.

16) Allow time for plants to rest and regrow between grazing periods to ensure they remain vigorous and productive. Plants that are continuously grazed during the growth period will lose their vigor and stop producing seeds, and their roots will die back, eventually causing a change in the plant community from more productive, palatable species to less productive and less palatable plants.

17) Discourage trailing along streambanks by placing logs across trails, perpendicular to the stream channel.

18) Herding on horseback can be an effective tool for managing livestock in riparian areas. Make sure riders know the reasons behind herding and what is expected of them; poorly conducted riding can cause more damage to the riparian zone and to livestock performance than allowing the livestock to remain in the riparian area.

19) Improve livestock distribution and forage use by using salt and mineral blocks, but avoid placing them within riparian areas [keep them at least ½ mile (0.8 km) from the stream] or in immediately adjacent uplands.

20) Improve adjacent upland forage to lure livestock out of riparian areas.

21) If needed, add more pastures to increase management flexibility and rest for riparian vegetation.

22) The presence of off-stream water is an important management tool to encourage livestock to move away from riparian areas. Develop shade and water (wells, windmills, guzzlers, or water piped from the stream) in upland areas to help spread grazing pressure. Keep in mind, however, that small birds can drown when they fall into stock tanks and troughs while drinking. Provide escape ramps to prevent drowning (Figure 5).

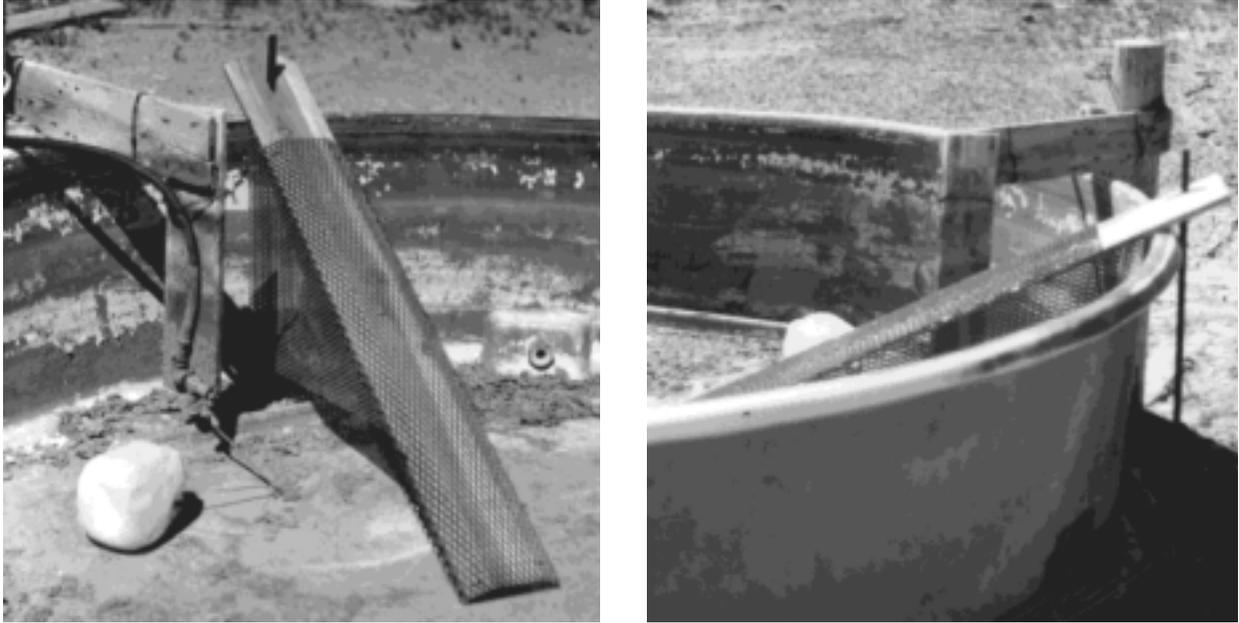


Figure 5. Escape ramps placed in stock tanks and troughs to prevent drowning of small birds and mammals (photographs courtesy of Mark Gorges, Bureau of Land Management).

23) Locate livestock-handling facilities and collection points outside of riparian areas. Branding, loading, and other handling efforts should be limited to areas and times that do not harm soils and plants in riparian zones.

24) Changing from cattle to sheep, or vice versa, may help with implementing some of the suggested grazing BMPs.

25) Conversion to cropland is the greatest threat to birds in this habitat type. Efforts to maintain ranching and compatible grazing regimes as the dominant economic force and land use in riparian habitat will benefit birds. The Conservation Reserve Program has helped bird habitat, but permanent easements on important riparian areas could be significantly more beneficial.

26) Play an active role in managing riparian areas. Success in maintaining or improving riparian health depends on the degree of operator involvement.

### Farming

These recommendations for farming practices will benefit birds and other wildlife, and will also help protect water quality and reduce soil erosion.

1) Leave a buffer of uncultivated grasses, shrubs, and trees along all waterways, including rivers, streams, ditches, drains, etc. Cultivating up to the edge of a waterway removes important vegetative filters, increases sedimentation, accelerates siltation, and shortens irrigation pump life. Reestablish woody and herbaceous vegetation through plantings and, if necessary, fencing.

2) Avoid driving tractors and other equipment in riparian areas.

3) Protect ditch banks and streambanks from burning. The vegetation along banks reduces erosion, filters runoff, maintains water quality, and provides wildlife habitat.

4) Maintain large patches of riparian habitats; fragmented habitats result in increased predation and increased nest parasitism by cowbirds.

5) Prevent chemical runoff into streams and rivers. Agricultural chemicals can harm downstream riparian vegetation and wildlife.

6) Prevent soil from eroding into adjacent waterways. Increased sedimentation reduces the quality of aquatic habitat.

7) When irrigating, avoid depleting ground water and diverting streams outside their natural stream channels. These actions can kill moisture dependant riparian plants by leaving them high and dry. Avoid converting native habitat to cropland, especially in areas too dry to farm without irrigation. Irrigating in arid and semiarid regions can concentrate salts in soil and water, causing severe production and environmental problems (about 30% of the contiguous United States has potential for soil and water salinity problems).

8) While it is better for birds (and cats) if cats are kept indoors, have domestic “barn” cats spayed or neutered, keep pet food and food bowls indoors so predators like raccoons and feral cats do not have an additional food source, and never intentionally feed feral cats. Cats (even well fed domestic cats) can be devastating to local songbird populations. Natural predators, like owls and hawks, are very efficient at controlling rodent pests, even around human dwellings.

9) Avoid converting existing riparian areas to cropland; this is the greatest threat to birds in this habitat type. Permanent easements on important riparian areas could benefit both landowners and wildlife. Develop conservation partnerships between landowners, land managers, and private organizations. While landowners need to derive income from the land, this can often be compatible with maintaining regional biological diversity, depending on how the land is used and what land management tools are employed. Identify the habitat needs of the birds in the area and the economic needs of the landowner so a baseline need is established.

## Forestry

Timber harvesting, including firewood cutting, can negatively affect riparian areas by removing nesting trees and foraging sites from the riparian zone. Standing dead and live trees also trap sediments and nutrients, moderate water temperatures, and provide large organic debris. These recommendations can help reduce the impacts of forestry practices on riparian areas.

- 1) To protect the stream channel and provide habitat for birds that depend on mature trees, retain a buffer zone in timber harvest and firewood cutting areas where no cutting is allowed. Other activities within these zones should be modified to protect natural resources. Biologists with the Wyoming Game and Fish Department, U.S. Forest Service, or Bureau of Land Management can give advice on the appropriate buffer width for the area.
- 2) Maintain mature stands of trees adjacent to meadows to help species like the Olive-sided Flycatcher. Maintain snags (standing dead trees) and dead-topped trees along perimeters of wet meadows and in stream corridors. These provide nesting cavities for birds and enhance the number of insects available for food. Snags eventually topple and become organic debris, so retain an abundance of mature trees to replace them over time.
- 3) Avoid locating landings, log decks, or skid trails in or through riparian areas.
- 4) Route helicopter flight paths away from riparian areas and locate helicopter landing sites more than ¼ mile (0.4 km) from riparian areas, especially from May through July. Helicopters and other loud noises interfere with songbird breeding activity, which relies on singing and being heard.
- 5) Maintain a shrubby understory in stands of trees adjacent to meadows and along stream courses to help species like the MacGillivray's Warbler and Yellow Warbler.
- 6) Avoid operating heavy equipment through, along, or across riparian areas. If equipment operation is necessary, use tracked equipment rather than wheeled vehicles, and only during winter when the ground is frozen and less vulnerable to damage.
- 7) During fire activities, locate incident bases, camps, helibases, staging areas, helispots, and other centers for incident activities outside of riparian areas. Design fuel treatment and fire suppression strategies, practices, and actions to reduce disturbance of riparian vegetation. Keep chemical retardant, foam, or additives out of surface waters.

## Engineering

Damming or diverting streams and rivers can dramatically alter the hydrology of the watershed by trapping spring floodwater and releasing artificially steady and high summer flows. These changes directly affect the downstream vegetation. All potential upstream and downstream effects of dams and diversions should be addressed. Well-planned roads, stream crossings, and other engineering projects can help reduce disturbance to riparian areas. Use the recommendations below to minimize impacts of engineering projects.

- 1) Avoid building roads parallel to streams in riparian zones or through wet meadows. Stream crossings should be at right angles to minimize impacts on riparian vegetation, streambanks, soils, and water quality.
- 2) Roads and rights-of-way often cross riparian corridors, which can fragment bird habitat and reduce its value. Combine all of these disturbances at one crossing site to decrease the area impacted.
- 3) Design roads with adequate structures to prohibit vehicles from leaving the roads and off-roading in riparian zones or adjacent uplands.
- 4) Construct new and improve existing culverts, bridges, fords, and other stream crossings to accommodate a 100-year flood, including associated bedload and debris, where those crossings could pose a substantial risk to riparian ecosystems.
- 5) Maintain buffer zones between riparian areas and mining, oil, gas, sand/gravel, and geothermal activities, including structures, roads, and support facilities.
- 6) Avoid straightening or diverting sections of stream channel. These activities increase stream velocity and erosion, reduce streambank stability, and negatively impact upstream and downstream habitat.
- 7) Before altering water flows where cottonwood stands occur, develop a standardized environmental assessment program that describes historical patterns of cottonwood abundance; establishes an inventory of present cottonwood distribution, abundance, and age-class composition; and establishes long-term study sites to follow changes in the cottonwood forest. Regular monitoring of the water table and cottonwood abundance, mortality, and replenishment should provide indices of stress and decline. Establish control sites upstream from a dam or diversion structure to help detect downstream changes.
- 8) Reduce cottonwood decline downstream from dams or diversions through mitigation. Water management plans and dam operations can reduce cottonwood

mortality, improve seedling replenishment, and enhance seed germination by meeting moisture requirements at critical periods. Mitigation measures include enhancing river flows, altering summer flows, maintaining spring flooding, preparing or modifying a site to enhance seedling growth, replanting from shoot or root cuttings, and using physical measures to enhance replenishment or prevent grazing damage.

9) Restore disturbed areas with native vegetation, prevent grazing by livestock while plants recover, and eliminate the invasion of nonnative plants during the reclamation period.

10) Minimize collisions between birds and power lines by avoiding constructing power lines in areas where birds concentrate during migration, breeding, or winter. However, if problems exist after construction, reduce the potential for collisions by using natural vegetation or human-made structures to shield power lines, modifying habitat near power lines to change its attractiveness to birds, and/or modifying land use to reduce disturbance (i.e. flushing birds near power lines). Some of the possibilities for line modification include enhancing the visibility of lines (e.g. flags or marker balls), burying the line, removing overhead groundwires, and removing small lightning shield wires in sensitive areas. Other possible mitigations include constructing lines parallel to the prevailing wind, constructing lines lower than flight corridors, and placing lines across rivers at oblique rather than right angles. To minimize avian mortality, power lines should be constructed to the most current standards using publications such as those from the Avian Power Line Interaction Committee (APLIC) (1994). For details on power line mitigation to benefit birds, please refer to these publications.

11) Minimize the electrocution of raptors on power lines by constructing and retrofitting power lines to the most current standards. Raptor electrocution can be addressed by a variety of mitigation measures, through design and retrofitting existing lines. Possible mitigation includes using insulating materials; gapping groundwires; adding pole-top extensions; lowering crossarms; and adding elevated perches, depending on the nature of the pole and the problem. Also, nest platforms may be installed on power line structures to enhance populations of raptors while minimizing the risk of electrocution and the risk to service. Nest platforms may be provided on the poles themselves or on “dummy” poles placed near those poles where nests have been built. To minimize avian mortality, power lines should be constructed and retrofitted to the most current standards using publications such as those from the Avian Power Line Interaction Committee (APLIC) (1996). For details on power line mitigation to benefit birds, please refer to these publications.

12) To minimize the effects of continuous noise on bird populations, reduce noise levels to 49 dBA or less, particularly during the bird nesting season. Constant noise generators should be located far enough away from sensitive habitats such as grouse leks and raptor nests that the noise that reaches those habitats is less than 49 dBA. For

example, the noise impact from drill rigs is greater than 49 dBA when the rig is closer than about 800 feet (250 m) to a receptor; impact from a 26,000 horsepower compressor station is greater than 49 dBA when located closer than about 2,500 feet (750 m) to a receptor. Near roads with 10,000 cars per day the population density of birds may be reduced up to 1 mile (1.5 km) from the road, while near very busy roads (up to 60,000 cars per day) the effect may be felt up to 2 miles (2.9 km) away. Avoid placing well pads, roads, and any other facilities requiring human presence within 825 feet (250 m) of raptor nests to prevent flushing adults from the nest. This buffer zone should be expanded in areas where prey are scarce, as raptors must spend more time searching for prey and may be less tolerant of disturbances. If necessary, implement mitigation measures to decrease continuous noise levels. For example, enclose compressor engines with buildings and install additional suppression around muffler exhausts. Noise barriers can be constructed at drilling and testing operations, and noise dampening around engines should be considered (including foam insulation around drilling rigs).

13) Where possible, avoid construction activities and other temporary disturbances during the breeding season in areas where priority bird species occur. Avoid noisy disturbances within ½ to 1 mile (0.8 to 1.6 km) of active or occupied raptor nests, depending on the species, during the period from February 1 through July 31 to prevent nest abandonment.

### Recreation

Unfortunately for birds, people also like to use healthy riparian areas and some recreational uses are not compatible with bird conservation goals. Recreation can affect birds by creating disturbances and habitat degradation, especially during the breeding season. Birds are also affected by vegetation trampling and firewood gathering. One study found that of 106 nonconsumptive uses, 73% of them negatively affected wildlife. The recommendations below can help minimize negative effects associated with recreation.

1) Consider potential disturbances to birds and habitat (and other wildlife) when planning or locating camping sites, picnic areas, and other sites of human activity within riparian areas.

2) Locate new recreation sites outside of riparian areas wherever possible. If sites must be within riparian zones, concentrate them in one area, rather than spreading them throughout the riparian area, to limit negative impacts on breeding birds and habitat. Keep disturbance to soils and vegetation to less than 15% of the area within the developed site.

3) Avoid constructing new trails along or parallel to riparian areas.

- 4) Keep pets under control in recreation areas. Free-roaming dogs and cats can be devastating to birds that nest on or just above the ground.
- 5) Provide firewood at developed campgrounds to decrease the use of riparian areas as a wood source.
- 6) Promote “Tread Lightly” recreation ethics. Educate recreationists about problems humans can cause in riparian habitat and how they can avoid damaging these areas.
- 7) Manage or restrict off-road vehicles, bicycles, and horses in riparian areas and wet meadows because soil compaction and ruts caused by these uses can lead to the drying of these wet areas.
- 8) Reduce recreational disturbances, including bird watching, in riparian areas during the bird nesting season, especially where rare, sensitive, or endangered species nest.
- 9) Maintain existing shrubs and saplings in campgrounds and retain a diversity of shrub species interspersed throughout the campsites to benefit birds like flycatchers, Lazuli Buntings, Song Sparrows, and Fox Sparrows that are negatively associated with vegetation removal.
- 10) Plant dense native vegetation, such as willows, to screen and reduce human use of fragile or vulnerable riparian areas.
- 11) Avoid using foggers for mosquito control in riparian habitats, especially during the nesting season, so a food source remains available for birds.

### Beavers

Beavers alter the landscape. Although they cut down trees, they also create suitable sites for establishing new growth of trees and shrubs. Where beaver populations are stable, their activities help store water, buffer floods, raise water tables, and provide a diversity of habitats. Restoring or maintaining beaver populations can be an effective habitat management tool, depending on habitat goals.

- 1) Establish desired beaver population levels on a drainage-by-drainage basis, and manage for that level. Address damage and loss of mature trees where they occur, and control beaver populations by relocation or harvest.
- 2) Maintain beaver populations in locations where they currently occur. Encourage and promote reintroduction into areas that were historically occupied by beavers, and provide suitable habitat for reintroduced animals.

- 3) Avoid removing beavers and destroying beaver dams where their activities do not affect irrigation, property developments, or habitat quality. Removing beavers and their dams can reduce water storage, lower water tables, reduce riparian vegetation, increase soil erosion, degrade aquatic habitat, and increase flood damage potential.
- 4) Willow planting may create suitable beaver habitat where absent, and aspen regeneration may improve habitat suitability for beavers in some areas.
- 5) Reintroduce beavers into drainages where gulying occurs and where willow reestablishment is a goal. Stream gradients should be less than 4%, and there should be an adequate supply of woody vegetation for food and dam-building materials. (Vegetation may have to be supplemented.)

### Pesticides

Pesticides can harm bird populations if used incorrectly. Insecticides can negatively affect bird populations for the very reason they were created—to kill insects. Birds, even seedeaters, depend on insects to feed their young. Loss of insect prey during the nesting season can be devastating, and can turn a habitat that regularly produces birds into one that does not. Also, many migrants rely on insects in riparian areas to store up or replenish fat reserves for their journey. Improperly used pesticides can directly kill birds, or weaken them and make them more susceptible to disease or unable to produce young. Herbicides change the composition of the vegetation in the riparian area, which causes loss of nesting sites and declines in prey abundance. If pesticides must be used, label directions should always be carefully followed.

- 1) Strictly limit pesticide application in riparian areas and adjacent sites to activities that improve or maintain the riparian vegetation and aquatic community (e.g. elimination of competitive noxious weeds). Where pesticides are needed, use them as part of an Integrated Pest Management (IPM) program. IPM involves closely monitoring pest populations of both plants and animals, and using chemicals only when and where pests are likely to cause economically or ecologically important damage. This reduces exposure of wildlife to harmful chemicals and reduces the destruction of non-target insects and plants.
- 2) If available, use biological control for specific noxious species, rather than chemical control.
- 3) When possible, apply pesticides by hand to target weeds and other pests as specifically as possible.
- 4) Carefully plan aerial application of pesticides to prevent drift of chemicals into riparian areas. Depending on the wind speed, provide a buffer zone of 1 to 4 miles (1.6

to 6.4 km) downwind of the aircraft, and 250 feet to 1 mile (0.08 to 1.6 km) upwind. Avoid spraying pesticides in winds exceeding 10 mph (16 kph), or during calm weather when temperature inversions may prevent sprays from reaching the ground. Pellet pesticides are less prone to wind drift and are preferred when applying near riparian areas. Check with the Wyoming Department of Agriculture for more specific information.

5) Work with state and federal agencies, such as APHIS, to coordinate the use of pesticides where necessary.

### Rehabilitation

Riparian vegetation can be divided into two zones, each defined by its distance from the stream. The first zone and line of defense for the riparian area is the vegetation at the edge of the water. These plants, called the vegetative liner, keep moving water and debris away from the streambank. An effective vegetative liner should be at least 10 feet (3 m) wide; the wider the vegetative liner, the more protection it provides during flooding. Ideal plants for the vegetative liner have pliable stems, establish quickly, tolerate water logging, regenerate after injury, and form a uniform stand. In many areas, native willows are excellent liner plants. Beyond the vegetative liner, as a second line of defense, is a combination of native trees and shrubs. This zone should be 30 to 150 feet (9 to 46 m) wide from the high water mark. (Terrain, soil type and condition, and adjacent land uses and ownership will influence the appropriate width at each location.) The vegetation in this second zone increases the filtering capability of the area, provides wildlife habitat, and helps shade the stream. Where rehabilitation of riparian zones is needed, use a combination of the suggested methods below.

1) Always identify and address the causes of riparian degradation before starting rehabilitation. Many rehabilitation projects fail without a change in other management activities, such as grazing or intensive recreation.

2) Tailor specific rehabilitation efforts to each riparian area. Physical factors such as stream type, geology, climate, and elevation will influence the project's success.

3) Determine specific objectives for each riparian area, and develop a monitoring program to track whether the objectives are being met.

4) To rehabilitate streambank damage, erosion, and adjacent over-utilized upland sites that all erode and add soil to streams, use willow plantings, dry root stock transplants, seeding, and/or livestock exclusion. Plant only native species to increase nesting cover and foraging opportunities for birds. Protect new plantings and seedings from livestock and wildlife use.

- 5) Cottonwood forest regeneration requires periodic flooding that scours out seedbeds for cottonwood seedlings. Where flood control and other water storage or diversions have removed this scouring action, consider sod removal, irrigation, or seeding to encourage cottonwood regeneration.
- 6) Replenish cottonwood riparian forests to compensate for mortality of mature trees. Seed germination requires spring flooding to prepare seedbeds and recharge underground water levels so seedlings have continuous moisture until their root systems develop. After the first two years, cottonwood saplings grow increasingly tolerant of flooding and drought stress as they develop larger root systems.
- 7) Remove exotic plants, like Russian olive and tamarisk (salt cedar), that compete with native plant species and do not provide foraging or nesting opportunities for wildlife. In areas of widespread invasions where native trees and shrubs are scarce, removal of these invaders in sections, followed by replanting with natives, may be better than a onetime, wide-scale removal. This should allow any wildlife using Russian olive or tamarisk to gradually switch to native vegetation.
- 8) Where streambank erosion is severe, banks may have to be reshaped to at least a 1:1 slope, and then stabilized with 4- to 6-inch (10- to 15-cm) diameter willow or cottonwood posts planted with a power auger or backhoe 2 feet (0.6 m) below the low flow water surface. Streambank revegetation works best on slower moving streams [less than 9 feet (3 m) per second] with relatively flat gradients. On faster streams, a combination of vegetation and structural measures, like riprap or jetties, may be needed to stabilize streambanks.
- 9) Stabilize and protect eroding banks with professionally designed rock riprap, tree revetments, or gabions. Structural options include placing instream structures, such as low-head dikes, to improve riparian systems by slowing flow, increasing sediment deposition, and allowing reestablishment of riparian vegetation. These structures should not be used as substitutes for proper riparian management but as temporary solutions while addressing the causes of deterioration.
- 10) Avoid channelizing streams, re-routing streams, straightening meanders, or diking banks. Where channelization has occurred in the past, restore meanders to raise water tables, narrow and deepen channels, stabilize banks, and allow re-growth of woody riparian vegetation.
- 11) Reintroduce beavers into drainages where gullying occurs and where willow reestablishment is a goal. Stream gradients should be less than 4%, and there should be an adequate supply of woody vegetation for food and dam-building materials. (Vegetation may have to be supplemented.)

12) Eliminate the invasion of nonnative plants during the rehabilitation period. Fabric or plastic mats are very useful in riparian areas to help tree seedlings stay ahead of grass competition.

13) Landowners interested in improving riparian habitat on their lands can seek financial assistance and expert advice from the U.S. Fish and Wildlife Service's Partners for Wildlife Program (307-332-8719), the U.S. Natural Resources Conservation Service (307-261-6453), or the Wyoming Game and Fish Department (1-800-842-1934).

### Wildlife Management

Wildlife, especially big game animals, can impact riparian areas. Managing for one species can sometimes have negative impacts on other species, such as birds. Wildlife management goals for each riparian area should be well planned, and should complement the overall goals of the riparian community.

1) Consider riparian area conditions and big game impacts (e.g. on willows or aspen) when setting herd objective levels. Do not exceed the carrying capacity of riparian habitats.

2) Cooperate with the Wyoming Game and Fish Department to identify and eliminate wild ungulate impacts to riparian areas. Locate ungulate feeding sites outside of riparian areas.

3) Be aware of the impacts that cowbird nest parasitism has on nesting birds. Increased nest parasitism results when forests are fragmented or livestock grazing occurs near woody habitats during the nesting season. The cowbird is an open-habitat species that commonly associates with livestock because of the foraging opportunities livestock provide. Due to their nomadic behavior, cowbirds build no nest of their own. Instead, females lay their eggs in the nests of host species, often removing a host's eggs in the process. Cowbird eggs hatch sooner than the hosts' eggs, and cowbird young are larger and more aggressive; therefore, they crowd the hosts' young and receive the majority of food brought to the nest, at the expense and often demise of the hosts' young. In the West, expansion of livestock into forested areas has allowed cowbird populations to increase and expand their range. Cowbirds are highly mobile, commuting up to 4 miles (7 km) daily between breeding and feeding sites. Therefore, it is necessary to take a landscape-scale approach to planning grazing regimes to benefit birds.

4) Manage predator issues on a case-by-case basis where negative impacts to birds occur, as predators like raccoons, skunks, and crows often increase in number around human developments.

## Residential and Urban Development

Urban and residential environments can be particularly hazardous for breeding birds. Nest predators such as crows, squirrels, raccoons, skunks, and domestic cats are common, as are nest parasites, Brown-headed Cowbirds. Human impacts on the environment and on birds can also be intense. Within riparian corridors, individual houses result in habitat loss and fragmentation, human disturbance, and introduction of exotic plant species and predators like cats. The recommendations below will help reduce the impact of human developments on both birds and habitat.

- 1) Retain and plant vegetation that is native to your area when landscaping, including a natural distribution of vegetation in the ground, shrub, and tree layers. This will result in a more natural-looking landscape, and will provide food, shelter, and nest sites for birds. Avoid planting exotic species, especially aggressive nonnatives like Russian olive and tamarisk (salt cedar), because these have relatively little value to wildlife.
- 2) Where possible, keep snags and dying trees in place. If safety is a concern, cut them to a height of about 10 feet (3 m), rather than removing them altogether.
- 3) Clump housing into a small area and leave the rest of the riparian corridor as “open space” to reduce habitat fragmentation. Conservation easements can be used to protect the open space in perpetuity.
- 4) Control Brown-headed Cowbirds in residential areas if nest parasitism becomes a problem.
- 5) Keep domestic cats indoors or leashed when outside, and never feed feral cats. Keep pet food bowls indoors and tightly cover all outdoor garbage cans so predators like raccoons do not have an additional food source.
- 6) Minimize collisions between birds and windows by breaking up the reflection on the outside of windows with a non-reflective window coating, window screens, flash tape, or bird netting. Covering windows with netting is most effective when cost and appearance are acceptable. Single objects such as falcon silhouettes, owl decals, or large eye patterns may not be effective deterrents because they cover only part of the glass and are not applied in sufficient numbers to alert the birds to the glass barrier. Glass surfaces should be uniformly covered with objects or patterns to turn them into obstacles that birds can recognize and avoid. Objects or patterns may have to be separated by as little as 2 to 4 inches (5 to 10 cm) to successfully protect hummingbirds and the smallest passerines. Birds in flight are more apt to give vertical objects wider clearance than horizontal ones, so tapes or cloths should be placed vertically.

7) Bird attractants such as feeders, watering areas, and nutritious vegetation in front of windows increases the density of birds near windows and can increase the hazard. Either move attractants such as feeders a considerable distance away from windows or place them very close to the glass surface to slow birds down and lessen the effect of impact.

8) Plant trees and install window awnings to block the sun from hitting windows and eliminate some reflection.

9) Enact a building policy of minimum night lighting, especially during migration, to alleviate bird attraction and confusion around tall buildings and towers, and to reduce light pollution.

10) In new or remodeled buildings, install windows at an angle so that the pane reflects the ground instead of the surrounding habitat and sky. Birds will avoid flying into a reflection of the ground, but are easily deceived by and strike reflected images of habitat and sky on windows installed in the conventional vertical position.

11) For more information on landscaping for wildlife, contact the Wyoming Game and Fish Department's Nongame Program (1-800-654-7862 or 307-332-2688).

### Information and Education

1) Establish public education goals and implement programs to inform users of public lands and owners of private lands of the value, sensitivity, and importance of riparian areas to resident and Neotropical migratory birds and other species. This could range anywhere from interpretive signs on public lands, to distribution of Best Management Practices to landowners, to presentations at local grade schools, etc.

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