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Purple Loosestrife (*Lythrum salicaria*)
On FE Warren Air Force Base

Fertig 1999

Purple Loosestrife (*Lythrum salicaria*)

on F.E. Warren Air Force Base

Prepared for the US Air Force by

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INTRODUCTION

Purple loosestrife (*Lythrum salicaria*) is a handsome, purple-flowered perennial herb that has become widely established throughout wetland areas of North America after being introduced as an ornamental from Europe in the early 1800s. Left unchecked, purple loosestrife can quickly crowd out native wetland plants to form monocultures that provide little food or shelter for waterfowl and other wildlife (Heidorn and Anderson 1991). Large infestations can also clog irrigation ditches and replace more palatable forage plants used for hay production or summer livestock pasture (Hight and Drea 1991). In many areas of the northeastern United States, large populations of loosestrife threaten the survival of several threatened and endangered species, including Long's bulrush (*Scirpus longii*) and the bog turtle (Hight and Drea 1991). The annual cost of purple loosestrife in terms of agricultural and recreational losses and diminished wildlife habitat has been estimated at \$45 million (Thompson *et al.* 1987).

Purple loosestrife was first documented in Wyoming near Lovell (Park County) in 1979 (Lichvar and Dorn 1980). Robert Dorn discovered a second population along "Crow Creek on the west side of Cheyenne" in 1980. In September 1996, Walter Fertig relocated this species along Crow Creek on F.E. Warren Air Force Base (WAFB) while conducting annual surveys for the Colorado butterfly plant (*Gaura neomexicana* ssp. *coloradensis*) (Fertig 1997). Two loosestrife plants were observed during the survey, both along the banks of Crow Creek near a small, wooden foot bridge just upstream of the Crow Creek Reservoir (downstream of the FamCamp). The plants were pulled up and removed for destruction, but unfortunately, both had already produced a crop of seed. A repeat visit in July 1997, confirmed that a small population of loosestrife (consisting of 5 flowering and vegetative plants) was still present at this site.

The establishment of purple loosestrife on WAFB may pose a serious threat to populations of Colorado butterfly plant (recently proposed for listing as Threatened under the Endangered Species Act) and Preble's meadow jumping mouse (recently listed as Threatened) in wetland areas on the Base. For the Colorado butterfly plant, competition with purple loosestrife could result in loss of habitat and a serious population decline (Fertig 1997). In the case of the jumping mouse, a shift in natural vegetation towards dominance by loosestrife could impact its food supply and escape cover (Beauvais 1998; Garber 1995). Other wetland animal and plant species on the Base could also be negatively impacted if the purple loosestrife population is not contained.

In 1998, the US Air Force contracted with the Wyoming Natural Diversity Database (WYNDD) to conduct an assessment of the purple loosestrife infestation on WAFB as part of an ongoing study on the demographics and management of the Colorado butterfly plant. This report includes results of this study, as well as control recommendations and background biological information (Appendix A).

METHODS

Surveys for purple loosestrife were done in conjunction with studies of Colorado butterfly plant populations in late August and early September 1998. The location of

loosestrife plants was recorded on maps in the field and later transferred to an arcview coverage (Figure 1). All loosestrife plants encountered in the survey were uprooted by hand and removed from the Base for destruction. Information on potential management responses to the loosestrife infestation were determined from literature sources.

RESULTS

Surveys of wetland areas along Diamond Creek and the "Unnamed drainage" in August and September 1998 failed to locate any new colonies of purple loosestrife. Likewise, no new populations were found along upper Crow Creek, or near its confluence with Diamond Creek. A small colony consisting of four vegetative and fruiting plants was encountered along the west bank of Crow Creek near the foot bridge and inlet of Crow Creek Reservoir, just south of the FamCamp on 21 August (Figure 1). This population represents the same colony initially discovered by Fertig (1997) in September 1996, and relocated in July and September 1997. All four plants were uprooted, bagged, and removed from the Base for destruction. No seedlings were located during a search of the surrounding area.

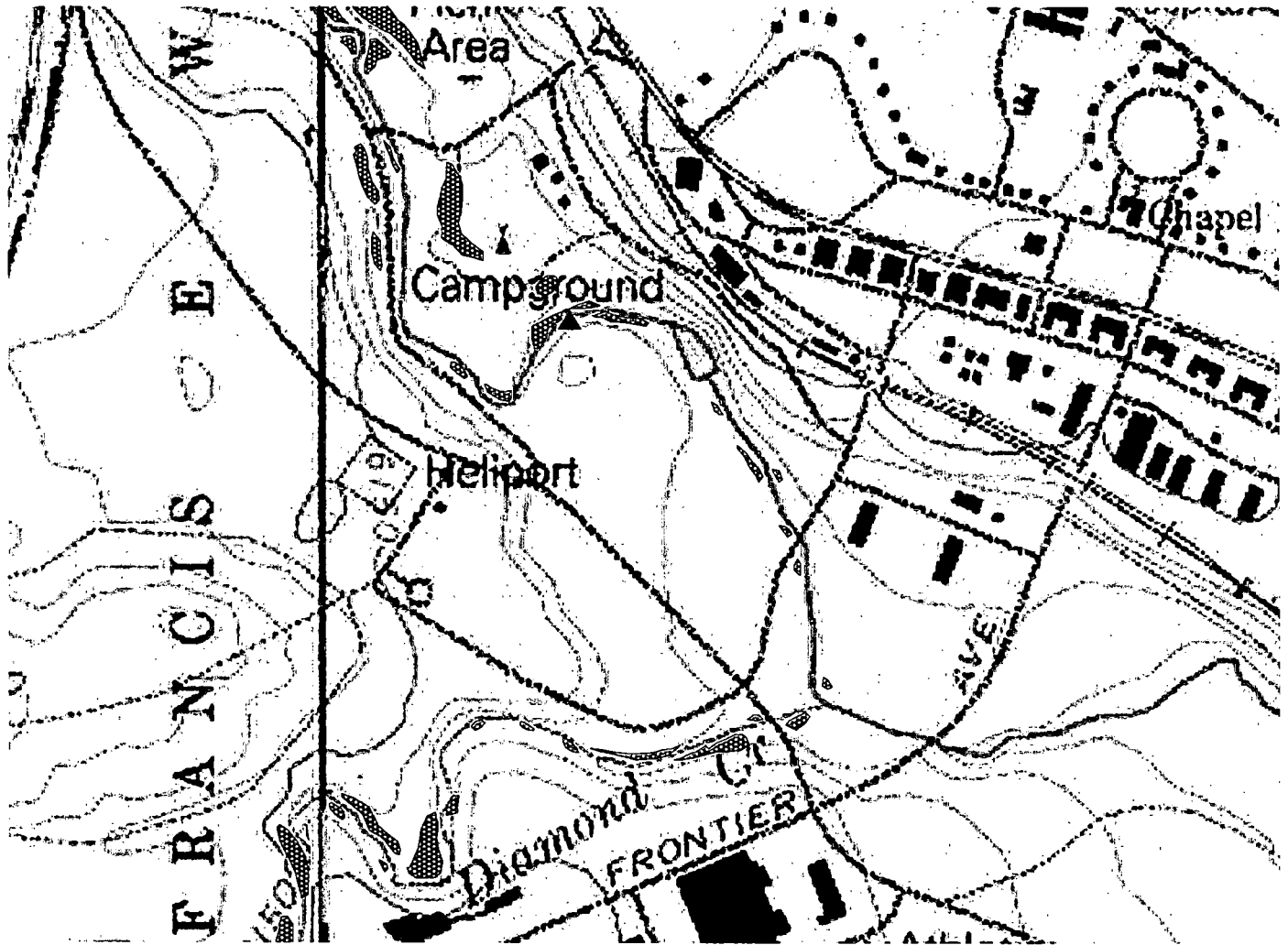
DISCUSSION AND MANAGEMENT RECOMMENDATIONS

Early detection and removal has so far kept the population of purple loosestrife very low along Crow Creek. Such vigilance is important because of the plant's prolific reproductive potential. A single plant can produce as many 2.5 million seeds throughout the summer, and these seeds are readily dispersed by flowing water, wind, and muddy animal feet (Thompson *et al.* 1987). Seeds can remain viable for up to 20 months, even when submerged. Purple loosestrife can also spread vegetatively from broken root or stem segments and by subterranean rhizomes (Heidorn and Anderson 1991).

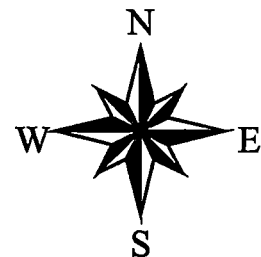
Given the likelihood that a seed bank may be established along Crow Creek, efforts to find and destroy all loosestrife plants should continue for several more years. Surveys should be conducted in early summer when loosestrife is in flower (and most visible) and before seeds have been produced (Heidorn and Anderson 1991). All plants should be bagged on site and removed from the Base for destruction to prevent stem and root fragments from resprouting. If seeds are present, extra cautions should be taken to ensure that all equipment and the clothing of field personnel are kept clean. Other wetland areas on the Base should also be surveyed in early summer, including the ponds near the WAFB golf course and the lower segment of Crow Creek.

Mechanical control efforts, such as those employed to date on WAFB, can be successful at preventing purple loosestrife infestations when the area is small. Should the infestation become too large, however, chemical and biocontrol methods are also available. As with all pest programs in natural areas, the choice of a control method is dependent on its potential benefits outweighing any risks to other organisms. In the case of WAFB, this decision is compounded by the presence of two listed or proposed Threatened species.

Figure 1. Location of Purple loosestrife on FE Warren Air Force Base



- ▲ Purple loosestrife
- ▨ Colorado butterfly plant



The most successful and least environmentally harmful chemical control program for purple loosestrife involves the application of glyphosate directly to individual plants. Rodeo is the only glyphosate herbicide registered for use in wetland areas (Heidorn and Anderson 1991). Because glyphosate is non-selective, extreme care needs to be taken to prevent the chemical from being applied to native wetland plants, especially the Colorado butterfly plant (Fertig 1997). Application of the chemical is best done in early summer, when loosestrife is just beginning to flower. John Randall, an exotic plant specialist with The Nature Conservancy, has recommended the application of 1% Rodeo and 0.5% aquatic surfactant on individual loosestrife plants with a backpack sprayer in late July or early August to control this species on the Base (Fertig 1997). Other authorities have recommended a 1.5% Rodeo solution and application of the herbicide twice during the growing season to capture any late-blooming plants (Heidorn and Anderson 1991).

Biocontrol efforts for purple loosestrife have focused primarily on phytophagous insects and fungi from its native range in Europe, as no significant native pest organisms have been found on the plant in North America. At least 15 insect species are known to prey on loosestrife in Europe, of which 3-4 show good potential for biocontrol application in controlled studies (Randall 1996).

The most promising of the biocontrol insects is *Hylobius transversovittatus*, a type of root-infesting weevil (Hight and Drea 1991). Adult weevils and their larvae feed directly on loosestrife roots and are capable of persisting even when stands are flooded. These insects are able to do enough damage to roots to kill loosestrife plants outright or seriously reduce their vigor and flower and seed production.

Leaf-feeding beetles (*Galerucella californiensis* and *G. pusilla*) also show promise for biocontrol use (Hight and Drea). Adults feed on loosestrife foliage in the spring and lay their eggs on the plant's leaves, shoots, and lower stems. Larvae hatch throughout the summer and feed on developing buds, leaves, and flowers. At high densities, *Galerucella* beetles can completely defoliate loosestrife plants. Small beetle populations can still be effective at reducing loosestrife foliar growth and retarding flower production.

Following tests to confirm host specificity (needed to ensure that released insects would not feed on native species of *Lythrum*, or other related native species in the Lythraceae), the first applications of these biocontrol insects were attempted in the early 1990s. Control programs in Indiana so far have had limited success, in part due to problems getting the insects established and finding an adequate beetle supply (Anonymous 1997; Hight and Drea 1991). The state of Minnesota, however, has had good success establishing beetle populations and is seeing reductions in purple loosestrife (Anonymous 1997).

Eradication of purple loosestrife should be one of the most important management priorities on WAFB during the next several years. Fortunately, the Crow Creek infestation is currently small and readily controllable by mechanical means. Unless contained quickly, however, this colony could spread or infect other wetland areas of the Base, with potentially disastrous consequences for wildlife and Threatened species.

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