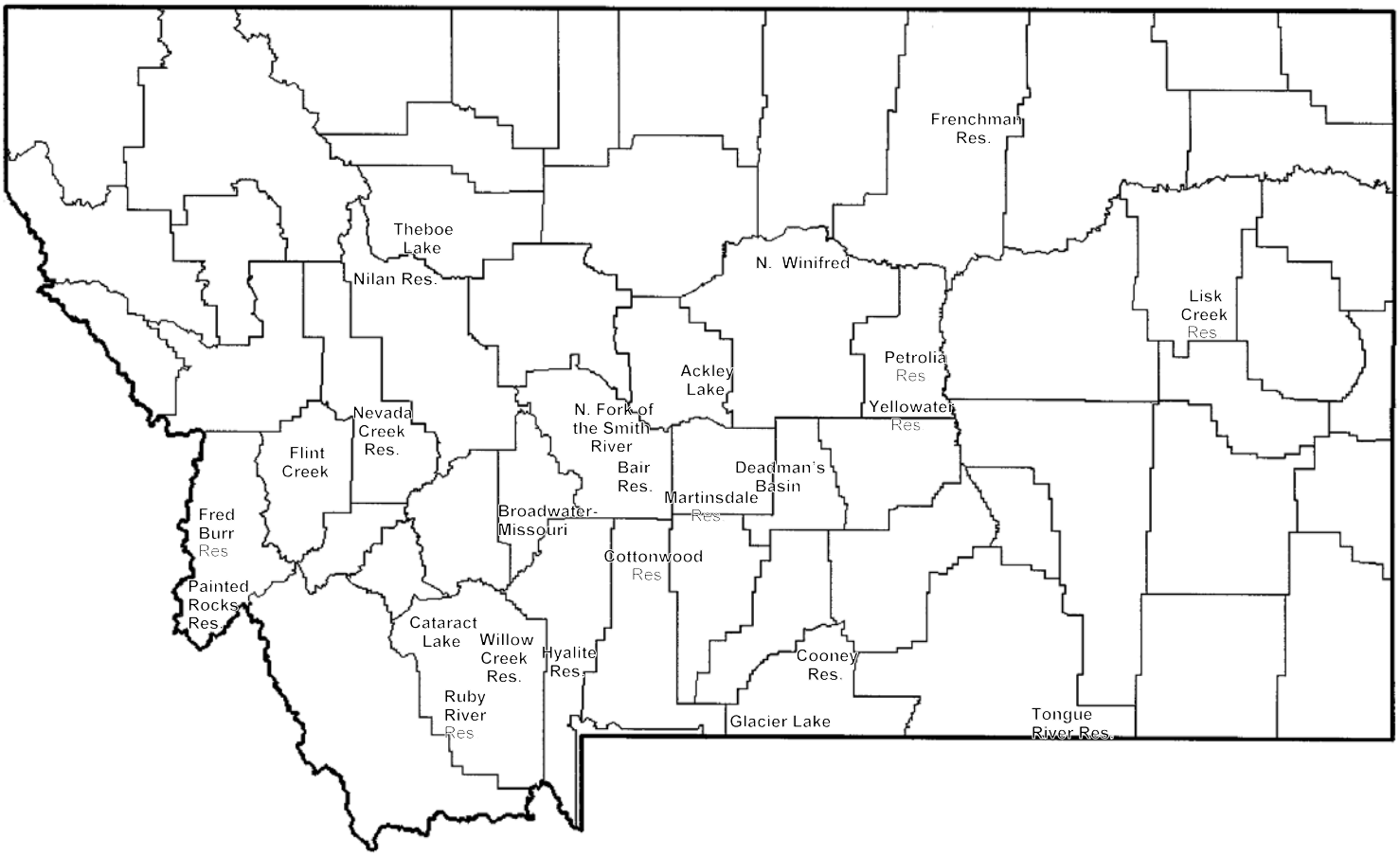
Six-Year Integrated Noxious Weed Management Plan for Water Projects Bureau Reservoir Sites

DNRC WATER BUREAU
WATER STORAGE PROJECTS



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May 1997

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Montana DNRC Water Projects Bureau
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I. Executive Summary

Montana's County Noxious Weed Control Act (CNWCA) (7-22-2101 MCA) requires each county to create a noxious weed district, managed by a weed district board, to control noxious weeds within the county district. Noxious weeds requiring management, as defined in the CNWCA, include "...any exotic plant species established or that may be introduced in the state which may render land unfit for agriculture, forestry, livestock, wildlife, or other beneficial uses or that may harm native plant communities", and is designated as a statewide noxious weed or a district noxious weed (Tables 1 & 2). The districts' noxious weed management plans are required to be integrated plans which, through an interdisciplinary approach, incorporate all appropriate methods, including: education, prevention, mechanical methods, biological controls, cultural methods, and general land management practices.

The 1995 Montana Legislature passed House Bill 395 as an amendment to the Montana County Noxious Weed Control Act. Department of Natural Resources and Conservation's Water Projects Bureau is required by House Bill 395 to implement an integrated noxious weed control program in coordination with the weed district boards of those counties in which the Bureau's properties lie. According to HB 395, the coordinated effort must be outlined in the following documents:

> "(a) a six-year integrated noxious weed management plan, which must be updated biennially; (b) a noxious weed management goals statement; (c) a specific plan of operations for the biennium, including a budget to implement the plan; and (d) a provision requiring a biennial performance report by the board to the state weed coordinator in the Department of Agriculture...regarding the success of the plan" (7-22-2151 MCA).

The statewide success of the plan is dependent upon the effective integration of the Water Project Bureau's management efforts with those of the county districts. With noxious weeds infesting over 6.5 million acres of Montana's rangelands, attempts to control weeds in isolated pockets will prove futile. Instead, the development of an integrated management plan that complements the activities of adjacent landowners allows all parties involved to achieve better control of noxious weeds on a larger scale.

Nine basic elements of an integrated management plan are summarized below:

1. *Prevention*: Preventing the establishment or spread of weeds by seeds or vegetative propagules should be the first line of defense in developing a weed management

program. Examples include access and use management, weed-free hay programs, state seed purity laws, etc.

2. *Education* for the public and professional land managers is an important part of a weed program. The identification, ecology and environmental impacts of noxious weeds, control techniques and environmental considerations involve information from multiple disciplines. Yearly training seminars are available for land managers. Educational efforts targeting the general public can emphasize what weeds are of concern and why they are a threat.

3. *Detection* is an ongoing effort. Land managers, ecologists, botanists, and the public should be involved. Awareness can be encouraged through educational efforts. Some exotic weeds are inconspicuous when at low densities and initial surveys will identify which problematic new species are present.

4. *Mapping* the distribution of target noxious weeds and environmental constraints at a site provides data needed to develop, implement and evaluate site specific management plans.

5. Setting specific land use *goals* determines the type of plant communities considered as desirable outcomes and provides the basis for setting control *objectives* for specific weeds.

6. *Baseline monitoring* may take different forms depending on the land use objectives and the types of control techniques to be employed. It minimally should include abundance data for the target weed species and general site data including vegetation and ground surface conditions.

7. *Control actions* may include a range of chemical, biological, physical or cultural techniques.

8. *Response monitoring* allows assessment of the effectiveness of control techniques on target weeds and the resulting vegetation changes in relation to desired conditions.

9. *Adaptive management* refers to the use of monitoring information to determine the types and timing of future actions. Possible future adjustments are identified during the planning process whenever possible.

The State Water Projects consist of twenty-five sites in nineteen counties. Field survey crews identified two noxious weed free sites: Frenchman Reservoir and Glacier Lake. At the remaining twenty-three reservoirs, crews identified fifteen noxious weeds, including five state-listed species and ten county-designated noxious species. The methods recommended for control of these weeds include biological, mechanical, chemical, and cultural techniques, as well as preventive measures such as education and access/use management. The estimated total cost for this six year planning period is $41,000; the average yearly cost is approximately $275 per reservoir site.

Detailed site specific plans were written for each individual reservoir and submitted to the County Weed Districts for review and approval. An Environmental Assessment was prepared to analyze potential impacts at each site. This General Plan provides an overview of the entire Water Projects Bureau weed management plan.

II. Current conditions

Noxious weed distributions at 25 Water Projects Bureau managed sites were mapped during summer 1996 using the standards proposed by the Montana Noxious Weed Survey and Mapping System (Cooksey and Sheley 1996). A complete listing of Montana statewide noxious weed species, and county-designated noxious weeds that were found at one or more reservoir sites in 1996 are in Tables 1 and 2, respectively. General conditions of the vegetation and ground surface, and current management and uses also were noted. Conditions of the vegetation at the reservoirs ranged from relatively intact native communities to highly degraded vegetation with large infestations of noxious weeds. A single site may exhibit the full range of these conditions.

Table 1. Montana noxious weed list and Weed Science Society of America 5-letter codes.

Noxious weed species Common name	Scientific name	WSSA code
Category I[1]		
leafy spurge	*Euphorbia esula*	EPHES
Canada thistle	*Cirsium arvense*	CIRAR
Russian knapweed	*Centaurea repens*	CENRE
spotted knapweed	*Centaurea maculosa*	CENMA
diffuse knapweed	*Centaurea diffusa*	CENDI
field bindweed	*Convolvulus arvensis*	CONAR
whitetop (hoary cress)	*Cardaria draba*	CADDR
Dalmatian toadflax	*Linaria dalmatica*	LINDA
St. Johnswort (goatweed)	*Hypericum perforatum*	HYPPE
sulfur cinquefoil	*Potentilla recta*	PTLRC
Category II[2]		
dyer's woad	*Isatis tinctoria*	ISATI
purple loosestrife	*Lythrum salicaria*	LYTSA
purple loosestrife	*Lythrum virgatum*	LYTVI
Category III[3]		
yellow starthistle	*Centaurea solstitialis*	CENSO
common crupina	*Crupina vulgaris*	CJNVU
rush skeletonweed	*Chondrilla juncea*	CHOJU

[1]Category I noxious weeds are weeds that are currently established and generally widespread in many counties of the state. Management criteria include awareness and education, containment and suppression of existing infestations, and prevention of new infestations. These weeds are capable of rapid spread and render land unfit or greatly limit beneficial uses.

[2]Category II noxious weeds have recently been introduced into the state or are rapidly spreading from their current infestation sites. These weeds are capable of rapid spread and invasion of lands,

rendering lands unfit for beneficial uses. Management criteria include awareness and education, monitoring and containment of known infestations and eradication where possible.

[3]Category III noxious weeds have not been detected in the state or may be found only in small, scattered, localized infestations. Management criteria include awareness and education, early detection and immediate action to eradicate infestations. These weeds are known pests in nearby states and are capable of rapid spread and render land unfit for beneficial uses.

Table 2. County-designated noxious weeds found at one or more reservoir sites in 1996.

Noxious weed species Common name	Scientific name	WSSA code
Common burdock	*Arctium minus*	ARFMI
Common tansy	*Tanacetum vulgare*	CHYVU
Spotted water hemlock	*Cicuta maculata*	CIUMC
Musk thistle	*Carduus nutans*	CRUNU
Houndstongue	*Cynoglossum officinale*	CYWOF
Wild licorice	*Glycyrrhiza lepidota*	GYCLE
Black henbane	*Hyoscyamus niger*	HSYNI
Perennial sowthistle	*Sonchus arvensis*	SONAR
Saltcedar	*Tamarix ramosissima*	TAARA
Common toadflax	*Linaria vulgaris*	LINVU

Table 3 summarizes noxious weed infestations at each site. Sizes of the infestations are indicated by the following scale:

1	<1 acre	4	50 - 100 acres
2	1-10 acres	5	>100 acres
3	10-50 acres		

Table 3. Summary of weed infestations based on 1996 inventory and mapping - part 1: statewide noxious weeds.

SITE	spotted knapweed	Canada thistle	field bindweed	leafy spurge	sulfur cinquefoil
Ackley Lake	2	3	2		
Bair Reservoir	2	3			
Broadwater-Missouri	1	1	1		
Cataract Reservoir	1	2			
Cooney Reservoir	5	4	2		
Cottonwood Reservoir	1	3			
Deadman's Basin	3	3	1	sprayed in previous years	
East Fk. Rock Creek Res.	3	1			
Fred Burr Reservoir	2				
Frenchman Reservoir					
Glacier Lake					
Hyalite Reservoir		3			1

SITE	spotted knapweed	Canada thistle	field bindweed	leafy spurge	sulfur cinquefoil
Lisk Creek		4			
Martinsdale Reservoir	3	4			
Nevada Reservoir	3	2			
Nilan Reservoir	3	3	1		
N.Fork of the Smith River	3	2			
N. Winifred Reservoir (Stafford)		3			
Painted Rocks Reservoir	5				
Petrolia Lake	1	3			
Ruby River Reservoir	4	3			
Theboe Lake		1		1	
Tongue River Reservoir		4	1		
Yellow Water Reservoir		1			
Willow Creek Reservoir (Harrison Lake)	5	1			

Table 3 continued - part 2: county-designated noxious weeds

SITE	common toadflax	salt-cedar	perennial sowthistle	black henbane	wild licorice	hounds-tongue	musk thistle	water hemlock	common tansy	common burdock
Ackley Lake										
Bair Reservoir						2	2			
Broadwater-Missouri			1	1	1		1	1	1	1
Cataract Reservoir						2	2		1	
Cooney Reservoir						2				
Cottonwood Reservoir						2				
Deadman's Basin						2				
East Fk. Rock Creek Res.							1			
Fred Burr Reservoir										
Frenchman Reservoir										
Glacier Lake										
Hyalite Reservoir	1						1		1	
Lisk Creek										
Martinsdale Reservoir						2				
Nevada Reservoir										
Nilan Reservoir										
N.Fork of the Smith River						3	3			
N. Winifred Reservoir										

SITE	common toadflax	salt-cedar	perennial sowthistle	black henbane	wild licorice	hounds-tongue	musk thistle	water hemlock	common tansy	common burdock
Painted Rocks Reservoir										
Petrolia Lake										
Ruby River Reservoir							1			
Theboe Lake										
Tongue River Reservoir		1								
Yellow Water Reservoir										
Willow Creek Reservoir						3	1			

Canada thistle was the most widespread noxious weed in terms of the number of sites infested, and also tended to occur as large infestations (> 10 acres). Spotted knapweed was second in these respects. Houndstongue, designated noxious by several counties in Montana, also occurred at a number of reservoir sites. Purple loosestrife, a Category 2 weed invasive in wetland habitats, was not found during the 1996 inventory and mapping. A small infestation of leafy spurge was found at Theboe Lake in Teton County, and leafy spurge has occurred in previous years at Deadman's Basin in Wheatland County. A small infestation of sulfur cinquefoil was found at Hyalite Reservoir in Gallatin County. Ten other state or county designated noxious weeds occur sporadically at the reservoirs, mostly at low to moderate levels of infestation.

III. Desired conditions

Desired conditions of the vegetation depend upon anticipated uses of the sites and the intensity of those use patterns (Table 4). High recreational use requires vegetation and ground cover that can withstand intense disturbance by trampling and vehicle tracks, yet provide soil stability, aesthetic quality and weed resistance. Livestock use requires vigorous grass stands with low weed densities so that seeds or vegetative propagules of noxious species are not transported by livestock into other pasture areas. Wildlife uses may require high forage value, nesting and hiding cover, and diverse plant communities. Most, but not all, of the reservoirs are used to provide irrigation water. Weed management for water resource uses is primarily focused on preventing weed seed dispersal in waterways.

Table 4. Intensity of current and anticipated uses at the 25 reservoir sites.

Reservoir site	**Recreation**	**Livestock**	**Wildlife**	**Irrigation**
Ackley Lake	High	Moderate	Moderate	High
Bair Reservoir	High	High	Moderate	High
Broadwater-Missouri	Moderate	None	Low	High
Cateract Lake	Moderate	Moderate	Moderate	Moderate
Cooney Reservoir	High	High	Moderate	High
Cottonwood Reservoir	Moderate	High	High	High
Deadman's Basin	High	High	Moderate	High
East Fork Reservoir	High	None	High	High
Fred Burr Reservoir	Moderate	None	High	High
Frenchman Reservoir	Low	Low	Moderate	High
Glacier Lake	High	None	High	High

Reservoir site	Recreation	Livestock	Wildlife	Irrigation
Hyalite Reservoir (Middle Creek)	High	None	Moderate	High
Lisk Creek Reservoir	Low	High	High	High
Martinsdale Reservoir	High	High	High	High
Nevada Lake	High	Low	Low	High
Nilan Reservoir	High	High	Moderate	High
North Fork of the Smith Res.	High	High	Low	High
North Winifred Reservoir (Stafford)	Low	High	Moderate	None
Painted Rocks Reservoir	High	None	Moderate	High
Petrolia Reservoir	Moderate	High	Moderate	High
Ruby River Reservoir	High	High	Moderate	High
Theboe Lake	None	High	Low	None
Tongue River Reservoir	High	Low	Moderate	High
Willow Creek Reservoir	High	High	Moderate	High
Yellowwater Reservoir	High	High	High	High

The observed levels of recreational use at the reservoirs are noteworthy. Recreational use at most of these sites can be expected to increase gradually. Recreational users are having significant impact on vegetation and soil conditions at a number of the sites, especially those sites having high use but with limited facility development and maintenance (e.g. Bair, N. Fork of the Smith, Ruby, Yellowwater). Vehicles often are driven where convenient, with new roads created adjacent to old ones that become

muddy and deeply rutted. This decreases the aesthetic quality and safety of the sites, increases soil erosion, and creates favorable microsites for noxious weed establishment. Weed seeds attached to vehicles may be introduced from diverse areas of the state or from other regions. Furthermore, seeds from weeds already established at the reservoirs can be transported to other sites via vehicles driven off-road.

Domestic livestock grazing is also a significant use at several of the reservoirs. Proper grazing management that favors healthy grass stands will help prevent replacement of grasses by weedy forbs. Fencing should be considered at some sites to limit the impact of livestock trampling in riparian areas while allowing access to water. Livestock uses are expected to remain constant or decrease slightly over time.

Wildlife use is a diverse category, but waterfowl use was significant at a number of the sites.

Irrigation uses are expected to remain constant at most of these sites over the next decade. However, some sites may be transferred completely into private ownership.

IV. Management constraints

The State Water Projects sites present a complex environment for vegetation management and noxious weed control.

The proximity of water resources imposes constraints on herbicide applications that would be of minimal concern on typical dry rangeland sites. Specific expertise in ecology and the environmental fate of herbicides has been utilized to develop an aggressive herbicide component of the integrated management approach. Site-specific soil and physiography data were used in evaluations of risks associated with off-site movement of herbicides due to infiltration and/or runoff. All suggested chemical applications are within the limitations of label requirements.

Information on occurrences of sensitive, threatened, or endangered plants and other species within 5 miles of each project site has been provided by the Montana Natural Heritage Program. Special consideration is given to element occurrences within 1 mile of each project area. Mitigation measures are incorporated into the site-specific management plans when management actions have potential to impact populations of sensitive species.

Many Water Project sites are heavily used recreation areas. The heavy public use increases the intensity and frequency of disturbance of soil surfaces and existing vegetation. Management constraints due to recreation use are a primary concern since the level of use is likely to increase in future years. Revegetation, grazing, and biocontrol establishment methods can be influenced by large numbers of public users.

Complex ownership and leasing patterns at a number of reservoirs result in the most difficult management constraints. Problems associated with these patterns include access limitations, potential lack of cooperation among adjacent land owners/lease holders, uncertainty about land ownership/lease patterns and thus uncertainty about weed management responsibility, and coordination of weed management planning among multiple agencies at the local, state and federal levels.

Lack of familiarity with noxious weed identification among agency professionals may decrease the frequency of early detections that would occur incidental to site inspections for other purposes. The site-specific management plans include monitoring and detection surveys at 2 to 5-year intervals. The Water Project Bureau also should encourage the Water Users Associations, county weed supervisors, and adjoining agency landowners to provide them with information on new weed infestations discovered at the reservoir sites, to ensure good record keeping and coordination of management activities.

V. Review & Summary of Control Methods Applicable to State Water Project Lands

The Water Bureau's noxious weed management plans take an integrated approach. The plans incorporate a variety of tools including: biological, mechanical, chemical, and cultural controls, as well as preventive measures such as education and access/use management.

Each available management tool was evaluated for potential efficiency within the constraints of each site's current and desired conditions. The site plans employ the most effective and appropriate combination of tools to achieve each site's specific management goals. The suggested control methods are summarized below.

Biological Controls (Montana Biological Weed Control Committee 1996)

Spotted knapweed:

Urophora affinis (Banded gall fly)

Adult flies, active during June and July, are black, about 4.0 mm long, and have faint horizontal bands on the wings. The flies mate & the eggs are deposited into immature flower buds, where they hatch in several days. The larvae, which are short, white, and have a distinctive spiracular plate, form galls in the seedhead. The galls are generally present from late summer until the following spring. *Urophora* spp. can decrease seed production by up to 95%.

Urophora quadrifasciata (UV knapweed seed head fly)

Adult flies are black, about 4.0 mm long, and have dark bands forming a distinctive "UV" pattern on each wing. First generation adults are present from spring to early summer; second generation adults can be found from late summer to late fall. Larvae are generally present in the mature seed head from summer to the following spring. *Urophora* spp. can decrease seed production by up to 95%.

Agapeta zoegana (Sulphur knapweed moth)

Small yellow and brown moth attacks the roots of spotted knapweed, reducing storage capacity and increasing susceptibility to infection. The moth overwinters as a larva in the root. Adult emergence occurs from mid-June to early September. Attacks diffuse knapweed to a lesser extent.

Canada and Musk thistle:

Rhinocyllus conicus (thistle head weevil)

The weevil lays its eggs in the bracts of musk thistle. The larvae infest the seed head or stem from early June to fall, and their feeding stimulates the plant to concentrate nutrients and tissue in the affected area. The weevil overwinters in the adult stage in sheltered locations such as the hollows of trees. Because the weevil attacks seed producing tissue, it can be very effective on musk thistle, which reproduces entirely by seed.

Mechanical Controls

Mowing
Reduces seed production and/or carbohydrate storage in some plants.
Hand digging
Allows for complete removal of plant material when located in small, low density infestations.

Chemical Controls

Tordon 22K (picloram)
2,4-D amine
Escort (metsulfuron)
Curtail (clopyralid + 2,4-D)
Rodeo (glyphosate)
Transline (clopyralid)
Krenite S (fosamine)
Arsenal (imazapyr)

Cultural Controls

Grass reseeding
Revegetation after disturbance to create a closed canopy resistant to weed invasion.
Silvicultural management
Provide shade to discourage establishment of noxious weeds.

Access/Use management

Education
Signing informs users of potential impacts noxious weeds may have on the site, as well as information on identification and preventative measures that enable users to prevent further noxious weed infestation. Agency personnel training in the identification of noxious weeds enhances early detection during site visits.
Noxious weed seed free hay use requirement will prevent the introduction of noxious weed seeds into weed-free areas.
Transportation system improvements
In areas with heavy vehicle use, improvements may define acceptable travel routes, eliminating multiple roads and reducing vehicle impact. Restricting off-road vehicle access will reduce the spread of noxious weeds.

VI. Recommended Management Actions for Target Weed Species

Site	Biological	Chemical	Cultural	Mechanical	Access/Use Control
Ackley Lake		spotted knapweed Canada thistle			all noxious weeds
Bair Reservoir		spotted knapweed Canada thistle musk thistle houndstongue		spotted knapweed houndstongue	all noxious weeds
Broadwater-Missouri		common burdock spotted knapweed Canada thistle musk thistle perennial sowthistle field bindweed		common tansy black henbane spotted water-hemlock	
Cataract Reservoir		spotted knapweed Canada thistle common tansy musk thistle houndstongue			
Cooney Reservoir	spotted knapweed	houndstongue			
Cottonwood Reservoir		spotted knapweed houndstongue		houndstongue	
Deadman's Basin		spotted knapweed Canada thistle houndstongue field bindweed		houndstongue	

Site	Biological	Chemical	Cultural	Mechanical	Access/Use Control
East Fk. Rock Creek		spotted knapweed Canada thistle musk thistle	all noxious weeds		
Fred Burr Reservoir		spotted knapweed		spotted knapweed	
Frenchman Reservoir					
Glacier Lake					
Hyalite Reservoir	Canada thistle musk thistle			sulfur cinquefoil common tansy	
Lisk Creek		Canada thistle			
Martinsdale		spotted knapweed Canada thistle houndstongue		houndstongue	
Nevada Reservoir	spotted knapweed	spotted knapweed Canada thistle		spotted knapweed	
Nilan Reservoir		spotted knapweed Canada thistle field bindweed			
N.Fork of the Smith River	musk thistle Canada thistle	spotted knapweed Canada thistle musk thistle houndstongue		houndstongue	all noxious weeds
N. Winifred Reservoir (Stafford)	Canada thistle	Canada thsitle			

Site	Biological	Chemical	Cultural	Mechanical	Access/Use Control
Painted Rocks Reservoir		spotted knapweed		spotted knapweed common tansy	
Petrolia Lake		spotted knapweed			
Ruby River Reservoir	spotted knapweed	spotted knapweed musk thistle Canada thistle		spotted knapweed	
Theboe Lake		leafy spurge			
Tongue River Reservoir		salt-cedar			
Yellow Water Reservoir		Canada thistle			all noxious weeds
Willow Creek Reservoir	Canada thistle musk thistle	spotted knapweed houndstongue Canada thistle		spotted knapweed houndstongue	

VII. Estimated Cost Summary (for 6 year planning period)

SITE	Biological	Chemical	Cultural	Mechanical	Access/ Use	Monitoring/ detection	**Est. 6- yr. Cost**
Ackley Lake		2439.00			300.00	651.00	**3390.00**
Bair Reservoir		2720.50		403.20		144.00	**3267.70**
Broadwater-Missouri		985.00		168.00		72.00	**1225.00**
Cataract Reservoir		775.00				194.00	**969.00**
Cooney Reservoir	1788.00					288.00	**2076.00**
Cottonwood Reservoir		627.00				144.00	**771.00**
Deadman's Basin		2421.25				194.00	**2615.25**
East Fk. Rock Creek		887.50	705.00			584.00	**2176.50**
Fred Burr Reservoir		1113.00		403.20		651.00	**2167.20**
Frenchman Reservoir						388.00	**388.00**
Glacier Lake					100.00	48.00	**148.00**
Hyalite Reservoir	100.00			159.40		121.00	**380.40**
Lisk Creek		1170.00				194.00	**1364.00**
Martinsdale Reservoir		1969.00				144.00	**2113.00**
Nevada Reservoir	1788.00	1284.00				244.00	**3316.00**
Nilan Reservoir		2477.00				363.00	**2840.00**
N.Fork of the Smith River		2538.00				194.00	**2732.00**

SITE	Biological	Chemical	Cultural	Mechanical	Access/ Use	Monitoring/ detection	**Est. 6-yr. Cost**
N. Winifred (Stafford Res.)	396.00	1036.00					**1432.00**
Painted Rocks Reservoir		1113.00		403.20		363.00	**1879.20**
Petrolia Lake		272.66				169.00	**441.66**
Ruby River Reservoir	100.00	2190.00				144.00	**2434.00**
Theboe Lake		1104.90				169.00	**1273.90**
Tongue River Reservoir							**Pending***
Yellow Water Reservoir						194.00	**194.00**
Willow Creek Reservoir	100.00	1359.00		201.60		144.00	**1804.60**
TOTALS:	**4272.00**	**28481.81**	**705.00**	**1738.60**	**400.00**	**5801.00**	**41398.41**

Estimated Total 6 year cost: $41,400

* pending completion of land acquisitions, State Park relocation, and dam reconstruction at Tongue River Reservoir

STATE WATER PROJECTS BUREAU SPECIFIC PLAN OF OPERATIONS FOR NOXIOUS WEED MANAGEMENT:
Ackley Lake, Judith Basin County

I. Situation statement

A. Description of State Water Project Bureau managed lands

1. Major features and location

Ackley Lake is located 4 miles SW of Hobson in the Judith River drainage at 4300 feet elevation (T14N R14E portions of sections 22, 27 and 28). It is an offstream storage reservoir supplied by a diversion canal from the Judith River with water returned to the river through an outlet canal. The dam at the N end floods approximately 250 acres.

2. Land ownership patterns of agency and general statement of accessibility - See Water Project Bureau land ownership map.

Water Bureau land consists of the flooded acres with additional land around the N end recreational area and to the SE. The site is a State Park and has a FWP fishing access.

3. Delineation of current use zones

water resource zone: high pool to low pool
maintenance zone: road system and dam at the N end
recreation zone: camping/picnic sites and boat launch areas around the N half of the lake
grazing zone: S and SE shore + surrounding area
natural areas zone: S shore + adjacent open water receives high waterfowl use

4. Soil types

Judith-Utica cobbly or gravelly loams to clay loams

B. Statement of the weed problem

1. Current list of state and county noxious weeds

State noxious weed species (Table 1)

Judith Basin County designated noxious weeds:

yellow mignonette (RESLU)	black henbane (HSYNI)
common burdock (ARFMI)	common mullein (VESTH)

2. General distribution patterns of noxious species at the site (see weed maps)

Spotted knapweed occurs as scattered individuals and small colonies along the N shore road system and below the dam. Canada thistle is broadly distributed at the site with large infestations along the E and W shores and below the dam. Field bindweed is also present along the N and E shores. Ackley Lake Reservoir falls within a special quarantine area (W and S of Hobson) for yellow mignonette. Yellow mignonette (RESLU) was not found on Water Bureau land during the 1996 site inventory, but there are infestations of this weed in the surrounding area and Ackley Lake is a high priority site for detection and management.

3. Identification of problem areas (e.g. drainages, gravel pits, roads, campsites)

Recreational area around N half of the lake receives high use / vehicle traffic. Outlet canal feeds into Judith River.

II. Plan of work

A. Vegetation management goals

1. County Weed Board -

Containment or eradication of designated noxious weed species. High priority on detection and eradication of yellow mignonette in special quarantine area.

2. Water Bureau -

Concurrent with Judith Basin County goals.

B. Weed management priorities

1. Terrain / access

Mostly gentle slopes with access around the N half by existing road system. Access around S end may be possible through private land.

2. Environmental concerns

Surface water.

3. Target noxious weeds identified at the site

spotted knapweed (CENMA)
Canada thistle (CIRAR)
field bindweed (CONAR)

4. Management objectives by species / zone

Species	Water resource zone	Maintenance zone	Recreation zone	Grazing zone	Natural areas zone
CENMA	NA	eradicate	eradicate	detect	detect
CIRAR	NA	contain	contain	contain	contain
CONAR	NA	contain	contain	contain	contain
RESLU	NA	detect	detect	detect	detect

NA - not applicable - the weed species was not observed in this zone and is not expected to be an immediate threat in this zone

C. Implementation (management prescription)

Previous and ongoing weed management at Ackley Lake:

Prior to 1995, weed control work on fishing access sites and State Parks in FWP Region 4 was done by FWP R-4 Parks Division. Starting in 1995, Ray Schwartz, R-4 Parks Maintenance Supervisor, contracted with Helena Weed Control to spray weeds at various sites in Region 4, including Ackley Lake.

FWP also gives the Ackley Lake Water Users 2½ gallons of Tordon 22K every other year for weed control.

Helena Weed Control sprayed 1 acre of spotted knapweed, ½ acre of Canada thistle and 3 acres of houndstongue at Ackley Lake in 1995, using Tordon and 2,4-D, at a total cost of $350.

General management prescription:

1. Continue small area herbicide treatments targeting spotted knapweed. Apply 1 pint/acre Tordon 22K to actively growing plants (spring / early summer or at fall regrowth). In shoreline areas, use a 2,4-D amine labeled for use near water (such as Weed Pro®, Cornbelt Chemical Co.) at 2 lbs/acre in spring or early summer (bolt stage). Herbicide spot treatments should be part of an annual maintenance program.

2. Treat Canada thistle in the maintenance and recreation zones incidental to the spotted knapweed spray program. Apply spot herbicide treatments to Canada thistle in the grazing zone using a 2,4-D amine labeled for use near water. Spot treatment of Canada thistle should be done with the goal of containing the existing large infestations along the E and W shores.

3. At this time, monitoring is the only action recommended for field bindweed. Control would be difficult given the already significant infestation and high rates of chemical application required. Consider using spot herbicide treatments in the future for containment if field bindweed appears to be spreading.

4. Frequent inspection of the site for new weeds should be a priority. Vehicle traffic and water flow associated with the site could transport seeds of established weeds into other areas. Significant infestations of yellow mignonette occur in the general area and Ackley Lake lies within a special quarantine zone. Leafy spurge and Dalmatian toadflax also can be expected to occur at Ackley Lake in the future. Annual walk through inspections should be made with special attention to high traffic and recreational areas. Newly established noxious weeds should be targeted for eradication by hand digging or herbicide treatment under the guidance of the Judith Basin Weed Supervisor.

5. Use signing and/or physical barriers to limit vehicle impact to established roads and campsite parking areas.

D. Monitoring

Annual walk through inspections for new weeds and observational recording of established weed infestations. Remap noxious species in 2002.

E. Needs

1. Short and long term needs
    a. Personnel - licensed herbicide applicator, 1 person-day / year, years 1 - 6; 1 person-day / year for new weeds / site inspection
    b. Equipment - backpack, ATV or truck-mounted hand spraying equipment
    c. Chemicals - Tordon® 22K herbicide, 2,4-D amine herbicide
    d. Biological control agents - none
    e. Seeds - none
2. Yearly procurement plan - NA

III. Budget

SITE: Ackley Lake Reservoir				
		Years 1 - 2	Years 3 - 6	**6-Yr Total**
Cultural / mechanical controls				
	Hand pulling			$0.00
	{Labor = $7 / hr + 20% benefits -			
	One person can pull weeds from about			
	1/10 to 1/5 acre / day depending on the			
	infestation and site conditions}			
Herbicide application				
	helicopter @ $7 / acre			$0.00
	truck / ATV broadcast @ $25 / acre			$0.00
	truck broadcast:			
	1 x 11' swath @ $32.50 / mile			$0.00
	2 x 11' swath @ $65.00 / mile			$0.00
	truck / ATV handgun @ $45 / hr			$0.00
	backpack spot spraying @ $45 / hr	$720.00	$1,440.00	$2,160.00
Herbicide costs				
	Tordon 22K @ $71 / gal	$71.00	$142.00	$213.00
	Transline @ $270 / gal			$0.00
	2,4-D amine @ $11 /gal	$22.00	$44.00	$66.00
Insects				
	purchase or collection costs			$0.00
	establishment costs (labor and materials)			$0.00
	redistribution costs			$0.00
Seeding and revegetation costs				
	seed costs per acre			$0.00
	application cost per acre			$0.00
Education and awareness signing		$300.00		$300.00
Vegetation and weed response monitoring				
	Labor @ $10 / hr + 20% benefits	$192.00	$384.00	$576.00
	Supplies	$25.00	$50.00	$75.00
	Total Estimated Costs	$1,330.00	$2,060.00	$3,390.00

STATE WATER PROJECTS BUREAU SPECIFIC PLAN OF OPERATIONS FOR NOXIOUS WEED MANAGEMENT:
Bair Reservoir, Meagher County

I. Situation statement

A. Description of State Water Project Bureau managed lands

1. Major features and location

Bair Reservoir is located about 16 miles E of White Sulfur Springs on the N. Fork of the Musselshell River (T10N R9E portions of sections 27,34,35). The dam at the SE end floods approximately 292 acres. Elevation at the spillway is 5325 feet.

2. Land ownership patterns of agency and general statement of accessibility - See Water Project Bureau land ownership map.

Bair Reservoir is reached by Highway 12 near the town of Checkerboard. Water Bureau land consists largely of the flooded acres and immediately adjacent shoreline with a few acres below the dam and camping / picnic facilities along the south shore. The facilities are not well maintained and the campground areas are heavily impacted by vehicles.

3. Delineation of current use zones

water resource zone: high pool to low pool
maintenance zone: dam and spillway at the S end
recreation zone: campgrounds along the SE shore
grazing/natural areas zone: the shoreline and adjacent land supports good native grass and shrubland, especially to the north

4. Soil types

mostly shallow loams to clay loams in shale

B. Statement of the weed problem

1. Current list of state and county noxious weeds

State noxious species (Table 1).

additional Meagher County designated noxious weeds (as of 1/97):

absinth wormwood (ARTAB)	black henbane (HSYNI)
black knapweed (CENNI)	bull thistle (CIRVU)
common mullein (VESTH)	bladder campion (SILVU)
common toadflax (LINVU)	common tansy (CHYVU)

musk thistle (CRUNU)
houndstongue (CYWOF)
common burdock (ARFMI)
field scabious (KNAAR)
hawkweed, yellow and orange (HIECA, HIEAU)
oxeye daisy (CHYLE)
perennial sowthistle (SONAR)
scentless chamomile (MATIN)
scotch thistle (ONRAC)
yellow mignonette (RESLU)

2. General distribution patterns of noxious species at the site

Spotted knapweed occurs as scattered individuals and small colonies (less than 5 acres total), mostly along the W shore, in the recreation zone, and along the dam. Canada thistle is widely distributed around the shore (about 20 acres total). Musk thistle, common mullein and hounstongue are also widely scattered around the entire shore. Immediately adjacent lands have relatively lower weed densities.

3. Identification of problem areas (e.g. drainages, gravel pits, roads, campsites)

Heavy vehicle impact in the recreation zone results in constant ground disturbance. With unrestricted access, vehicles are driven where convenient as existing roads become muddy or rocky.

II. Plan of work

A. Vegetation management goals

1. Short term goals (1 - 2 years) - County Weed Board

Containment of existing weed infestations. Prevention of new weed establishment.

2. Short term goals - Water Project Bureau

Concurrent with Meagher County goals

3. Long term goals (2 - 6 years) - County Weed Board

Suppression or eradication of existing noxious weed infestations. Prevention of new weed establishment.

4. Long term goals - Water Project Bureau

Concurrent with Meagher County goals.

B. Weed management priorities

1. Terrain / access

Terrain is moslty gentle but with some steep slopes around the SE end and unstable, shaly bluffs along the NW shore. Topography limits access to the NE side of the reservoir.

2. Environmental concerns

Surface water. Occasional steep slopes with fine textured soil and shale.

3. Target noxious weeds identified at the site

Category I
spotted knapweed (CENMA)
Canada thistle (CIRAR)
houndstongue (CYWOF)
musk thistle (CRUNU)

4. Management objectives by species / zone

Species	**Water resource zone**	**Maintenance zone**	**Recreation zone**	**Grazing / natural areas zone**
CENMA	NA	eradicate	eradicate	eradicate
CIRAR	NA	contain	contain	contain
CYWOF	NA	contain	contain	contain
CRUNU	NA	contain	contain	contain

NA - not applicable - the weed species was not observed in this zone and is not expected to be an immediate threat in this zone

C. Implementation (management prescription)

Previous noxious weed management at Bair Reservoir:

Since 1993: One broad treatment of spotted knapweed in recreation area, with minor touch ups, by Richard Fairweather, Meagher County Weed Supervisor.

Management prescription:

1. Use small area broadcast and spot herbicide treatments for spotted knapweed control. Apply Tordon 22K at 1 pint/acre in early to mid-summer (bolt stage). Application at this stage will provide high efficacy while plants are visible, but prior to seed set. Plants near the water's edge can be hand dug. When hand digging, the entire plant must be removed since regrowth can occur from the crown or root. Plants with seeds should be bagged and removed from the site.

2. A maintenance spraying program for containment of musk thistle and Canada thistle can be implemented incidental to the spotted knapweed treatments (same rates and timing).

3. Contain houndstongue by herbicide spot treatment and hand digging. Both first and second year plants are susceptible to Escort® at 0.5 to 1 ounce / acre. Seed production of single plants and small clusters can be reduced by cutting the root as far below the crown as possible. This should be done by early July or before. However, regrowth of houndstongue from deep rootstocks and subsequent seed production will not be completely eliminated. Seedtops (July and later) should be bagged for removal and burning.

4. The Bair Reservoir site suffers from poor maintenance of the road system and camping/picnic facilities. Consider road improvements (e.g., gravel) and restricted access through signing and or physical barriers that would prevent travel off the designated roads. The constant disturbance of heavy vehicle impact makes weed control more difficult and expensive, and makes the area less visually attractive and safe. Weed seeds including spotted knapweed are disseminated by vehicles and seed germination in houndstongue is stimulated by cracking of the hull. The Water Users Association is responsible for physical maintenance of the site.

D. Monitoring

Walk through inspections for new weeds and observational recording of established weed infestations. Update biennially. Re-map noxious species in 2002.

E. Needs

1. Short and long term needs
   a. Personnel - licensed herbicide applicator, 2 person-days in year 1 and 1 person-day / year in years 2 - 6 for annual maintenance work; 1 person-day / year for hand digging, years 1 - 6
   b. Equipment - truck and ATV or backpack spray equipment; hand digging tools
   c. Chemicals - Tordon® 22K herbicide (DowElanco), Escort® herbicide (DuPont)
   d. Biological control agents - none

e. Seeds - none

2. Yearly procurement plan - NA

III. Budget

SITE: Bair Reservoir				
		Years 1 - 2	Years 3 - 6	**6-Yr Total**
Cultural / mechanical controls				
	Hand pulling	$134.40	$268.80	$403.20
	{Labor = $7 / hr + 20% benefits -			
	One person can pull weeds from about			
	1/10 to 1/5 acre / day depending on the			
	infestation and site conditions}			
Herbicide application				
	helicopter @ $7 / acre			$0.00
	truck / ATV broadcast @ $25 / acre	$75.00		$75.00
	truck broadcast:			
	1 x 11' swath @ $32.50 / mile			$0.00
	2 x 11' swath @ $65.00 / mile			$0.00
	truck / ATV handgun @ $45 / hr	$360.00	$720.00	$1,080.00
	backpack spot spraying @ $45 / hr	$540.00	$720.00	$1,260.00
Herbicide costs				
	Tordon 22K @ $71 / gal	$106.50	$142.00	$248.50
	Transline @ $270 / gal			$0.00
	2,4-D amine @ $11 /gal			$0.00
	Escort @ $19 / oz	$19.00	$38.00	$57.00
Insects				
	purchase or collection costs			$0.00
	establishment costs (labor and materials)			$0.00
	redistribution costs			$0.00
Seeding and revegetation costs				
	seed costs per acre			$0.00
	application cost per acre			$0.00
Education and awareness signing				$0.00
Vegetation and weed response monitoring				
	Labor @ $10 / hr + 20% benefits			$0.00
	Supplies			$0.00
	Total Estimated Costs	$1,234.90	$1,888.80	$3,123.70

STATE WATER PROJECTS BUREAU SPECIFIC PLAN OF OPERATIONS FOR NOXIOUS WEED MANAGEMENT:
Broadwater Dam (=Toston), Broadwater County

I. Situation statement

A. Description of State Water Project Bureau managed lands

1. Major features and location

Broadwater Dam is located 4 miles S of Toston on the Missouri River at 4000 feet elevation (T4N R3E section 7 NW¼). The Broadwater-Missouri Westside Canal originates at the dam.

2. Land ownership patterns of agency and general statement of accessibility - See Water Project Bureau land ownership map.

Water Project Bureau land is limited to a small section N of the dam, along the shore of the Missouri River. There is a BLM / MT DFWP picnic area and boat ramp at the site.

3. Delineation of current use zones

water resource: river channel and diversion canal
maintenance: access road and dam / powerhouse area
recreation: picnic area, boat ramp

4. Soil types

Nielsen channery loam, 15 to 60 percent slopes (majority of the N shoreline near dam) - Shallow, well drained soils on side slopes and ridges with moderate permeability.

Rencot channery loam, 15 to 35 percent slopes (small portion of N shore near dam) - Shallow, well drained soils on uplands with moderate permeability.

B. Statement of the weed problem

1. Current list of state and county noxious weeds

State noxious weed species (Table 1)

Broadwater County designated noxious weeds:

musk thistle (CRUNU)	poison hemlock (COIMA)
spotted waterhemlock (CIUMC)	houndstongue (CYWOF)
common burdock (ARFMI)	black henbane (HSYNI)

common toadflax (LINVU)	perennial sowthistle (SONAR)
common tansy (CHYVU)	wild licorice (GYCLE)

2. General distribution patterns of noxious species at the site

Weed infestations were found in the NW portion of the project area. There were minor infestations of spotted knapweed, Canada thistle, field bindweed, black henbane, common burdock, spotted waterhemlock, wild licorice, and perennial sowthistle.

3. Identification of problem areas (e.g. drainages, gravel pits, roads, campsites)

picnic / recreational area; irrigation canal

II. Plan of work

A. Vegetation management goals

1. County Weed Board -

All campground areas and all irrigation canals have been identified as problem areas in Broadwater County for management of spotted knapweed, leafy spurge, Canada thistle and whitetop. Short term goals are to emphasize detection of priority weeds which also include statewide Category 3 weeds, and to contain existing infestations using herbicides where appropriate. Long term goals are to reduce noxious weed infestations using herbicide, biological, mechanical, and other methods, where appropriate.

2. Water Project Bureau

Concurrent with Broadwater County goals.

B. Weed management priorities

1. Terrain / access

moderate terrain along Missouri riverbank; accessible to vehicles

2. Environmental concerns

Surface water.

3. Target noxious weeds identified at the site

spotted knapweed (CENMA)
Canada thistle (CIRAR)

field bindweed (CONAR)
musk thistle (CRUNU)
common tansy (CHYVU)
black henbane (HSYNI)
common burdock (ARFMI)
spotted waterhemlock (CIUMC)
wild licorice (GYCLE)
perennial sowthistle (SONAR)

4. Management objectives by species / zone

Species	Water resource zone	Maintenance zone	Recreation zone
CENMA	NA	eradicate	eradicate
CIRAR	NA	contain	contain
CONAR	NA	contain	contain
CRUNU	NA	contain	contain
CHYVU	NA	eradicate	eradicate
HSYNI	NA	eradicate	eradicate
ARFMI	NA	eradicate	eradicate
CIUMC	detect	eradicate	eradicate
GYCLE	NA	tolerate	tolerate
SONAR	NA	contain	contain

NA - not applicable - the weed species was not observed in this zone and is not expected to be an immediate threat in this zone

C. Implementation (management prescription)

The Broadwater Dam site largely consists of maintenance and recreational facilities. Management of the recreational area appears to be joint BLM / MT DFWP. Recent weed control work was noticed during the 1996 site inspection. Weeds near the boat ramp had been hand pulled and spot sprayed, portions of the picnic area had been mowed and spotted knapweed had been sprayed along the road.

A combination of hand digging and spot herbicide applications can be used to accomplish the weed species control objectives. The herbicide Curtail® (clopyralid + 2,4-D) applied to actively growing weeds at 2 to 3 quarts / acre (0.2 to 0.3 + 1.0 to 1.5 lb / acre) should effectively control common burdock, spotted knapweed, Canada thistle, musk thistle, and perennial sowthistle. This chemical prescription may provide suppression of field bindweed. An alternate prescription for field bindweed is

to apply Tordon® 22K (picloram) at 2 quarts / acre during periods of active growth. For common tansy, black henbane, spotted waterhemlock, and weeds occurring near the edge of surface waters, hand digging with personal protective equipment (PPE) is recommended. When hand digging, as much of the root as possible should be removed. Plants that are near or at seed set should be bagged for removal and burning. Workers must wear PPE when hand digging these species. Some people have severe allergic reactions to aromatic compounds in common tansy. Spotted waterhemlock is very poisonous to humans, especially the juice in its taproot. Black henbane is also considered a poisonous plant to humans. Gloves, masks, long-sleeved shirt and pants, shoes and socks should be worn when digging these plants. Care should be taken to limit exposure to sap by washing hands before eating.

Spot spraying and hand digging on an annual maintenance basis for 3 to 4 years should reduce overall weed infestations at this site. At that point, less frequent activity (every 2 to 3 years) may maintain control and prevent new weed establishment.

D. Monitoring

Maintain observational records of the extent noxious weed infestations. Inspect for new weeds. Update biennially. Re-map target noxious species in 2002.

E. Needs

1. Short and long term needs
    a. Personnel - licensed herbicide applicator, ½ person-day / year, years 1 through 4 and 6; ½ person-day / year for hand digging, years 1 through 4 and 6; ¼ person-day / year in years 2, 4, 6 for vegetation monitoring and new weeds inspection
    b. Equipment - backpack or truck-mounted hand spraying equipment; hand digging tools
    c. Chemicals - Curtail® herbicide (DowElanco)
    d. Biological control agents - none
    e. Seeds - none
2. Yearly procurement plan - NA

III. Budget

SITE: Broadwater Dam				
		Years 1 - 2	Years 3 - 6	**6-Yr Total**
Cultural / mechanical controls				
	Hand pulling	$67.20	$100.80	$168.00
	{Labor = $7 / hr + 20% benefits -			
	One person can pull weeds from about			
	1/10 to 1/5 acre / day depending on the			
	infestation and site conditions}			
Herbicide application				
	helicopter @ $7 / acre			$0.00
	truck / ATV broadcast @ $25 / acre			$0.00
	truck broadcast:			
	1 x 11' swath @ $32.50 / mile			$0.00
	2 x 11' swath @ $65.00 / mile			$0.00
	truck / ATV handgun @ $45 / hr			$0.00
	backpack spot spraying @ $45 / hr	$360.00	$540.00	$900.00
Herbicide costs				
	Curtail @ $34 / gal	$34.00	$51.00	$85.00
Insects				
	purchase or collection costs			$0.00
	establishment costs (labor and materials)			$0.00
	redistribution costs			$0.00
Seeding and revegetation costs				
	seed costs per acre			$0.00
	application cost per acre			$0.00
Education and awareness signing				$0.00
Vegetation and weed response monitoring				
	Labor @ $10 / hr + 20% benefits	$24.00	$48.00	$72.00
	Supplies			$0.00
	Total Estimated Costs	$485.20	$739.80	$1,225.00

STATE WATER PROJECTS BUREAU SPECIFIC PLAN OF OPERATIONS FOR NOXIOUS WEED MANAGEMENT:
Cateract Lake, Madison County

I. Situation statement

A. Description of State Water Project Bureau managed lands

1. Major features and location

Cateract Lake is located about 6 miles SW of Pony at 6350 feet elevation in the Tobacco Root Mountains (T2S R3W S23 SW¼). The dam at its E end, on Cateract Creek, floods approximately 45 acres. The surrounding landscape is a mosaic of forest-shrubland-grassland on mountainous terrain.

2. Land ownership patterns of agency and general statement of accessibility - See Water Project Bureau land ownership map.

Water Project Bureau land consists of the flooded acres and immediate shore area, mostly as deeded acres, as well as Beaverhead NF permit.

3. Delineation of current use zones

water resource: high pool to low pool
maintenance: dam and spillway at E end, road along N shore
grazing: shore, primarily upper end, and surrounding area
natural areas: (overlapping the grazing zone) S shores + surrounding lands

4. Soil types

Information on soils was obtained from the Madison County Soil Survey. Slopes along the N and S shores have deep, well-drained soils: Sebud-Rochester-rock outcrop complex to the N and immediately below the dam; Hapgood-Sebud very stony loams to the SE; Sebud-Hapgood complex to the SW. Textures of these soils are loam to loamy sand, gravelly/very gravelly to very stony. Along the creek bottom (upper end of the lake and below the dam), soils are Cryaquolls, poorly to very poorly drained, clay loam to loamy sand.

B. Statement of the weed problem

1. Current list of state and county noxious weeds

State noxious species (Table 1)

Madison County designated noxious weeds:
common tansy (CHYVU) houndstongue (CYWOF)

musk thistle (CRUNU) field scabious (KNAAR)

2. General distribution patterns of noxious species at the site

Scattered individuals and small colonies of spotted knapweed were found along the N shore road edge and along the dam. A colony of Canada thistle occurred at the upper (W) end of the reservoir. Common tansy was heavy along the dam, and musk thistle was heavy along the N shore road edge and also occurred on the dam. Scattered individuals of houndstongue occurred around much of the W, N and E shores. Leafy spurge has been found about 3 miles S of the Cateract Reservoir site, near Potosi Hot Springs on private land.

II. Plan of work

A. Vegetation management goals

1. County Weed Board

Implement prevention and detection activities as weed management tools. Control existing noxious weed infestations using an Integrated Pest Management approach. Control spotted knapweed using herbicides where suitable, or approved biocontrol agents. Suppress Canada and musk thistle using herbicides or biocontrol agents. Contain common tansy using herbicides. Eradicate houndstongue within 3 years after initial application using herbicides. Monitor effects of management actions.

2. Water Project Bureau

Concurrent with Madison County goals.

B. Weed management priorities

1. Terrain / access

There is vehicle access to the dam and along the N shore by taking the dirt road up Cateract Creek from FR 191 along North Willow Creek, SW of Pony. Terrain is steep.

2. Environmental concerns

Surface water.

3. Target noxious weeds identified at the site

spotted knapweed (CENMA) Canada thistle (CIRAR)
common tansy (CHYVU) musk thistle (CRUNU)
houndstongue (CYWOF) leafy spurge (EPHES) ~3 miles south

4. Management objectives by species / zone

Species	Water resource zone	Maintenance zone	Grazing zone	Natural areas zone
CENMA	NA	suppress	detect	detect
CIRAR	NA	detect	suppress	suppress
CHYVU	NA	contain	detect	detect
CRUNU	NA	suppress	suppress	suppress
CYWOF	NA	eradicate	eradicate	eradicate
EPHES	detect	detect	detect	detect

NA - not applicable - the weed species was not observed in this zone and is not expected to be an immediate threat in this zone

C. Implementation (management prescription)

1. Implement a biennial maintenance spraying program for containment and suppression of spotted knapweed, Canada thistle, musk thistle and common tansy. Use a 2,4-D amine labeled for use near water at 2 lb/acre. Treat when weeds are actively growing (late spring to mid summer).

2. Make herbicide applications for houndstongue control. First year plants are susceptible to 2,4-D, so houndstongue applications could be made concurrent with the maintenance spray program. However, for effective houndstongue control using 2,4-D, annual applications should be made for 2 to 3 years. Best timing is early summer.

3. Leafy spurge has been found about 3 or 4 miles S of Cateract Reservoir in the South Willow Creek drainage, in the area near Potosi Hot Springs on private land. A detection objective is set for leafy spurge at the Cateract site. If leafy spurge is detected at the site, eradication treatments should be initiated with guidance from the Madison County Weed Supervisor.

D. Monitoring

Maintain observational records of the extent of noxious weed infestations. Inspect the site for new weeds. Update biennially. Re-map noxious species in 2002.

E. Needs

1. Short and long term needs
   a. Personnel - licensed herbicide applicator, ½ person-day years 1 - 3, then ½ person day every other year; ½ person-day, biennially for response monitoring and new weeds inspection
   b. Equipment - backpack or truck/ATV-mounted hand spraying equipment
   c. Chemicals - 2,4-D amine labeled for use near water (e.g. Weed Pro®, Cornbelt Chemical Co.)
   d. Biological control agents - none
   e. Seeds - none
2. Yearly procurement plan - NA

III. Budget

SITE: Cateract Reservoir				
		Years 1 - 2	Years 3 - 6	**6-Yr Total**
Cultural / mechanical controls				
	Hand pulling			$0.00
	{Labor = $7 / hr + 20% benefits -			
	One person can pull weeds from about			
	1/10 to 1/5 acre / day depending on the			
	infestation and site conditions}			
Herbicide application				
	helicopter @ $7 / acre			$0.00
	truck / ATV broadcast @ $25 / acre			$0.00
	truck broadcast:			
	1 x 11' swath @ $32.50 / mile			$0.00
	2 x 11' swath @ $65.00 / mile			$0.00
	truck / ATV handgun @ $45 / hr			$0.00
	backpack spot spraying @ $45 / hr	$360.00	$360.00	$720.00
Herbicide costs				
	2,4-D amine @ $11 /gal	$33.00	$22.00	$55.00
Insects				
	purchase or collection costs			$0.00
	establishment costs (labor and materials)			$0.00
	redistribution costs			$0.00
Seeding and revegetation costs				
	seed costs per acre			$0.00
	application cost per acre			$0.00
Education and awareness signing				$0.00
Vegetation and weed response monitoring				
	Labor @ $10 / hr + 20% benefits	$48.00	$96.00	$144.00
	Supplies	$25.00	$25.00	$50.00
	Total Estimated Costs	$466.00	$503.00	$969.00

I. Situation statement

A. Description of State Water Project Bureau managed lands

1. Major features and location

Cooney Reservoir is located about 7 miles E of Boyd, off of US 212, at 4250 feet elevation in the Rock Creek drainage (T4S R20E portions of sections 25,34,35,36 and T5S R20E portions of section 2). It is fed by Red Lodge Creek (W end) and Willow Creek (S), and the dam at its E end floods approximately 790 acres.

2. Land ownership patterns of agency and general statement of accessibility - See Water Project Bureau land ownership map.

The Water Project Bureau owns significant portions of land beyond the flooded acres, primarily around the dam and S shore. Portions of this land are leased by DFWP and maintained as a State Park, with extensive recreational facilities including camp areas, picnic areas, boat launches and roads.

3. Delineation of current use zones

water resource zone: high pool to low pool
maintenance zone: dam, spillway, road system around S and E shores
recreation zone: (heavy use) campgrounds, picnic areas, boat launches along S, E and NE shores (see attached map)
grazing zone: portions of the S and W ends
natural areas zone: ridge along N central shore with native grass / shrubland communities

4. Soil types

Soils are clay loams and silty clay loams. All are deep and well drained except a small area of shallow, well drained (Wayden) clay loam in shale along the north shore and on the south shore near the dam. Permeability ranges from slow to moderate.

B. Statement of the weed problem

1. Current list of state and county noxious weeds

State noxious species (Table 1)

Carbon County designated noxious weeds:

musk thistle (CRUNU)	houndstongue (CYWOF)
common toadflax (LINVU)	scotch thistle (ONRAC)
milk thistle (SLYMA)	common tansy (CHYVU)

2. General distribution patterns of noxious species at the site

A large infestation of spotted knapweed was mapped around the S, E, and NE shores. This infestation extends into adjacent lands, but was only mapped to the project boundary. Scattered individuals and small colonies of spotted knapweed also occurred along the N shore. Canada thistle was widely distributed around much of the shore. A few patches of field bindweed were found E and S of the dam, and one on the W shore of the Willow Creek fork. Houndstongue was also scattered throughout the recreational zone.

II. Plan of work

A. Vegetation management goals

1. County Weed Board -

The Red Lodge Creek and Cooney Reservoir drainage is a priority area for noxious weed management in Carbon County. A small infestation of leafy spurge at Cooney Reservoir was noted in the 1989 Carbon County Weed Management plan, and a goal for eradication was set. Requiring local ranchers, the US Forest Service, and Montana DFWP to take responsibility for controlling spotted and diffuse knapweeds on lands under their management is also a priority. Detection and eradication of Russian knapweed, whitetop and Dalmatian toadflax are also priorities for the area.

2. Water Project Bureau

Concurrent with Carbon County goals.

B. Weed management priorities

1. Terrain / access

Moderate terrain dominated by grassland and shrubland habitat types, and willow thickets in some of the riparian areas. The road system extends around the E and S shores, and there is no vehicle access to the N shore.

2. Environmental concerns

Surface water.

3. Target noxious weeds identified at the site

spotted knapweed (CENMA)
Canada thistle (CIRAR)
field bindweed (CONAR)
houndstongue (CYWOF)

diffuse knapweed (CENDI) - general area
leafy spurge (EPHES) - 1989 report

4. Management objectives by species / zone

Species	Water resource zone	Maintenance zone	Recreation zone	Grazing zone	Natural areas zone
CENMA	NA	suppress	suppress	suppress	suppress
CIRAR	NA	contain	contain	contain	contain
CONAR	NA	contain	contain	detect	detect
CYWOF	NA	contain	contain	contain	detect
CENDI	NA	detect	detect	detect	detect
EPHES	detect	detect	detect	detect	detect

NA - not applicable - the weed species was not observed in this zone and is not expected to be an immediate threat in this zone

C. Implementation

Previous and ongoing weed management activities:

Montana Fish, Wildlife & Parks leases land for and maintains the State Park at Cooney Reservoir. They have developed a noxious weed management plan for the site (dated Aug 1994). The plan recognizes spotted knapweed and Canada thistle as target noxious species. Control methods are specified as “mowing, weed eating, chemical herbicides and insects”, with different sets of control methods applied to each of 3 different use zones. Carbon County Weed District has done contract spraying under this plan. In 1995, significant portions of the land around Cooney Dam were sprayed using truck equipment at a total cost of $3593.50. Targets included spotted knapweed, Canada thistle, field bindweed and houndstongue.

A rangeland analysis and grazing unit management plan has been developed for the Cooney Reservoir Grazing Unit, pastures A-E (Gary Brandenburg, DNRC Trust Land Management, Southern Land Office).

Water Project Bureau recommendations:

1. The rangeland analysis for the DNRC-admistered grazing unit at Cooney addresses grazing and noxious weed concerns at this site. Implementation of the recommendations in this analysis would be beneficial for noxious weed management:

1. Consider leasing, what is now considered the Cooney Reservoir Grazing Unit, to the MT DFWP.
2. If leased as a grazing unit, require the leasee to follow a DNRC approved grazing management plan.
3. Develop, in conjunction with the Carbon Co. Weed Supervisor, an aggressive spotted knapweed management plan.
4. Earmark all funds generated through the lease to spotted knapweed control of the area.

2. Clarify whether any biological control insects have been released that target spotted knapweed. Verify the presence of the banded gall fly and/or the knapweed seed head fly (*Urophora* spp.). Make releases of the knapweed root moth (see below). Insect releases should be made at sites which are inaccessible during truck herbicide applications, and free from other disturbances such as mowing.

<u>Biological control insects for spotted and diffuse knapweed</u>:

The banded gall fly (*Urophora affinis*) and the knapweed seed head fly (*Urophora quadrifasciata*) are widely established in Montana and may be already established at Cooney Reservoir. Their presence can be verified by opening mature seed heads and inspecting for galls (*U. affinis*) and larvae (*U. quadrifasciata*), which are generally present from summer to the following spring. The *Urophora* spp. can decrease seed production by up to 95%. Infested seed heads can be transferred to new sites. Both *Urophora* species attack spotted and diffuse knapweeds.

Agapeta zoegana (knapweed root moth) is a small yellow and brown moth of European origin that attacks the roots of spotted knapweed. The moth overwinters as a larva in the root. Adult emergence occurs from mid-June to early September. Release sites should be unshaded or partly unshaded knapweed infestations that are at least 10 acres in size and guaranteed free from disturbance for at least 5 years. Releases of one to a few hundred adult *Agapeta* should be made at two or three different locations around the reservoir. Release sites should be recorded and marked in the field. Annual releases for several years may be necessary to establish initial in situ populations of *Agapeta*. *Agapeta* primarily attacks spotted knapweed, and also attacks diffuse knapweed to a lesser extent.

3. If houndstongue control is desired, consider using Escort herbicide. Both first and second year plants of this biennial species are susceptible to Escort at 0.5 to 1 ounce / acre. First year plants are susceptible to 2,4-D. However, for effective houndstongue control using 2,4-D, annual applications should be made for at least 2 or 3 years. Best timing is early summer. Seed production of single plants and small clusters can be reduced by cutting the root as far below the crown as possible. This should be done by early July or before. However, regrowth of houndstongue from deep rootstocks and subsequent seed production will not be completely eliminated. Seedtops (July and later) should be bagged for removal and burning.

4. Walk through inspections for new weeds should be conducted biennially, with priority on detection of leafy spurge, Dalmatian toadflax, and diffuse knapweed.

D. Monitoring

Maintain observational records of the extent of noxious weed infestations during biennial site inspections. Permanently mark insect release sites. Re-map target noxious weeds in 2002.

E. Needs

1. Short and long term needs
   a. Personnel - ½ person-day / year for insect releases; 1 person-day, biennially, for weed response monitoring and new weeds inspection
   b. Equipment - none
   c. Chemicals - none
   d. Biological control agents - *Agapeta zoegana* (knapweed root moth)
   e. Seeds - none
2. Yearly procurement plan - The MAES Western Montana Agricultural Research Center (Corvallis) is currently providing adult *Agapeta* for redistribution. Insects should be requested early (winter/spring) as demand is high and availability will vary.

III. Budget

SITE: Cooney Reservoir				
		Years 1 - 2	Years 3 - 6	**6-Yr Total**
Cultural / mechanical controls				
	Hand pulling			$0.00
	{Labor = $7 / hr + 20% benefits -			
	One person can pull weeds from about			
	1/10 to 1/5 acre / day depending on the			
	infestation and site conditions}			
Herbicide application				
	helicopter @ $7 / acre			$0.00
	truck / ATV broadcast @ $25 / acre			$0.00
	truck broadcast:			
	1 x 11' swath @ $32.50 / mile			$0.00
	2 x 11' swath @ $65.00 / mile			$0.00
	truck / ATV handgun @ $45 / hr			$0.00
	backpack spot spraying @ $45 / hr			$0.00
Insects				
	support rearing effort at MAES-Corvallis	$500.00	$1,000.00	$1,500.00
	establishment (labor, annual releases)	$96.00	$192.00	$288.00
	redistribution costs			$0.00
Seeding and revegetation costs				
	seed costs per acre			$0.00
	application cost per acre			$0.00
Education and awareness signing				$0.00
Vegetation and weed response monitoring				
	Labor @ $10 / hr + 20% benefits	$96.00	$192.00	$288.00
	Supplies			$0.00
	Total Estimated Costs	$692.00	$1,384.00	$2,076.00

STATE WATER PROJECTS BUREAU SPECIFIC PLAN OF OPERATIONS FOR NOXIOUS WEED MANAGEMENT: Cottonwood Reservoir, Park County

I. Situation statement

A. Description of State Water Project Bureau managed lands

1. Major features and location

Cottonwood Reservoir is located about 3 miles N of Wilsall along US 89 at 5100 feet elevation (T3N R8E portions of sections 1,2,11,12). The dam at its SE corner floods approximately 475 acres.

2. Land ownership patterns of agency and general statement of accessibility - See Water Project Bureau land ownership map.

Water Project Bureau owns the flooded acres plus some additional land around most of the shore.

3. Delineation of current use zones

water resource: high pool to low pool
maintenance: dam and spillway, plus road system around E shore
grazing: entire shore and surrounding area
recreation: campsites on E shore
natural areas: overlapping the water resource zone and partially overlapping the grazing zone: heavy use by waterfowl and shore birds

4. Soil types

Mostly clay loams - major series include: Tamaneen clay loam, Regent and Wilsall clay loams, Tolman cobbly sandy loam, Vershal channery loam, Soapcreek silty clay loam, Adger variant clay loam/clay, and Lennep clay loam. Soils range from very shallow to very deep and mostly well-drained with slow to moderate permeability. Runoff is mostly medium to rapid.

B. Statement of the weed problem

1. Current list of state and county noxious weeds

State noxious species (Table 1)

Park County designated noxious weeds:
houndstongue (CYWOF) poison hemlock (COIMA)

2. General distribution patterns of noxious species at the site

Canada thistle is widely distributed around the shore and adjacent land. A few small colonies of spotted knapweed occur around the E shore. Scattered plants of houndstongue were found around most of the shore.

3. Identification of problem areas (e.g. drainages, gravel pits, roads, campsites)

road system, campsites along E shore

II. Plan of work

A. Vegetation management goals

1. County Weed Board

Prevent establishment of new weed infestations. Suppress or eradicate noxious weed species where possible.

2. Water Project Bureau

Concurrent with Park County goals.

B. Weed management priorities

1. Terrain / access

Gentle terrain. Adjacent to US 89, with road system around E shore. No vehicle access to W shore.

2. Environmental concerns

Surface water.

3. Target noxious weeds identified at the site

spotted knapweed (CENMA)
Canada thistle (CIRAR)
houndstongue (CYWOF)

4. Management objectives by species / zone

Species	Water resource zone	Maintenance zone	Grazing zone	Recreation zone	Natural areas zone
CENMA	NA	eradicate	eradicate	eradicate	eradicate
CIRAR	NA	tolerate	tolerate	tolerate	tolerate
CYWOF	NA	contain	contain	contain	contain

NA - not applicable - the weed species was not observed in this zone and is not expected to be an immediate threat in this zone

C. Implementation (management prescription)

1. Apply herbicide spot treatments for spotted knapweed control. Use 1 pint/acre Tordon 22K during periods of active knapweed growth. Conduct follow-up spot treatments every other year to maintain spotted knapweed control at the site.

2. Contain houndstongue by herbicide spot treatment and hand digging. Both first and second year plants are susceptible to Escort® at 0.5 to 1 ounce / acre. Seed production of single plants and small clusters can be reduced by cutting the root as far below the crown as possible. This should be done by early July or before. However, regrowth of houndstongue from deep rootstocks and subsequent seed production will not be completely eliminated. Seedtops (July and later) should be bagged for removal and burning.

3. Canada thistle would be difficult to control at this site due to its wide distribution, large area occupied and proximity to surface waters. Monitoring is the only action recommended at this time. If thistle populations appear to be expanding, consider increasing herbicide use to contain its acreage. Curtail (clopyralid + 2,4-D) at 6 pints / acre (0.3 + 1.5 lb/acre) is effective, but a single application will not provide long term control. For treatment near surface water, Rodeo (glyphosate) can be applied at 3 to 4½ pints/acre plus a non-ionic surfactant labeled for use with herbicides. Care must be taken not to kill desirable vegetation when applying Rodeo. Apply when Canada thistle plants are actively growing and when most plants are at or beyond the bud stage of growth.

D. Monitoring

Maintain observational records of noxious weed infestations. Update biennially. Re-map target noxious weeds in 2002.

E. Needs

1. Short and long term needs
    a. Personnel - licensed herbicide applicator, ½ person-day / year, years 1, 3, 5; ½ person-day / year for vegetation response monitoring and new weeds inspection, years 2, 4, 6
    b. Equipment - truck or backpack hand spraying equipment
    c. Chemicals - Tordon® 22K herbicide; Escort® herbicide
    d. Biological control agents - none
    e. Seeds - none
2. Yearly procurement plan - NA

III. Budget

SITE: Cottonwood Reservoir				
		Years 1 - 2	Years 3 - 6	**6-Yr Total**
Cultural / mechanical controls				
	Hand pulling			$0.00
	{Labor = $7 / hr + 20% benefits -			
	One person can pull weeds from about			
	1/10 to 1/5 acre / day depending on the			
	infestation and site conditions}			
Herbicide application				
	helicopter @ $7 / acre			$0.00
	truck / ATV broadcast @ $25 / acre			$0.00
	truck broadcast:			
	1 x 11' swath @ $32.50 / mile			$0.00
	2 x 11' swath @ $65.00 / mile			$0.00
	truck / ATV handgun @ $45 / hr	$180.00	$360.00	$540.00
	backpack spot spraying @ $45 / hr			$0.00
Herbicide costs				
	Tordon 22K @ $71 / gal	$10.00	$20.00	$30.00
	Escort @ $19 / oz	$19.00	$38.00	$57.00
Insects				
	purchase or collection costs			$0.00
	establishment costs (labor and materials)			$0.00
	redistribution costs			$0.00
Seeding and revegetation costs				
	seed costs per acre			$0.00
	application cost per acre			$0.00
Education and awareness signing				$0.00
Vegetation and weed response monitoring				
	Labor @ $10 / hr + 20% benefits	$48.00	$96.00	$144.00
	Supplies			$0.00
	Total Estimated Costs	$257.00	$514.00	$771.00

STATE WATER PROJECTS BUREAU SPECIFIC PLAN OF OPERATIONS FOR NOXIOUS WEED MANAGEMENT:
Deadmans Basin Reservoir, Wheatland and Golden Valley Counties

I. Situation statement

A. Description of State Water Project Bureau managed lands

1. Major features and location

Deadmans Basin is an offstream storage reservoir located just N of Highway 12, about 22 miles E of Harlowton (T7N R18E portions of sections 22,23,24,25,26,27,35) at 3900 feet elevation. The NE corner extends slightly into Golden Valley County. It is supplied by a diversion canal from the Mussellshell River, and water is released through two outlet canals, the Careless Creek Canal and the Barber Canal. There are approximately 2,000 flooded acres.

2. Land ownership patterns of agency and general statement of accessibility - See Water Project Bureau land ownership map.

Water Bureau land includes the flooded acres plus some additional land around most of the shore. Fish, Wildlife and Parks has a Fishing Access lease with campgrounds and boat ramps.

3. Delineation of current use zones

water resource: high pool to low pool
maintenance: dam on E shore, road system
recreation: campgrounds and boat ramps along S shore, cabin site area along SE shore
grazing/agriculture: shoreline and surrounding area, exclusive of the recreation zone; cultivated land along N shore
natural areas: native grassland and shrubland along the E and S shores, exclusive of the recreation and maintenance zones

4. Soil types

mostly loams around the reservoir edges, but some may be clay loams to clay

B. Statement of the weed problem

1. Current list of state and county noxious weeds

State noxious species (Table 1)

Wheatland County designated noxious weeds:

houndstongue (CYWOF)

Golden Valley designated noxious weeds:
None

2. General distribution patterns of noxious species at the site

Spotted knapweed was widely scattered at low to moderate densities around the SE shore - in the campgrounds and along the road edges. Significant spotted knapweed infestations were found on and below the dam, with some heavy colonies along the outlet canal. Canada thistle was widely distributed around most of the shore. Houndstongue occurred as widely scattered individuals. A small colony of field bindweed was found on the S shore, W of the campground area.

3. Identification of problem areas (e.g. drainages, gravel pits, roads, campsites)

Cabin sites / road system along SE shore. Campgrounds / road system along S shore.

II. Plan of work

A. Vegetation management goals

1. County Weed Boards

Contain or suppress existing noxious weed infestations. Prevent establishment of new weed species.

2. Water Project Bureau

Concurrent with Wheatland County and Golden Valley County goals.

B. Weed management priorities

1. Terrain / access

Vehicle access around entire shore (W shore through private land). Moderate terrain.

2. Environmental concerns

Surface water.

3. Target noxious weeds identified at the site

Category I

spotted knapweed (CENMA)
Canada thistle (CIRAR)
houndstongue (CYWOF)
field bindweed (CONAR)

4. Management objectives by species / zone

Species	**Water resource zone**	**Maintenance zone**	**Recreation zone**	**Grazing / agriculture zone**	**Natural areas zone**
CENMA	NA	suppress	suppress	detect	suppress
CIRAR	NA	contain	contain	contain	contain
CYWOF	NA	contain	contain	contain	contain
CONAR	NA	detect	suppress	detect	detect
EPHES	detect	detect	detect	detect	detect

NA - not applicable - the weed species was not observed in this zone and is not expected to be an immediate threat in this zone

C. Implementation

Previous and ongoing weed management activities:

Montana DFWP Region 5 has developed a noxious weed management plan for land leased from DNRC at Deadmans Basin. The plan targets spotted knapweed, Canada thistle and leafy spurge. Control methods are specified as “mowing, weed eating, insects, and chemical herbicides,” with different combinations of control methods applied to each of three use zones. Under this plan, Wheatland County Weed Control District has coordinated herbicide application work, with portions of the property treated in both 1995 and 1996.

General recommendations for management on Water Project Bureau lands:

1. Coordinate management activities with DFWP. Contact: Rick Johnson, DFWP, Billings, (406) 247-2966.

2. Continue road edge and spot herbicide treatments for spotted knapweed control. Clarify which areas have been treated by Wheatland County Weed Control District. Spotted knapweed in the recreation, maintenance and natural areas zones should be treated with Tordon 22K at 1 pint/acre during periods of active knapweed growth. Spot and small area broadcast treatments can be made using ground application

equipment. Tordon 22K cannot be used on the inside banks of the outlet canal nor close to the water's edge where contamination might occur.

3. Control the heavy infestations of spotted knapweed along the outlet canal using a 2,4-D amine labeled for use on irrigation canal ditchbanks. Follow label instructions for application procedures. Apply at 2 lb/acre to actively growing spotted knapweed plants (spring / early summer), before the bud or early bloom stage (rosette to early bolt stages preferred). Annual maintenance spraying may be required for several years, although 2 or 3-year intervals eventually may be sufficient to maintain suppression.

4. Contain Canada thistle by herbicide spot spraying. Canada thistle can be treated incidental to the spotted knapweed spray program (same chemical rates and timings).

5. Contain houndstongue by herbicide spot treatment and hand digging. Both first and second year plants are susceptible to Escort® at 0.5 to 1 ounce / acre. Seed production of single plants and small clusters can be reduced by cutting the root as far below the crown as possible. This should be done by early July or before. However, regrowth of houndstongue from deep rootstocks and subsequent seed production will not be completely eliminated. Seedtops (July and later) should be bagged for removal and burning.

6. Use herbicide applications for suppression of field bindweed at the W end of the S shore recreation zone. Treat the field bindweed patch during annual maintenance spraying of spotted knapweed. Make 2 passes over the field bindweed patch so that the rate doubles to 1 quart / acre, instead of the 1 pint / acre used for knapweed.

7. A small colony of leafy spurge has been reported from the cabin site area, although no plants were located during the 1996 mapping. The leafy spurge has probably been sprayed during the past 2 or 3 years. Mark it for monitoring and follow up herbicide treatment. A high priority is set for detection of leafy spurge since it will likely occur at other locations around Deadman's Basin.

D. Monitoring

Inspect the site for new weed infestations and maintain observational records of current weed infestations. Update biennially. Re-map target noxious species in 2002.

E. Needs - assuming continued maintenance spraying, mowing, etc. under DFWP weed management plan

1. Short and long term needs
    a. Personnel - licensed herbicide applicator, 1 person-day / year, for spotted knapweed treatment on and around the outlet canal ditchbanks, and general weed control work in portions of the maintenance zone that do not fall under DFWP responsibility; ½ person day / year, biennially, for vegetation response monitoring and new weeds inspection
    b. Equipment - backpack or ATV-mounted ground application equipment
    c. Chemicals - 2,4-D amine labeled for irrigation canal ditchbanks (e.g. Weed Pro®, Cornbelt Chemical Co.); Tordon® 22K herbicide
    d. Biological control agents - none
    e. Seeds - none
2. Yearly procurement plan - NA

III. Budget

SITE: Deadmans Basin				
		Years 1 - 2	Years 3 - 6	**6-Yr Total**
Cultural / mechanical controls				
	Hand pulling			$0.00
	{Labor = $7 / hr + 20% benefits -			
	One person can pull weeds from about			
	1/10 to 1/5 acre / day depending on the			
	infestation and site conditions}			
Herbicide application				
	helicopter @ $7 / acre			$0.00
	truck / ATV broadcast @ $25 / acre			$0.00
	truck broadcast:			
	1 x 11' swath @ $32.50 / mile			$0.00
	2 x 11' swath @ $65.00 / mile			$0.00
	truck / ATV handgun @ $45 / hr	$720.00	$1,440.00	$2,160.00
	backpack spot spraying @ $45 / hr			$0.00
Herbicide costs				
	Tordon 22K @ $71 / gal	$88.75	$106.50	$195.25
	2,4-D amine @ $11 /gal	$22.00	$44.00	$66.00
Insects				
	purchase or collection costs			$0.00
	establishment costs (labor and materials)			$0.00
	redistribution costs			$0.00
Seeding and revegetation costs				
	seed costs per acre			$0.00
	application cost per acre			$0.00
Education and awareness signing				$0.00
Vegetation and weed response monitoring				
	Labor @ $10 / hr + 20% benefits	$48.00	$96.00	$144.00
	Supplies	$25.00	$25.00	$50.00
	Total Estimated Costs	$903.75	$1,711.50	$2,615.25

STATE WATER PROJECTS BUREAU SPECIFIC PLAN OF OPERATIONS FOR NOXIOUS WEED MANAGEMENT:
East Fork Rock Creek, Granite County

I. Situation statement

A. Description of State Water Project Bureau managed lands

1. Major features and location

The East Fork dam on Rock Creek floods approximately 420 acres in a steep canyon in the Anaconda Range (Deerlodge NF) at 6050 feet elevation (T4N R14W portions of sections 5,6,8).

2. Land ownership patterns of agency and general statement of accessibility - see Water Project Bureau land ownership maps

489.11 total acres are comprised of deeded land and a USFS Special Use Permit. A well-maintained FS road (FR #261) runs along the entire length of the E shore. A road (FR# ?) runs across the dam to the Spillway Campground at the NW corner of the reservoir then heads away to the NW.

3. Delineation of current use zones

water resource zone: high pool to low pool
maintenance zone: dam/spillway at N end, roads across dam and along E shore
recreation zone: vehicle turnout area at N end of E shore with undeveloped campsites and boat launch area, adjacent FS campground ("Spillway")
natural areas zone: shoreline and surrounding area, inlet area (S end)

4. Major soil types

<u>W shore</u>: Worock-Elve-Elvick complex, moderately steep moraines - stony or very cobbly loam surface layers, very deep and well-drained

<u>E shore and portions of N shore</u>: Whitore-Tropal-Rock outcrop complex, very steep troughwalls - cobbly (Whitmore) or stony (Tropal) loam surface layers, Whitmore is very deep (60+ in) and somewhat excessively drained, Tropal is shallow (10-20 in) and well drained

<u>portions of N shore</u>: Dnfbata-Elve-Elvick complex, moderately steep young moraines - Dnfbata is gravelly silt loam, very deep and well-drained; Elve is very cobbly loam, very deep and well-drained; Elvick is very bouldery loam, very deep and somewhat poorly drained (no flooding)

inlet and outlet: Mooseflat loam (very deep and very poorly drained, occasional flooding) - Finn gravelly loam (very deep and very poorly drained, rare flooding) complex

B. Statement of the weed problem

1. Current list of state and county noxious weeds

State noxious species (Table 1)

Granite County designated noxious weeds:

Category I

common burdock (ARFMI)	common tansy (CHYVU)
musk thistle (CRUNU)	houndstongue (CYWOF)
caraway (CRYCA)	

Category II

tansy ragwort (SENJA)

2. General distribution patterns of noxious species at the site

Spotted knapweed was scattered along the dam and along the first mile of the E shore road (FR 261) edge and vehicle turnout area. Occasional plants of Canada thistle and musk thistle were also present.

3. Identification of problem areas (e.g. drainages, gravel pits, roads, campsites)

The dam will undergo repair work in fall 1996 involving significant ground disturbance. Undeveloped campsites are located in the vehicle turnout area and at the S end of the E shore road (#261). There is a gravel pit near the NW corner of the reservoir.

II. Plan of work

A. Vegetation management goals

1. Short term goals (1 - 2 years) - County Weed Board

Containment or suppression of Category I weeds by Integrated Weed Management practices and prevention of spread into noninfested areas. Detection and immediate eradication of Category II weeds. Revegetation of disturbed areas.

2. Short term goals - Water Project Bureau

Concurrent with Granite County goals.

3. Long term goals (2- 6 years) - County Weed Board

Prevention of new noxious weed establishment in this relatively nonweedy area.

4. Long term goals - Water Project Bureau

Concurrent with Granite County goals.

B. Weed management priorities

1. Terrain / access

Good access to dam and along E shore. W shore has closed canopy forest and probably will not be a problem area for noxious weeds. Surrounding terrain is steep canyon.

2. Environmental concerns

Surface water.

3. Target noxious weeds identified at the site

<u>Category I</u>
spotted knapweed (CENMA)
Canada thistle (CIRAR)
musk thistle (CRUNU)

4. Management objectives by weed species / zone

Species	**Water resource zone**	**Maintenance zone**	**Recreation zone**	**Natural areas zone**
CENMA	NA	eradicate	eradicate	detect
CIRAR	NA	suppress (incidental to CENMA management)	suppress (incidental to CENMA management)	tolerate
CRUNU	NA	suppress (incidental to CENMA management)	suppress (incidental to CENMA management)	tolerate

NA - not applicable - the weed species was not observed in this zone and is not expected to be an immediate threat in this zone

C. Implementation (management prescription)

1. Treat the west road edge along the first mile (N end) of FR #261 with Transline (clopyralid) at ⅔ pint/acre, targeting spotted knapweed. Apply spot treatments with Transline (⅔ pint/acre) along the top of the dam, in the vehicle turnout area, and along the 2nd mile (S end) of FR #261 targeting spotted knapweed, Canada thistle and musk thistle. Treatments should be made in early summer when plants are actively growing. Apply follow-up spot treatments 2 to 3 years after the initial applications.

2. Following the dam repair work, reseed the downstream face with grass to stabilize soil and create a closed canopy resistant to weed invasion. Treat with ⅔ pint/acre Transline if there is significant spotted knapweed establishment following disturbance to the dam face.

<u>species</u>: smooth brome + Mandan pubescent wheatgrass + Potomac orchardgrass
<u>sources</u>: Wind River Seed, Manderson, WY (307-568-3361); Lake Milling, Hamilton, MT (406-363-2334)
<u>timing</u>: fall, soon after disturbance if possible, or the following spring
<u>rate of application</u>: 40 lb/acre pure live seed (16 lb smooth brome, 16 lb pubescent wheatgrass, 8 lb orchardgrass)
<u>method of application</u>: Provide a good topsoil seedbed (save existing topsoil if possible). Broadcast and rake in. Use a mulch product, such as NutriMulch (available through Wind River Seed), to improve soil stability and seedling establishment.

3. Silvicultural management should be attentive to maintaining shade around the dam and road prisms where possible.

D. Monitoring

1. Establish permanent photo points (5-10) on the dam face with location records. Make first photos prior to dam repair work. Update biennially. (For photo plot procedures, see MSU Extension Service Bulletin 369, “Monitoring Montana Rangeland”, Oct 1992 reprint.)

2. Maintain observational records of road and shoreline conditions. Inspect for new weeds. Update biennially.

3. Re-map noxious weed species in 2002.

E. Needs

1. Determine short and long term needs
   a. Personnel - licensed herbicide applicator, 1 person-day / year, year 1 and year 3 or 4
   b. Equipment - truck sprayer with handgun; camera and photopoint frames
   c. Chemicals - Transline® herbicide
   d. Biological control agents - none
   e. Seeds - 16 lb smooth brome, 16 lb pubescent wheatgrass and 8 lb orchardgrass per acre of disturbed ground; 1 ton NutriMulch per acre of disturbed ground
2. Yearly procurement plan - NA

III. Budget

SITE: E. Fork Rock Creek Reservoir				
		Years 1 - 2	Years 3 - 6	**6-Yr Total**
Cultural / mechanical controls				
	Hand pulling			$0.00
	{Labor = $7 / hr + 20% benefits -			
	One person can pull weeds from about			
	1/10 to 1/5 acre / day depending on the			
	infestation and site conditions}			
Herbicide application				
	helicopter @ $7 / acre			$0.00
	truck / ATV broadcast @ $25 / acre			$0.00
	truck broadcast:			
	1 x 11' swath @ $32.50 / mile	$32.50		$32.50
	2 x 11' swath @ $65.00 / mile			$0.00
	truck / ATV handgun @ $45 / hr	$360.00	$360.00	$720.00
	backpack spot spraying @ $45 / hr			$0.00
Herbicide costs				
	Tordon 22K @ $71 / gal			$0.00
	Transline @ $270 / gal	$67.50	$67.50	$135.00
	2,4-D amine @ $11 /gal			$0.00
Insects				
	purchase or collection costs			$0.00
	establishment costs (labor and materials)			$0.00
	redistribution costs			$0.00
Seeding and revegetation costs				
	seeds @ 40 lb / acre, est. 1 ac. total	$80.00		$80.00
	NutriMulch @ 1 ton / acre, est. 1 ac. total	$425.00		$425.00
	application cost (est., equipment + labor)	$200.00		$200.00
Education and awareness signing				
Vegetation and weed response monitoring				
	Labor @ $10 / hr + 20% benefits	$192.00	$192.00	$384.00
	Supplies	$150.00	$50.00	$200.00
	Total Estimated Costs	$1,507.00	$669.50	$2,176.50

STATE WATER PROJECTS BUREAU SPECIFIC PLAN OF OPERATIONS FOR NOXIOUS WEED MANAGEMENT:
Fred Burr Reservoir, Ravalli County

I. Situation statement

A. Description of State Water Project Bureau managed lands

1. Major features and location

Fred Burr Reservoir is located about 9 miles SW of Victor and about 1 mile E of the Selway-Bitterroot Wilderness boundary on Fred Burr Creek. Elevation at the dam is 5140 feet and it floods approximately 31 acres.

2. Land ownership patterns of agency and general statement of accessibility - See Water Project Bureau land ownership map.

The reservoir can be reached by a 4WD FS road up Fred Burr Creek, about 5 miles from the locked gate at the trailhead. A bridge just below the dam was undergoing reconstruction in 1996. Water Bureau land consists of 45 acres (31 flooded) surrounded by Bitterroot National Forest land.

3. Delineation of current use zones

water resource zone: high pool to low pool
maintenance zone: access road, dam and spillway at E end
recreation zone: hiking trail = access road to the dam with trail continuing W along the N shore
natural areas zone: shoreline and surrounding area

4. Soil types

deep to very deep loams, extremely bouldery - Sitdown-Priestlake-Jurvannah Complex - excessively drained, except Jurvannah which are silt loams with seasonally high water table (marshy areas)

B. Statement of the weed problem

1. Current list of state and county noxious weeds

State noxious species (Table 1)
Ravalli County designated noxious weeds:
- common tansy (CHYVU)
- common toadflax (LINVU)
- houndstongue (CYWOF)

2. General distribution patterns of noxious species at the site

A low to moderate infestation of spotted knapweed occurs along the access road from openings around the bridge to the dam, and around the dam and spillway. Scattered individuals of spotted knapweed were found along the N shore hiking trail, which has brush and tree cover (shown open on the topo). Most of the immediately surrounding area supports closed canopy forest or has rocky cliffs, so that little of the immediately adjacent habitat is susceptible to spotted knapweed invasion. The upper 1 to 2 miles of the access road have few noxious weeds until just below the dam. Spotted knapweed is common along the lower portion of the road, and there is some sulfur cinquefoil on private land there.

II. Plan of work

A. Vegetation management goals

1. Short and long term goals (1 - 6 years) - County Weed Board

Detect and reduce new noxious weeds with highest priority on leafy spurge, Dalmatian toadflax, sulfur cinquefoil. Suppress spotted knapweed in high priority areas.

2. Short and long term goals - Water Project Bureau

Concurrent with Ravalli County goals.

B. Weed management priorities

1. Terrain / access

Fred Burr Reservoir is in a steep canyon with access by 4WD road. Access around the S shore is difficult due to steep slopes and no trail, but with closed canopy forest along most of the shore.

2. Environmental concerns

Surface water.

3. Target noxious weeds identified at the site

<u>Category I</u>
spotted knapweed (CENMA)

4. Management objectives by species / zone

Species	Water resource zone	Maintenance zone	Recreation zone	Natural areas zone
CENMA	NA	suppress	suppress	suppress

NA - not applicable - the weed species was not observed in this zone and is not expected to be an immediate threat in this zone

C. Implementation (management prescription)

1. Suppress spotted knapweed in the maintenance, recreation and natural areas zones by hand digging and small area herbicide treatments. Treat the spotted knapweed in the openings around the bridge and road below the dam and along the top of dam with 2,4-D amine at 2 lbs / acre using a backpack sprayer. Herbicide application must be made to actively growing plants (spring - mid summer). Hand dig plants that are near water and plants along the N shore hiking trail. The entire plant must be removed since regrowth can occur from the crown or root. Plants should be dug when soil is moist and before seeds are formed. Plants with seeds should be bagged and removed from the site. Hand digging and spot spraying should be done as part of an annual maintenance program until the soil seed bank is diminished.

2. Monitoring for new weeds is important at this site because of its proximity to the Selway-Bitterroot wilderness. The wilderness and access points are high priority noxious weed management areas for the Bitterroot NF.

D. Monitoring

High priority noxious weeds in Ravalli County include leafy spurge, Dalmatian toadflax and sulfur cinquefoil. Inspection of the site for new weeds should be done annually. Sulfur cinquefoil is already present on lower portions of the access road and could occur on Water Bureau land around Fred Burr. New noxious weeds should be eradicated under the guidance of Ravalli County Weed Control.

Conduct a walk-through inspection for new weeds. Update annually.

E. Needs

1. Short and long term needs
   a. Personnel - 1 person-day / year in years 1 - 6, for weed identification and mapping; licensed herbicide applicator, ½ person-day / year in years 1 - 6 for herbicide spot treatments; 1 person-day / year in years 1 - 6 for hand digging
   b. Equipment - backpack sprayer and hand digging tools
   c. Chemicals - 2,4-D amine labeled for use near water (e.g., Weed Pro®, Cornbelt Chemical Co.)

d. Biological control agents - none
e. Seeds - none

2. Yearly procurement plan - NA

III. Budget

SITE: Fred Burr Reservoir				
		Years 1 - 2	Years 3 - 6	**6-Yr Total**
Cultural / mechanical controls				
	Hand pulling	$134.40	$268.80	$403.20
	{Labor = $7 / hr + 20% benefits -			
	One person can pull weeds from about			
	1/10 to 1/5 acre / day depending on the			
	infestation and site conditions}			
Herbicide application				
	backpack spot spraying @ $45 / hr	$360.00	$720.00	$1,080.00
Herbicide costs				
	Tordon 22K @ $71 / gal			$0.00
	Transline @ $270 / gal			$0.00
	2,4-D amine @ $11 /gal	$11.00	$22.00	$33.00
Insects				
	purchase or collection costs			$0.00
	establishment costs (labor and materials)			$0.00
	redistribution costs			$0.00
Seeding and revegetation costs				
	seed costs per acre			$0.00
	application cost per acre			$0.00
Education and awareness signing				$0.00
Vegetation and weed response monitoring				
	Labor @ $10 / hr + 20% benefits	$192.00	$384.00	$576.00
	Supplies	$25.00	$50.00	$75.00
	Total Estimated Costs	$722.40	$1,444.80	$2,167.20

STATE WATER PROJECTS BUREAU SPECIFIC PLAN OF OPERATIONS FOR NOXIOUS WEED MANAGEMENT:
Frenchman Reservoir, Phillips County

I. Situation statement

A. Description of State Water Project Bureau managed lands

1. Major features and location

Frenchman Reservoir is located about 17 miles N of US 2 at Saco (T34N R34E portions of sections 12,13,14,23). Elevation is 2260 feet.

2. Land ownership patterns of agency and general statement of accessibility - See Water Project Bureau land ownership map.

The Water Project Bureau owns the flooded acres and adjacent shore, a small block below the dam and some additional acres at the N end.

3. Delineation of current use zones

water resource: high pool to low pool
maintenance: dam and spillway + roads along dam, E and N shores
agriculture: N end beyond the flooded acres + surrounding area

B. Statement of the weed problem

1. Current list of state and county noxious weeds

State noxious species (Table 1)

Phillips County designated noxious weeds:
None

2. General distribution patterns of noxious species at the site

No noxious species were found at the site during the 1996 inspection.

II. Plan of work

A. Vegetation management goals

1. County Weed Board

Detect and prevent noxious weed establishment.

2. Water Project Bureau

Concurrent with Phillips County goals.

B. Weed management priorities

1. Terrain / access

Mostly gentle terrain. Vehicle access to the dam and around E and N shores.

2. Environmental concerns

Surface water.

3. Target noxious weeds identified at the site

None

4. Management objectives by species / zone

Species	**Water resource zone**	**Maintenance zone**	**Agriculture zone**
statewide noxious species	detect	detect	detect

C. Implementation (management prescription)

Conduct biennial site inspections for detection of new weed establishment. Target newly established noxious weeds for eradication. Carry hand digging tools and plastic bags during site visits for removal of new noxious weeds that might occur.

D. Needs

1. Short and long term needs
   a. Personnel - 1 person-day, biennially, for new weeds inspection
   b. Equipment - hand digging tools
   c. Chemicals - none
   d. Biological control agents - none
   e. Seeds - none
2. Yearly procurement plan - NA

III. Budget

SITE: Frenchman Reservoir				
		Years 1 - 2	Years 3 - 6	**6-Yr Total**
Cultural / mechanical controls				
	Hand pulling			$0.00
	{Labor = $7 / hr + 20% benefits -			
	One person can pull weeds from about			
	1/10 to 1/5 acre / day depending on the			
	infestation and site conditions}			
Herbicide application				
	helicopter @ $7 / acre			$0.00
	truck / ATV broadcast @ $25 / acre			$0.00
	truck broadcast:			
	1 x 11' swath @ $32.50 / mile			$0.00
	2 x 11' swath @ $65.00 / mile			$0.00
	truck / ATV handgun @ $45 / hr			$0.00
	backpack spot spraying @ $45 / hr			$0.00
Herbicide costs				
	Krenite S @ $54 / gal			$0.00
	Rodeo @ $100 / gal			$0.00
	Tordon 22K @ $71 / gal			$0.00
	Transline @ $270 / gal			$0.00
	2,4-D amine @ $11 /gal			$0.00
Insects				
	purchase or collection costs			$0.00
	establishment costs (labor and materials)			$0.00
	redistribution costs			$0.00
Seeding and revegetation costs				
	seed costs per acre			$0.00
	application cost per acre			$0.00
Education and awareness signing				$0.00
Vegetation and weed response monitoring				
	Labor @ $10 / hr + 20% benefits	$96.00	$192.00	$288.00
	Supplies	$50.00	$50.00	$100.00
	Total Estimated Costs	$146.00	$242.00	$388.00

STATE WATER PROJECTS BUREAU SPECIFIC PLAN OF OPERATIONS FOR NOXIOUS WEED MANAGEMENT: Glacier Lake, Carbon County

I. Situation statement

A. Description of State Water Project Bureau managed lands

1. Major features and location

Glacier Lake (Rock Creek) is on the Montana-Wyoming border, 19 miles SW of Red Lodge at 9700 feet elevation on the Beartooth Plateau (T9S R18E portions of sections 29,30,31,32). There is a dam at the SE end, and approximately 166 flooded acres.

2. Land ownership patterns of agency and general statement of accessibility - See Water Project Bureau land ownership map.

The reservoir acres result from a U.S.F.S. Special Use Permit.

3. Delineation of current use zones

water resource: high pool to low pool
maintenance / recreation: dam and access trail
natural areas: shoreline and surrounding area

B. Statement of the weed problem

1. Current list of state and county noxious weeds

State noxious species (Table 1)

Carbon County designated noxious weeds:

musk thistle (CRUNU)	houndstongue (CYWOF)
common toadflax (LINVU)	scotch thistle (ONRAC)
milk thistle (SLYMA)	common tansy (CHYVU)

2. General distribution patterns of noxious species at the site

No noxious weed species were found at Glacier Lake.

II. Plan of work

A. Vegetation management goals

1. County Weed Board - Prevent new weed establishment in this pristine natural area

2. Water Project Bureau - Concurrent with Carbon County goals

B. Weed management priorities

1. Terrain / access

Steep, rocky terrain. No vehicle access (single track swithbacks for the last ~ 1½ miles).

2. Environmental concerns

biological integrity in a pristine natural area

3. Target noxious weeds identified at the site

None

4. Management objectives by species / zone

prevention and detection objectives for all exotic plant species

C. Implementation (management prescription)

Conditions at this high elevation lake are not suitable for establishment of most noxious weed species. However, the lake lies along the Absaroka-Beartooth Wilderness boundary and along an access route to other portions of the Wilderness. Preventing the introduction of exotic plant species is a goal for the site.

1. Provide signing at the parking area / access trail that requires use of noxious weed seed-free hay.

2. Inspect the site at 5-year intervals for detection of noxious weed species and exotic plants that have not yet been declared noxious, but that are potentially problematic.

E. Needs

1. Short and long term needs
   a. Personnel - ½ person-day in year 5 for new weeds inspection
   b. Equipment - none
   c. Chemicals - none
   d. Biological control agents - none
   e. Seeds - none
2. Yearly procurement plan - NA

III. Budget

SITE: Glacier Lake				
		Years 1 - 2	Years 3 - 6	**6-Yr Total**
Cultural / mechanical controls				
	Hand pulling			$0.00
	{Labor = $7 / hr + 20% benefits -			
	One person can pull weeds from about			
	1/10 to 1/5 acre / day depending on the			
	infestation and site conditions}			
Herbicide application				
	helicopter @ $7 / acre			$0.00
	truck / ATV broadcast @ $25 / acre			$0.00
	truck broadcast:			
	1 x 11' swath @ $32.50 / mile			$0.00
	2 x 11' swath @ $65.00 / mile			$0.00
	truck / ATV handgun @ $45 / hr			$0.00
	backpack spot spraying @ $45 / hr			$0.00
Insects				
	purchase or collection costs			$0.00
	establishment costs (labor and materials)			$0.00
	redistribution costs			$0.00
Seeding and revegetation costs				
	seed costs per acre			$0.00
	application cost per acre			$0.00
Education and awareness signing		$100.00		$100.00
Vegetation and weed response monitoring				
	Labor @ $10 / hr + 20% benefits		$48.00	$48.00
	Supplies			$0.00
	Total Estimated Costs	$100.00	$48.00	$148.00

STATE WATER PROJECTS BUREAU SPECIFIC PLAN OF OPERATIONS FOR NOXIOUS WEED MANAGEMENT:
Lisk Creek Reservoir, McCone County

I. Situation statement

A. Description of State Water Project Bureau managed lands

1. Major natural features (river/stream, terrain, # flooded acres)

The Lisk Creek Dam floods approximately 42 acres at 2770 feet elevation about 12 miles SSW of the town of Brockway (T16N R46E portions of sections 13,14,23,24). It is in gentle terrain surrounded by farm and grazing land.

2. Land ownership patterns of agency and general statement of accessibility - See land ownership map.

Water Bureau land consists of the flooded acres and shoreline. There is no public access.

3. Delineation of current use zones

water resource zone: high pool to low pool
maintenance zone: dam with unmarked county road along the top
grazing zone: entire shoreline and surrounding area
natural areas zone: main pool and shore area with high waterfowl use

4. Soil types

Majority of soils around shoreline are Cherry silt loams, which are deep, well drained, and have moderately slow permeability. Other soils mostly are sandy loams. The major series are: Havrelon loam, Trembles sandy loam, Tally fine sandy loam, Dast sandy loam on bedrock, and Blanchard loamy sand. Soils are moderately deep to deep, well drained. Havrelon soils have moderate permeability, and the other soils have moderately rapid to rapid permeability.

B. Statement of the weed problem

1. Current list of state and county noxious weeds

State noxious species (Table 1).

McCone County designated noxious weeds:
showy milkweed (ASCSP)

2. General distribution patterns of noxious species at the site

Canada thistle was the only noxious species identified at the site. It is distributed around most of the shore at low to moderate densities.

3. Identification of problem areas (e.g. drainages, gravel pits, roads, campsites)

II. Plan of work

A. Vegetation management goals

1. County Weed Board

Eradicate or suppress noxious weed species. Prevent new weed spread.

2. Water Bureau

Concurrent with McCone County goals.

B. Weed management priorities

1. Terrain / access

Gentle terrain. Access by county road to dam (no public access to the lake).

2. Environmental concerns

Surface water.

3. Target noxious weeds identified at the site

<u>Category I</u>
Canada thistle (CIRAR)

4. Management objectives by species / zone

Species	**Water resource zone**	**Maintenance zone**	**Grazing zone**	**Natural areas zone**
CIRAR	NA	suppress	suppress	suppress

NA - not applicable - the weed species was not observed in this zone and is not expected to be an immediate threat in this zone

C. Implementation (management prescription)

Treat the Canada thistle with Rodeo® at 3 to 4½ pints/acre plus a non-ionic surfactant labeled for use with herbicides. Care must be taken not to kill desirable vegetation when applying Rodeo. Apply when Canada thistle plants are actively growing and when most plants are at or beyond the bud stage of growth. Make follow-up spot treatments on an annual maintenance basis.

For areas away from the shoreline, an alternate prescription would be to apply Curtail (clopyralid + 2,4-D) at 2 quarts/acre to actively growing plants before bud stage.

D. Monitoring

Maintain observational records of Canada thistle response to herbicide treatments. Inspect for new weeds. Update biennially. Re-map noxious weed species in 2002.

E. Needs

1. Short and long term needs
    a. Personnel - licensed herbicide applicator, 1 person-day in year 1, ½ person-day in years 2 - 6; ½ person-day / year for weed response monitoring and new weeds inspection, years 2, 4, 6
    b. Equipment - backpack or ATV hand spraying equipment
    c. Chemicals - Rodeo® herbicide (Monsanto), non-ionic surfactant (e.g. R-11®, Wilbur-Ellis)
    d. Biological control agents - none
    e. Seeds - none
2. Yearly procurement plan - NA

III. Budget

SITE: Lisk Cr. Reservoir				
		Years 1 - 2	Years 3 - 6	**6-Yr Total**
Cultural / mechanical controls				
	Hand pulling			$0.00
	{Labor = $7 / hr + 20% benefits -			
	One person can pull weeds from about			
	1/10 to 1/5 acre / day depending on the			
	infestation and site conditions}			
Herbicide application				
	helicopter @ $7 / acre			$0.00
	truck / ATV broadcast @ $25 / acre			$0.00
	truck broadcast:			
	1 x 11' swath @ $32.50 / mile			$0.00
	2 x 11' swath @ $65.00 / mile			$0.00
	truck / ATV handgun @ $45 / hr			$0.00
	backpack spot spraying @ $45 / hr	$540.00	$720.00	$1,260.00
Herbicide costs				
	Krenite S @ $54 / gal			$0.00
	Rodeo @ $100 / gal	$500.00	$400.00	$900.00
	Tordon 22K @ $71 / gal			$0.00
	Transline @ $270 / gal			$0.00
	2,4-D amine @ $11 /gal			$0.00
Insects				
	purchase or collection costs			$0.00
	establishment costs (labor and materials)			$0.00
	redistribution costs			$0.00
Seeding and revegetation costs				
	seed costs per acre			$0.00
	application cost per acre			$0.00
Education and awareness signing				$0.00
Vegetation and weed response monitoring				
	Labor @ $10 / hr + 20% benefits	$48.00	$96.00	$144.00
	Supplies	$25.00	$25.00	$50.00
	Total Estimated Costs	$1,113.00	$1,241.00	$2,354.00

STATE WATER PROJECTS BUREAU SPECIFIC PLAN OF OPERATIONS FOR NOXIOUS WEED MANAGEMENT:
Martinsdale Reservoir, Meagher and Wheatland Counties

I. Situation statement

A. Description of State Water Project Bureau managed lands

1. Major features and location

Martinsdale Reservoir is an offstream storage reservoir located about 1 mile SE of Martinsdale, off Highway 12, at 4780 feet elevation (T8N R11E portions of 13,14,24 and T8N R12E portions of 18,19,20,30). The eastern ~½ is in Wheatland County and the western ~½ is in Meagher County. Two dams (E and NE ends) flood approximately 1050 acres.

2. Land ownership patterns of agency and general statement of accessibility - See Water Project Bureau land ownership map.

According to Montana DFWP (contact: Ray Swartz, R-4 Parks Maintenance Supervisor, Great Falls, 454-5856), they own 26.33 acres along the N shore, including the recreational / boat launch area.

According to the Water Bureau ownership map, Water Bureau land consists largely of the flooded acres and immediate shoreline, with some additional adjacent acres along the S shore. There is good access by road around most of the shore. Public use is concentrated along the N shore. Access to the E shore is restricted by locked gates so that the E shore picnic area is now defunct. The line between Meagher and Wheatland counties approximately splits the reservoir in half.

3. Delineation of current use zones

water resource zone: high pool to low pool
maintenance zone: dams to the NE and E + road system
recreation zone: N shore picnic sites and vehicle turnouts off the main road
grazing zone: shoreline and adjacent land
natural areas zone: (overlapping the water resource and grazing zones) shoreline and open water receive heavy waterfowl use

4. Soil types

loams to clay loams, gravelly to stony

B. Statement of the weed problem

1. Current list of state and county noxious weeds

State noxious species (Table 1)

additional Meagher County designated noxious weeds (as of 1/97):

absinth wormwood (ARTAB)	black henbane (HSYNI)
black knapweed (CENNI)	bull thistle (CIRVU)
common mullein (VESTH)	bladder campion (SILVU)
common toadflax (LINVU)	common tansy (CHYVU)
musk thistle (CRUNU)	houndstongue (CYWOF)
common burdock (ARFMI)	field scabious (KNAAR)
hawkweed, yellow and orange (HIECA, HIEAU)	
oxeye daisy (CHYLE)	perennial sowthistle (SONAR)
scentless chamomile (MATIN)	scotch thistle (ONRAC)
yellow mignonette (RESLU)	

Wheatland County designated noxious weeds:
houndstongue (CYWOF)

2. General distribution patterns of noxious species at the site

Spotted knapweed occurs as widely scattered individuals and small colonies (12 acres total). Canada thistle is widely distributed around much of the shoreline (35 acres total). Houndstongue is also widely scattered around much of the shore.

3. Identification of problem areas (e.g. drainages, gravel pits, roads, campsites)

II. Plan of work

A. Vegetation management goals

1. County Weed Boards

Suppression or eradication of existing noxious weed infestations. Prevention of new weed establishment.

2. Water Project Bureau

Concurrent with Meagher and Wheatland County goals.

B. Weed management priorities

1. Terrain / access

Gentle to moderate terrain with vehicle access around most of the shore (some portions through private land).

2. Environmental concerns

Surface water.

3. Target noxious weeds identified at the site

   Category I
   spotted knapweed (CENMA)
   Canada thistle (CIRAR)
   houndstongue (CYWOF)

4. Management objectives by species / zone

Species	**Water resource zone**	**Maintenance zone**	**Recreation zone**	**Grazing zone**	**Natural areas zone**
CENMA	NA	eradicate	eradicate	eradicate	eradicate
CIRAR	NA	contain	contain	contain	contain
CYWOF	NA	contain	contain	contain	contain

NA - not applicable - the weed species was not observed in this zone and is not expected to be an immediate threat in this zone

C. Implementation (management prescription)

Previous weed management at Martinsdale Reservoir:
The spotted knapweed-infested canal outlet has received sporadic treatments by the Water Users Association. The Meagher County Weed Supervisor has also done some herbicide treatment on spotted knapweed.

Montana DFWP does weed control in the N shore recreational area, by contract. From the cattle guard on the main access road (N shore) to the NE dam, they spray weeds along the right-of-way down to the reservoir on an annual maintenance basis.

Weed management at Martinsdale Reservoir needs to be coordinated among the Water Project Bureau, DFWP, Meagher County Weed District, Wheatland County Weed District, and adjacent private landowners.

Management prescription:

1. Use small area broadcast and spot herbicide treatments for spotted knapweed control. Apply Curtail® at 2 quarts / acre in early to mid-summer (bolt stage). Application at this stage will provide good efficacy while plants are visible, but prior to seed set.

2. A maintenance spraying program for containment and suppression of Canada thistle can be implemented incidental to the spotted knapweed treatments (same rates and timing).

3. Contain houndstongue by herbicide spot treatment and hand digging. Both first and second year plants are susceptible to Escort® at 0.5 to 1 ounce / acre. Seed production of single plants and small clusters can be reduced by cutting the root as far below the crown as possible. This should be done by early July or before. However, regrowth of houndstongue from deep rootstocks and subsequent seed production will not be completely eliminated. Seedtops (July and later) should be bagged for removal and burning.

D. Monitoring

Maintain observational records of the extent of weed infestations at the site. Inspect for new weeds. Update biennially. Re-map target noxious weeds in 2002.

E. Needs

1. Short and long term needs
   a. Personnel - licensed herbicide applicator, 1 person-day in year 1, plus ½ person-day / year in years 2 - 6 for annual maintenance spraying; ½ person-day, biennially, for monitoring and new weeds inspection
   b. Equipment - backpack and truck or ATV hand spraying equipment
   c. Chemicals - Curtail® herbicide (DowElanco), Escort® herbicide (DuPont)
   d. Biological control agents - none
   e. Seeds - none
2. Yearly procurement plan - NA

III. Budget

SITE: Martinsdale Reservoir				
		Years 1 - 2	Years 3 - 6	**6-Yr Total**
Cultural / mechanical controls				
	Hand pulling			$0.00
	{Labor = $7 / hr + 20% benefits -			
	One person can pull weeds from about			
	1/10 to 1/5 acre / day depending on the			
	infestation and site conditions}			
Herbicide application				
	helicopter @ $7 / acre			$0.00
	truck / ATV broadcast @ $25 / acre			$0.00
	truck broadcast:			
	1 x 11' swath @ $32.50 / mile			$0.00
	2 x 11' swath @ $65.00 / mile			$0.00
	truck / ATV handgun @ $45 / hr	$540.00	$720.00	$1,260.00
	backpack spot spraying @ $45 / hr			$0.00
Herbicide costs				
	Curtail @ $34 / gal	$255.00	$340.00	$595.00
	Escort @ $19 / oz	$38.00	$76.00	$114.00
Insects				
	purchase or collection costs			$0.00
	establishment costs (labor and materials)			$0.00
	redistribution costs			$0.00
Seeding and revegetation costs				
	seed costs per acre			$0.00
	application cost per acre			$0.00
Education and awareness signing				$0.00
Vegetation and weed response monitoring				
	Labor @ $10 / hr + 20% benefits	$48.00	$96.00	$144.00
	Supplies			$0.00
	Total Estimated Costs	$881.00	$1,232.00	$2,113.00

STATE WATER PROJECTS BUREAU SPECIFIC PLAN OF OPERATIONS FOR NOXIOUS WEED MANAGEMENT:
Middle Creek Reservoir (= Hyalite), Gallatin County

I. Situation statement

A. Description of State Water Project Bureau managed lands

1. Major features and location

Middle Creek Reservoir is located about 15 miles S of Bozeman at 6700 feet elevation in the Gallatin Range (T4S R6E portions of sections 15,22,23). The dam on Hyalite Creek (Middle Cr.) floods approximately 212 acres. The reservoir is a municipal water storage site.

2. Land ownership patterns of agency and general statement of accessibility - See Water Project Bureau land ownership map.

3. Delineation of current use zones

water resource: high pool to low pool
maintenance: dam and spillway at NW end + road system
recreation: (heavy recreational use) fishing access at NW corner (formerly Blackmore Campground), campgrounds, boat ramp and picnic sites along NE shore, S shore foot trails
natural areas: shoreline and surrounding area, overlapping the recreation zone

B. Statement of the weed problem

1. Current list of state and county noxious weeds

State noxious species (Table 1)

Gallatin County designated noxious weeds:

musk thistle (CRUNU)	oxeye daisy (CHYLE)
meadow knapweed (?)	poison hemlock (COIMA)
houndstongue (CYWOF)	common toadflax (LINVU)
common tansy (CHYVU)	

2. General distribution patterns of noxious species at the site

Canada thistle was widely distributed around the shoreline at low to moderate densities. A small colony of sulfur cinquefoil occurred in a vehicle turnout at the end of the causeway (SE end). Patches of common tansy and musk thistle were found along the E shore.

3. Identification of problem areas (e.g. drainages, gravel pits, roads, campsites)

Heavy recreational use, including roads, trails, campsites and picnic sites, around the entire shore.

II. Plan of work

A. Vegetation management goals

1. County Weed Board -

Detection and immediate eradication of statewide Category 3 noxious weeds. Detection and containment, or eradication where possible, of statewide Category 2 noxious weeds. Containment or suppression of existing infestations and prevention of new infestations of statewide Category 1 noxious weeds. Control of Gallatin County designated noxious weeds on federal, state and county road right-of-ways, as well as emphasis on biological control efforts.

Emphasize awareness and education.

Build and implement programs that help promote cooperative efforts between groups, individuals and agencies.

2. Water Project Bureau -

Concurrent with Gallatin County goals.

B. Weed management priorities

1. Terrain / access

Moderate to steep terrain in canyon bottom. Vehicle access to dam and along NE shore by FR 62. Foot trails along S shore.

2. Environmental concerns

The Hyalite drainage provides municipal water supply and storage.

Element occurrence report for a sensitive plant species within at least 1/2 to 1 mile of the project area:

- Oregon checker-mallow *Sidalcea oregana* (Global rank G5, State rank S1) - T4S R6E section 26

Description:
Malvaceae (mallow family); perennial; leaf blades roundish heart-shaped to kidney-shaped; petals purple, rose or pink, 3 cm or less long; stigmas long and slender; stamens becoming free mostly in groups of 2-6; slopes, meadows and open woods

Dorn, R.D. 1984. Vascular plants of Montana. Mountain West Publishing, Cheyenne, WY.

3. Target noxious weeds identified at the site

Category I
- Canada thistle (CIRAR)
- sulfur cinquefoil (PTLRC)

Gallatin county designated
- common tansy (CHYVU)
- musk thistle (CRUNU)

4. Management objectives by species / zone

Species	Water resource zone	Maintenance zone	Recreation zone	Natural areas zone
CIRAR	NA	tolerate	tolerate	tolerate
PTLRC	NA	eradicate	detect	detect
CHYVU	NA	eradicate	detect	detect
CRUNU	NA	tolerate	tolerate	tolerate

NA - not applicable - the weed species was not observed in this zone and is not expected to be an immediate threat in this zone

C. Implementation (management prescription)

1. Hand dig the sulfur cinquefoil in the SE end turnout for eradication. The upper portion or crown of the root system should be removed when hand digging. Frequent mowing or cutting is not an effective management technique for sulfur cinquefoil. The massive, woody root system serves as a food storage organ and enables the plant to send up new shoots after mowing. Permanently mark the site of infestation for inspection and follow-up hand digging.

2. Tolerate Canada thistle and musk thistle infestations, but encourage biocontrol insect populations.

Biological control: Biological control options for thistle species are limited. The thistle head weevil (*Rhinocyllus conicus*) prefers the bracts of musk thistle for egg laying, but will also attack other thistle species including Canada thistle. The larvae infest the seed head or stem from early June to fall, and their feeding stimulates the plant to concentrate nutrients and tissue in the affected area. The weevil overwinters in the adult stage in sheltered locations such as caves or the hollows of trees. Because the weevil attacks seed-producing tissue, it can be very effective on musk thistle which reproduces entirely by seed. The weevil is well-established in NW

states including Montana. Its presence at the Middle Creek Reservoir site should be verified. If transfer to the site is necessary, large numbers can be collected during May and June from almost any established location. Collections should be made as the weevils gather on plants in the spring and begin to mate (May through June). Adults are dislodged onto a tarp, table top or plastic bag for sorting. The weevils can then be stored or shipped for up to a week, if kept at 46 to 54° F. They can be stored or shipped in cardboard cartons with musk thistle leaves as food.

3. Eradicate common tansy in the maintenance zone by hand digging. The whole plant must be removed to prevent regrowth from rootstocks. Protective clothing should be worn when hand digging because some individuals are allergic to compounds in this aromatic plant.

D. Monitoring

Permanently mark the sulfur cinquefoil colony for periodic inspection and follow-up hand digging. Inspect the site for new weeds at 3 to 4 year intervals. Re-map noxious weed distributions in 2002.

E. Needs

1. Short and long term needs
    a. Personnel - 1 person-day, 1997-98, for hand digging; 1 person-day / year for vegetation monitoring and new weeds inspection every 3 to 4 years
    b. Equipment - hand digging tools
    c. Chemicals - none
    d. Biological control agents - thistle head weevil
    e. Seeds - none
2. Yearly procurement plan - (if necessary) collect weevils from established locations as described in section II.C.2.

III. Budget

SITE: Middle Creek Reservoir				
		Years 1 - 2	Years 3 - 6	**6-Yr Total**
Cultural / mechanical controls				
	Hand pulling	$134.40		$134.40
	{Labor = $7 / hr + 20% benefits -			
	One person can pull weeds from about			
	1/10 to 1/5 acre / day depending on the			
	infestation and site conditions}			
	Supplies	$25.00		$25.00
Insects				
	purchase or collection costs			$0.00
	establishment costs (labor and materials)	$100.00		$100.00
	redistribution costs			$0.00
Seeding and revegetation costs				
	seed costs per acre			$0.00
	application cost per acre			$0.00
Education and awareness signing				$0.00
Vegetation and weed response monitoring				
	Labor @ $10 / hr + 20% benefits		$96.00	$96.00
	Supplies		$25.00	$25.00
	Total Estimated Costs	$259.40	$121.00	$380.40

STATE WATER PROJECTS BUREAU SPECIFIC PLAN OF OPERATIONS FOR NOXIOUS WEED MANAGEMENT:
Nevada Lake, Powell County

I. Situation statement

A. Description of State Water Project Bureau managed lands

1. Major features and location

Nevada Lake is located along Highway 141 about 5 miles NW of Finn at 4615 feet elevation (T12N R10W portions of sections 11,12,13,14 and T12N R9W portions of 18,19). The dam at the W end floods approximately 375 acres along Nevada Creek.

2. Land ownership patterns of agency and general statement of accessibility - See Water Bureau land ownership map.

Water Project Bureau owns the flooded acres and adjacent shore excluding portions around the upper end of the lake and including a block of land below the dam up to the dirt road running parallel to the dam. Adjacent lands include private and the Nevada Lake WMA bordering along the NW shore.

3. Delineation of current use zones

water resource: high pool to low pool
maintenance: dam with access road and highway along the N shore
recreation: vehicle turnouts and boat launch along N shore (W half of lake)
grazing/agriculture: portions of the creek bottom below the dam are cut for hay; neighboring lands

4. Soil types

Mostly loams - major series include: Turrah silty clay loam, Danvers clay loam, Bignell gravelly clay loam, Yreka gravelly loam, Crow clay loam, Braziel gravelly loam, Tolbert very stony loam, Marcott silty clay loam, Carten loam, Wetsand loam, Saypo loam, Roy gravelly loam, Shawmut gravelly loam, and Perma gravelly loam. Soils are mostly very deep and well-drained with moderate to moderately slow permeability.

B. Statement of the weed problem

1. Current list of state and county noxious weeds

State noxious species (Table 1)

Powell County designated noxious weeds: None

2. General distribution patterns of noxious species at the site

The heaviest concentrations of spotted knapweed are along the N shore adjacent to the right-of-way, along the dam, and portions of the meadows below the dam. Right-of-way spraying has controlled knapweed for the first 10 to 20 feet from the road edge. Canada thistle is scattered along the N shore and in the meadows and willow thickets below the dam.

3. Identification of problem areas (e.g. drainages, gravel pits, roads, campsites)

II. Plan of work

A. Vegetation management goals

1. County Weed Board

Contain or suppress Category I noxious weeds. Prevent establishment of new weeds.

2. Water Bureau

Concurrent with Powell County goals.

B. Weed management priorities

1. Terrain / access

Narrow valley bottom with moderate to steep slopes. Good access by road along the N shore and below the dam. Limited access to the S shore.

2. Environmental concerns

Surface water.

3. Target noxious weeds identified at the site

<u>Category I</u>
spotted knapweed (CENMA)
Canada thistle (CIRAR)

4. Management objectives by species / zone

Species	Water resource zone	Maintenance zone	Recreation zone	Grazing / agriculture zone
CENMA	NA	suppress	suppress	suppress
CIRAR	NA	suppress	suppress	contain

NA - not applicable - the weed species was not observed in this zone and is not expected to be an immediate threat in this zone

C. Implementation (management prescription)

1. Release biocontrol insects and use small area herbicide treatments and hand digging for spotted knapweed control. The moderate to heavy infestations of spotted knapweed along the N shore are probably beyond reach of ground herbicide application equipment due to guard rails, slope angle, vegetation, etc. The first 10 to 20 feet of the road edge and vehicle turnouts have been maintained as part of normal right-of-way work. Effective mechanical or chemical control below the dam would also be difficult due to the complex vegetation, stream meander and number of acres infested.

<u>Biological control insects</u>:
The banded gall fly (*Urophora affinis*) and the knapweed seed head fly (*Urophora quadrifasciata*) are widely established in Montana and are probably already present at Nevada Lake. Their presence can be verified by opening mature seed heads and inspecting for galls (*U. affinis*) and larvae (*U. quadrifasciata*), which are generally present from summer to the following spring. The *Urophora* spp. can decrease seed production by up to 95%. Infested seed heads can be transferred to new sites.

Agapeta zoegana (knapweed root moth) is a small yellow and brown moth of European origin that attacks the roots of spotted knapweed. The moth overwinters as a larva in the root. Adult emergence occurs from mid-June to early September. Release sites should be unshaded or partly unshaded knapweed infestations that are at least 10 acres in size and guaranteed free from disturbance for at least 5 years. Releases of one to a few hundred adult *Agapeta* should be made at two or three points along the N shore and below the dam. Release sites should be recorded and marked in the field.

<u>Herbicide treatment</u>:
Small area and spot herbicide treatments should be used in areas favorable to spotted knapweed seed dissemination off the site. These include the dam and access road, spillway edges, and portions of the recreation and maintenance zones that are not reached during right-of-way spraying such as vehicle turnouts/parking areas and the boat launch area. Use Curtail® at 2 quarts/acre during periods of active knapweed growth (spring - early summer). Make spot treatments on an annual maintenance basis.

Control the scattered individuals and small colonies of spotted knapweed along the S shore by herbicide spot treatment and hand digging plants that are on the shore near water. When hand digging, the entire plant must be removed since regrowth can occur from the crown or root. Plants should be dug when soil is moist and before seeds are formed. Plants with seeds should be bagged and removed from the site.

2. Canada thistle in the maintenance and recreation zones can be controlled incidental to spotted knapweed spot spraying (same rate and timing).

3. Clarify who is responsible for management of the meadows below the dam. Portions of this area appear to be used for hay pasture. Seek cooperation in noxious weed management with that individual. Several mowings per year are needed to reduce thistle infestations. Mowing when plants are in the early bud growth stage is a priority to prevent seed-set. For best results, mowing should be combined with a chemical control program. Clopyralid + 2,4-D (Curtail®) provides consistent control, but a single application will not provide long-term control. Much of the Canada thistle is along the stream banks scattered through heavy willow stands. Chemical and mechanical control options will not be feasible there, so a containment goal is recommended in the grazing/agriculture zone.

D. Monitoring

Record and mark locations of insect releases. Maintain observational records of spotted knapweed infestations (canopy cover, approximate acres, extent). Inspect for new weeds. Update biennially. Remap noxious weed species in 2002.

E. Needs

1. Short and long term needs
   a. Personnel - licensed herbicide applicator, ½ person-day / year; ½ person-day / year for insect releases; ½ person-day / year, biennially, for vegetation monitoring and new weeds inspection
   b. Equipment - backpack spraying equipment, hand digging tools
   c. Chemicals - Curtail® herbicide (DowElanco)
   d. Biological control agents - *Agapeta zoegana* (knapweed root moth)
   e. Seeds - none
2. Yearly procurement plan - The MAES Western Montana Agricultural Research Center (Corvallis) is currently providing adult *Agapeta* for redistribution. Insects should be requested early (winter/spring) as demand is high and availability will vary.

III. Budget

SITE: Nevada Lake				
		Years 1 - 2	Years 3 - 6	**6-Yr Total**
Cultural / mechanical controls				

	Hand pulling			$0.00
	{Labor = $7 / hr + 20% benefits -			
	One person can pull weeds from about			
	1/10 to 1/5 acre / day depending on the			
	infestation and site conditions}			
Herbicide application				
	helicopter @ $7 / acre			$0.00
	truck / ATV broadcast @ $25 / acre			$0.00
	truck broadcast:			
	1 x 11' swath @ $32.50 / mile			$0.00
	2 x 11' swath @ $65.00 / mile			$0.00
	truck / ATV handgun @ $45 / hr			$0.00
	backpack spot spraying @ $45 / hr	$360.00	$720.00	$1,080.00
Herbicide costs				
	Curtail @ $34 / gal	$68.00	$136.00	$204.00
Insects				
	support rearing effort at MAES-Corvallis	$500.00	$1,000.00	$1,500.00
	establishment (labor, annual releases)	$96.00	$192.00	$288.00
	redistribution costs			$0.00
Seeding and revegetation costs				
	seed costs per acre			$0.00
	application cost per acre			$0.00
Education and awareness signing				$0.00
Vegetation and weed response monitoring				
	Labor @ $10 / hr + 20% benefits	$48.00	$96.00	$144.00
	Supplies	$50.00	$50.00	$100.00
	Total Estimated Costs	$1,122.00	$2,194.00	$3,316.00

STATE WATER PROJECTS BUREAU SPECIFIC PLAN OF OPERATIONS FOR NOXIOUS WEED MANAGEMENT:
N. Fork of the Smith River Reservoir, Meagher County

I. Situation statement

A. Description of State Water Project Bureau managed lands

1. Major features and location

N. Fork of the Smith Reservoir is located along Highway 12 about 9 miles NE of White Sulfur Springs at 5490 feet elevation (T10N R8E portions of 9,15,16,17,20,21). The N. Fork of the Smith River drains from the north and Eightmile Creek enters from the east. The dam at the west end floods approximately 335 acres.

2. Land ownership patterns of agency and general statement of accessibility - See Water Project Bureau land ownership map.

Water Projects Bureau land consists of the flooded acres and immediate shoreline and small blocks below the dam and spillway. There are some undeveloped campsites along the S shore at the public access area.

3. Delineation of current use zones

water resource zone: high pool to low pool
maintenance zone: dam and spillway with access road at the W end
recreation zone: public access and undeveloped campsites along the S shore
grazing zone: entire shoreline and adjacent land

4. Soil types

shallow loams to clay loams in shale

B. Statement of the weed problem

1. Current list of state and county noxious weeds

State noxious species (Table 1)

additional Meagher County designated noxious weeds (as of 1/97):

absinth wormwood (ARTAB)	black henbane (HSYNI)
black knapweed (CENNI)	bull thistle (CIRVU)
common mullein (VESTH)	bladder campion (SILVU)
common toadflax (LINVU)	common tansy (CHYVU)
musk thistle (CRUNU)	houndstongue (CYWOF)

common burdock (ARFMI) field scabious (KNAAR)
hawkweed, yellow and orange (HIECA, HIEAU)
oxeye daisy (CHYLE) perennial sowthistle (SONAR)
scentless chamomile (MATIN) scotch thistle (ONRAC)
yellow mignonette (RESLU)

2. General distribution patterns of noxious species at the site

Spotted knapweed is broadly distributed around the shore, primarily along the W half of the reservoir (about 35 acres total). Infestations in adjacent lands appeared to be minor. A few small colonies of Canada thistle were found along the SW shore (1 acre total). Numerous scattered plants and colonies of musk thistle, houndstongue and common mullein occur around much of the shore, with significant infestations to the east around the Eightmile Creek fork.

3. Identification of problem areas (e.g. drainages, gravel pits, roads, campsites)

Vehicle impact in the recreation zone along the S shore causes soil disturbance and is a weed introduction point.

II. Plan of work

A. Vegetation management goals

1. Short term goals (1 - 2 years) - County Weed Board

Containment of existing weed infestations. Prevention of new weed establishment.

2. Short term goals - Water Bureau

Concurrent with Meagher County goals. Control brush on the dam face.

3. Long term goals (2- 6 years) - County Weed Board

Suppression or eradication of existing noxious weed infestations. Prevention of new weed establishment.

4. Long term goals - Water Bureau

Concurrent with Meagher County goals

B. Weed management priorities

1. Terrain / access

Access is limited around the N end. Steep slopes to the NE and across the highway to the SW, otherwise terrain is moderate.

2. Environmental concerns

Surface water.

Element occurrence report for a sensitive plant species within at least 1/2 to 1 mile of the project area:

- long-styled thistle *Cirsium longistylum* (Global rank: G2Q, State rank: S2) - T10N R8E section 15 - “0.5 mile E of Lake Sutherlin” (= N. Fk. Smith Res.), in moist meadow

Description:
involucre of largest heads usually over 1.8 cm long; heads often in terminal clusters, occasionally axillary; leaves often not much reduced upward; bases of leaves usually clasping stem and not extending downward along stem; leaves with dense, short, wool-like tangled hairs beneath (‘tomentose’), sometimes thinly so; pappus shorter than corolla; invulucral bracts lacking a glutinous dorsal ridge; outer involucral bracts mostly lacerate on the margins; disturbed areas and meadows

Dorn, R.D. 1984. Vascular plants of Montana. Mountain West Publishing, Cheyenne, WY.

3. Target noxious weeds identified at the site

Category I
spotted knapweed (CENMA)
Canada thistle (CIRAR)
houndstongue (CYWOF)
musk thistle (CRUNU)

4. Management objectives by species / zone

Species	**Water resource zone**	**Maintenance zone**	**Recreation zone**	**Grazing zone**
CENMA	NA	eradicate	eradicate	eradicate
CIRAR	NA	suppress	suppress	suppress
CYWOF	NA	suppress	suppress	suppress
CRUNU	NA	suppress	suppress	suppress

NA - not applicable - the weed species was not observed in this zone and is not expected to be an immediate threat in this zone

C. Implementation (management prescription)

Previous noxious weed management at N. Fk. of the Smith Reservoir:

1994: Helicopter application of Tordon 22K (1 pint/acre) + 2,4-D (1 quart/acre) for spotted knapweed control in the dam/west end area

1994-96: annual herbicide follow-up treatments by Meagher County Weed Supervisor

Agapeta zoegana (spotted knapweed root-mining moth) has been released behind the dam (Meagher Co. Weed Supervisor)

There is a noxious weed educational display at the S shore public access

Management prescription:

1. Inspect areas to be treated with herbicides, prior to or at the time of application, for the occurrence of the sensitive plant long-styled thistle (see description in section II.B.2 above). Populations of this species should not be oversprayed.

2. Continue broadcast herbicide applications for spotted knapweed control. The dam/west end area can be treated by helicopter with 1 pint / acre Tordon 22K. The infestation along the N shore lies mostly above the Water Project Bureau property on adjacent private land. The Water Project Bureau should seek cooperation with the adjacent landowners in managing the spotted knapweed infestation in this area. The scatterred spotted knapweed in the S shore recreation area and along the N shore of the Eightmile Creek Fork can be treated with ground equipment also using 1 pint / acre Tordon 22K. Preferred timing is early to mid summer when bolting plants are easily visible. Respraying at 3-year intervals for 6 to 9 years may be required before the site can be managed with maintenance spot treatments alone.

3. Contract with the Meagher County Weed Supervisor to continue annual follow-up treatments of spotted knapweed after the broadcast applications are made.

4. Musk thistle and Canada thistle can be suppressed incidental to the spotted knapweed spray program. The thistle head weevil, *Rhinocyllus conicus*, has already established in this area and may be having some impact on musk thistle which reproduces entirely by seed.

5. Contain houndstongue by herbicide spot treatment and hand digging. Both first and second year plants are susceptible to Escort® at 0.5 to 1 ounce / acre. Seed production of single plants and small clusters can be reduced by cutting the root as far below the crown as possible. This should be done by early July or before. However, regrowth of houndstongue from deep rootstocks and subsequent seed

production will not be completely eliminated. Seedtops (July and later) should be bagged for removal and burning.

6. Consider access and use management in the S shore recreation area. Unrestricted vehicle impact causes continual ground disturbace. Vehicles spread weed seeds and stimulate germination of houndstongue by cracking the seed hull.

7. Work with the Meagher County Weed Supervisor to provide recommendations to the Water Users Association for brush control on the dam face.

For big sagebrush control, one option would be to use Spike 20P (tebuthiuron). An application rate of 3.0 to 3.5 lb / acre should provide good control of sagebrush.

D. Monitoring

Walk through inspections for new weeds and observational recording of established weed infestations. Update biennially. Remap noxious species in 2002.

E. Needs

1. Short and long term needs
    a. Personnel - licensed herbicide applicator, ½ person-day / year for maintenance spraying; licensed herbicide helicopter applicator years 1 and 4; ½ person-day / year, bienially for weed response monitoring and new weeds inspection
    b. Equipment - helicopter and ground (truck/ATV) spray equipment; hand digging tools
    c. Chemicals - Tordon® 22K herbicide (DowElanco); Escort® herbicide (DuPont)
    d. Biological control agents - none
    e. Seeds - none
2. Yearly procurement plan - NA

III. Budget

SITE: N. Fk. Smith				
		Years 1 - 2	Years 3 - 6	**6-Yr Total**
Cultural / mechanical controls				
	Hand pulling			$0.00
	{Labor = $7 / hr + 20% benefits -			
	One person can pull weeds from about			
	1/10 to 1/5 acre / day depending on the			
	infestation and site conditions}			
Herbicide application				
	helicopter @ $7 / acre	$175.00	$175.00	$350.00
	truck / ATV broadcast @ $25 / acre			$0.00
	truck broadcast:			
	1 x 11' swath @ $32.50 / mile			$0.00
	2 x 11' swath @ $65.00 / mile			$0.00
	truck / ATV handgun @ $45 / hr	$360.00	$720.00	$1,080.00
	backpack spot spraying @ $45 / hr			$0.00
Herbicide costs				
	Tordon 22K @ $71 / gal	$426.00	$568.00	$994.00
	Transline @ $270 / gal			$0.00
	2,4-D amine @ $11 /gal			$0.00
	Escort @ $19 / oz	$38.00	$76.00	$114.00
Insects				
	purchase or collection costs			$0.00
	establishment costs (labor and materials)			$0.00
	redistribution costs			$0.00
Seeding and revegetation costs				
	seed costs per acre			$0.00
	application cost per acre			$0.00
Education and awareness signing				$0.00
Vegetation and weed response monitoring				
	Labor @ $10 / hr + 20% benefits	$48.00	$96.00	$144.00
	Supplies	$25.00	$25.00	$50.00
	Total Estimated Costs	$1,072.00	$1,660.00	$2,732.00

STATE WATER PROJECTS BUREAU SPECIFIC PLAN OF OPERATIONS FOR NOXIOUS WEED MANAGEMENT:
Nilan Reservoir, Lewis and Clark County

I. Situation statement

A. Description of State Water Project Bureau managed lands

1. Major natural features (river/stream, terrain, # flooded acres)

Nilan Reservoir is located about 7 miles W of Augusta in the Sun River drainage at 4440 elevation (T20N R7W portions of sections 17,18,19,20). It is in gentle terrain with the front range rising a few miles to the west. A supply canal from Smith and Ford Creeks enters from the west and two dams (N and E) flood approximately 535 acres.

2. Land ownership patterns of agency and general statement of accessibility - See land ownership map

Water Project Bureau land is limited to the flooded acres and immediately surrounding shore zone. There is a FWP Fishing Access at the E end with picnic sites.

3. Delineation of current use zones

water resource zone: high pool to low pool
maintenance zone: dams at N and E ends, Augusta Ranger Station Road along E dam and S shore
recreation zone: fishing access/picnic sites along SE shore
grazing/natural areas zone: much of the surrounding area supports good native grassland and pasture to the shoreline and has cattle grazing, but excluding the recreation zone

4. Soil types

very deep, well-drained loams: Fairfield, Beanlake, Winsect stony loams, Shawmut gravelly loam

B. Statement of the weed problem -

1. Current list of state and county noxious weeds - Table 1

2. General distribution patterns of noxious species at the site - see attached weed map

Spotted knapweed is widely distributed around the reservoir shore, but there is not a significant infestation in the surrounding area. The spotted knapweed on Water Bureau land occurs mostly as distinct, small patches and is not yet a major component of the vegetation. A small patch of field bindweed occurs along the road edge to the SE. Canada thistle is broadly distributed around the shore.

3. Identification of problem areas (e.g. drainages, gravel pits, roads, campsites)

The road and picnic sites along the S shore are potential weed introduction points.

II. Plan of work

A. Vegetation management goals

1. Lewis and Clark County

Suppress or eradicate Category I noxious weeds already present at the site. Prevent noxious weeds from spreading into adjacent uninfested areas. Detect establishment of new weed species that may occur and implement eradication activities if necessary.

2. Water Project Bureau

Concurrent with Lewis and Clark County goals.

B. Weed management priorities

1. Terrain / access

Terrain is gentle with good access by truck or ATV around the entire shore.

2. Environmental concerns

Surface water.

Land along portions of the SW shore is low-lying and may have a shallow water table.

3. Target noxious weeds identified at the site

<u>Category I</u>
spotted knapweed (CENMA)
Canada thistle (CIRAR)
field bindweed (CONAR)

4. Management objectives by species / zone

Species	Water resource zone	Maintenance zone	Recreation zone	Grazing / natural areas zone
CENMA	NA	suppress	suppress	suppress
CIRAR	NA	suppress (incidental to CENMA management)	suppress (incidental to CENMA management)	suppress (incidental to CENMA management)
CONAR	NA	eradicate	detect	detect

NA - not applicable - the weed species was not observed in this zone and is not expected to be an immediate threat in this zone

C. Implementation (management prescription)

Previous and ongoing weed control activities:

Prior to 1995, weed control work on fishing access sites and State Parks in FWP Region 4 was done by FWP R-4 Parks Division. Starting in 1995, Ray Schwartz, R-4 Parks Maintenance Supervisor, contracted with Helena Weed Control to spray weeds at various sites in Region 4, including Nilan Reservoir. The fishing access site at Nilan has a total area of 12 acres and has spotted knapweed and Canada thistle. Helena Weed Control sprayed portions of the FAS in 1995 at a cost of $400.

General management prescription:

1. Apply herbicide spot treatments and small area broadcast treatments targeting spotted knapweed. Coordinate treatment work with FWP management of the fishing access site. Much of the spotted knapweed in the maintenance, recreation and grazing/natural areas zones can be treated with Tordon 22K (picloram) at 1 pint/acre. On low lying portions of the shore near the water edge, use a 2,4-D amine labeled for use near water at 2 pounds/acre. For best efficacy, apply 2,4-D in the spring or early summer when spotted knapweed is in the bolt stage. Inspection and follow-up spot treatments should be continued in year 2, after which maintenance spraying at 3-year intervals will probably be sufficient.

2. Canada thistle can be suppressed incidental to the spotted knapweed spray program because of the overlap in distributions of these two weeds.

3. Treat the field bindweed on the SE shore road edge with Tordon 22K (picloram) at the spot rate of 2 quarts/acre. Make a follow-up treatment the next year if necessary.

D. Monitoring

Maintain observational records of the extent of spotted knapweed, Canada thistle and field bindweed infestations. Inspect for new weeds. Update biennially. Re-map noxious weed species in 2002.

E. Needs

1. Short and long term needs
   a. Personnel - licensed herbicide applicator
      Years 1 - 2: 2 person-days per year
      Years 3 - 6: 2 person-days
   b. Equipment - backpack or ATV-mounted hand sprayer
   c. Chemicals - Tordon® 22K herbicide (Dow Elanco), 2,4-D amine herbicide labeled for use near water (such as Weed Pro®, Cornbelt Chemical Co.)
   d. Biological control agents - none
2. Yearly procurement plan - NA

III. Budget

SITE: Nilan Reservoir				
		Years 1 - 2	Years 3 - 6	**6-Yr Total**
Cultural / mechanical controls				
	Hand pulling			$0.00
	{Labor = $7 / hr + 20% benefits -			
	One person can pull weeds from about			
	1/10 to 1/5 acre / day depending on the			
	infestation and site conditions}			
Herbicide application				
	helicopter @ $7 / acre			$0.00
	truck / ATV broadcast @ $25 / acre			$0.00
	truck broadcast:			
	1 x 11' swath @ $32.50 / mile			$0.00
	2 x 11' swath @ $65.00 / mile			$0.00
	truck / ATV handgun @ $45 / hr	$1,440.00	$720.00	$2,160.00
	backpack spot spraying @ $45 / hr			$0.00
Herbicide costs				
	Tordon 22K @ $71 / gal	$213.00	$71.00	$284.00
	Transline @ $270 / gal			$0.00
	2,4-D amine @ $11 /gal	$22.00	$11.00	$33.00
Insects				
	purchase or collection costs			$0.00
	establishment costs (labor and materials)			$0.00
	redistribution costs			$0.00
Seeds				
	seed costs per acre			$0.00
	application cost per acre			$0.00
Education and awareness signing				$0.00
Vegetation and weed response monitoring				
	Labor @ $10 / hr + 20% benefits	$96.00	$192.00	$288.00
	Supplies	$25.00	$50.00	$75.00
	Total Estimated Costs	$1,796.00	$1,044.00	$2,840.00

STATE WATER PROJECTS BUREAU SPECIFIC PLAN OF OPERATIONS FOR NOXIOUS WEED MANAGEMENT:
Painted Rocks Lake, Ravalli County

I. Situation statement

A. Description of State Water Project Bureau managed lands

1. Major features and location

Painted Rocks Lake is located about 17 miles W of Lost Trail Pass in the Bitterroot Range on the W Fork of the Bitterroot River (T2S R22W portions of sections 2,3,4,10 and T1S R22W portions 26,34,35). Elevation is 4726 feet at the spillway (N end) and the dam floods approximately 655 acres.

2. Land ownership patterns of agency and general statement of accessibility - See Water Project Bureau land ownership map.

The site is a State Park and is reached by taking the W Fork Road from Highway 93 at 4 miles S of Darby. Water Bureau owns the flooded acres and adjacent shore, a block at the S end around Painted Rocks State Recreation Campground, and a block at the N end below the dam. There is a road along the entire length of the E shore (continuation of W Fork Road), and a road along the W shore (FS Rd. 362) to the end of Blue Joint Bay. Most of the surrounding land is Bitterroot NF. The reservoir also has a FWP Fishing Access.

3. Delineation of current use zones

water resource zone: high pool to low pool
maintenance zone: dam and spillway at N end, roads along E and W shore
recreation zone: FWP fishing access sites, boat ramps on E shore, State Recreation Campground at S end
natural areas zone: shoreline and surrounding area

4. Soil types

Majority of shoreline composed of Halloway association soils, which are moderately deep loams. Other series present are Como coarse sandy loam, Clark Fork cobbly sandy loam, and Chamokane complex soils. These soils are mostly moderately deep and well to excessively well-drained.

B. Statement of the weed problem

1. Current list of state and county noxious weeds

State noxious species (Table 1)

Ravalli County designated noxious weeds:
common tansy (CHYVU)
common toadflax (LINVU)
houndstongue (CYWOF)

2. General distribution patterns of noxious species at the site

Spotted knapweed is widespread along the road edges / forest ecotones, mostly at low to moderate densities. A few patches of common tansy were found around the boat ramp and on the road cut near the Slate Creek inlet.

3. Identification of problem areas (e.g. drainages, gravel pits, roads, campsites)

II. Plan of work

A. Vegetation management goals

1. Short and long term goals (1 - 2 years) - County Weed Board

Detect and reduce new weeds that may occur with highest priority on leafy spurge, Dalmatian toadflax, sulfur cinquefoil, and blueweed. Suppress spotted knapweed in high priority areas.

2. Short and long term goals - Water Project Bureau

Concurrent with Ravalli County goals.

B. Weed management priorities

1. Terrain / access

The site is in mountainous terrain. There are steep slopes with loose rock to the water's edge in many places. All but the SW shore has access by road.

2. Environmental concerns

Surface water.

Element occurrence reports for three sensitive plant species within at least 1/2 to 1 mile of the project area:

- Hollyleaf clover *Trifolium gymnocarpum* (G4, S2, USFS Sensitive) - T1S R22W sections 32, 34 & 35, T2S R22W sections 3 & 17

Description:
tufted, strongly taprooted perennial legume; foliage has grey cast due to short, straight, appressed hairs; 3-15 greenish to yellow-white flowers clustered into terminal heads that are shorter than the leaf canopy; locally well-represented on dry wooded ridges

- Coville Indian paintbrush *Castilleja covilleana* (G3/G4, S2, USFS Sensitive) - T1S R22W section 35 - E side of reservoir, above W. Fk. Road just W of Slate Creek turnoff

Description:
stems (4-12 in. tall) mostly unbranched from a woody base; lower leaves nearly linear and usually entire, while upper ones have a pair of narrow, lateral lobes; foliage usually stiff hairy below and glabrous above, but sometimes glabrous or pubescent throughout; flowere bracts are bright red, narrow with a pair of lateral lobes; calyx is deeply divided beneath, less so above; curved red corolla has a finely hairy upper lip that is about ½ its length

- Lemhi beardstongue *Penstemon lemhiensis* (G3, S2, USFS Sensitive) - T2S R22W sections 3 & 4 - one small population has been reported from ca. 1/4 mile N of Blue Joint Bay

Description:
1 to several stems (12-28 in. tall) from a branched root crown; thick, entire-margined basal leaves have lance-shaped petioles that are 6 in long; stem leaves are mostly sessile and narrower; foliage covered with fine short hairs; flowers are all on one side of the inflorescence; the bright blue corolla with short-hairy anthers

species descriptions from: Lackschewitz, K. 1991. Vascular plants of west-central Montana - identification guidebook. USDA Forest Service Gen. Tech. Rep. INT-277.

3. Target noxious weeds identified at the site

Category I
spotted knapweed (CENMA)

Ravalli County designated
common tansy (CHYVU)

4. Management objectives by species / zone

Species	Water resource zone	Maintenance zone	Recreation zone	Natural areas zone
CENMA	NA	suppress	suppress	suppress
CHYVU	NA	eradicate	eradicate	detect

NA - not applicable - the weed species was not observed in this zone and is not expected to be an immediate threat in this zone

C. Implementation (management prescription)

Weed management at Painted Rocks Reservoir needs coordination among federal, state and local agencies. The W. Fork Road along the E shore is maintained by Ravalli County and a road spraying program is ongoing. FR 362, along the W shore, is maintained by the Bitterroot NF and road edge treatments are planned within the next 1 to 2 years. Fish, Wildlife & Parks has a site specific weed management plan for the State Park campground area that will include cultural methods and herbicide applications targeting spotted knapweed.

To support ongoing weed management efforts, hand digging and herbicide spot spraying should be done on a biennial maintenance basis on Water Bureau managed land:

1. Inspect areas that will receive chemical or mechanical control actions, prior to or at the time of application, for the occurrence of the sensitive plant species listed above (section II.B.2). Populations of these species should not damaged during weed control work.

2. Support the road maintenance work done by Ravalli county and Bitterroot NF by hand digging and spot spraying spotted knapweed in areas that cannot be reached by truck. These include boat ramps, turnouts and open areas below the dam. For spot spraying, a 2,4-D amine labeled for use near water can be applied at 2 lbs / acre. Herbicide application must be made to actively growing plants (spring - mid summer). When hand digging, the entire plant must be removed since regrowth can occur from the crown or root. Plants should be dug when soil is moist and before seeds are formed. Plants with seeds should be bagged and removed from the site.

3. Eradicate common tansy in the recreation and maintenance zones by hand digging. The whole plant must be removed to prevent regrowth from rootstocks. Protective clothing should be worn when hand digging because some individuals are allergic to compounds in this aromatic plant.

D. Monitoring

Monitoring at this site should focus on detection of new weeds. High priority species in Ravalli County include leafy spurge, Dalmatian toadflax and sulfur cinquefoil. Infestations of blueweed (*Echium vulgare*) have been found in southern Ravalli County, and detection in this area is also a high priority.

Maintain observational records of spotted knapweed and common tansy infestations. Inspect the site for new weeds. Update biennially. Re-map noxious species in 2002.

E. Needs

1. Short and long term needs
    a. Personnel - licensed herbicide applicator, 1 person-day in years 1, 3 and 5; 2 person-days in each of years 1, 3 and 5 for hand digging; 1 person-day in each of years 1, 3 and 5 for weed response monitoring and new weeds detection
    b. Equipment - backback sprayer and hand digging equipment
    c. Chemicals - 2,4-D amine
    d. Biological control agents - none
    e. Seeds - none
2. Yearly procurement plan - NA

III. Budget

SITE: Painted Rocks Reservoir				
		Years 1 - 2	Years 3 - 6	**6-Yr Total**
Cultural / mechanical controls				
	Hand pulling	$134.40	$268.80	$403.20
	{Labor = $7 / hr + 20% benefits -			
	One person can pull weeds from about			
	1/10 to 1/5 acre / day depending on the			
	infestation and site conditions}			
Herbicide application				
	helicopter @ $7 / acre			$0.00
	truck / ATV broadcast @ $25 / acre			$0.00
	truck broadcast:			
	1 x 11' swath @ $32.50 / mile			$0.00
	2 x 11' swath @ $65.00 / mile			$0.00
	truck / ATV handgun @ $45 / hr			$0.00
	backpack spot spraying @ $45 / hr	$360.00	$720.00	$1,080.00
Herbicide costs				
	Tordon 22K @ $71 / gal			$0.00
	Transline @ $270 / gal			$0.00
	2,4-D amine @ $11 /gal	$11.00	$22.00	$33.00
Insects				
	purchase or collection costs			$0.00
	establishment costs (labor and materials)			$0.00
	redistribution costs			$0.00
Seeding and revegetation costs				
	seed costs per acre			$0.00
	application cost per acre			$0.00
Education and awareness signing				$0.00
Vegetation and weed response monitoring				
	Labor @ $10 / hr + 20% benefits	$96.00	$192.00	$288.00
	Supplies	$25.00	$50.00	$75.00
	Total Estimated Costs	$626.40	$1,252.80	$1,879.20

STATE WATER PROJECTS BUREAU SPECIFIC PLAN OF OPERATIONS FOR NOXIOUS WEED MANAGEMENT:
Petrolia Reservoir, Petroleum County

I. Situation statement

A. Description of State Water Project Bureau managed lands

1. Major features and location

Petrolia Reservoir is located about 7 miles SE of Winnett at 2900 feet elevation (T14N R27E portions of sections 25,36). It is fed by Yellow Water Creek downstream from Yellow Water Reservoir, and Flatwillow Creek, in the Musselshell River drainage. The dam at the E end floods approximately 515 acres.

2. Land ownership patterns of agency and general statement of accessibility - See Water Project Bureau land ownership map.

Water Project Bureau land largely consists of flooded acres and immediate shoreline. There is a recreational site along the NE shore and a parcel of Water Bureau land just below the dam. Repair work on the spillway was ongoing during the 1996 site inspection. The project is to be turned over to the private water users.

3. Delineation of current use zones

water resource: high pool to low pool
maintenance: dam and road along SE shore to spillway
recreation: camping sites and boat launch area along NE shore, picnic site E of the spillway
grazing / agriculture: shore and adjacent land, primarily W half
natural areas: waterfowl use in the water resource zone and shore, especially upper end

4. Soil types

loams (Havre-Glendive complex, Cabbart-Crago-Delpoint complex, Attewan, Verson clay loam, Yamac)

B. Statement of the weed problem

1. Current list of state and county noxious weeds

State noxious species (Table 1)

Petroleum County designated noxious weeds:

None

2. General distribution patterns of noxious species at the site

Canada thistle is distributed around much of the shore and a significant population occurs in the willow thicket at the S end (about 45 acres total). A small infestation of spotted knapweed (< 1/2 acre) was found just N of the dam along the road edge.

3. Identification of problem areas (e.g. drainages, gravel pits, roads, campsites)

Campsites and boat launch area at NE corner.

II. Plan of work

A. Vegetation management goals

1. County Weed Board - Control existing weed infestations where possible using an integrated weed management approach. Prevent establishment of new noxious weed species.

2. Water Project Bureau - concurrent with Petroleum Co. goals

B. Weed management priorities

1. Terrain / access

Gentle terrain and good access by existing roads around E half of the reservoir (E shore and S “arm”). Steep terrain around upper end (N “arm”).

2. Environmental concerns

Surface water. Shallow ground water around upper portions.

3. Target noxious weeds identified at the site

<u>Category I</u>
Spotted knapweed (CENMA)
Canada thistle (CIRAR)

4. Management objectives by species / zone

Species	**Water resource zone**	**Maintenance zone**	**Recreation zone**	**Grazing / agriculture zone**	**Natural areas zone**
CENMA	NA	eradicate	detect	detect	detect
CIRAR	NA	tolerate	tolerate	tolerate	tolerate

NA - not applicable - the weed species was not observed in this zone and is not expected to be an immediate threat in this zone

C. Implementation (management prescription)

1. Treat the spotted knapweed at the N end of the dam for eradication. Apply spot treatments with 1 pint/acre Tordon 22K in the spring when knapweed plants are actively growing. Inspect and retreat at 2 year intervals.

D. Monitoring

Maintain records of colony size and number of spotted knapweed plants. Inspect the maintenance and recreation zones for new weeds. Update biennially.

E. Needs

1. Short and long term needs
   a. Personnel - licensed herbicide applicator, .25 person-day in years 1,3,5
   b. Equipment - hand spot spraying equipment
   c. Chemicals - Tordon 22K herbicide
   d. Biological control agents - none
   e. Seeds - none
2. Yearly procurement plan

III. Budget

SITE: Petrolia Reservoir				
		Years 1 - 2	Years 3 - 6	**6-Yr Total**
Cultural / mechanical controls				
	Hand pulling			$0.00
	{Labor = $7 / hr + 20% benefits -			
	One person can pull weeds from about			
	1/10 to 1/5 acre / day depending on the			
	infestation and site conditions}			
Herbicide application				
	helicopter @ $7 / acre			$0.00
	truck / ATV broadcast @ $25 / acre			$0.00
	truck broadcast:			
	1 x 11' swath @ $32.50 / mile			$0.00
	2 x 11' swath @ $65.00 / mile			$0.00
	truck / ATV handgun @ $45 / hr			$0.00
	backpack spot spraying @ $45 / hr	$90.00	$180.00	$270.00
Herbicide costs				
	Tordon 22K @ $71 / gal	$0.89	$1.78	$2.66
	Transline @ $270 / gal			$0.00
	2,4-D amine @ $11 /gal			$0.00
Insects				
	purchase or collection costs			$0.00
	establishment costs (labor and materials)			$0.00
	redistribution costs			$0.00
Seeding and revegetation costs				
	seed costs per acre			$0.00
	application cost per acre			$0.00
Education and awareness signing				$0.00
Vegetation and weed response monitoring				
	Labor @ $10 / hr + 20% benefits	$48.00	$96.00	$144.00
	Supplies	$25.00		$25.00
	Total Estimated Costs	$163.89	$277.78	$441.66

STATE WATER PROJECTS BUREAU SPECIFIC PLAN OF OPERATIONS FOR NOXIOUS WEED MANAGEMENT:
Ruby River Reservoir, Madison County

I. Situation statement

A. Description of State Water Project Bureau managed lands

1. Major features and location

Ruby River Reservoir is located about 9 miles SW of Virginia City at 5400 feet elevation (T7S R4W portions of sections 8,9,17,18,19,20,30). Ruby Dam at its N end floods approximately 970 acres on the Ruby River.

2. Land ownership patterns of agency and general statement of accessibility - See Water Project Bureau land ownership map.

The Water Project Bureau owns the flooded acres and immediate shoreline plus a small block below the dam.

3. Delineation of current use zones

water resource: high pool to low pool
maintenance: dam and spillway; Upper Ruby Road along E shore and road along SW shore
recreation: developed and undeveloped campsites along E shore, with heavy vehicle impact
grazing / **natural areas**: S and W shores + surrounding areas

4. Soil types

mostly loams - major series include Musselshell gravelly loam, Crago very gravelly loam, Crago very stony loam, Rivra gravelly sandy loam, Rentsac very channery loam, Trudau loam, Neen silty clay loam - mostly deep and well-drained with moderate to moderately slow permeability

B. Statement of the weed problem

1. Current list of state and county noxious weeds

State noxious species (Table 1)

Madison County designated noxious weeds:

common tansy (CHYVU)	houndstongue (CYWOF)
musk thistle (CRUNU)	field scabious (KNAAR)

2. General distribution patterns of noxious species at the site

Spotted knapweed occurs at low to high densities along nearly the entire E shoreline and as scattered individuals and small colonies along the W shore. It also occurs at high density on the dam with numerous colonies below the dam. Canada thistle is moderately abundant along the W shore and at the upper (S) end. Musk thistle is present on the NE shore.

3. Identification of problem areas (e.g. drainages, gravel pits, roads, campsites)

Camp sites, on all the larger peninsulas along the E shore, receive heavy recreational and vehicle impact.

II. Plan of work

A. Vegetation management goals

1. County Weed Board -

Implement prevention and detection activities as weed management tools. Control existing noxious weed infestations using an Integrated Pest Management approach. Control spotted knapweed using herbicides where suitable, or approved biocontrol agents. Suppress Canada and musk thistle using herbicides or biocontrol agents. Monitor effects of management actions.

2. Water Project Bureau

Concurrent with Madison County goals.

B. Weed management priorities

1. Terrain / access

Terrain is moderate. Reached by taking Upper Ruby Road S from Highway 287 at Alder for about 7 miles. Access by road around entire E shore and S half of W shore.

2. Environmental concerns

Surface water.

Element occurrence report for a sensitive plant species within 1/2 to 1 mile of the project area:

- beaked spikerush *Eleocharis rostellata* (Global rank G5, State rank: S2) - T7S R4W section 7 (SE1/4 SE1/4), section 8 (SW1/4 SW 1/4), section 17 (NW1/4 NW

1/4) & section 18 (NE1/4 NE 1/4) - ca. 1/4 mile W of Ruby Res., on terraces below Trudau Lake

Description:
Cyperaceae (sedge family) (most spike rushes matue fairly late in the growing season, and mature fruits are needed for positive identification); perianth of 6 or fewer bristles or none; stigmas 3; achenes three-angled or nearly round in cross section; tubercle confluent with achene, not set off by a groove or indentation; spikelets 10 or more flowered, mostly 8 mm long or more; culms 1-2 mm in diameter, flattened; alkaline or marly areas

Dorn, R.D. 1984. Vascular plants of Montana. Mountain West Publishing, Cheyenne, WY.

3. Target noxious weeds identified at the site

spotted knapweed (CENMA)
Canada thistle (CIRAR)
musk thistle (CRUNU)

4. Management objectives by species / zone

Species	**Water resource zone**	**Maintenance zone**	**Recreation zone**	**Grazing / natural areas zone**
CENMA	NA	suppress	suppress	suppress
CIRAR	NA	contain	contain	contain
CRUNU	NA	contain	contain	contain

NA - not applicable - the weed species was not observed in this zone and is not expected to be an immediate threat in this zone

C. Implementation (management prescription)

1. If the herbicide Rodeo (glyphosate) is used, inspect areas to be treated, prior to or at the time of application, for the occurrence of the sensitive plant beaked spikerush (see description in section II.B.2 above). Populations of this species should not be oversprayed with Rodeo. Plants in the sedge family are tolerant of synthetic auxin-type broadleaf herbicides such as 2,4-D and clopyralid.

2. The largest spotted knapweed infestations occur along the E shore, in areas adjacent to the Upper Ruby Road. Madison County will do weed control along the right-of-way, where site characteristics allow for label-approved herbicide applications. Some of these knapweed areas extend to the shoreline and herbicide treatment of the entire infestation may be difficult without the use of watercraft. Spotted knapweed also occurs throughout the recreational areas, around and below the dam and spillway, and lightly scattered along the W shore. Curtail (clopyralid + 2,4-D) at 2 quarts / acre could be used for spotted knapweed control in these areas. Treat when knapweed plants are actively growing (spring - early summer). Curtail

should not be applied to areas where spray mist might contact surface waters nor below the high water mark. Hand dig plants that are near the water's edge. The entire plant must be removed since regrowth can occur from the crown or root. Plants should be dug when soil is moist and before seeds are formed. Plants with seeds should be bagged and removed from the site.

3. A containment strategy for Canada and musk thistles could be implemented in conjunction with the spotted knapweed spray program. Musk thistle on the NE shore and Canada thistle along the W shore can be treated at the same rates and timing used for spotted knapweed (i.e. with Curtail). Some of the Canada thistle infestation occurs in the upper (S) end riparian zone. If control is desired in this area, Rodeo can be applied at 3 to 4½ pints/acre plus a non-ionic surfactant labeled for use with herbicides. Care must be taken not to contact desirable vegetation when applying Rodeo. Apply when Canada thistle plants are actively growing and when most plants are at or beyond the bud stage of growth.

4. The Rodeo prescription could also be used along the reservoir shore in areas where Curtail application cannot be made within label. The higher rate should also provide some suppression of spotted knapweed.

5. Work with the Madison County Weed Supervisor to establish biocontrol insect populations targeting spotted knapweed. Optimum release sites for the knapweed root moth (*Agapeta zoegana*) may be on the adjoining lands proximal to the reservoir site, and not on the immediate shore or road edge. Establishment of insect populations in the general area would be beneficial for the long-term management of spotted knapweed.

D. Monitoring

Maintain observational records of the extent of weed infestations at the site. Inspect for new weeds. Update biennially. Re-map target noxious weeds in 2002.

E. Needs

1. Short and long term needs
    a. Personnel - licensed herbicide applicator, 1 person-day / year, biennially; ½ person-day, biennially, for monitoring and new weeds inspection
    b. Equipment - truck/ATV ground application equipment
    c. Chemicals - Curtail® herbicide (DowElanco), Rodeo® herbicide (Monsanto)
    d. Biological control agents - knapweed root moth (*Agapeta zoegana*)
    e. Seeds - none
2. Yearly procurement plan - Coordinate insect releases through the Madison County Weed Supervisor since release sites will be on nearby private land. Assist in obtaining and distributing insects if necessary.

III. Budget

SITE: Ruby River Reservoir				
		Years 1 - 2	Years 3 - 6	**6-Yr Total**
Cultural / mechanical controls				
	Hand pulling			$0.00
	{Labor = $7 / hr + 20% benefits -			
	One person can pull weeds from about			
	1/10 to 1/5 acre / day depending on the			
	infestation and site conditions}			
Herbicide application				
	truck / ATV handgun @ $45 / hr	$720.00	$720.00	$1,440.00
	backpack spot spraying @ $45 / hr			$0.00
Herbicide costs				
	Curtail @ $34 / gal	$170.00	$340.00	$510.00
	Krenite S @ $54 / gal			$0.00
	Rodeo @ $100 / gal	$200.00	$400.00	$600.00
	Tordon 22K @ $71 / gal			$0.00
	Transline @ $270 / gal			$0.00
	2,4-D amine @ $11 /gal			$0.00
Insects				
	purchase or collection costs			$0.00
	establishment costs (labor and materials)	$100.00		$100.00
	redistribution costs			$0.00
Seeding and revegetation costs				
	seed costs per acre			$0.00
	application cost per acre			$0.00
Education and awareness signing				$0.00
Vegetation and weed response monitoring				
	Labor @ $10 / hr + 20% benefits	$48.00	$96.00	$144.00
	Supplies			$0.00
	Total Estimated Costs	$1,238.00	$1,556.00	$2,794.00

STATE WATER PROJECTS BUREAU SPECIFIC PLAN OF OPERATIONS FOR NOXIOUS WEED MANAGEMENT:
Stafford Reservoir, Fergus County

I. Situation statement

A. Description of State Water Project Bureau managed lands

1. Major natural features (river/stream, terrain, # flooded acres)

The Stafford Dam on Homestake Creek floods approximately 90 acres about 1 mile NW of the town of Winifred at 3238 feet elevation (T21N R18E section 27). The reservoir is surrounded by farmland in gentle terrain.

2. Land ownership patterns of agency and general statement of accessibility -

Water Project Bureau land includes the flooded acres and shoreline.

3. Delineation of current use zones

water resource zone: high pool to low pool
maintenance zone: dam
grazing/agriculture zone: shore and surrounding land, including cultivated field to the NW
natural areas zone: flooded acres and shoreline (waterfowl habitat)

B. Statement of the weed problem

1. Current list of state and county noxious weeds

State noxious species (Table 1)

Fergus County designated noxious weeds:

None

2. General distribution patterns of noxious species at the site

Canada thistle is abundant around the entire shore area. No other noxious species were found at the site. No significant weed infestations were observed in the surrounding area.

3. Identification of problem areas (e.g. drainages, gravel pits, roads, campsites)

The dam face and shore were littered with discarded scrap metal and tires.

II. Plan of work

A. Vegetation management goals

Current and anticipated uses need to be clarified for this site so that specific management objectives can be set. Short term goals are to contain, and where possible, suppress infestations of Canada thistle, and prevent further establishment of noxious weed infestations.

B. Weed management priorities

1. Terrain / access

Gentle terrain with good vehicle access.

2. Environmental concerns

Surface water.
Shallow ground water at upper end.

3. Target noxious weeds identified at the site

<u>Category I</u>

Canada thistle (CIRAR)

4. Management objectives by species / zone

Species	**Water resource zone**	**Maintenance zone**	**Grazing / agriculture zone**	**Natural area zone**
CIRAR	NA	suppress	suppress	suppress

NA - not applicable - the weed species was not observed in this zone and is not expected to be an immediate threat in this zone

C. Implementation

1. Some of the Canada thistle infestation can be treated with Curtail (clopyralid + 2,4-D) at 2 quarts/acre. Treatment should be made to actively growing plants before bud stage. Curtail should not be used along the shoreline or in the marshy areas at the upper end of the reservoir where ground water is shallow. If herbicide treatment is desired in these areas, Rodeo could be applied as a spot treatment at 3 to 4½ pints/acre plus a non-ionic surfactant. Care must be taken not to kill desirable vegetation when applying Rodeo. Apply when Canada thistle plants are actively growing and when most plants are at or beyond the bud stage of growth. Follow-up

treatments should be made one year after the initial applications, and maintenance spot spraying continued at 1 to 2 year intervals.

2. Introduction of biocontrol insects could be considered if Canada thistle is not treated near the water or in marshy areas, or as an alternative to herbicide control at this site.

The Canada thistle stem weevil (*Ceutorhynchus litura*) may be effective in reducing the overwintering survival of Canada thistle. At least one established population of this species in Montana is associated with an insect disease, and thus there is concern about redistribution of this agent. *Ceutorhynchus* can be purchased from Biological Control of Weeds in Bozeman ($150 per 100 - contact: Noah Poritz, 406-586-5111).

A second insect, the thistle stem gall fly (*Urophora cardui*), can reduce flowering of Canada thistle. Preferred habitat is in areas where Canada thistle is dense and adult flies can obtain moisture from surface water. Fields subject to flooding, grazing, mowing, or chemical treatments are not conducive to fly survival. Availability of this insect is limited, although there are some established sites in Montana where galls can be collected in fall, winter or early spring by snipping them from last year's plants (contact: Neal Spencer, USDA ARS in Sidney, 406-482-2020). *Urophora cardui* can also be purchased from Biological Control of Weeds for $100 per 100.

D. Monitoring - If biocontrol insects are released, mark release sites and take photos of Canada thistle infestations from recorded points. Inspect the site for new weed infestations at 2 to 3-year intervals.

E. Needs
   1. Personnel - licensed herbicide applicator, 1 person-day in year 1, ½ person-day in years 2, 4, and 6
   2. Equipment - backpack or ATV hand spraying equipment
   3. Chemicals - Curtail herbicide; Rodeo herbicide and non-ionic surfactant (e.g. R-11®, Wilbur-Ellis)
   4. Biological control agents -Canada thistle stem weevil (*Ceutorhynchus litura*) and/or thistle stem gall fly (*Urophora cardui*)
   5. Seeds - none

III. Budget

SITE: Stafford Reservoir				
		Years 1 - 2	Years 3 - 6	**6-Yr Total**
Cultural / mechanical controls				
	Hand pulling			$0.00
	{Labor = $7 / hr + 20% benefits -			
	One person can pull weeds from about			
	1/10 to 1/5 acre / day depending on the			
	infestation and site conditions}			
Herbicide application				
	helicopter @ $7 / acre			$0.00
	truck / ATV broadcast @ $25 / acre			$0.00
	truck broadcast:			
	1 x 11' swath @ $32.50 / mile			$0.00
	2 x 11' swath @ $65.00 / mile			$0.00
	truck / ATV handgun @ $45 / hr			$0.00
	backpack spot spraying @ $45 / hr	$540.00	$360.00	$900.00
Herbicide costs				
	Krenite S @ $54 / gal			$0.00
	Rodeo @ $100 / gal			$0.00
	Tordon 22K @ $71 / gal			$0.00
	Curtail @ $34 / gal	$102.00	$34.00	$136.00
	2,4-D amine @ $11 /gal			$0.00
Insects				
	purchase or collection costs	$250.00		$250.00
	establishment costs (labor and materials)	$146.00		$146.00
	redistribution costs			$0.00
Seeding and revegetation costs				
	seed costs per acre			$0.00
	application cost per acre			$0.00
Education and awareness signing				$0.00
Vegetation and weed response monitoring				
	Labor @ $10 / hr + 20% benefits			$0.00
	Supplies			$0.00
	Total Estimated Costs	$1,038.00	$394.00	$1,432.00

STATE WATER PROJECTS BUREAU SPECIFIC PLAN OF OPERATIONS FOR NOXIOUS WEED MANAGEMENT:
Theboe Lake, Teton County

I. Situation statement

A. Description of State Water Project Bureau managed lands

1. Major natural features (river/stream, terrain, # flooded acres)

Theboe Lake is situated in a small basin about 18 miles west of Choteau (T24N R8W section 36 NE¼) at 4675 feet elevation. Water is diverted to the lake through a short canal from the South Fork of Willow Creek.

2. Land ownership patterns of agency and general statement of accessibility - See land ownership map

About 18 miles W of Choteau on Bellview Rd., then S about 3 miles on unmarked county road to a private road through cow pasture about ¼ mile NW to the dam. There is no public access. Water Project Bureau owns 160 acres (NE ¼ of section 36), with the flooded acres making up about a third to half of that area. The project is apparently being sold into private ownership.

3. Delineation of current use zones

water resource zone: high pool to low pool
maintenance zone: small dam at N end; no maintained road system
grazing zone: shore and surrounding area

4. Soil types

gravelly / stoney loams

B. Statement of the weed problem

1. Current list of state and county noxious weeds

State noxious species (Table 1)

Teton County designated noxious weeds:

None

2. General distribution patterns of noxious species at the site

A small, low-density patch and scatterred plants of leafy spurge occur along the NE shore. Canada thistle is scatterrred around the dam and shore at low density.

II. Plan of work

A. Vegetation management goals

1. Short term goals (1 - 2 years) - County Weed Board

Eradicate the small colony of leafy spurge to prevent its spread into surrounding pastures.

2. Short term goals - Water Bureau

Concurrent with Teton county goal.

B. Weed management priorities

1. Terrain / access

Gentle terrain. No public access.

2. Environmental concerns

Shallow water table in a natural basin. Surface water.

Element occurrence reports for sensitive plant species within at least 1/2 to 1 mile of the project area:

- Macoun's gentian *Gentianopsis macounii* (Global rank G5, State rank S1; USFS Proposed Sensitive) - T24N R8W

Description:
annual with opposite leaves; flowers mostly several, 3.5-5.5 cm, deep blue, 4-merous; anthers 3-4 mm, style generally slender and 4-6 mm; generally with several basal leaves - Hitchcock and Cronquist use the name *Gentiana detonsa* Rottb.

Hitchcock, C.L. and A. Cronquist. 1973. Flora of the Pacific Northwest. University of Washington Press, Seattle.

- pale sedge *Carex livida* (Global rank: G5, State rank: S2, USFS: Sensitive) - T24N R8W

Description:
sedges are perennial, grass-like plants with flowers in spikes, each flower subtended by a scale - species identification involves examination of technical characters - for a key to this species, see Dorn, R.D. 1984. Vascular plants of Montana. Mountain West Publishing, Cheyenne, WY.

3. Target noxious weeds present on the site

Category I
leafy spurge (EPHES)
Canada thistle (CIRAR)

4. Management objectives by species / zone

Species	**Water resource zone**	**Maintenance zone**	**Grazing zone**
EPHES	eradicate	eradicate	eradicate
CIRAR	tolerate	tolerate	tolerate

C. Implementation (management prescription)

1. Apply herbicide spot treatments for eradication of leafy spurge. Because of its close proximity to open water and the shallow water table, either glophosate (Rodeo®) or fosamine (Krenite® S) should be used. Glyphosate (Rodeo®) at 0.75 lb/acre (1.5 pints/acre) with a nonionic surfactant (R-11®, Wilbur-Ellis) can be applied from mid-July to mid-September. Fosamine should be applied at 6 to 8 lbs/acre (1.5 to 2 gal/acre) during the period of true flower. A follow-up treatment for seedling control should be made the next year using a 2,4-D formulation labeled for use near water at 0.5 to 1 lb/acre.

Annual inspection and retreatment with 2,4-D as needed should be continued for 6 years or longer.

Prior to making spot applications, examine the treatment area for the sensitive plant species listed above. Avoid overspraying these species.

D. Monitoring

Maintain an observational record of the extent of leafy spurge infestation on the site. Permanently mark the main colony with a steel-T fence post. Inspect for new weeds. Update annually for 6 to 8 years.

E. Needs

1. Short and long term needs
   a. Personnel - Licensed herbicide applicator, ½ person-day / year
   b. Equipment - hand spot spraying equipment (truck/ATV-mounted or backpack)
   c. Chemicals - Rodeo® herbicide (Monsanto) or Krenite® S herbicide (DuPont), R-11® surfactant (Wilbur-Ellis) (or other Monsanto-approved surfactant) if Rodeo is used, a 2,4-D amine formulation labeled for use near water
   d. Biological control agents - none
   e. Seeds - none
2. Yearly procurement plan - NA

III. Budget

SITE: Theboe Lake				
		Years 1 - 2	Years 3 - 6	**6-Yr Total**
Herbicide application				
	backpack spot spraying @ $45 / hr	$360.00	$720.00	$1,080.00
Herbicide costs				
	Krenite S @ $54 / gal	$21.60		$21.60
	2,4-D amine @ $11 /gal	$1.10	$2.20	$3.30
Insects				
	purchase or collection costs			$0.00
	establishment costs (labor and materials)			$0.00
	redistribution costs			$0.00
Seeding and revegetation costs				
	seed costs per acre			$0.00
	application cost per acre			$0.00
Education and awareness signing				$0.00
Vegetation and weed response monitoring				
	Labor @ $10 / hr + 20% benefits	$48.00	$96.00	$144.00
	Supplies	$25.00		$25.00
	Total Estimated Costs	$455.70	$818.20	$1,273.90

STATE WATER PROJECTS BUREAU SPECIFIC PLAN OF OPERATIONS FOR NOXIOUS WEED MANAGEMENT:
Tongue River Reservoir, Big Horn County

I. Situation statement

A. Description of State Water Project Bureau managed lands

1. Major features and location

Tongue River Reservoir is located 10 miles N of the Montana-Wyoming border in SE Big Horn County near Decker at 3410 feet elevation (T8S R40E portions of sections 12,13,14,23,24,25,26,27,34,35,36, T8S R41E portion of 18, T9S R40E portions of 1,2,3,10,11,12,14,15,22,23). The dam at its N end floods approximately 3500 acres.

2. Land ownership patterns of agency and general statement of accessibility - See Water Project Bureau land ownership map.

Ownership patterns are complex at Tongue River. The Water Project Bureau ownership map may no longer be accurate. Montana DFWP leases land along the W shore of Tongue River Reservoir which comprises Tongue River State Park. This site totals 685 acres, of which 640 acres are leased from the DNRC and 1.9 acres are leased from Decker Coal. Also included with this site is a 43.1 acres wetland area called Pike Marsh, on the upper part of the reservoir, also leased from DNRC. The legal description for these properties is as follows: Tongue River State Park, T8S R40E Sec. 12,27,35, 641.86 acres; Pike Marsh, T9S R40E Sec.__, 43.1 acres. Tongue River SP is bordered by the reservoir to the east and private agricultural lands on the remaining sides with ownership by Decker Coal, Pacific Power and Light, and private producers. There are a number of recreational inholdings in the area including the Northern Cheyenne tribe.

3. Delineation of current use zones

water resource: high pool to low pool
maintenance: dam, spillway and road system
recreation: State Park developments include parking areas, picnic shelters, 4 campground areas, vault latrines, and a boat ramp
grazing: portions of E and W shores + surrounding area
natural areas zone: entire shoreline, overlapping other zones
mining: Decker Coal Mine on SE shore

4. Soil types

predominately loams, silty clay loams and silty clays with occasional cobbles and outcrops as inclusions: numerous loams dominated by the deep, well-drained Haverson series, and complexes of the Wibaux series, characterize the reservoir

perimeter; the steep ridges and drainageways are characterized by gravelly and cobbly soils and terrace escarpments

B. Statement of the weed problem

1. Current list of state and county noxious weeds

State noxious species (Table 1)

Big Horn County designated noxious weeds:

common burdock (ARFMI)	poison hemlock (COIMA)
black henbane (HSYNI)	saltcedar (TAARA)

2. General distribution patterns of noxious species at the site

Saltcedar was found at scattered locations along the high water mark on both E and W shores. The largest infestation of saltcedar was near the dam and around the spillway. Canada thistle was widely distributed around the reservoir, but with the largest infestations toward the S end. Two patches of field bindweed were found at the S end.

II. Plan of work

A. Vegetation management goals

1. County Weed Board -

Contain or suppress existing weed infestations. Prevent establishment of new weeds.

2. Water Project Bureau -

Concurrent with Big Horn County goals.

B. Weed management priorities

1. Terrain / access

Gentle to moderate terrain. Vehicle access to much of the W shore. Access to the SE shore through Decker Coal mine. Limited vehicle access to the E shore, mostly through private land.

2. Environmental concerns

Surface water.

3. Target noxious weeds identified at the site

Canada thistle (CIRAR)
saltcedar (TAARA)
field bindweed (CONAR)

4. Management objectives by species / zone

Species	**Water resource zone**	**Maintenance zone**	**Recreation zone**	**Grazing zone**	**Natural areas zone**	**Mining zone**
CIRAR	NA	contain	contain	contain	tolerate	tolerate
CONAR	NA	detect	detect	contain	contain	detect
TAARA	NA	eradicate	eradicate	detect	eradicate	detect

NA - not applicable - the weed species was not observed in this zone and is not expected to be an immediate threat in this zone

C. Implementation

At this time, only general management recommendations are appropriate at Tongue River Reservoir because ongoing construction activities will modify the site significantly. The Tongue River Basin Project (see *Tongue River Basin Project, Final Environmental Impact Statement*, March 1996, Montana DNRC, Northern Cheyenne Tribe, US Bureau of Reclamation) includes repair and enlargement of the Tongue River Dam, partial fulfillment of the Northern Cheyenne Indian Reserved Water Rights Settlement Act of 1992, and conservation, development and enhancement of fish and wildlife resources in the basin. Impacts of the project relating to vegetation management at the site are summarized in the EIS and include the following:

- wave action and water saturated soils due to higher water levels (4 ft. - spring 1999) will decrease upland species bordering the reservoir
- 3 miles of road construction will impact 33 acres of native vegetation
- state park relocation will impact 23 acres of native vegetation
- the construction staging area will impact 36 acres of native vegetation; predicted effects major in the short term but minor in the long term because of weed control plan implementation
- predicted impacts on ethnobotanical resources are minor; none of the 62 plant species inventoried were rare or uncommon

The EIS also addresses the ongoing invasion of saltcedar around the reservoir shore:

> Removal of existing vegetation from increased reservoir water levels, wave action, and ice movement may favor the spread of existing salt-cedar, a noxious, non-native shrub that aggresively colonizes disturbed riparian areas, and displaces more desirable native plants. Dense stands of willows and cottonwoods are less likely to be rapidly colonized by salt-cedar than are bare nonvegetated shorelines, because established vegetation competes with invading species for sunlight, nutrients, and growing space. If salt-cedar was not controlled, then there could be major long-term impacts to existing native vegetation. If it was controlled, then short-term impacts on salt-cedar and nontarget species would occur, however, long-term impacts would be beneficial. (p. 4-35)

A number of mitigation measures address these impacts, including:

- replacing habitat lost to inundation; the project sponsors will conduct a planting program above the new high water mark in suitable areas to mimic or enhance existing riparian conditions to expedite reestablishment of riparian communities and diversify existing habitat where feasible

- regeneration of cottonwood and willow stands from existing seed sources will be enhanced by site preparation; timing of preparation with the relatively short duration of seed viability is critical

- improve riparian areas by fencing cattle out of critical areas along the reservoir, restricting campers to designated areas, instituting programs to eradicate salt-cedar from the reservoir vicinity, and controlling noxious weeds

- reclamation of disturbed areas will be conducted according to a weed control plan developed by the project sponsors in consultation with county weed districts and in compliance with the Noxious Weed Control Act.

Montana DFWP has also developed a noxious weed management plan for Tongue River State Park (contact: Mike Hathaway, DFWP, Miles City, 232-4365). This plan is very general and was not based on detailed inventory. More extensive survey activities were planned for 1996 and 1997. The goals of the FWP plan are ". . . to prevent infestations from occurring. Hand pulling, cutting and mowing will also be used in preventing new infestations from establishing, this will be in addition to the protection of existing vegetation from disturbance by vehicles and other visitor activities." Proposed weed control methods are surveying; mowing of roadsides and disturbed areas to reduce weed seedhead formation; chemical treatments on some roadsides and parking areas; hand pulling, cutting, mowing and chemical methods on small spot infestations as they occur; and biocontrol methods in instances where there are limitations to chemical use and their use would be cost effective. Total budget amounts for FY 96 and FY 97 are $665 each year.

Noxious weed management at Tongue River needs coordination among the different local, state, and federal agencies involved in land and recreation management at the

site. Two major weed management activities should receive high priority during the next 6 years:

1. Detection / monitoring -

   Construction activities and higher reservoir water levels will result in vegetation shifts, potential introductions of new weed species, and new sites favorable to weed establishment. Therefore a high priority on detection of new invasive weed species and monitoring of existing infestations is needed. Good record keeping and data maintenance are important because a number of local, state and federal agencies are involved in management of the site, and numerous land managers are conducting on-the-ground work.

2. Saltcedar control -

   Saltcedar is native to southern Europe, North Africa, the Middle East and Southeast Asia which was introduced to N. America in the early 1800s as an ornamental. It has undergone significant range expansion in the western United States. Virtual monocultures are often formed in riparian areas resulting in degraded wildlife habitat and large water table draw downs.

   Saltcedar responds favorably to fire, resprouting quickly and vigorously. Mechanical control by root plowing is very expensive, high impact, and has only moderate efficacy. Research on herbicide control at New Mexico State University (Dr. K.W. Duncan) has identified effective chemical prescriptions. The herbicide Arsenal® (imazapyr) effectively controlled saltcedar when canopy-applied with a backpack sprayer or handgun. A 1.0% solution applied this way resulted in 93% mortality. Tank mixes of Arsenal with Rodeo® (glyphosate) have also been effective. A 0.75% + 0.75% solution should give 90 to 99% control. Also in New Mexico, an aerial application of Arsenal at 0.5 gal / acre (1.0 lb a.i. / acre) with Activator surfactant in a total volume of 7 gal / acre resulted in 95% mortality and 99% canopy reduction in a heavily infested lakebed area. Biological control of saltcedar is in the identification and host-range testing stage (contact: C.J. DeLoach, USDA-ARS, Temple, Texas).

III. Budget

Reasonable budget estimates cannot be made at this time. Coordination among the different agencies must take place and decisions made about what responsibilities each will assume. The impact of construction activities on vegetation patterns and weed distributions must be assessed before specific management actions can be prescribed.

STATE WATER PROJECTS BUREAU SPECIFIC PLAN OF OPERATIONS FOR NOXIOUS WEED MANAGEMENT:
Willow Creek Reservoir, Madison County

I. Situation statement

A. Description of State Water Project Bureau managed lands

1. Major features and location

Willow Creek Reservoir is located about 4 miles E of Harrison at 4730 feet elevation (T1S R1W portions of 26,27,28,34,35 and T2S R1W portions of 2,3,10). It is fed by North Willow Creek, South Willow Creek, Dry Hollow Creek and Norwegian Creek, which flow out of the Tobacco Root Mountains, west of the reservoir. Approximately 890 acres are flooded.

2. Land ownership patterns of agency and general statement of accessibility - See Water Project Bureau land ownership map.

Water Project Bureau ownership is largely limited to the flooded acres.
DFWP also owns about 40 acres on the W shore with picnic areas and boat ramp.

3. Delineation of current use zones

water resource zone: high pool to low pool
maintenance zone: dam and spillway, road system around portions of S end (E and W shores)
recreation zone: picnic areas and boat ramp on SW shore
grazing zone: surrounding pastures and grassland

4. Soil types

Mostly loams - major series include: Fluvaquentic Haplaquolls (clay loam to cobbly sandy loam), Nuley sandy loam, Shurley sandy loam, Brocko silt loam, Kalsted sandy loam, Blackhall sandy loam, Varney clay loam, Kalsted gravelly sandy loam, and areas of rock outcrop. Soils are mostly deep and well-drained with moderate to moderately rapid permeability

B. Statement of the weed problem

1. Current list of state and county noxious weeds

State noxious species (Table 1)

Madison County designated noxious weeds:
common tansy (CHYVU) houndstongue (CYWOF)

musk thistle (CRUNU) field scabious (KNAAR)

2. General distribution patterns of noxious species at the site

The weediest areas are around the spillway (houndstongue) and the recreation zone (spotted knapweed, houndstongue, musk thistle, Canada thistle). Canada thistle is widely distributed at the site, with large infestations at the S and NW ends of the reservoir.

II. Plan of work

A. Vegetation management goals

1. County Weed Board -

Implement prevention and detection activities as weed management tools. Control existing noxious weed infestations using an Integrated Pest Management approach. Control spotted knapweed using herbicides where suitable, or approved biocontrol agents. Suppress Canada and musk thistle using herbicides or biocontrol agents. Eradicate houndstongue using herbicides, where possible. Monitor effects of management actions.

2. Water Project Bureau

Concurrent with Madison County goals.

B. Weed management priorities

1. Terrain / access

Vehicle access is limited around the N end. Portions of the S end are accessible by road. Terrain is moderate (S) to steep (N).

2. Environmental concerns

Surface water.

Element occurrence report for a sensitive plant species within at least 1/2 to 1 mile of the project area:

- Great Basin downingia *Downingia laeta* (Global rank: G5, State rank: S1) - T2S R1W section 10 - Norwegian Creek inlet to the west side Willow Creek Res., about 30 yards from the high water mark

Description:
Campanulaceae (bellflower family); fibrous rooted glabrous annual; filaments of stamens united into a tube; corolla irregular; flowers sessile, solitary in axils; wet places
Dorn, R.D. 1984. Vascular plants of Montana. Mountain West Publishing, Cheyenne, WY.

3. Target noxious weeds identified at the site

spotted knapweed (CENMA)
Canada thistle (CIRAR)
houndstongue (CYWOF)
musk thistle (CRUNU)

4. Management objectives by species / zone

Species	**Water resource zone**	**Maintenance zone**	**Recreation zone**	**Grazing zone**
CENMA	NA	eradicate	eradicate	eradicate
CIRAR	NA	contain	contain	contain
CYWOF	NA	eradicate	eradicate	eradicate
CRUNU	NA	contain	contain	contain

NA - not applicable - the weed species was not observed in this zone and is not expected to be an immediate threat in this zone

C. Implementation

1. Inspect areas to be treated with herbicides, prior to or at the time of application, for the occurrence of the sensitive plant Great Basin downingia (see description in section II.B.2 above). Populations of this species should not be oversprayed.

2. Apply spot herbicide treatments for spotted knapweed control. Use a 2,4-D amine labeled for use near water at 2 lb / acre. Apply when knapweed plants are actively growing (spring / early summer). Individual plants and small colonies can also be hand dug. The entire plant must be removed since regrowth can occur from the crown or root. Plants should be dug when soil is moist and before seeds are formed. Plants with seeds should be bagged and removed from the site. Spotted knapweed control work should be done on an annual maintenance basis.

3. Use herbicide treatment and hand digging methods for houndstongue control. Both first and second year plants are susceptible to Escort® at 0.5 to 1 ounce / acre. First year plants are susceptible to 2,4-D, so houndstongue applications could be made concurrent with maintenance spraying on spotted knapweed. However, for effective houndstongue control using 2,4-D, annual applications should be made for at least 2 or 3 years. Best timing is early summer. Seed production of single plants and small clusters can be reduced by cutting the root as far below the crown as possible. This should be done by early July or before. However, regrowth of houndstongue from deep rootstocks and subsequent seed production will not be completely eliminated. Seedtops (July and later) should be bagged for removal and burning.

4. Contain Canada thistle and musk thistle by herbicide treatment and encouragement of biocontrol insect populations.

Biological control: Biological control options for thistle species are limited. The thistle head weevil (*Rhinocyllus conicus*) prefers the bracts of musk thistle for egg laying, but will also attack other thistle species including Canada thistle. The larvae infest the seed head or stem from early June to fall, and their feeding stimulates the plant to concentrate nutrients and tissue in the affected area. The weevil overwinters in the adult stage in sheltered locations such as caves or the hollows of trees. Because the weevil attacks seed-producing tissue, it can be very effective on musk thistle which reproduces entirely by seed. The weevil is well-established in NW states including Montana. Its presence at the Willow Creek Reservoir site should be verified. If transfer to the site is necessary, large numbers can be collected during May and June from almost any established location. Collections should be made as the weevils gather on plants in the spring and begin to mate (May through June). Adults are dislodged onto a tarp, table top or plastic bag for sorting. The weevils can then be stored or shipped for up to a week, if kept at 46 to 54° F. They can be stored or shipped in cardboard cartons with musk thistle leaves as food.

Herbicide control: The 2,4-D prescription for spotted knapweed will also suppress thistle species.

D. Monitoring

Maintain observational records of the extent of weed infestations at the site. Inspect for new weeds. Update biennially. Re-map target noxious weeds in 2002.

E. Needs

1. Short and long term needs
   a. Personnel - licensed herbicide applicator, ½ person-day / year; ½ person-day / year for hand digging; ½ person-day, biennially, for vegetation response monitoring and new weeds inspection
   b. Equipment - backpack or truck/ATV-mounted hand spraying equipment; hand digging tools
   c. Chemicals - 2,4-D amine labeled for use near water (e.g., Weed Pro®, Cornbelt Chemical Co.); Escort® herbicide (DuPont)
   d. Biological control agents - thistle head weevil (*Rhinocyllus conicus*)
   e. Seeds - none
2. Yearly procurement plan - verification of *Rhinocyllus* presence at the site, or transfer from established sites as described in section II.C.3.

III. Budget

SITE: Willow Creek Reservoir				
		Years 1 - 2	Years 3 - 6	**6-Yr Total**
Cultural / mechanical controls				
	Hand pulling	$67.20	$134.40	$201.60
	{Labor = $7 / hr + 20% benefits -			
	One person can pull weeds from about			
	1/10 to 1/5 acre / day depending on the			
	infestation and site conditions}			
Herbicide application				
	helicopter @ $7 / acre			$0.00
	truck / ATV broadcast @ $25 / acre			$0.00
	truck broadcast:			
	1 x 11' swath @ $32.50 / mile			$0.00
	2 x 11' swath @ $65.00 / mile			$0.00
	truck / ATV handgun @ $45 / hr	$360.00	$720.00	$1,080.00
	backpack spot spraying @ $45 / hr			$0.00
Herbicide costs				
	Krenite S @ $54 / gal			$0.00
	Rodeo @ $100 / gal			$0.00
	Tordon 22K @ $71 / gal			$0.00
	Transline @ $270 / gal			$0.00
	2,4-D amine @ $11 / gal	$55.00	$110.00	$165.00
	Escort @ $19 / oz	$38.00	$76.00	$114.00
Insects				
	purchase or collection costs			$0.00
	establishment costs (labor and materials)	$100.00		$100.00
	redistribution costs			$0.00
Seeding and revegetation costs				
	seed costs per acre			$0.00
	application cost per acre			$0.00
Education and awareness signing				$0.00
Vegetation and weed response monitoring				
	Labor @ $10 / hr + 20% benefits	$48.00	$96.00	$144.00
	Supplies			$0.00
	Total Estimated Costs	$668.20	$1,136.40	$1,804.60

STATE WATER PROJECTS BUREAU SPECIFIC PLAN OF OPERATIONS FOR NOXIOUS WEED MANAGEMENT:
Yellow Water Reservoir, Petroleum County

I. Situation statement

A. Description of State Water Project Bureau managed lands

1. Major features and location

Yellow Water Reservoir is situated about 10 miles SW of Winnett at 3120 feet elevation (T13N R25E portions of sections 1,12 and T13N R26E portions of 6,7). It is fed by Yellow Water and Spring Creeks with the dam at its E end flooding approximately 473 acres.

2. Land ownership patterns of agency and general statement of accessibility - See Water Project Bureau land ownership map.

The flooded acres and adjacent land include portions of the War Horse National Wildlife Refuge. Water Project Bureau land consists of flooded acres and immediate shoreline exclusive of the War Horse portion.

3. Delineation of current use zones

water resource zone: high pool to low pool
maintenance zone: dam with access road entering from the north
recreation zone: poor condition roads and undeveloped campsites around entire shore of E half, boat launching area at N end of dam
grazing zone: shoreline and surrounding area
natural areas zone: overlapping the grazing and water resource zones, NWR land delineated on map

4. Soil types

Mostly silty clays - major series include: Nobe-Absher silty clays, Neldore silty clay, Weingart silty clay loam, Gerdrum silty clay, Creed silty clay, Vanda silty clay, Zato-Orinoco silty clay loams, and areas of rock outcrop. Soils are mostly deep and well-drained with slow to very slow permeability.

B. Statement of the weed problem

1. Current list of state and county noxious weeds

State noxious species (Table 1)

Petroleum County designated noxious weeds:

None

2. General distribution patterns of noxious species at the site

Only a few plants of Canada thistle were found at the site - along the S shore and near the boat launch area at the N end of the dam.

3. Identification of problem areas (e.g. drainages, gravel pits, roads, campsites)

There is heavy vehicular and recreational impact around the entire E half of the reservoir including numerous undeveloped roads and campsites.

II. Plan of work

A. Vegetation management goals

1. Short term goals (1 - 2 years) - County Weed Board

Contain or suppress Category I noxious weeds.

2. Short term goals - Water Bureau

Concurrent with Petroleum County goals.

3. Long term goals (2- 6 years) - County Weed Board

Prevent the establishment of new noxious weeds. Provide ground cover allowing intensive recreational use.

4. Long term goals - Water Bureau

Concurrent with Petroleum County goals.

B. Weed management priorities

1. Terrain / access

Terrain is gentle with good access by vehicle around most of the shore.

2. Environmental concerns

Surface water.

3. Target noxious weeds identified at the site

Category I
Canada thistle (CIRAR)

4. Management objectives by species / zone

Species	**Water resource zone**	**Maintenance zone**	**Recreation zone**	**Grazing zone**	**Natural areas zone**
CIRAR	NA	contain	contain	contain	contain

NA - not applicable - the weed species was not observed in this zone and is not expected to be an immediate threat in this zone

C. Implementation (management prescription)

1. Monitor the Canada thistle infestation and contain it by hand digging or herbicide spot spraying if it appears to be spreading. Digging once or twice per month is required to deplete root reserves. A 2,4-D amine labeled for use near water can be applied at 2 lb/acre for spot treatments. Apply in the spring while Canada thistle is in vegetative growth stage.

2. Consider developing a transportation plan that would allow intesive recreational use while minimizing ground disturbance around the site.

D. Monitoring

Maintain observational records of the extent of Canada thistle infestation. Inspect for new weeds. Update biennially.

E. Needs

1. Short and long term needs
   a. Personnel - 1 person-day biennially for inspection and herbicide spot spraying (6 to 8 person days / year if hand digging)
   b. Equipment - hand digging tools and spot spraying equipment, if necessary
   c. Chemicals - 2,4-D amine labeled for use near water (such as Weed Pro®, Cornbelt Chemical Co.), if necessary
   d. Biological control agents - none
   e. Seeds - none
2. Yearly procurement plan - NA

III. Budget

SITE: Yellowwater Reservoir				
		Years 1 - 2	Years 3 - 6	**6-Yr Total**
Cultural / mechanical controls				
	Hand pulling			$0.00
	{Labor = $7 / hr + 20% benefits -			
	One person can pull weeds from about			
	1/10 to 1/5 acre / day depending on the			
	infestation and site conditions}			
Herbicide application				
	helicopter @ $7 / acre			$0.00
	truck / ATV broadcast @ $25 / acre			$0.00
	truck broadcast:			
	1 x 11' swath @ $32.50 / mile			$0.00
	2 x 11' swath @ $65.00 / mile			$0.00
	truck / ATV handgun @ $45 / hr			$0.00
	backpack spot spraying @ $45 / hr			$0.00
Herbicide costs				
	Transline @ $270 / gal			$0.00
	2,4-D amine @ $11 /gal			$0.00
Insects				
	purchase or collection costs			$0.00
	establishment costs (labor and materials)			$0.00
	redistribution costs			$0.00
Seeding and revegetation costs				
	seed costs per acre			$0.00
	application cost per acre			$0.00
Education and awareness signing				$0.00
Vegetation and weed response monitoring				
	Labor @ $10 / hr + 20% benefits	$48.00	$96.00	$144.00
	Supplies	$25.00	$25.00	$50.00
	Total Estimated Costs	$73.00	$121.00	$194.00