CHAPTER 3—Refuge Resources

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Sagebrush buttercup is one of many plant species found on Lee Metcalf National Wildlife Refuge.

This chapter describes the characteristics and resources of the Lee Metcalf National Wildlife Refuge in Montana and is organized in the following sections:

- 3.1 Physical Environment
- 3.2 Biological Resources
- 3.3 State and Federally Listed Species
- 3.4 Cultural Resources
- 3.5 Special Management Areas
- 3.6 Visitor Services
- 3.7 Management Uses
- 3.8 Socioeconomic Environment
- 3.9 Partnerships
- 3.10 Operations

3.1 Physical Environment

The following sections describe aspects of the physical environments that may be affected by implementation of the CCP. Physical characteristics include climate and hydrology, climate change, physiography and geography, soils, topography and elevation, and air quality. Unless otherwise noted, the information in this section is from unpublished Service data or a hydrogeomorphic (HGM) report entitled "An Evaluation of Ecosystem Restoration and Management Options for Lee Metcalf National Wildlife Refuge," which was developed by Greenbrier Wetland Services (Heitmeyer et al. 2010).

Climate and Hydrology

The climate of the Bitterroot Valley is characterized by cool summers, generally light precipitation, little wind, and relatively mild winters. Annual precipitation averages about 13 inches but is variable related to position in the valley (figure 6). Precipitation increases with elevation along the valley margins and ranges from less than 13 inches in the Bitterroot Valley floor to nearly 60 inches near the Bitterroot Mountain summits on the west side of the valley. In contrast, precipitation along the crest of the Sapphire Mountains on the eastern margin of the valley is about 25–35 inches per year. The growing season in the Valley averages about 103 days; on average, the last freeze occurs May 30, and the first frost occurs September 10. Spring is the wettest period of the year, with about 25 percent of the annual precipitation falling in May and June (Heitmeyer et al. 2010). Runoff in the Bitterroot River is highest in spring, with about 55 percent of the river's discharge occurring in May and June following snowmelt and local rainfall (McMurtrey et al. 1972). Natural flows in the Bitterroot River decline from spring peaks throughout the summer and remain relatively stable through winter. On average about

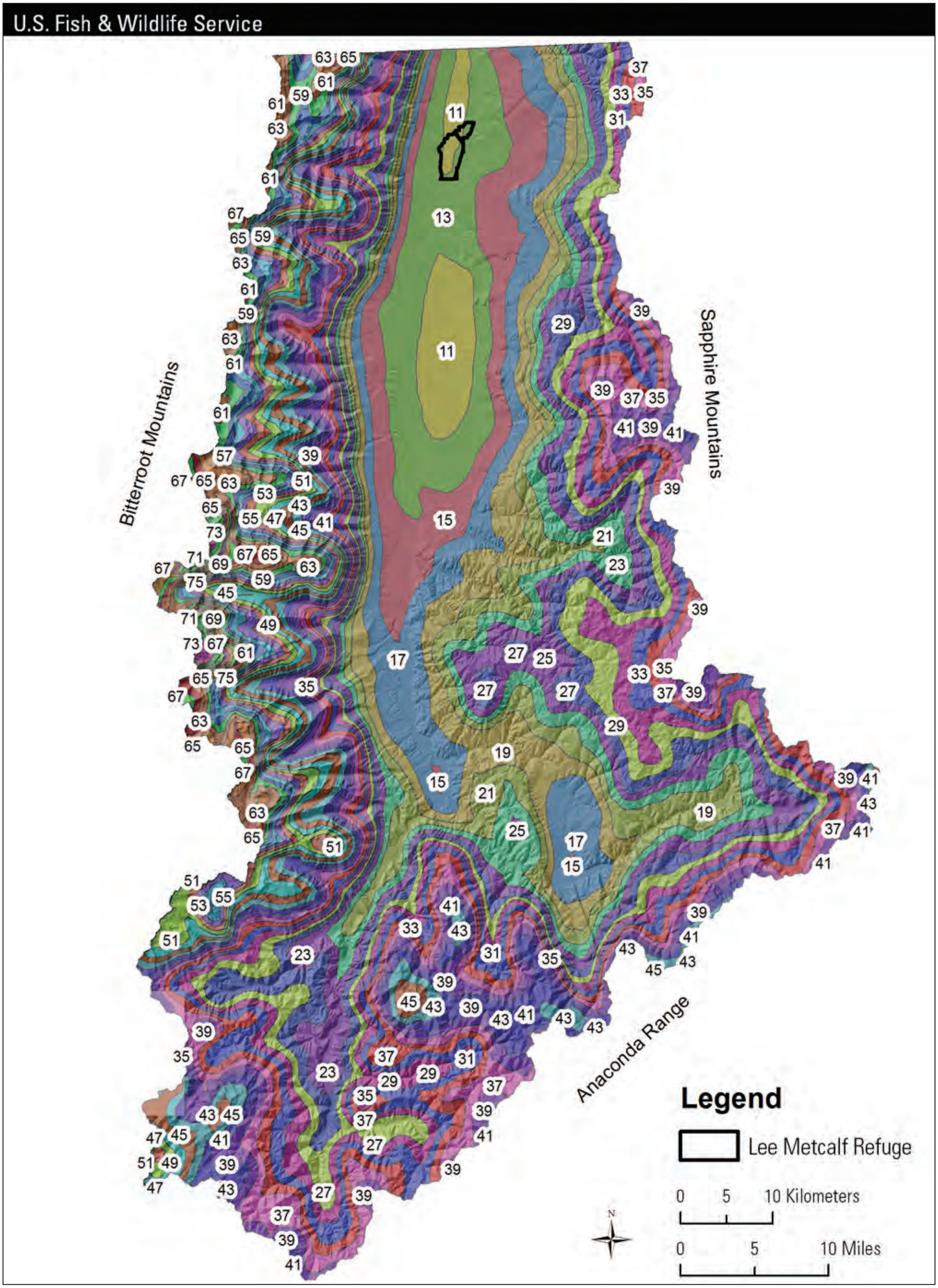

Figure 6. Ravalli County, Montana, average annual precipitation (inches) (USDA 2012).

1.772 million acre-feet of water flows into the Bitterroot basin via the Bitterroot River each year. Of this, 52 percent flows from the west, 37 percent flows from the south, and 11 percent flows from the east (Briar and Dutton 2000).

Numerous tributaries enter the Bitterroot Valley from mountain canyons. North Burnt Fork Creek and Three Mile Creek are major tributaries flowing across Lee Metcalf Refuge into Francois Slough and North Island Slough, respectively (figure 7). Other minor, within-floodplain drainages that historically crossed refuge land and ultimately emptied into the Bitterroot River included, Swamp Creek, Rogmans Creek, and the modified McPherson and Nickerson Creeks (now called Ditches). Rogmans Creek's historical channel is now covered by Ponds 2–10 and Otter Pond. Rogmans Creek was renamed "Spring Creek" on the 1967 U.S. Geological Survey topographical map. Valley-wide, about four times as many tributaries join the river from the Bitterroot Mountains on the west compared to the drier Sapphire Mountains on the east.

Records of flow and flood frequency relationships for the Bitterroot River near Florence date back to 1950. For this period of record, the river exceeded 1,050 cubic feet per second (cfs) at a 50-percent recurrence interval, or a frequency of every other year. Bank full discharge at Florence is about 13,000 cfs. This high flooding discharge causes extensive flooding throughout higher floodplain areas (figure 8) but occurs very infrequently (that is, at a greater than 50-year recurrence interval). At flows greater than 10,000 cfs, some modest backwater flooding on the refuge occurs with a greater than 7-foot stage height (USFWS 1974). This spring backwater flooding into connected floodplain sloughs and oxbows occurs regularly (that is, at a 5–10 year recurrence interval).

The Darby stream gauge station, approximately 35 miles upstream of the refuge, has the longest period of record for discharge on the Bitterroot River (beginning in 1937). Discharges on the Bitterroot River at Darby have less influence from irrigation return flow; accordingly, this gauge station represents the best location to evaluate relatively natural long-term patterns in riverflow. Records of peak discharge at Darby from the 1940s suggest some higher periodic discharge (greater than 10,000 cfs) at about 20- to 25-year intervals, with intervening years of moderate to low flows (figure 9). During the period of record, more very low flow (less than 4,000 cfs) years, about 20, occurred than did more average flow (greater than 8,000 cfs) years, about 16. In summary, river gauge data suggest the floodplain at the refuge was seldom extensively flooded historically (for example, 1974; figure 8), but that some backwater flooding into primary sloughs and tributaries occurred at a less than 50-percent recurrence interval in spring.

Many of the morphological characteristics of capillary (or secondary) channels of the Bitterroot River floodplain, including those at the refuge (such as Three Mile, Rogmans, McPherson, and Nickerson Creeks and Francois Slough), show an intimate connection with ground water discharge (Gaeuman 1997). Large upstream and downstream variations in discharge within individual channels, and observed springs along the margins of floodplain terraces reveal a substantial subsurface flow. Many of these channels are probably remnants of formerly large channels (including past abandoned channels of the Bitterroot River) that have filled incompletely. In other cases, ground water discharge may be actively excavating channels that seem to be growing by head cuts (abrupt changes in streambed elevation).

Alluvial aquifers in the Bitterroot Valley are generally unconfined and interconnected, although the configuration of water-bearing layers in the heterogeneous valley fill is highly variable (Briar and Dutton 2000). Permeability is highest in alluvium of the low Quaternary terraces and floodplain, and hydraulic conductivity of up to 75 feet per day has been calculated in low terrace alluvium. Ground water circulation is predominantly away from the valley margins toward the Bitterroot River. The basin-fill aquifers are recharged by infiltration of tributary streams into coarse terrace alluvium, subsurface inflow from bedrock, and direct infiltration of precipitation and snowmelt. High amounts of precipitation on the western side of the valley cause greater recharge in this area than on the east side of the valley. Ground water discharge occurs through seepage to springs and streams, evapotranspiration, and now by withdrawals from wells. Water in basin-fill aquifers is primarily a calcium bicarbonate type. Median specific conductance is about 250 microsiemens per centimeter at 77 °F, and median nitrate concentration is relatively low—0.63 milligrams per liter (mg/L)—within the aquifer. Nitrate concentration in surface waters may reach 6 mg/L (Briar and Dutton 2000).

Climate Change

The U.S. Department of the Interior issued an order in January 2001 requiring Federal agencies under its direction with land management responsibilities to consider potential climate change effects as part of long-range planning endeavors. The U.S. Department of Energy's report, "Carbon Sequestration Research and Development" (1999), concluded that ecosystem protection is important to carbon sequestration and may reduce or prevent loss of carbon currently stored in the terrestrial biosphere. The report defines carbon sequestration as "the capture and secure storage of carbon that would otherwise be emitted to or remain in the atmosphere."