

Linking Refuge Biology & Management: A Working Example from Medicine Lake NWR

1. Gather Baseline Information

What is the area or resource base of concern (habitat- or population-based)?

Medicine Lake NWR is situated in the far northeast corner of Montana and has relief typical of the glacial drift prairie, relatively gentle rolling plains with occasional shallow depressional wetlands. This is a prairie refuge located in the transition zone between the mixed grass and short grass prairie. The refuge encompasses 31,660 acres including 13,007 acres of open water and marsh, 15,096 acres of native prairie, and 3,557 acres of former cropland, most of which has been planted to varying mixtures of tame grasses and forbs. The surrounding private lands are intensively farmed for small grain production. The 11,360-acre Medicine Lake Wilderness Area was established by Congress in 1976. Included are Medicine Lake and the islands within, as well as the 2,320-acre Sandhills Unit.

What is the function of the area (FWS mandates, enabling legislation, station mission statements)?

Refuge Purpose:

"... as a refuge and breeding ground for migratory birds and other wildlife."
Executive Order 7148, dated August 19, 1935

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. 715d (Migratory Bird Conservation Act)

Medicine Lake NWR Mission Statement (Interim): To protect, restore and manage biological communities of the northern Great Plains mixed grass prairie; provide nesting, feeding, and migratory habitat for migratory birds; protect endangered, threatened, rare and unique species and their habitats; provide for biological diversity; protect unique designated areas; and increase public opportunities for compatible outdoor recreation and environmental education.

National Wildlife Refuge Mission: ... to preserve a national network of lands and waters for the conservation and management of fish, wildlife, and plant resources of the United States for the benefit of present and future generations.

Do you have maps showing habitat types and/or their extent?

Habitat mapping of refuge uplands was completed in 1987 by Bio-Techs Ensign and Krumwiede. Includes descriptive estimates of vegetative species composition and "condition", but no quantitative data. The maps are not current, particularly for tame grass and cropland areas which have undergone extensive renovation/management.

NWI final maps available, but of limited accuracy for temporary basins.

Do you have GIS coverage of this area or aerial photos (years and scale)?

NWI wetland data was digitized in the spring of 1998.

Black & white aerial photos available at refuge headquarters or county NRCS office dating back to the early 1940's. Unsure exactly what years are available. Most aerial photos are 1:7920, some at 1:15,840.

Indicate other data currently available (e.g., soil survey, climate data, exotic/pest spp.)

Soil survey, climate, evaporation pan data, distribution of leafy spurge and control efforts (biological, mechanical, chemical). Detailed management history for refuge uplands readily available for past 10-15 years. Earlier management records are available, but will require considerable effort to retrieve. No upland management data is available in a database format.

Are T&E species or other special concern species involved?

Seasonal use by bald eagles, peregrine falcons, and whooping cranes. Piping plovers nest adjacent to Medicine, Gaffaney, and Katy's Lakes shorelines during drought periods when extensive gravel beaches are exposed. A peak nesting population of 34 pairs occurred in 1992. Thirteen migratory bird SC species (Clark's grebe, white pelican, black-crowned night heron, ferruginous hawk, Franklin's gull, Caspian tern, Common tern, Forster's tern, black tern, burrowing owl, Baird's sparrow, Le Conte's sparrow, and Nelson's sharp-tailed sparrow) have been documented nesting on the refuge or in the immediate area. One additional species (yellow rail) is a suspected breeder. Two reptiles (western hognose and smooth green snakes) and one amphibian (northern leopard frog) are resident species. Basic inventories for small mammals, herps, insects, and plants are incomplete.

What historical population/habitat info do you have for the area (i.e., presettlement data, land use information, notes from land surveys, etc.)?

Unknown.

2. Identify Key Resources

List key habitats/species within project area, giving consideration to all biota as appropriate; briefly identify selection criteria (e.g., enabling legislation, endemic or T&E species, rare community type, etc.).

Key habitats

- Refuge wetlands, whether natural or diked impoundments, play a critical role in the life cycle of most migratory birds.
- Native prairie provides nesting habitat for upland nesting waterfowl, grassland passerines, shorebirds. Some prairie tracts have suffered extensive invasion by crested wheatgrass and/or clubmoss.
- DNC stands provide nesting habitat for upland nesting waterfowl and some species of grassland passerines. Vegetative species composition varies considerably between fields.
- Refuge Sandhills Unit is a unique community type which provides habitat for many species of migratory birds (e.g. yellow warbler, catbird, brown thrasher, American goldfinch, house wren, etc.) not found in more "typical" prairie.

Key Species

- migrant bald eagles, peregrine falcons, and whooping cranes; nesting piping plovers (ESA; FWS and NWR mandates)
- breeding and migrant waterfowl (enabling legislation)
- nesting white pelican colony has averaged approximately 4,000 nesting pairs in recent years, making it one of the top 10 (?) production sites in North America.
- other colonial nesting waterbird species (gulls, terns, grebes, cormorants, herons, etc.)
- other grassland nesting passerines and shorebirds, particularly endemic species with limited breeding ranges (e.g. Baird's sparrow). ~~Remainder of this proposal deals with non-game~~ grassland migratory birds.

3. Learn About Key Resources

Systematic monitoring of nesting non-game grassland migratory bird populations began in 1995. The attached excerpt from our 1997 Annual Narrative summarizes results to date. Approximately 160 point counts are being conducted in 1998.

Questions and Problems:

What are the impacts (positive or negative) of crested wheatgrass invasion into native prairie on the production of non-game migratory birds. Tentative analysis of 1995-97 data indicates an overall loss of species diversity in fields dominated by CRWG, however densities of several endemic prairie species such as Baird's and grasshopper sparrows appear unaffected. Do crested wheatgrass levels impact recruitment?

Need information on nest success, nest parasitism, and fledging rates in our three major upland habitat types.

Need to collect information on vegetative characteristics at nest sites to help understand species' habitat preferences and response to management activities.

Impacts of upland management practices, particularly grazing and prescribed burning, on breeding densities of grassland birds. Have some tentative results which could be presented. Need help with how to design a study and analyze the results.

We initiated a monitoring program in 1995 with two basic objectives in mind: (1) to obtain baseline population data for the common nesting species; and (2) to determine relative species abundance in our three major grassland habitat types (native prairie, dense nesting cover, and monotypic crested wheatgrass), thereby providing some clues to habitat preferences.

In 1995, 94 Emlen transects (100m x 100m) were walked once from 13 - 30 June. Transect locations were spaced relatively uniformly throughout the refuge uplands to maximize distribution. Wetland areas were avoided. Fifty-seven (57) transects were located in native prairie (NP), 24 in dense nesting cover (DNC), and 13 in crested wheatgrass (CRWG).

In 1996 and 1997, 100 circular plots 150m in diameter were sampled twice in early and late June using standardized 'point count' methodology. We switched sampling techniques primarily to make our results comparable with data from other stations and studies. Fifty nine (59) point count sites were located in NP, 29 in DNC, 7 in CRWG, and 5 plots were located on wetland margins or other subirrigated sites, and were classified as "wet meadow" areas (WM).

During the three years, paired males of 37 species were observed within the sample plots. A total of 33 species were found in NP, 22 in DNC, and only 13 in CRWG (Table 23). Despite the fact that only 44 acres of WM was surveyed, 16 breeding bird species were found in that habitat type.

In 1995, non-game grassland bird abundance was highest in DNC at 105 territorial males (TM) per 100 acres, followed by NP (96/100 ac.), and was lowest in CRWG (62/100ac.). In 1996, bird densities were highest in WM (150/100 ac.), followed by NP (129/100 ac.), DNC (80/100 ac.), then CRWG (74/100 ac.). Grassland bird densities increased markedly in all habitat types in 1997, however, CRWG showed the most dramatic increase, up 247% above 1996 levels. Bird densities remained highest in WM (183/100ac.), closely followed by CRWG (180/100ac.), then NP (160/100ac.), and DNC (134/100ac.).

We calculated refuge-wide population estimates (number of territorial males) for the more common upland nesting grassland passerines and shorebirds (Figure 20), to compare annual variations in bird abundance. Population estimates were weighted based on the acreage of each upland habitat type available on the refuge. Most species exhibited sizable population increases in 1997. Baird's sparrows (4700 TM) overtook chestnut-collared longspurs (4400 TM) as the refuge's most abundant grassland bird species. Grasshopper (4000 TM) and savannah sparrows (3500 TM) remained #3 and #4, respectively. The only species with population declines from 1996 were bobolinks and lark buntings.

Table 24. Breeding non-game migratory bird species observed in sample plots, Medicine Lake NWR, 1995-97.

SPECIES	NP (653 ac.)	DNC (312 ac.)	CRWG (94 ac.)	WM (44 ac.)
American avocet	x			x
American goldfinch	x			
Baird's sparrow	x	x	x	x
Black-billed magpie	x			
Brown-headed cowbird	x	x	x	x
Bobolink	x	x	x	x
Brewer's blackbird	x			
Brown thrasher	x			
Chestnut-collared longspur	x	x	x	
Clay-colored sparrow	x	x	x	x
Common grackle	x			
Common nighthawk	x			
Common yellowthroat	x			x
Eastern kingbird	x	x		x
Grasshopper sparrow	x		x	x
Horned lark	x	x	x	
House wren	x			
Killdeer	x		x	
Lark bunting	x	x		
LeConte's sparrow	x			x
Marbled godwit	x	x	x	x
Mourning dove	x			
Red-winged blackbird	x	x		x
Savannah sparrow	x	x	x	x
Sharp-tailed sparrow		x		
Short-eared owl		x		
Song sparrow		x		
Sprague's pipit	x	x	x	x
Swainson's hawk	x			
Upland sandpiper	x	x		
Vesper sparrow	x	x	x	
Western kingbird	x			
Western meadowlark	x	x	x	x
Willet	x	x		x
Wilson's phalarope	x			x
Yellow warbler	x			
Yellow-headed blackbird		x		
TOTAL	33 spp.	22 spp.	13 spp.	16 spp.

GRASSLAND BIRD POPULATIONS

MEDICINE LAKE NWR

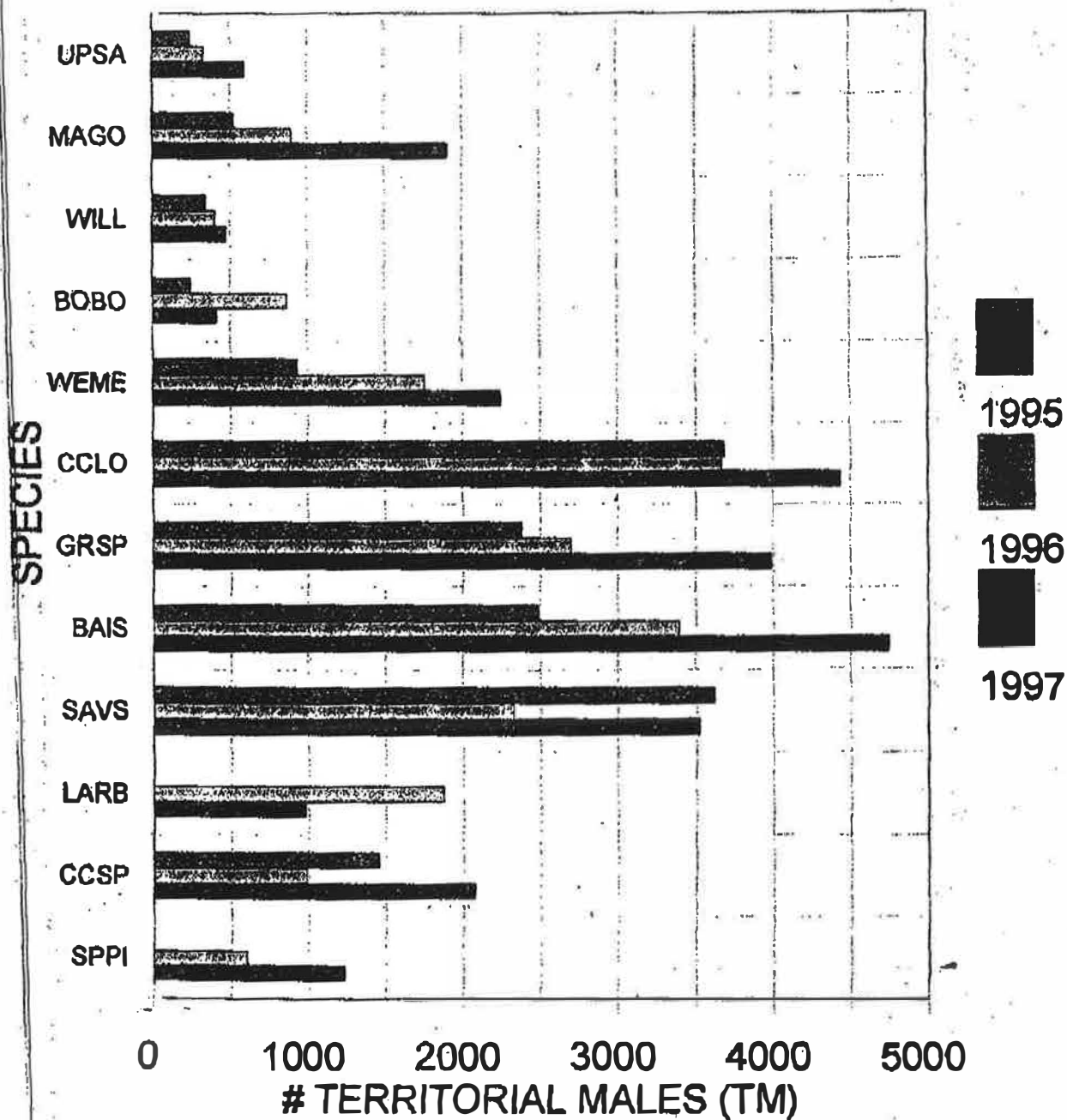


Figure 20. Populations of non-game grassland birds, Medicine Lake NWR, 1995-97.

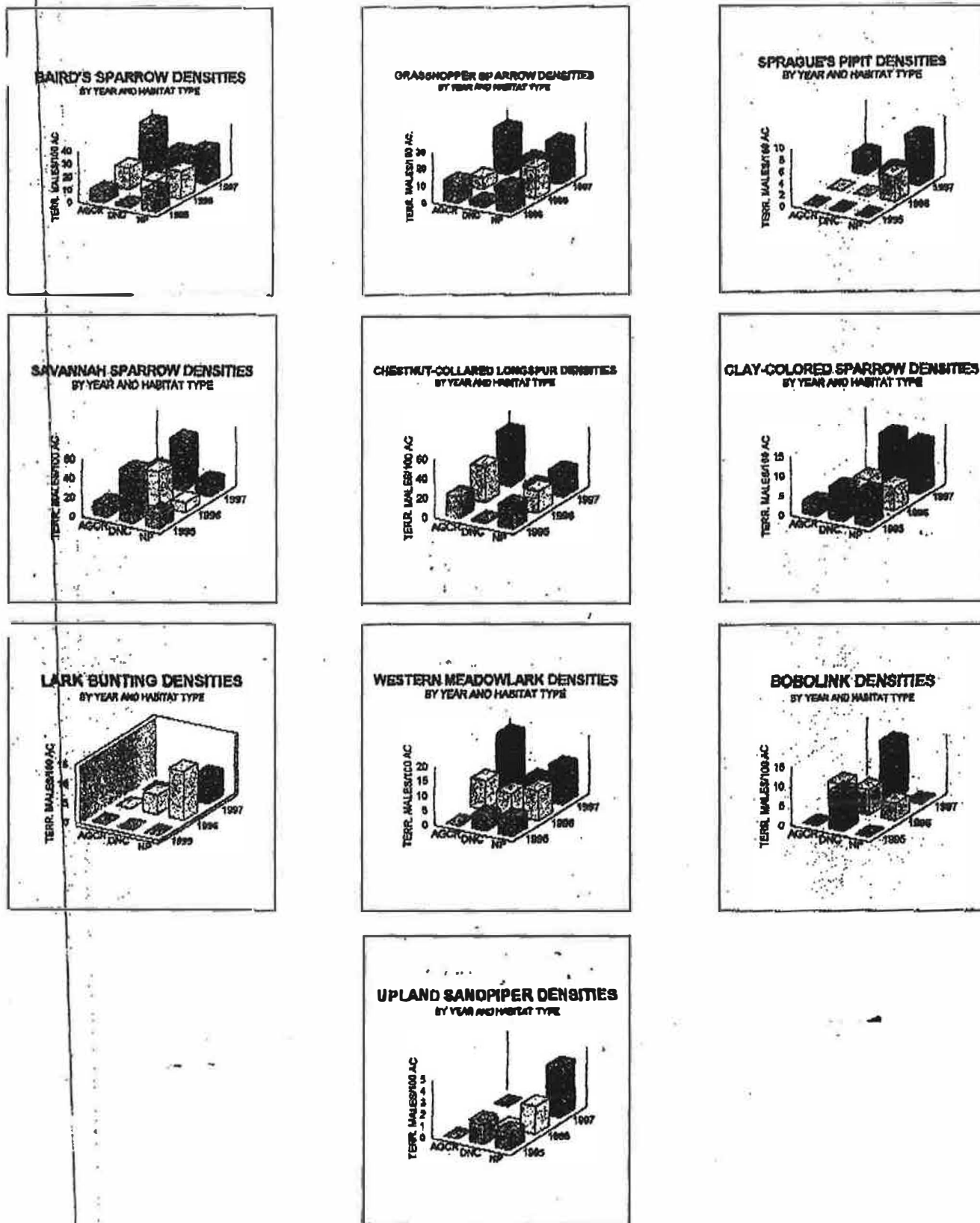


Figure 21. Densities of 10 non-game grassland bird species on Medicine Lake NWR, by year and habitat type.