

Preserve Design for the Nokomis Fritillary butterfly  
Colonies, Unaweep Canyon, Mesa County, Colorado.

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Table of Contents

	Page
1.0 Introduction	1
2.0 Directions and Site Descriptions	2
3.0 Ecological Significance	5
4.0 Ecological Boundaries	8
5.0 Ecological Composition and Condition	9
6.0 Current Land Use and Management	14
7.0 Viability and Defensibility	15
7.1 Nokomis fritillary	15
7.2 Special Concern Plant Communities	17
7.3 Special Concern Plant Species	17
8.0 Ecological Summary	18
9.0 Stewardship Needs	19
10.1 Unawep Seep Research Natural Area	20
10.2 Private Lands	24
10.3 Action Plan	25
10.0 Landowner Contacts	26
11.0 Literature Cited	27

## List of Tables and Figures

Tables	Page
Table 1. Element Summary, UnawEEP Canyon.	7
Table 2. Land Cover Types in the UnawEEP Canyon Study Area.	10
Table 3. Estimated area (acres) of land cover types within UnawEEP Canyon Nokomis Fritillary colonies.	13

Figures	
Figure 1. UnawEEP Canyon S. nokomis Colonies and Land Ownership	3

## 1.0 Introduction

The UnawEEP Seep is a 36 acre spring-fed hillside and riparian wetland adjacent to West Creek, a perennial stream that drains portions of the granite-walled UnawEEP Canyon. The UnawEEP Canyon cuts across the axis of the Uncompahgre Plateau in western Mesa County, Colorado at elevations between 4500 and 7500 feet in elevation (Map 1). The vegetation communities surrounding the UnawEEP Seep wetland include pinyon/juniper woodlands on south-facing slope exposures, and a mixed mountain shrub (Gambel oak, mountain mahogany, big sagebrush) on north-facing slopes. Approximately two-thirds of the wetland is on public land, administered by the Bureau of Land Management. The remaining wetland area is owned by the Casto family, cattle ranchers who reside in UnawEEP Canyon.

The UnawEEP Seep is inhabited by the Nokomis fritillary butterfly (Speyeria nokomis nokomis: Nymphalidae), a rare species that is restricted to low elevation wetlands at scattered locations along the western boundary of the Colorado Plateau. After discovery of this species in the UnawEEP Seep in 1965 by Scott Ellis, inventory studies on the plant and animals (Ellis et al 1979), and a quantitative Nokomis fritillary population and habitat study (Arnold 1979) were completed. Additional information on site soils, hydrology, land use, fauna, and flora were presented in the Habitat Management Plan (BLM 1983).

In 1982, the Colorado Natural Areas Program registered the 55 acre public land portion as a Colorado Natural Area. In 1983, the Bureau of Land Management, in cooperation with the Colorado Natural Areas Program, designated the UnawEEP Seep as a Research Natural Area.

The BLM Habitat Management Plan provides:

- o Management objectives for butterfly, big game, small mammal, herpetile, bird, and fish habitat.
- o Management constraints and recommendations with respect to existing uses and resources.
- o Planned actions for inventory and site management.

After the designation of the Research Natural Area, Richard Klopshinske of Olathe, Colorado, found an additional Nokomis fritillary population on West Creek approximately 5 miles upstream from the UnawEEP Seep (the Robert Massey site in this report). This discovery indicated that better

information on the distribution and abundance of this species in Unaweep Canyon was warranted.

In 1989, the Nature Conservancy entered into an agreement with the BLM to fund a study to meet the following objectives:

1) Assess and compare adjacent and nearby private parcels to the Unaweep Seep Research Natural Area for ecological significance.

2) Describe and map ecologically significant elements (plant communities, rare species occurrences, habitat for the Nokomis fritillary).

3) Make recommendations for the most critical parcels to be protected.

4) Provide input for update of the existing management plan.

The following sections provide a summary of the information obtained from 1989 field surveys, and management recommendations.

## 2.0 Directions and Site Descriptions

Additional Nokomis fritillary colonies were discovered upstream from the Unaweep Seep as a result of the 1989 survey. Because it is likely that there is interchange of individuals among these various colonies, the scope of the Preserve Design addresses the characteristics and existing management of the individual colonies, as well as a composite assessment which assumes that the individual colonies represent subpopulations of the overall "West Creek" population. The individual upstream colonies are named by owner. Figure 1 provides an overview of Nokomis fritillary colony locations, and land ownership.

A base USGS 1:24,000 map illustrating the road system and topography (Map 2A, 2B); land cover overlays illustrating Nokomis fritillary habitats and adjacent vegetation communities; land ownership overlays; and ecological boundary overlays are included in the Map Appendix. Five individual fritillary colony maps at a scale of approximately 1:12,000 (Maps 3 through 6) are also included in the Map Appendix. These maps should be used in conjunction with the verbal descriptions provided below to locate these sites.

Unawep Seep (Public and private ownership). Drive along Colorado State Highway 141 for 9 miles east of Gateway, Colorado, to the highway bridge across West Creek. Parking is available on the east side of the bridge. The site is easily seen from the highway. The Unawep Seep is a hillside wetland consisting of a mosaic of cottonwood woodlands, wet meadows, and tall shrub communities that form a strip along the steep south facing slope just north of West Creek. The wetland boundaries contrasts distinctly with the adjacent pinyon-juniper woodland community. This site extends approximately 0.3 mile downstream, and 0.1 miles upstream from the bridge.

Nelson site (private ownership). Drive along Colorado State Highway 141 for 11.5 miles east of Gateway. This site cannot be easily seen from the highway because the highway is approximately 0.5 miles from the creek at this point. Turn right (south) into the farmstead access road at the Nelson mailbox located on the north side of the highway. The gate across the access road is locked (owner permission required). Drive 0.2 miles south to the farmhouse next to West Creek. Downstream from the Nelson farmyard, the Nokomis fritillary colony is located in a series of sedge-dominated meadows embedded in irrigated cattle pasture. These spring meadows are located adjacent to West Creek on the north side. The western boundary of the colony (0.4 miles downstream) is a stand of cottonwoods where the spring meadows end. Upstream from the Nelson farmyard, the Nokomis colony is located adjacent to West Creek in an area where beavers are actively damming the stream, and old beaver ponds are present. This area consists of a mosaic of sandbar willow thickets, and small sedge meadows. The colony ends 0.3 miles upstream from the farmyard where the streamside meadows end.

Beeman Casto Site (private ownership). Drive along Colorado State Highway 141 for 12.4 miles east of Gateway. This site cannot be seen from the highway. Turn right (south) at the Beeman Casto mailbox onto the farmstead road. Drive 0.2 miles south to the Casto farmyard. Walk approximately 0.6 mi. downstream through hayfields on the north side of the stream. The site consists of two old beaver ponds on the south side of West Creek that have been breached, and are now dominated by sedges and sandbar willow. These ponds are fed by spring line that emerges along the south bank of West Creek.

Robert Massey site (private ownership). Drive along Colorado State Highway for 13.0 miles east of Gateway. This site is located along West Creek at a point where the highway bends around a steep sideslope, and West Creek is located just below the roadcut. The site, which can be easily viewed

from a pulloff on the south side of the highway bend, consists of a heavily grazed circular wet meadow dominated by sedges and sandbar willows. The meadow is bounded on the south by a Gambel oak stand. The site can be reached by driving east 0.2 miles from the highway bend, then turning right (south) at the Massey mailbox onto the farmstead access road. Drive approximately 0.1 mi. and park. Walk downstream to meadow across dry pasture.

James Massey site (private ownership). Drive along Colorado State Highway 141 for 13.6 miles east of Gateway. This site is located along the south side of West Creek opposite James Massey's house. The site consists of sedge wet meadows mixed with sandbar willow thickets, and an old beaver pond. The site is easily viewed from Highway 141. To reach the site, park in the Massey house yard, and walk across West Creek.

Lloyd Casto site (private ownership). Drive along Highway 141 for 17.1 miles east of Gateway. This site consists of a streamside sedge meadow embedded within an irrigated hay meadow, and a streamside willow and sedge hillside seep on the south side of West Creek opposite a rock outcrop, and a sharp highway road bend (Figure 2-1). This site was not directly investigated, but observations from the highway indicated that these wetlands appear suitable for the Nokomis fritillary.

### 3.0 Ecological Significance

The springfed wetland communities discussed in this report are ecologically significant because they are 1) a very uncommon wetland type in this arid region; 2) these communities are floristically and faunistically diverse; 3) these communities support obligate wetland plant and animal species with extremely localized and disjunct distributions. Because these types of communities are very valuable as livestock grazing areas, and as sources of water, many of these sites have been substantially altered by man's activities, or have declined as the result of climatic change.

Description of lowland wetland plant communities, and a ranking of these communities in terms of rarity of occurrence in Colorado is in its preliminary stages (Colorado Natural Areas Program 1986). Baker (1983, 1984a, 1984b) provided a summary of the described plant associations by a variety of authors in Colorado and surrounding states. Based on these sources, two of the wetland associations present in the

Unaweep Canyon have been identified as special concern communities because of their relative rarity, and because the composition of these communities has commonly been altered by livestock grazing. I have made a preliminary evaluation of the state and global rarity of these plant associations, based on my field experience in western Colorado, Utah, and Wyoming. These communities are included in the Element Summary Table (Table 1), and have been included on element occurrence records in Appendix A.

These wetland communities contain several plant species characteristic of midwestern mesic prairies and wetlands. These species also occur in portions of southern Utah and the southern Great Basin, suggesting that there may have been an influx of Great Plains species within recent geologic time (Cronquist et al 1977). The primary examples of these plains species in the Unaweep Seep Research Natural Area are joe pye weed Eupatorium maculatum, switchgrass Panicum virgatum, and Indian grass Sorghastrum nutans. Weber (1987) notes only one occurrence of Eupatorium maculatum on the Western Slope; he records one other occurrence of Panicum virgatum (Escalante Canyon, on the east side of the Uncompahgre Plateau); and does not include Sorghastrum nutans in this flora. Weber (1987) also records an occurrence of Boulder raspberry Oreobatus deliciosus in Unaweep Canyon, the only western slope station known for this species, which represents an eastern slope Front Range element.

The Unaweep Seep also supports several species characteristic of montane to subalpine wetlands and meadows. These include brown eyed susan Rudbeckia hirta, St. Johnswort Hypericum formosum, and ladies tresses Spiranthes romanzoffiana.

According to Weber (1987) the only known population of the grass Dichanthelium acuminatum var. fasciculatum on the Western Slope is found in the Unaweep Seep. I have added this species to Table 1 as a candidate Colorado S1 species, pending additional information on its distribution.

The helleborine orchid Epipactis gigantea (Colorado Natural Areas Program Special Concern List 2) is abundant throughout the Unaweep Seep Research Natural Area, and appears to represent the largest known population of this species in Colorado. Seven populations of this species are presently known from Colorado (Napp 1989); this orchid is more common in adjacent Utah.

The bog orchid Limnorchis ensifolia (Platanthera sparsiflora) (Colorado Natural Areas Program Special Concern List 2) was found in small patches in three different sites (Unaweep Seep, Nelson site, R. Massey site). This species is



Table 1. Element Summary, Unaweep Canyon

Element Name	Total Range	Distribution Pattern	Estimated EO's	Known EO's	# Protected EO's	Fed. Status	State Status	Occurrence Within Study Area <sup>1</sup>	Rank
Spikerush/helleborine orchid Association (Eleocharis palustris/Epipactis gigantea)	West. Colo., E. Utah	Endemic, in natural springs	5-10	2	1	NA	NA	1	G2
Sedge/alder spring meadow (Carex vesicaria, Carex nebrascensis, Alnus tenuifolia)	West Colo., E. Utah	Dolores, Gunnison River Systems in conjunction with natural springs (few in good condition)	10 -20	1	0	NA	NA	2	GU
Other associates: Eupatorium maculatum Limnorchis ensifolia Cornus stolonifera Viola sororia									
Limnorchis ensifolia (Platanthera sparsiflora)	Colo., Utah, AZ, NV	Regional endemic	50 - 100	50	0	NA	S3	1,2,4	G3
Epipactis gigantea	Colo. Utah, AZ, NM	Regional Endemic	50 - 100	30	5	NA	S2	1	G3
Dichanthelium acuminatum var. fasciculatum	Colo., Utah, Wyo.	Regional endemic	50-100	UNK.	1	NA	S1 <sup>2</sup>	1	G4, GU
Nokomis fritillary (Speyeria nokomis nokomis)	Utah, CO, NM	Regional Endemic	10-20 (this ssp)	10	1	C2	S2	1,2,3,4,5	G2, S2

<sup>1</sup> 1 = Unaweep Seep; 2 = Nelson Site; 3 = Casto Site; 4 = R. Massey Site; 5 = J, Massey Site

<sup>2</sup> Status proposed in this report.

presently known from 11 Colorado populations (Napp 1989), and is also found in Utah, Arizona, and Nevada (Jennings 1989). Jennings has resurrected the Rydberg name ensifolia to represent the Colorado Plateau and Great Basin populations that were previously referable to sparsiflora.

The best known inhabitant of the Unaweep Seep and other wetlands upstream is the Nokomis fritillary butterfly Speyeria nokomis nokomis (Federal Candidate Category 2). Ferris and Fisher (1971) limit the distribution of this subspecies to western Colorado and eastern Utah (Uintah Basin near Vernal). These authors note that individuals from southwest Utah colonies (Virgin River near Zion National Park) share phenotypic characteristics of both S. n. nokomis and S. n. apacheana, the Great Basin subspecies. A colony of S. nokomis discovered in the Lukachukai Mountains in San Juan County, New Mexico by James Scott is probably referable to Speyeria nokomis nokomis.

Speyeria nokomis nokomis has been documented in 4 locations in Colorado (near Ouray: Ouray County; near Paradox: Montrose County; and the Animas and Florida Rivers near Durango: La Plata County). The condition of all these populations has not been recently been verified. However, when I examined the Animas River site in 1986, the area had been severely disturbed by a gravel mining operation. The Ouray site was examined in September 1989, and was found to be abusively overgrazed, and most of the willow thickets stripped by year round horse grazing. Additional potential habitat may be present for the fritillary along Dallas Creek. I have not examined the Paradox site since the late 1960's, and have never seen the reported Florida River population.

Based on the new information collected as part of this survey, the Unaweep Canyon population is probably the largest and most secure population of this species in Colorado, and is probably second in size to the largest known S. nokomis nokomis colony located along Ashley Creek, north of Vernal, Uintah County, Utah.

#### 4.0 Ecological Boundaries

Two ecological boundaries have been defined for the Nokomis fritillary. The first boundary, called the colony boundary, encompasses the zone where nokomis males have been observed to actively patrol for emerging females. The second boundary, called a habitat continuity boundary, encompasses the West Creek riparian zone, which is defined as vegetation that is maintained by surface or ground water along the streambed. These boundaries are illustrated on the 1:24,000 ecological boundary overlays to Maps 2A and 2B. Although not yet proven, it is assumed that butterfly individuals of

both sexes traverse up and down this riparian corridor in search of nectar, and likely exchange individuals among colonies along this corridor. Pasturelands adjacent to the stream are not considered habitat discontinuities because they are structurally similar to wet meadows; however, males do not patrol in tame grass meadows.

The ecological boundaries for rare plants contained in the Unawep Seep (Map 3: Overlays 3 and 4) are hydrologically defined. The upper boundary is the hillside spring line; the lower boundary is the West Creek channel.

An important non-ecological boundary is the recharge zone for each spring meadow that supports a Nokomis fritillary population. Available studies on the groundwater hydrology of the Unawep Canyon have not been investigated. For purposes of this study, the hydrologic boundary is considered to be the alluvial fan material that lies upslope from the individual springs. A general representation of these potential recharge areas is presented on Map 1: Overlay 1. The groundwater contact point with the soil surface and flow direction is illustrated on the individual fritillary colony maps.

## 5.0 Ecological Composition and Condition

Table 2 provides a description of each community type mapped at a scale of 1:24,000 (Map 2A and 2B: Overlay 2). Table 3 provides a summary of the relative area that each type occupies within the primary Nokomis fritillary colony boundary. The critical Nokomis fritillary habitat components in each of the colonies is the area of wet meadow, and sandbar willow types, which generally support the greatest the number of foodplant violets, and provide the primary male activity areas.

All sites receive at least seasonal livestock grazing. The wet meadow sites show the least vegetation composition change from long term grazing; the herbaceous understory of the drier community types (Gambel oak, cottonwood woodland) have been extensively modified, consisting of grazing tolerant exotic grasses such as Kentucky bluegrass Poa pratensis, and annual grasses and herbs adapted to disturbance (cheatgrass Bromus tectorum, and pigweeds Chenopodium sp.). Species lists for the Unawep Seep and the Robert Massey property are presented by community type in Appendix A-1, and A-2. The species composition of the other upstream sites are very similar to that of the Robert Massey site.

Table 2. Land Cover Types in the Unaweep Canyon Study Area

Map Unit	Description
BS	<u>Big Sagebrush Shrubland.</u> This type occurs on gently sloping uplands on streamside benches and broad alluvial fans, and is dominated by big sagebrush ( <i>Artemisia tridentata</i> ), green rabbitbrush ( <i>Chrysothamnus viscidiflorus</i> ), and grasses ( <i>Poa</i> , <i>Stipa</i> ).
CW	<u>Cottonwood Woodland.</u> This type occurs along the West Creek stream drainage, and consists of narrow leaf cottonwood ( <i>Populus angustifolia</i> ), Fremont cottonwood ( <i>Populus fremontii</i> ) and box elder ( <i>Acer negundo</i> ) trees, and understory shrubs such as red-stem dogwood ( <i>Cornus stolonifera</i> ), hawthorn ( <i>Crataegus erythropoda</i> ), and chokecherry ( <i>Prunus virginiana</i> ). The herbaceous layer consists largely of introduced species such as Kentucky bluegrass ( <i>Poa pratensis</i> ), and clover ( <i>Trifolium repens</i> , <i>Trifolium pratense</i> ).
D	<u>Disturbed.</u> Areas where vegetation has been removed. These areas include roadside borrow areas, and a sawmill.
DP	<u>Dry Pasture.</u> Areas that have been cleared of native vegetation, but do not receive irrigation water. Species generally consist of non-native grasses, and introduced broad-leaved species.
GO	<u>Gambel Oak Woodland.</u> This type occurs along stream drainages, and consists of tall oak shrub thickets with a sparsely vegetated, open understory. These oak stands are commonly used as livestock resting areas, and vegetation composition consists largely of Kentucky bluegrass, and annual broadleaf species such as pigweeds ( <i>Chenopodium</i> ).
HWY	<u>Highway.</u> The Highway 141 roadbed and associated roadcuts.
H	<u>Farmstead.</u> The farmhouse, farmyard, outbuildings, and farmstead access road.

Table 2. (Continued)

- IH            Irrigated Hay. Areas that are irrigated from gravity flow irrigation ditches along West Creek. Hay crops include native hay (mostly Carex), and non-native species such as alfalfa, red clover, and tame grasses. Livestock are allowed to forage in these areas only during the fall and winter.
- IP            Irrigated Pasture. Areas that are irrigated from gravity flow irrigation ditches along West Creek that are grazed by cattle on a seasonal or year-round basis. Included within this type areas where willows have been removed along the stream channel, and have been replaced by tame pasture grasses. Species composition consists primarily of rhizomatous pasture grasses such as Kentucky bluegrass, and smooth brome.
- MS            Mixed Shrubland. Upland shrub communities that occupy steep sideslopes and alluvial fans. Species composition varies with slope aspect. On south-facing slopes, mountain mahogany (Cercocarpus montanus, C. ledifolius), fendlerbush (Fendlera rupicola), and big sagebrush are common components; on north-facing slopes Gambel oak, and serviceberry (Amelanchier alnifolia) are predominant.
- PJ            Pinyon-juniper. Upland small tree community that occupies steep, generally south-facing sideslopes on shallow soils. Pinyon pine (Pinus edulis) and Utah juniper (Juniperus osteosperma) dominate the cover type; shrub and herbaceous species provide sparse understory cover.
- SM            Spring Meadow. Herbaceous wetland dominated by rhizomatous sedges, and spikerushes. This type also includes small cattail (Typha latifolia) marshes. The Unweep Seep is a hillside spike-rush (Eleocharis palustris) dominated system; the remaining meadows are sedge-dominated (Carex vesicaria, C. nebraskensis) sites located on gently sloping areas next to West Creek. Perennial springs provide subsurface and surface flows in all of these map units.

SW

Sandbar Willow Shrubland. Shrubland that occupies streambanks of West Creek, and margins of spring meadows. This type is dominated by sandbar willow (*Salix exigua*). The herbaceous understory ranges from native sedges (*Carex vesicaria*) on wetter sites, to introduced grasses and herbs (eg. clover, (*Trifolium*), plantain (*Plantago major*), and burdock (*Arctium minus*)) on drier streambanks that are intensively grazed by livestock.

Table 3. Estimated area (acres) of land cover types within Unaweep Canyon Fritillary colonies.

Site	Total Colony Area	<sup>1</sup> SM	SW	CW	DP	IH	MS
Unaweep Seep (Public)	8.8	2.0	1.5	3.5			1.8
(Private)	4.0	1.5		2.5			
A. Nelson	18.0	10.0	1.5	3.5	2.5	0.5	
B. Casto	3.0	1.0	2.0				
R. Massey	5.0	2.5	2.5				
J. Massey	8.0	2.5	5.5				

1 SM = Spring Meadow; SW = Sandbar willow; CW = Cottonwood Woodland; DP = Dry Pasture; IH = Irrigated Hay; MS = Mixed Shrubland

## 6.0 Current Land Use and Management

There are no existing buildings or structures within the Nokomis fritillary colony boundary on any of the sites investigated on this survey (see Maps 2A and 2B: Overlays 2 and 3). A presently unoccupied farmhouse and outbuildings on the Nelson property, and the Beeman Casto farmhouse are located within the colony continuity corridor illustrated on Map 2D. These structures were likely constructed in the early 1900's, and represent a long term influence along West Creek.

Livestock graze on a year-round basis on the Robert and James Massey sites, and on the majority of the Nelson site. No summer cattle grazing was observed in the Casto site, but heavy fall, winter, and spring are indicated by the browsed condition of sandbar willows. The Unawep Seep is located within the North Creek Grazing Allotment (4,155 public and 320 private acres), where the permittee is qualified to use 55 Animal Unit Months (AUMs). The grazing periods are April 1 to May 15, and December 1 to January 15 (70 cows in the spring, 77 cows in the fall, at 25 percent public land use) (BLM 1983).

Nearly all streamside areas dominated by sandbar willow Salix exigua showed evidence of periodic burning. Discussions with Robert Massey indicated that ranchers burn willows because cows readily browse the willow resprouts during the winter season, and burning opens up the herbaceous understory for grazing. Based on examination of several burned areas, alder Alnus tenuifolia, river birch Betula fontinalis, hawthorn Crataegus sp., and shiny willow Salix lucida appeared to be much less fire tolerant, and were generally found only in extremely wet areas where hot fires could not be maintained.

As noted previously, the understory of upland communities has been substantially altered by long term cattle grazing; wetland community (wet meadow) sites are dominated by native species. At least two adventive species, bull thistle Cirsium vulgare, and burdock Arctium minus, provide important nectar sources for the Nokomis fritillary within and near the wet meadow/sandbar willow activity areas. There is remarkably little invasion of noxious weeds along West Creek within the area surveyed. One stand of Canadian thistle Cirsium arvense was located between the James Massey and Robert Massey site within existing pastureland. Canadian thistle is well established along the banks of East Creek, approximately 10 miles to the east. There is apparently a small colony of leafy spurge Euphorbia esula upstream of the James Massey



site (John Anderson, personal communication). Canadian thistle is a very serious contaminant of a spike rush/helleborine orchid site in Delta County; this species will inevitably spread throughout the West Creek system. Aggressive adventive woody species (e.g. tamarisk Tamarix pentandra, and Russian olive Eleagnus angustifolia) were not observed. Noxious herbaceous weed invasion probably represents the most serious, and most intractable ecological threat to the maintenance of native plant species diversity within these wetlands.

## 7.0 Viability and Defensibility

### 7.1 Nokomis fritillary

1989 field surveys found viable populations of the Nokomis fritillary in 5 separate colonies ranging from 5 to approximately 20 acres in size. The Unawep Seep RNA population, known for approximately 25 years, appeared to be supporting a larger (order of magnitude) adult population of the butterfly than was found in 1979 (Arnold 1979, Arnold 1989). The Massey and Nelson colonies, although small, provided the highest instantaneous density of this species of any populations that I have examined in the western United States. For example, on the Nelson site, I saw more female nokomis butterflies in 2 hours than I had seen cumulatively in all populations up to that time. In summary, the individual populations appear to be viable, but are vulnerable because of small colony sizes.

Defensibility is considered here in terms of human access, and in terms of threats to existing colonies from changes in land use.

Butterfly collectors have collected many specimens from the public land portions of the Unawep Seep Research Natural Area over the past 20 years, particularly after the site was listed as "critical habitat" by the USFWS in a Federal Register notice. The general opinion in the butterfly collector grapevine is that the species is extinct at this site, and little effort has been expended by collectors to collect there in recent years. Present market values for this species are about \$20.00 for males, and \$40.00 for females. The site is difficult for collectors because of the dense shrub thickets, steep slopes, and slippery footing. It would be nearly impossible to increase the security of the site because it is remote, and collectors usually spend only a portion of a day at a given site.

The remaining sites are on private land. The Robert Massey site is somewhat vulnerable because the spring meadow harboring the butterfly is next to the road. However, any unauthorized person would be easily seen from the road.

My observations on the private lands suggest that ranchers use the spring meadows as seasonal or year round pasturelands, and have made little attempt to modify these meadows for other purposes. Most of the springs that support the nokomis meadows emerge next to or within a few hundred feet of the present stream channel; these springs emerge at elevations lower than the contours along which the surface water irrigation ditches flow. As a result, the springs don't offer much opportunity for diversion onto hayland downstream. One wet meadow is partially drained on the Nelson site by a drainage ditch that was dug many years ago. A possible purpose of this ditch was to provide better cattle access along West Creek by drying out the streambank.

Another factor that may have protected these areas from modification are the long term economics of cattle ranching in this area. The ranches that contain nokomis colonies are "home ranches" - the owner's long term residence, winter range for cattle, and the location where feed hay is grown from irrigated hay fields. Cattle are driven up to federal land summer range, and then brought down to the home ranch pastures, where the cattle graze on native forage, and on hay grown on the ranch during the snowy months. The spring meadows on these ranches may have remained intact because they are a useful component of these home ranches, and opportunities for alternative uses of the spring water are limited because of terrain, soil, and economic benefit limitations.

The fact that most of the hay used on these ranches is "home grown" may be a factor in the limited occurrence of noxious weeds. Imported hay is commonly a source of new weed infestations.

In summary, both the viability and defensibility of these nokomis butterfly colonies appear good in the short term. The defensibility of these sites could be changed radically if groundwater source development became an economical option. Such alternatives could include well systems upslope of the springs to support small pivot irrigation systems, and development of groundwater to support additional domestic uses. The risk of future agricultural development is considered low; the possibility of more residential development is more likely.

## 7.2 Special Concern Plant Communities

The spike rush/ helleborine orchid association at the Unawep Seep Natural Area receives (Map 3: Overlay 3) intensive seasonal grazing, and appears highly tolerant of this use. This community is often mechanically disturbed by cattle crossing the saturated soils, but rhizomatous character of both species maintains community integrity.

The sedge/Alder meadow association located on the Nelson site (Map 4: Overlay 2) consists of a very wet spring meadow formed below a streambank spring line. Although cattle apparently graze the site during the winter, there was little evidence of summer grazing, and much of the interior portion of the meadow was too wet for livestock access. A beaver dam that effectively impounds water is located adjacent to the community, which further reduces livestock access. Alders are mature, and some had been felled by beaver. Elsewhere in the West Creek drainage, alders have largely been removed by periodic sandbar willow burning. This site does not appear to have been recently burned. Under current conditions the site appears secure, but may receive additional disturbance from foraging beavers.

## 7.3 Special Concern Plant Species

As indicated above the helleborine orchid (Epipactis gigantea) is tolerant of seasonal cattle grazing. Bill Jennings, an orchid expert believes that the Unawep Seep population is the largest in Colorado, and probably consists of over a million individual stems. The species is widely distributed throughout both the spike rush meadows and adjacent willow thickets (See Map 3: Overlay 2).

Other plant species (Dichanthelium acuminatum var. fasciculatum, Sorghastrum nutans, Panicum virgatum, Limnorchis ensifolia) are confined to the spike rush meadows in the Unawep Seep (See Map 3: Overlay 4). All these species are somewhat rhizomatous, and form small patches at scattered locations throughout the spring meadows. The current grazing system in place on this site (spring and fall only) allows these warm season species (as well as many others) to flower and fruit without loss of seedheads to grazing. These grass species appear viable and secure at the present time, and should remain viable, assuming that the current seasonal livestock rotation is followed.

The bog orchid Limnorchis ensifolia is also found in the wet Carex meadow portion of the Carex/Alnus association site on the Nelson property (Map 4: Overlay 2); and in a very wet portion of the Robert Massey Nokomis fritillary site (Map 5: Overlay 1).

## 8.0 Ecological Summary

o The nokomis fritillary in the Unawep Canyon requires the following habitat factors. These factors are listed from the most to least limiting in the context of the Unawep Canyon site.

- Springs with abundant, and perennial flows. Every colony examined is supplied by a spring line which does not appear to be directly dependent on West Creek stream flows.

- Presence of the larval foodplant, Viola sororia ssp. affinis (nephrophylla). This plant grows most abundantly on the margins of spring meadows and under shrubs. Based on oviposition observations, violets preferred for egg-laying are commonly associated with moist, but slightly elevated sites (hummocks), and conjunction with hard surfaces (logs, willow stems).

- Availability of open sedge, or spike rush meadows and willow thickets where males patrol for emerging females.

- Adult nectar sources. Adult butterflies prefer blue and yellow-flowered composites (e.g. Eupatorium maculatum, Cirsium vulgare, Chrysothamnus nauseosus).

o The nokomis fritillary is coexisting with current livestock grazing practices. Evidence for co-existence is based on the following observations:

- The butterfly has persisted in areas heavily grazed for the past 100 years.

- The larval foodplant appears to be locally more abundant in grazed habitats, possibly because grazing reduces competition from other species, and violets readily regenerate under grazed conditions.

- The larval foodplant and the butterfly are able to survive, and may benefit, from periodic burning of sandbar willows along the West Creek channel. Cattle browse young

willow shoots, preventing the willows from forming dense, closed stands.

o The nokomis fritillary occurs in a series of small (5 - 20 acre) colonies that are centered around isolated spring fed meadows. Based on examination of the distribution of these colonies, and the composition of land cover types between colonies, it is assumed:

- There is exchange of individuals among colonies on a routine (1-5 year) basis. This assumption is based on the strong flying ability of adult butterflies, and the continuity of the riparian zone from colony to colony. Arnold's 1989 observations on the the two Massey sites, located approximately .75 miles from each other, indicated that 50 percent of the recaptured butterflies had moved from one colony to the other, a remarkably high interchange rate.

- Some of the individual colonies (R.Massey, J. Massey, and B. Casto sites) are at substantial risk from short term hydrologic alterations, such as flooding by beaver dams, stream flooding, and stream channel changes, and landslides (Unawep Seep). As a consequence, the maintenance of all colonies is important to buffer these local habitat disturbances. In other words, short term extinctions may be possible at any particular site, but recolonization maintains the overall population in the long term. Beaver represent a long term dyanamic factor in this system, both creating and destroying suitable nokomis habitat.

o The Unawep Seep RNA and the upstream nokomis colonies are dominated by different vegetation communities, which affect management goals. The Unawep Seep consists of several diverse, largely native plant communities with considerable structural diversity; the upstream sites are generally much less floristically diverse, and have been radically altered by livestock grazing toward non-native floristic dominance. As a consequence, it is assumed that the Unawep Seep should be managed for total species diversity; the upstream sites should be managed for the nokomis fritillary as the primary goal.

## 9.0 Stewardship Needs

The approach for defining the stewardship needs for the Unawep Canyon nokomis fritillary colonies is based on 1) defining the habitat requirements for the various diversity elements; 2) translating these habitat requirements into specific management objectives; and 3) defining management and stewardship actions that will accomplish these

objectives. The work of Arnold (1979), and the subsequent Habitat Management Plan prepared by the BLM (1983) provide an excellent existing framework. The purpose of the section is to: 1) consider the stewardship requirements for the 5 individual wetlands described previously, 2) examine the planned actions contained in the BLM Habitat Management Plan for the Unawep Seep Research Natural Area; and 3) make recommendations where additional measures appear appropriate, or where more information is needed.

The following sections address several habitat management issues. The Unawep Seep RNA is treated separately because a management plan has already been written for it, and it represents a unique problem because of mixed ownership. The format for discussing the existing HMP is to first list "Planned Actions", and then provide an evaluation, based on present knowledge, and personal opinion.

## 9.1 Unawep Seep Research Natural Area

1. Designate the Habitat Management Area as a "research natural area".

Evaluation: The Unawep Seep was designated as a Research Natural Area on May 26, 1983 (Federal Register 48 (103): 23716).

2. Secure water rights to the springs and feeder streams into West Creek that pass through the HMA.

Evaluation: A high priority activity. BLM filed for a conditional water right in 1983. In 1989, BLM refiled a modified application asking for absolute water rights. BLM expects to receive decrees within 1 year (Case No 83CW67) (Lambeth, 1989). The entire water rights situation on West Creek should be examined by a water attorney. The Nature Conservancy has an expert in this area; it would appear to be an important issue to determine the water right status of spring water flows into West Creek, since a significant portion of the base flow of West Creek appears to be contributed by springs. Another priority activity is an examination of the groundwater hydrology of the Canyon by a groundwater hydrologist to properly identify recharge areas for the springs.

3. Continue to seek acquisition of title or easement to the private portions of the Unawep Seep.

Evaluation: With the discovery of additional nokomis fritillary populations upstream, efforts to immediately acquire the private portion do not appear ecologically justified; there does not appear to be a significant degradation of the private portion of the habitat that would threaten the integrity of the entire habitat. The private portion does contain important occurrences of special plants, and a large fraction (about 40 percent) of the primary nokomis fritillary habitat. Based on the Defensibility/Viability discussion above, none of the featured elements appear to be at greater risk from current land management practices on the private portion as compared to the public portion. This is largely because BLM grazing policies control the use pattern of both the public and private lands.

In the longer term, it is recommended that acquisition of the private portion of the habitat continue to be pursued, or that stronger cooperative efforts with the landowner, Beeman Casto be attempted. The rationale for this recommendation is that public or Nature Conservancy ownership could offer greater management flexibility to manage for overall diversity of the site, and that potentially incompatible land uses could be precluded. It may be appropriate to approach the owner in the context of a cooperative management agreement; it also appears appropriate to approach the owner with a strong statement of interest in the event that he would be willing to sell this land in the future.

4. Control ORV use under regulations 43 CFR 8340.

Evaluation: The intent to control ORV use is appropriate; however, the level of threat to the habitat is low because of inaccessibility.

5. Collection of butterflies for sale or barter will be controlled through regulations contained in 43 CFR 8363.

Evaluation: There may be legal mechanisms to punish collectors; however, enforcement would be extremely difficult. BLM should elaborate how these regulations could be enforced. As noted under Defensibility above, publicly drawing attention to the location of rare butterflies with an established market value may cause further depredations.

6. Initiate study of seeps and springs in the HMA to identify water chemistry, temperatures, and flows.

Evaluation: Useful, but not critical. Low priority. Flow pattern appears to be dynamic, and could possibly be

analyzed with periodic aerial photography flights performed during winter when flowing water would contrast with colder, snow covered areas.

7. Adult nectar source (e.g. Joe pye weed) propagation study.

Evaluation: Adult nectar sources are probably not strongly population limiting. The wetland environment provides a long flowering season for these key nectar sources. As indicated previously, nokomis fritillary adults utilize a variety of fall flowering composites as nectar sources, and are mobile enough to find these alternate sources. Low priority, or delete.

8. Revise the North Creek Activity Management Plan after completion of the exclosure study.

Evaluation: BLM should evaluate. It is not clear what is required here.

9. Conduct a study of microhabitat and violet limiting factors.

Evaluation: High priority. 1989 studies indicate that violets appear to be much more abundant at the upstream colonies. A spring violet survey to compare with Dick Arnold's 1979 survey should be done to see if there are measurable changes since that time. Qualitatively, violets appear to be less abundant in the Unawep Seep than formerly.

Field observations in the upstream sites indicated that violets were often abundant growing adjacent to, or on fallen logs and limbs. The fallen logs also provide a measure of protection for nokomis larvae by reducing livestock trampling. It may be appropriate to consider a small experiment in which logs are imbedded in wet meadow or marsh areas intensively grazed by cattle to determine whether such microhabitat management might be useful.

10. Erect an exclosure to determine the influence of cattle grazing.

Evaluation: This exclosure was installed, and monitored by BLM. Qualitative evaluations of the exclosed area in 1989 indicated that shrubs and spike rush had increased in dominance at the expense of other herbaceous species, including violets. This exclosure was removed during the summer of 1989, and the enclosed vegetation will now be accessible to cattle.



It is recommended that BLM and the Nature Conservancy develop a joint study to study the effects of grazing in the formerly fenced area, and to study the effects of grazing on willow regeneration and spike rush growth generally throughout the Unawep Seep.

11. Conduct a trend study using the exclosure.

Evaluation: BLM has performed this trend study. Data from this study should be summarized by BLM to evaluate the needs of a future violet study.

12. Monitor the fritillary population annually.

Evaluation: BLM has performed this study, and should summarize available data. It is strongly recommended that this study be continued.

13. Contract a mark-recapture study similar to that done in 1979.

Evaluation: BLM has contracted this study with Dick Arnold, and results of the 1989 work will be forthcoming in the near future.

Other recommendations:

o The Unawep Seep contains a very diverse plant and animal assemblage. It would appear appropriate to focus management goals on the maintenance of overall species diversity within the site, and to manage against factors that reduce diversity. The most significant risk to plant species diversity is the invasion of noxious weeds. The baseline for plant species in the Seep is reasonably good; it is recommended that monitoring surveys be conducted at least every 2 years to document that existing plant diversity is being maintained, and that invasive species have not gained a foothold. It is also recommended that breeding bird surveys be performed at periodic intervals, since birds provide an index of structural diversity.

o A cooperative weed control plan should be developed in advance with the landowner so that effective action can be taken if new invasions are found.

o The Unawep Seep is the furthest downstream colony of the 5 known colonies. It may be useful to study the exchange rate of individuals between the Nelson Site and the Unawep Seep. This would require a simultaneous mark-recapture study at the 2 sites.

o New color infrared (CIR) aerial photographs should be taken of the Unawep Seep to document land cover changes since 1979. Since 1979, a fire burned a portion of the cottonwood stand on the east side; a recent landslide has modified a cottonwood stand and shrub communities; river birch shrubs appear to be a more dominant element in the seep meadows than they were in 1979. Examination of current photographs would provide an objective way to document changes, and justify management goals. Such a flight should be extended upstream to encompass the private land colonies available BLM 1:24,000 scale true color photographs are inadequate to examine small land cover details at a resolution of 1 acre or less.

## 9.2 Private Lands

In the short term, the primary stewardship goals for the private lands should be continued contact with landowners to insure that the owners have an appreciation for the butterflies, and the factors that allow the butterflies to survive (particularly the hydrologic factors). Explain to the owners that the survival of the butterfly depends upon them collectively such that the negative actions of one owner could have long term effects on other sites.

The long term goal is to develop cooperative agreements with all the upstream owners so that all populations have some measure of protection. Areas to be protected include all the primary core colony areas outlined on Table 3, and the riparian zone of West Creek for a distance of 0.10 miles on each side from the Unawep Seep eastward to the James Massey site. Future investigations may indicate that protection efforts should be extended upstream to the Lloyd Casto site, a distance of approximately 10 miles. The particular management issues on these sites include:

- o Protection of the recharge areas for the seep meadows.
- o Avoidance of direct modification of spring meadow (i.e. excavation of ditches and drains to channel flow, and dry up or modify the natural surface and subsurface spring water flow).
- o Avoidance of herbicides for willow control. Willows are so difficult to kill that herbicide concentrations necessary to kill them may be devastating to more sensitive species.
- o Periodic access to monitor butterfly populations.

o Consideration of microscale habitat management (e.g. protection of primary oviposition sites) that is compatible with current grazing practices. Examples could include placing limbs and tree trunks in violet meadows to provide more violet substrate and larval protection; surrounding the base of large shrub willow clumps with fencing to provide greater violet protection.

The potentially greatest risk to the butterfly populations would be a change of ownership in which the new owner radically changed the hydrologic system. If the existing owners decide to sell, it is important for them to understand that the Nature Conservancy could be a potential buyer.

### 9.3 Action Plan

The following are recommended actions to be accomplished in order of priority.

1. Nature Conservancy develop conservation agreements or management leases with willing private owners to provide appropriate protection for Nokomis fritillary colonies. Start with James and Robert Massey, followed by Nelson, and last, Beeman and Lloyd Casto. Time Frame: 1990 -1991.

2. Nature Conservancy/BLM initiate: 1) violet/ willow management study on Unawep Seep; 2) Nokomis fritillary adult colony interchange study. Time Frame: 1990 -1991.

3. Nature Conservancy/BLM develop offer for 80 acres of Beeman Casto property at Unawep Seep, depending upon outcome of No. 1 above. Time Frame: 1990 -1992.

4. Nature Conservancy examine other opportunities for land acquisition along West Creek as they become available.

## 10.0 Landowner Contacts

James E. Massey  
594 Serenade Drive  
Grand Junction, Colorado 80504  
(303) 434-8467

o Retired Union Carbide employee who worked at Carbide facilities throughout the western U.S., including Uravan and Rifle. Grew up in the farmhouse presently occupied by his brother, Robert Massey. James recently finished his retirement house next to Highway 141, which is adjacent to the Nokomis fritillary colony. Massey is presently teaching science at the Gateway School, and is interested in using his property for science education purposes. Mr. Massey is very interested in ornithology, and knows other local ornithologists well. His property will probably be included in the Colorado Bird Breeding Bird Atlas surveys.

Robert B. Massey  
29705 Highway 141  
Whitewater, CO 81527  
(303) 931-2892

o Unawep Canyon rancher whose winter pastures along West Creek contain a Nokomis fritillary colony. Mr. Massey has been visited by peregrine falcon researchers looking for nests on nearby canyon cliffs.

Alfred S. Nelson  
6145 Plymouth Street  
Downers Grove, Illinois 60516  
(312) 971-2491

o Absentee owner of large cattle ranch along West Creek. Vernon Moores family helps Nelson with haying and irrigating. Phone conversations indicate that Mr. Nelson visits his ranch frequently during the summer.

Beeman Casto  
Unawep Canyon  
Gateway, CO 81522  
(303) 931-2893

o Unawep Canyon rancher whose family has been ranching in this area for 2, and possibly 3 generations. Large land holdings along West Creek. Son Lloyd owns ranch upstream.

## 11.0 Literature Cited

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Appendix A-1. Additions to Unawep Seep plant species list.

*Ailanthus altissima*  
*Pentaptyloides floribunda*  
*Brickellia grandiflora*  
*Limnorchis ensifolia*  
*Leucanhemum vulgare*

Appendix A-2. Plant species occurrence, canopy cover, and sociability at the Robert Massey Nokomis Fritillary Colony.

Species	Vegetation Type			
	SW	GM	LGM	T
	<sup>2</sup> C/S	C/S	C/S	<sup>1</sup> C/S
<b>Shrubs</b>				
<i>Salix exigua</i>	5/ 5			
<i>Alnus tenuifolia</i>			+ /1	
<i>Chrysothamnus nauseosus</i>	+ / 1			
<i>Clematis ligusticifolia</i>	1/ 3			
<i>Rosa woodsii</i>	+ / 2			
<i>Toxicodendron radicans</i>	+ / 2			
<b>Grass/ Grass-like</b>				
<i>Agrostis stolonifera</i>	1/ 3	1/ 2	1/ 2	
<i>Carex vesicaria</i>	1/ 4	3/ 4	5/ 5	4/ 4
<i>Carex nebraskensis</i>	1/ 4	1/ 4	1/ 5	
<i>Eleocharis palustris</i>	1/ 4	3/ 4	2/ 5	2/ 5
<i>Equisetum arvense</i>	1/ 4		1/ 2	
<i>Juncus saximontanus</i>				+ / 2
<i>Juncus sp.</i>			1/ 2	
<i>Phragmites communis</i>	1/ 4			
<i>Poa pratensis</i>	1/ 2	1/ 2		
<i>Scirpus acutus</i>			+ / 2	
<i>Typha latifolia</i>				5/ 5
<b>Herbs</b>				
<i>Achillea millefolium</i>	+ / 1			
<i>Apocynum cannabinum</i>	1/ 3			
<i>Arctium minus</i>	1/ 2			
<i>Asclepias speciosa</i>	1/ 2			
<i>Aster laevis</i>	+ / 2		+ / 2	
<i>Castilleja minor</i>	1/ 1	1/ 1	1/ 1	
<i>Cicuta douglasii</i>		+ / 1	1/ 2	
<i>Cirsium vulgare</i>	+ / 2	+ / 2		
<i>Epilobium ciliatum</i>	+ / 1			
<i>Grindelia squarrosa</i>	+ / 1			
<i>Helenium autumnale</i>	+ / 1			
<i>Limnorchis ensifolia</i>			+ / 1,2	
<i>Lupinus argenteus</i>	+ / 2			
<i>Medicago lupulina</i>	2/ 4	2/ 4		
<i>Melilotus alba</i>	1/ 2			
<i>Mentha arvensis</i>	1/ 2	+ / 2	1/ 2	



Appendix A-2 (Continued)

Species	SW	GM	LGM	T
Monarda fistulosa	+ / 1			
Nasturtium officinale			1 / 5	1 / 5
Plantago major	2 / 3			
Polygonum coccinea	1 / 4	1 / 4	1 / 4	
Scutellaria galericulata			+ / 2	
Taraxacum officinale	1 / 2	1 / 2		
Trifolium pratense	2 / 4			
Trifolium repens	2 / 4	3 / 5		
Vicia americana	1 / 2			
Veronica catenata		1 / 2		
Viola sororia ssp. affinis (nephrophylla)	1 / 2	2 / 2	2 / 3	

1

Subtypes of the Spring Meadow type:

- o Sandbar Willow (SW) - Dense willow stands on streambanks, and margins of wet meadows.
- o Grazed Meadow (GM) - Wet meadow that is accessible to livestock, and closely cropped (.05 to .1m in height)
- o Lightly Grazed Meadow (LGM) - Wet meadow that is so wet that cattle graze the area only occasionally, and herbaceous vegetation grows to a height of .2 to 1 m.
- o Typha (T) - Area of standing water supporting cattail (Typha latifolia).

2

C = Cover:

- s solitary
- + several
- 1 less than 5%
- 2 5 - 25%
- 3 25 - 50%
- 4 50 - 75%
- 5 greater than 75%

S = Sociability

- 1 solitary
- 2 clumps
- 3 small patches
- 4 small colonies
- 5 large, dense stands

Appendix A-1. Additions to Unawep Seep plant species list.

*Ailanthus altissima*  
*Pentaphylloides floribunda*  
*Brickellia grandiflora*  
*Limnorchis ensifolia*  
*Leucanhemum vulgare*  
*Mahonia fendleri*

Scott Ellis plants from Unaweap Canyon

1

identified November 1989, by W. A. Weber

1. 89.02.1. *Dichantheium acuminatum* (Sw.) Frechm. var. *fasciculatum*
2. 2. *Brickellia grandiflora* (Hook.) Nutt.
3. 3. *Aster laevis* + *Dichantheium acuminatum*
4. 4. *Spiranthes romanzoffiana*
5. 5. *Pentaphylloides floribunda* (Pursh) Löve
6. 6. *Viola sororia* Willd.
7. 7. *Castilleja minor* A. Gray
- ✓ 8. 8. *Sorghastrum avenaceum* (Michx.) Nash
9. 9. *Cicuta douglasii* (DC.) C. & R.
- ✓ 10. 10. *Panicum virgatum* L.
- ✓ 11. 11. *Limnorchis ensifolia* Rydb.
12. 12. "
13. 13. "
14. 14. *Leucanhemum vulgare* Lamarck
15. 89.03.1. *Sidalcea candida* A. Gray
16. 2. *Mimulus guttatus* DC.
17. 3. *Salix lucida* Muhl.
18. 4. *Carex nebrascensis* Dewey
19. 5. *Persicaria pensylvanica* (L.) Gomez
20. 89.04.1. *Juncus saximontanus* A. Nels.
21. 2. *Epilobium ciliatum* Raf.
22. 3. *Limnorchis ensifolia* Rydb.
23. 4. *Veronica catenata* Pennell
24. 5. *Persicaria pensylvanica* (L.) Gomez
25. 6. *Juncus saximontanus* A. Nels.
26. 7. *Rorippa teres* (Michx.) Stuckey
27. 8. *Juncus saximontanus* A. Nels.
28. 9. *Scutellaria galericulata* L.
29. 10. *Mentha arvensis* L.
30. 11. *Eleocharis palustris* (L.) R. & S.
31. 12. *Juncus saximontanus* A. Nels.
32. 13. *Carex nebrascensis* Dewey
33. 14. *Agrostis exarata* Trin.
34. 15. *Carex vesicaria* L.
35. 16. *Carex nebrascensis* Dewey
36. 89.05.1. *Carex vesicaria* L.
- 37.
- 38.
- 39.
- 40.
- 41.
- 42.
- 43.
- 44.
- 45.
- 46.
- 47.
- 48.
- 49.
- 50.

## Localities

89.02 COLO. Mesa Co. West Creek, 8.5 road mi. NE of Gateway on Highway 141, Unaweep Seep Research Natural Area, Unaweep Canyon. 5800 ft. T15S, R103W, S10, NE 1/4. Eleocharis, Carex/ Salix exigua meadows and shrub thickets.

89.03 COLO. Mesa Co. West Creek, Unaweep Canyon. Nelson Ranch. 6400 ft. T15S, R103W, S1, SE 1/4. Carex wetland meadow.

89.04 COLO. Mesa Co. West Creek, Unaweep Canyon. R. Massey Ranch. 6480 ft. T15S, R102W, S8, NE 1/4. Carex/Salix exigua wetland.

89.05. COLO. MesaCo. West Creek, Unaweep Canyon. B. Casto Ranch. 6400 ft. T. 15S, R102W, S6, SW 1/4. Carex/ Salix exigua wetland.

Table 1.

List of plant species encountered on and adjacent to the Unaweep Canyon Springs, Mesa County, Colorado (courtesy of S. Ellis).

		HABITAT <sup>/1</sup>				ABUNDANCE <sup>/2</sup>
		WM	MM	DG	PJ	
ACERACEAE						
<i>Acer negundo</i> L.	box-elder	X				I
AMARANTHACEAE						
<i>Amaranthus retroflexus</i> L.	rough pigweed			X		I
ANACARDIACEAE						
<i>Rhus glabra</i> L.	smooth sumac		X			I
<i>Rhus trilobata</i> Nutt. ex. T.&G.	skunkbush sumac		X			C
<i>Toxicodendron rydbergii</i> (Small) Greene	poison ivy		X			C
APIACEAE						
<i>Angelica pinnata</i> S. Wats		X				
<i>Cicuta douglasii</i> (DC) J.M. Coult & Rose	Douglas waterhemlock	X				
APOCYANACEAE						
<i>Apocynum sibericum salignum</i> (Greene) Fernald	dogbane	X				I
ASPARAGACEAE						
<i>Asparagus officinalis</i> L.	asparagus	X				I
ASTERACEAE						
<i>Iva xanthifolia</i> Nutt.	false ragweed			X		C
<i>Arctium minus</i> (Hill) Bernh.	burdock			X		F
<i>Artemisia ludoviciana</i> Nutt.	Louisiana sagewort		X			F
<i>Artemisia tridentata</i> Nutt.	big sagebrush				X	C
<i>Aster lacris</i> L.						
<i>Aster rubrotinctus</i> Blake in Tide.	aster				X	I
<i>Chaenactis stevioides</i> Hook. and Arn.	false yarrow				X	I

Table 1. (Cont.) List of plant species encountered on and adjacent to the Unaweep Canyon Springs, Mesa County, Colorado.

		HABITAT <sup>/1</sup>				ABUNDANCE <sup>/2</sup>
		WM	MM	DG	PJ	
ASTERACEAE (cont.)						
<i>Chrysothamnus nauseosus</i> (Pallas) Britt. in Britt. & Brown	rubber rabbit- brush			X		I
<i>Cirsium neomexicanum</i> A. Gray	thistle		X			I
<i>Erigeron divergens</i> T.&G.	daisy				X	F
<i>Eupatorium maculatum</i> L.	thoroughwort	X				C
<i>Gaillardia pinnatifida</i> J. Torr.	blanketflower				X	R
<i>Grindelia squarrosa</i> (Pursh) Dunal	gumweed			X	X	C
<i>Gutierrezia sarothrae</i> (Pursh) Britt. & Rusby	snakeweed				X	C
<i>Helianthus annuus</i> L.	sunflower			X		F
<i>Helianthus nuttallii</i> J. Torr. & A. Gray						
<i>Heterotheca villosa</i> (Pursh) Shinnars	golden aster				X	C
<i>Hymenopappus filifolius</i> Hook						
<i>Hymenoxys acaulis</i> (Pursh) Parker	hymenoxys				X	C
<i>Rudbeckia hirta</i> L.	coneflower	X				R
<i>Senecio multilobatus</i> T.&G. ex Gray	groundsel				X	F
<i>Solidago canadensis</i>	goldenrod	X				I
<i>Sonchus asper</i> (L.) Hill	spiny sow- thistle	X				I
<i>Stephanomeria tenuifolia</i> (Torr.) Hall						
BETULACEAE						
<i>Alnus tenuifolia</i> Nutt.	narrow-leaved alder		X			F
<i>Betula fontinalis</i> Sarg.	river birch		X			I

Table 1 (Cont.)

List of plant species encountered on and adjacent to the Unaweep Canyon Springs, Mesa County, Colorado.

		HABITAT / <u>1</u>				ABUNDANCE / <u>2</u>
		WM	MM	DG	PJ	
BORAGINACEAE						
<i>Cryptantha flava</i> (A. Nels.) Payson	cryptantha				X	R
<i>Lappula redowskii</i> (Hornem.) Greene	stickseed			X		F
BRASSICACEAE						
<i>Arabis demissa demissa</i> Greene	rockcress				X	R
<i>Camelina microcarpa</i> Andrs. in DC	false flax			X		F
<i>Capsella bursa-pastoria</i> (L.)	shepher's purse			X		C
<i>Descurainia richardsonii</i> (SW.) O.E. Schulz	western tansy mustard			X		F
<i>Lepidium montanum</i> Nutt.						
<i>Nasturtium officinale</i> R.Br.	water cress	X				C
<i>Sisymbrium altissimum</i> L.	tumble mustard			X		F
<i>Streptanthus cordatus</i> Nutt. ex T.&G.	twist flower				X	I
CACTACEAE						
<i>Echinocereus triglochid- iatus</i> Engelm. in Wislizenus	hedgehog cactus				X	F
<i>Opuntia polyacantha</i> Haw.	prickly pear				X	C
<i>Pediocactus simpsonii</i> Engelm.	hedgehog cactus				X	I
CORNACEAE						
<i>Cornus stolonifera</i> Nichx.	red-osier dogwood		X			F
CYPERACEAE						
<i>Carex interior</i> Bailey	sedge	X				I
<i>Carex lanuginosa</i> Nichx.	wooly sedge	X				C
<i>Carex nebraskensis</i> Dewey	Nebraska sedge	X				C

Table 1 (Cont.)

List of plant species encountered on and adjacent to the Unaweep Canyon Springs, Mesa County, Colorado.

			HABITAT / <u>1</u>				ABUNDANCE / <u>2</u>
			WM	MM	DG	PJ	
CYPERACEAE (cont.)							
Eleocharis macrostachya Britt.	large-spiked spike rush	X				C	
Scirpus acutus Muehl.	bulrush	X				C	
Scirpus lacustris L.	great bulrush	X				C	
EQUISETACEAE							
Equisetum arvense L.	field horsetail	X				C	
Hippochaete laevigata (A.Br.) Farwell	scouring rush	X				C	
EUPHORBIACEAE							
euphorbia robusta (Engelm.)	Rocky Mountain spurge				X	I	
FABACEAE							
Astragalus coltoni Jones	milkvetch				X	I	
Astragalus mollisimus Torr.	Milkvetch				X	F	
Melilotus alba Desr.	white sweet- clover	X				C	
Melilotus officinalis (l.) Lam.	yellow sweet- clover	X				C	
Thermopsis montana Nutt. ex T.&G.	goldenpea	X				I	
Trifolium pratense L.	red clover	X				I	
Vicia americana Muehl.	American vetch	X				F	
FAGACEAE							
Quercus gambelii Nutt.	Gambel oak		X			C	
GERANIACEAE							
Erodium cicutarium (L.) L.Her.	filaree				X	C	
HYPERICACEAE							
Hypericum formosum H.B.K.	St. Johnswort	X				C	
IRIDACEAE							
Sisrinchium montanum	blue-eyed-grass	X				R	



Table 1. (Cont.) List of plant species encountered on and adjacent to the Unaweep Canyon Springs, Mesa County, Colorado.

	HABITAT <sup>/1</sup>				ABUNDANCE <sup>/2</sup>
	WM	MM	DG	PJ	
JUNCACEAE					
Juncus ensifolius Wikstr.					C
LABIATEAE					
Juncus tenuis Willd. var. dudley					
Mentha arvensis L.			field mint		I
Moldavica parviflora (Nutt.)Britt. in Britt. & Br.			dragonhead		C
LABITAEAE (cont.)					
Monarda fistulosa L.			bee balm		I
Prunella vulgaris L.			healall		C
LILIACEAE					
Allium acuminatum Hook.			tapertip onion	X	F
Calochortus gunnisonii Watson			mariposa lily	X	F
Yucca baccata Torr.			yucca	X	F
Yucca harrimaniae Trel.			Yucca	X	C
LORANTHACEAE					
Phoradendron juniperinum Engelm.			mistletoe	X	F
Arcanthobium campy- lopodum forma divaricatum Engelm.) Gill			mistletoe	X	I
MALVACEAE					
Sphaeralcea coccinea (Pursh) Rydb.			globe mallow	X	C
NYCTAGINACEAE					
Mirabilis sp.			four o'clock	X	I
ONAGRACEAE					
Oenothera hookeri			evening primrose	X	I

Table 1. (Cont.) List of plant species encountered on and adjacent to the Unaweep Canyon Springs, Mesa County, Colorado.

	HABITAT <sup>/1</sup>				ABUNDANCE <sup>/2</sup>
	WM	MM	DG	PJ	
ORCHIDACEAE					
Epipactis gigantea Dougl. ex. Hook.	X				C
Spiranthes romanzoffiana Cham. & Schl.	X				R
PINACEAE					
Pinus ponderosa Dougl. ex. P. Lawson				X	R
Pinus edulis Engelm. in Wisliz.				X	F
PLANTAGINACEAE					
Plantago lanceolata L.	X				I
Plantago patagonica Jacq.			X		C
POACEAE					
Agrostis gigantea Roth	X				I
Aristida longiseta Steud.				X	F
Bromopsis intermis (Leyss) Holub	X				I
Bromus japonicus Thunberg			X		C
Bromus tectorum L.			X	X	C
Calamagrostis inexpansa A. Gray					
Dactylis gomerata L.	X				F
Dichanthelium lanuginosum	X				F
Echinochloa crusgalli (L.) Beauv.					
Glyceria striata (Lam.) Hitchc.	X				F
Hilaria jamesii (Torr.) Benth.				X	C
Holcus lanatus L.					
Oryzopsis hymenoides (R.&S.) Ricker				X	C

Table 1. (Cont.)

List of plant species encountered on and adjacent to the Unaweep Canyon Springs, Mesa County, Colorado.

		HABITAT / <sup>1</sup>				ABUNDANCE / <sup>2</sup>
		WM	MM	DG	PJ	
POACEAE (cont.)						
<i>Panicum virgatum</i> L.	switchgrass	X				R
<i>Phalaris arundinacea</i> L.	reed canary grass	X				F
<i>Phleum pratense</i> L.	timothy	X				I
<i>Phragmites communis</i> Trin.	common reed	X				C
<i>Poa pratensis</i> L.	Kentucky blue-grass	X				F
<i>Poa sandbergii</i> Vasey	Sandberg blue-grass				X	I
<i>Sorghastrum nutans</i> (L.) Nash						
<i>Sporobolus cryptandrus</i> (Torr.) A. Gray	sand dropseed			X		I
<i>Stipa comata</i> Trin. & Rupr.	needle-and-thread				X	I
<i>Vulpia octoflora</i> (Walt.) Rydb.	six-weeks fescue			X	X	F
POLEMONIACEAE						
<i>Leptodactylon pungens</i> (Torr.) Nut. ex. Rydb.	prickly gilia				X	F
POLYGONACEAE						
<i>Rumex crispus</i> L.	curly dock	X				F
PRIMULACEAE						
<i>Dodecatheon radicans</i> Greene	shooting star	X				I
RANUNCULACEAE						
<i>Clematis ligusticifolia</i> Nutt. ex T.&G.	clematis		X			C
<i>Delphinium scaposum</i> Greene	larkspur				X	I
<i>Ranunculus</i> sp.	buttercup	X				
<i>Thalictrum dasycarpum</i> Fisch. & Lall.	meadow rue	X				R
ROSACEAE						
<i>Amelanchier utahensis</i> Koehne	serviceberry		X		X	F

Table 1. (Cont.) List of plant species encountered on and adjacent to the Unaweep Canyon Springs, Mesa County, Colorado.

	HABITAT <sup>/1</sup>				ABUNDANCE <sup>/2</sup>
	WM	MM	DG	PJ	
ROSACEAE (cont.)					
Crataegus rivolaris Nutt.	X				F
Rosa woodsii Lindl.		X			F
SALICACEAE					
Populus angustifolia James		X			C
Salix exigua Nutt.		X			C
Salix lutea Nutt.					
SCROPHULARIACEAE					
Castilleja minor Gray	X				F
Veronica catenata Penn.	X				F
Penstemon moffattii Eastw.					
SOLANACEAE					
Physalis subglabrata Mack. & Bush			X		I
TYPHACEAE					
Typha latifolia L.	X				C
ULMACEAE					
Celtis reticulata Torr.		X			I
URTICACEAE					
Urtica dioica procera (Muhl.) Wedd.			X		F
VIOLACEAE					
Viola nephrophylla Greene	X				C
VITACEAE					
Parthenocissus vitacea		X			I

<sup>1</sup> Habitats: WM = Wet Meadow; MM = Meadow Margins; DG = Disturbed Ground; PJ = Pinyon-Juniper Woodland.

<sup>2</sup> Abundance: C = Common; F = Frequent; I = Infrequent; R = Rare.

Appendix A-3 Species Occurrence Records

EO-CODE [p \_\_\_\_\_]

TAXON [ Speyeria nokomis nokomis ]

COMMON NAME [ nokomis fritillary butterfly ]

SURVEY DATE [ 9 - 6 - 89 ] LAST OBSERVED [ - - ] FIRST OBSERVED [ 1989 UNK ]

STATE [CO] CO [COUNTY] [CO Mesa CO CO CO ]

QUAD CODE [ ] MARGIN NO. [ ]

QUAD NAME [ Fish Creek 7.5 " ]

TOWNSHIP/RANGE [ T15S, R102W ] SECTION [ 8 ] MERIDIAN [ ]

OTHER COMMENTS [ ]

LATITUDE [ ] LONGITUDE [ ] PRECISION [ ]

NATURAL REGION [ ] WATERSHED [ ]

DIRECTIONS [ Hwy. 141, 13 miles E. of Gateway. Site is along west Creek adjacent to steep side slope/ bend to the northeast. ]

HABITAT [ ]

G E O L : streamside alluvium / granite bedrock

A S P E C T : flat

S O I L :

S L O P E : flat

A S S O C T A X A : willow thickets/ spring sedge meadows

ELEVATION [ 6350 ] ft. SIZE [ 8 ] acres

POPULATION DATA [ ca. 100 - 150 individuals/ day ]

B U D : % EST # : F R U I T : %

F L O W E R : %

COMMENTS [ %%%% grazed year round ]

MANAGEMENT UNITS [CO] [CO] [CO]

NATURAL AREA [ ] ADDITIONAL MANAGEMENT UNITS ? [ ]

SITE NAME [ Robert Massey Site ]

OWNER [ Robert Massey ]

OWNER COMMENTS [ ]

PROTECTION COMMENTS [ ]

MANAGEMENT COMMENTS [ ]

BT SOURCE [ Scott Ellis, 1011 West Mountain Ave. Ft. Collins, CO 80521 ]

BOUNDARIES [ ] PHOTOS [ ] VERIFIED? [ ] BORANK [ ] GRANK [ ] SRANK [ ]

TRANSCRIBER [ ] MAPPER [ ] UPDATER [ ]

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ELEMENT OCCURRENCE RECORD

EO-CODE [P \_\_\_\_\_]

TAXON [ Speyeria nokomis nokomis: Nymphalidae ]

COMMON NAME [ nokomis fritillary butterfly ]

SURVEY DATE [ 9 - 6 - 89 ] LAST OBSERVED [ \_\_\_\_\_ ] FIRST OBSERVED [ 7-89 ]

STATE [CO] CO [ COUNTY [CO Mesa CO \_\_\_\_\_ CO \_\_\_\_\_ ]

QUAD CODE [ \_\_\_\_\_ ] MARGIN NO. [ \_\_\_\_\_ ]

QUAD NAME [ Fish Creek 7.5 " ]

TOWNSHIP/RANGE [ T15S, R102W ] SECTION [ 6 ] MERIDIAN [ \_\_\_\_\_ ]

PERSON COMMENTS [ \_\_\_\_\_ ]

LATITUDE [ \_\_\_\_\_ ] LONGITUDE [ \_\_\_\_\_ ] PRECISION [ \_\_\_\_\_ ]

NATURAL REGION [ \_\_\_\_\_ ] WATERSHED [ \_\_\_\_\_ ]

DIRECTIONS [ Hwy. 141, 12.4 mi. e. of Gateway, drive 0.2 mi. South @ Casto mailbox, to farmhouse, then west along West Creek for 0.5 mi. Spring meadow (old beaver dam meadow) with willow thickets ]

HABITAT

GEOLOGY: granite alluvium ASPECT: \_\_\_\_\_

SOIL: hydric - dark SLOPE: \_\_\_\_\_

ASSOCIATA: sedge meadow, willow thicket (Salix exigua)

ELEVATION [ 6300 ] ft. SIZE [ 3 ] acres

POPULATION DATA [ 10 or less individuals/day - may be part of downstream colony ca. .2 mi. away. ]

EST # : \_\_\_\_\_ BUD : % \_\_\_\_\_ FRUIT : % \_\_\_\_\_ FLOWER : % \_\_\_\_\_

COMMENTS [ \_\_\_\_\_ ]

MANAGEMENT UNITS [CO \_\_\_\_\_ ] [CO \_\_\_\_\_ ] [CO \_\_\_\_\_ ]

NATURAL AREA [ \_\_\_\_\_ ] ADDITIONAL MANAGEMENT UNITS ? [ \_\_\_\_\_ ]

SITE NAME [ Casto site ]

OWNER [ Beeman Casto ]

OWNER COMMENTS [ \_\_\_\_\_ ]

PROTECTION COMMENTS [ \_\_\_\_\_ ]

MANAGEMENT COMMENTS [ \_\_\_\_\_ ]

SOURCE [ Scott Ellis , 1011 West Mountain Ave. Ft. Collins, CO 80521 ]

BOUNDARIES [ ] PHOTOS [ ] VERIFIED? [ ] BORANK [ ] GRANK [ ] SRANK [ ]

TRANSCRIBER [ ] MAPPER [ ] UPDATER [ ]

10/1/89

## ELEMENT OCCURRENCE RECORD

EO-CODE [P \_ \_ \_ \_ \_ ]

TAXON [ Speyeria nokomis nokomis: Nymphalidae ]

COMMON NAME [ nokomis fritillary butterfly ]

SURVEY DATE [ 9 - 6 - 89 ] LAST OBSERVED [ \_ \_ \_ ] FIRST OBSERVED [ 7 - 89 ]

STATE [CO] CO [COUNTY] [CO Mesa CO CO CO ]

QUAD CODE [ ] MARGIN NO. [ ]

QUAD NAME [ Fish Creek 7.5 W ]

TOWNSHIP/RANGE [ T15S, R103 W, ] SECTION [ 6 ] MERIDIAN [ ]

OTHER COMMENTS [ ]

LATITUDE [ ] LONGITUDE [ ] PRECISION [ ]

NATURAL REGION [ ] WATERSHED [ ]

DIRECTIONS [ Hwy. 141, 11.5 mi. E. of Gateway. Turn south 0.2 mi. Sat Nelson mailbox to farmstead. Colony extends 0.4 mi down stream; 0.3 mi. upstream in spring meadows and willow thickets ]

HABITAT

G E O L : granite alluvium

S O I L : hydric - dark

A S P E C T : flat

A S S O C \_ T A X A : Carex meadows, willow thickets (Salix exigua)

S L O P E :

ELEVATION [ 6400 ] ft. SIZE [ 18 ] acres

POPULATION [ Instantaneous population 200 - 150 individuals ]

DATA

NA

B U D : % EST # : FRUIT : %

F L O W E R : %

COMMENTS [ heavily ~~used~~ grazed streamside meadows ]

MANAGEMENT UNITS [CO] [CO] [CO]

NATURAL AREA [ ] ADDITIONAL MANAGEMENT UNITS ? [ ]

SITE NAME [ Nelson site ]

OWNER [ Alfred Nelson, ]

OWNER COMMENTS [ ]

PROTECTION COMMENTS [ ]

MANAGEMENT COMMENTS [ ]

BEST SOURCE [ Scott Ellis, 1011 W. Mountain Ave. Ft. Collins, CO 80521 (303) 493-883 6069 ]

BOUNDARIES [ ] PHOTOS [ ] VERIFIED? [ ] BORANK [ ] GRANK [ ] SRANK [ ]

TRANSCRIPTION [ ] MAPS [ ] UPDATES [ ]

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ELEMENT OCCURRENCE RECORD

EO-CODE [P \_\_\_\_\_]

TAXON [ Speyeria nokomis nokomis ] ->

COMMON NAME [ Nokomis fritillary butterfly ] ->

SURVEY DATE [ 9 -5 -89 ] LAST OBSERVED [ UNK - - ] FIRST OBSERVED [ 8-65 ]

STATE [CO] CO [ COUNTY ] [CO MESA CO CO CO ]

QUAD CODE [ ] MARGIN NO. [ ]

QUAD NAME [ Two V Basin ]

TOWNSHIP/RANGE [ T15S, R103W ] SECTION [ 10, 10, 3 ] MERIDIAN [ ]

OTHER COMMENTS [ ]

LATITUDE [ ] LONGITUDE [ ] PRECISION [ ]

NATURAL REGION [ ] WATERSHED [ ]

DIRECTIONS [ Hwy 141, 9 mi. E. of Gateway at Bridge Crossing of West Creek ]

HABITAT

G E O L : Granite alluvium

S O I L : Hydric - dark

A S S O C I A T A X A : cottonwood woodland, willow thicket, spring meadow

ELEVATION [ 5800 ] ft. SIZE [ 13 ] acres

POPULATION DATA [ Instantaneous population generally less than 50 individuals ] ->

NA

B U D : % EST # : F R U I T : %

F L O W E R : %

COMMENTS [ ] ->

MANAGEMENT UNITS [CO] [CO] [CO]

NATURAL AREA [Colo. Registered] ADDITIONAL MANAGEMENT UNITS ? [ ]

SITE NAME [ Unawep Seep ] ->

OWNER [ U.S. (BLM); Beeman Casto ]

OWNER COMMENTS [ ] ->

PROTECTION COMMENTS [ ] ->

MANAGEMENT COMMENTS [ Management Plan written by BLM ] ->

LIST SOURCE [ Scott Ellis, 1011 West Mountain Ave., Ft. Collins, CO 80521 ] ->

BOUNDARIES [ ] PHOTOS [ ] VERIFIED? [ ] BORANK [ ] GRANK [ ] SRANK [ ]

TRANSCRIBER [ ] MAPPER [ ] UPDATER [ ]

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ELEMENT OCCURRENCE RECORD

EO-CODE [P \_\_\_\_\_]

TAXON [ Speyeria nokomis nokomis ] ->

COMMON NAME [ Nokomis fritillary butterfly ] ->

SURVEY DATE [ 9 -5 -89 ] LAST OBSERVED [ - - ] FIRST OBSERVED [ 7 - 89 ]

STATE [CO] CO [COUNTY] [CO] Mesa CO CO CO ]

QUAD CODE [ ] MARGIN NO. [ ]

QUAD NAME [ Fish Creek 7.5" ]

TOWNSHIP/RANGE [ T15S, R102W ] SECTION [ 9 ] MERIDIAN [ ]

OTHER COMMENTS [ ]

LATITUDE [ ] LONGITUDE [ ] PRECISION [ ]

NATURAL REGION [ ] WATERSHED [ ]

DIRECTIONS [ Hwy. 141, 13.6 mi. E. of Gateway. West Creek, adjacent to James Massey house next to highway on the south side. Sedge meadows, willow thickets below springs emerging from south bank of West Creek ] /

HABITAT

GEOLOGY: Granite bedrock/ streambed alluvium ]

SOIL: hydric ] ASPECT: flat ] /

ASSOCIATED TAXA: ] SLOPE: flat ] /

ELEVATION [ 6550 ] ft. SIZE [ 8 ] acres ]

POPULATION DATA [ 100 - 150 individuals/ day. At peak flight period. ] ->

BUD: EST #: ] FRUIT: ] /  
FLOWER: % % % % ]

COMMENTS [ ] ->

MANAGEMENT UNITS [CO] [CO] [CO] ]

NATURAL AREA [ ] ADDITIONAL MANAGEMENT UNITS ? [ ]

SITE NAME [ J. Massey Site ] ->

OWNER [ James Massey ]

OWNER COMMENTS [ ] ->

PROTECTION COMMENTS [ Owner interested in protecting the butterfly - brother runs cattle on property. ] ->

MANAGEMENT COMMENTS [ Seasonal to year round grazing. ] ->

SOURCE [ Scott Ellis, 1011 West Mountain Ave., Ft. Collins, CO 80521 ] ->

BOUNDARIES [ ] PHOTOS [ ] VERIFIED? [ ] EORANK [ ] GRANK [ ] SRANK [ ]

TRANSCRIBER [ ] MAPPER [ ] UPDATER [ ]

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ELEMENT OCCURRENCE RECORD

EO-CODE [P \_\_\_\_\_]

**TAXON** [ Epipactis gigantea ]

COMMON NAME [ helleborine orchid ]

**SURVEY DATE** [ 9 - 5 - 89 ] LAST OBSERVED [ \_\_\_\_\_ ] FIRST OBSERVED [ 7-75 ]

STATE [CO] CO [ **COUNTY** Mesa CO CO CO ]

QUAD CODE [ \_\_\_\_\_ ] MARGIN NO. [ \_\_\_\_\_ ]

QUAD NAME [ Two V Basin ]

TOWNSHIP/RANGE [ T15S, R103W ] **SECTION** [ 10,3 ] MERIDIAN [ \_\_\_\_\_ ]

OTHER COMMENTS [ \_\_\_\_\_ ]

LATITUDE [ \_\_\_\_\_ ] LONGITUDE [ \_\_\_\_\_ ] PRECISION [ \_\_\_\_\_ ]

NATURAL REGION [ \_\_\_\_\_ ] WATERSHED [ \_\_\_\_\_ ]

**DIRECTIONS** [ Hw. 141, 9 mi. E. of Gateway at Bridge Crossing of West Creek ]

**HABITAT** [ \_\_\_\_\_ ]

G E O L : [ granite alluvium ] ASPECT : [ S ]

S O I L : [ hydric - dark ] SLOPE : [ 20-30% ]

A S S O C I A T A : [ \_\_\_\_\_ ]

**ELEVATION** [ 5800 ] ft. SIZE [ ca. 5 ] acres

**POPULATION DATA** [ Est. over 1 million stems - probably largest population in CO ]

B U D : [ \_\_\_\_\_ ] E S T # : [ \_\_\_\_\_ ] F R U I T : [ \_\_\_\_\_ ]  
F L O W E R : [ \_\_\_\_\_ ]

**COMMENTS** [ Found throughout spring meadows and wet portions of sandbar willow thickets. Appears to tolerate seasonal grazing well - may be unpalatable. In association with Eleocharis palustris, Hypericum formosum ]

MANAGEMENT UNITS [CO \_\_\_\_\_ ] [CO \_\_\_\_\_ ] [CO \_\_\_\_\_ ]

NATURAL AREA [ \_\_\_\_\_ ] ADDITIONAL MANAGEMENT UNITS ? [ \_\_\_\_\_ ]

**SITE NAME** [ Unawep Seep ]

**OWNER** [ BLM/ Beeman Casto ]

OWNER COMMENTS [ \_\_\_\_\_ ]

PROTECTION COMMENTS [ Registered as Colo. Natural Area ]

MANAGEMENT COMMENTS [ Management Plan written by BLM - this species not included in plan ]

**TYPE SOURCE** [ Scott Ellis, 1011 West Mountain Ave., Ft. Collins Co 80521 ]

BOUNDARIES [ ] PHOTOS [ ] VERIFIED? [ ] BORANK [ ] GRANK [ ] SRANK [ ]

TRANSCRIBER [ ] MAPPER [ ] UPDATER [ ]

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ELEMENT OCCURRENCE RECORD

EO-CODE [P \_\_\_\_\_]

TAXON [ \$\$ Dichantelium acuminatum var. fasciculatum ] ->

COMMON NAME [ NA ] ->

SURVEY DATE [ 9 - 5 - 89 ] LAST OBSERVED [ - - ] FIRST OBSERVED [ 7-79 ]

STATE [CO] CO [COUNTY] [CO Mesa CO CO CO ]

QUAD CODE [ ] MARGIN NO. [ ]

QUAD NAME [ Two V Basin ]

TOWNSHIP/RANGE [ T15S, R103W ] SECTION [ 10,3 ] MERIDIAN [ ]

OTHER COMMENTS [ ]

LATITUDE [ ] LONGITUDE [ ] PRECISION [ ]

NATURAL REGION [ ] WATERSHED [ ]

DIRECTIONS [ Hwy. 141, 9 mi. E. of Gateway at Bridge Crossing of West Creek ]

HABITAT

G E O L : Granite alluvium ASPECT : /

S O I L : hydric - dark SLOPE : /

A S S O C T A X A : Eleocharis palustris/ Hypericum formosum/ Epipactis gigantea

ELEVATION [ 5800 ] ft. SIZE [ 3.5 ] acres

POPULATION DATA [ est. 200,000 stems, scattered throughout spring meadows ] ->

B U D : EST # : FRUIT : % FLOWER : %

COMMENTS [ Associated with hummocks and rocks embedded in spike rugh meadows. Locally common in small patches. ] ->

MANAGEMENT UNITS [CO] [CO] [CO]

NATURAL AREA [ UnawEEP Seep ] ADDITIONAL MANAGEMENT UNITS ? [ ]

SITE NAME [ UnawEEP Seep ] ->

OWNER [BLM/ Beeman Casto ]

OWNER COMMENTS [ ] ->

PROTECTION COMMENTS [ Registered Colo. Natural Area ] ->

MANAGEMENT COMMENTS [ BLM Management Plan - this species not included ] ->

SOURCE [ Scott Ellis, 1011 West Mountain St Collins, CO ] ->

BOUNDARIES [ ] PHOTOS [ ] VERIFIED? [ ] EORANK [ ] GRANK [ ] SRANK [ ]

TRANSCRIBER [ ] MAPPER [ ] UPDATER [ ]

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## Maps and Overlays

## Maps and Overlays

### Map 1. UnawEEP Canyon, Mesa County, Colorado

Map 1, Overlay 1. Hydrologic boundaries for Nokomis fritillary colonies.

### Map 2A. UnawEEP Canyon Study Area (West)

Map 2A, Overlay 1. Land Ownership

Map 2A, Overlay 2. Land Cover Types

Map 2A, Overlay 3. Ecological Boundaries

### Map 2B. UnawEEP Canyon Study Area (East)

Map 2B, Overlay 1. Land Ownership

Map 2B, Overlay 2. Land Cover Types

Map 2B, Overlay 3. Ecological Boundaries

### Map 3. UnawEEP Seep Research Natural Area. Land Cover Types

Map 3, Overlay 1. Nokomis fritillary habitat elements.

Map 3, Overlay 2. Special Plant Communities/Species Helleborine orchid.

Map 3, Overlay 3. Special Plant Communities/Species Spike rush/helleborine orchid Association.

### Map 4. Nelson and B. Casto Sites. Land Cover Types

Map 4, Overlay 1. Nokomis fritillary habitat elements.

Map 4, Overlay 2. Special Plant Communities

### Map 5. Robert Massey Site. Land Cover Types

Map 5, Overlay 1. Nokomis fritillary habitat elements.

Map 6. James Massey Site. Land Cover Types

Map 6, Overlay 1. Nokomis fritillary habitat  
elements.



MHP1, UNADEEP CANYON  
MESA COUNTY, COLORADO

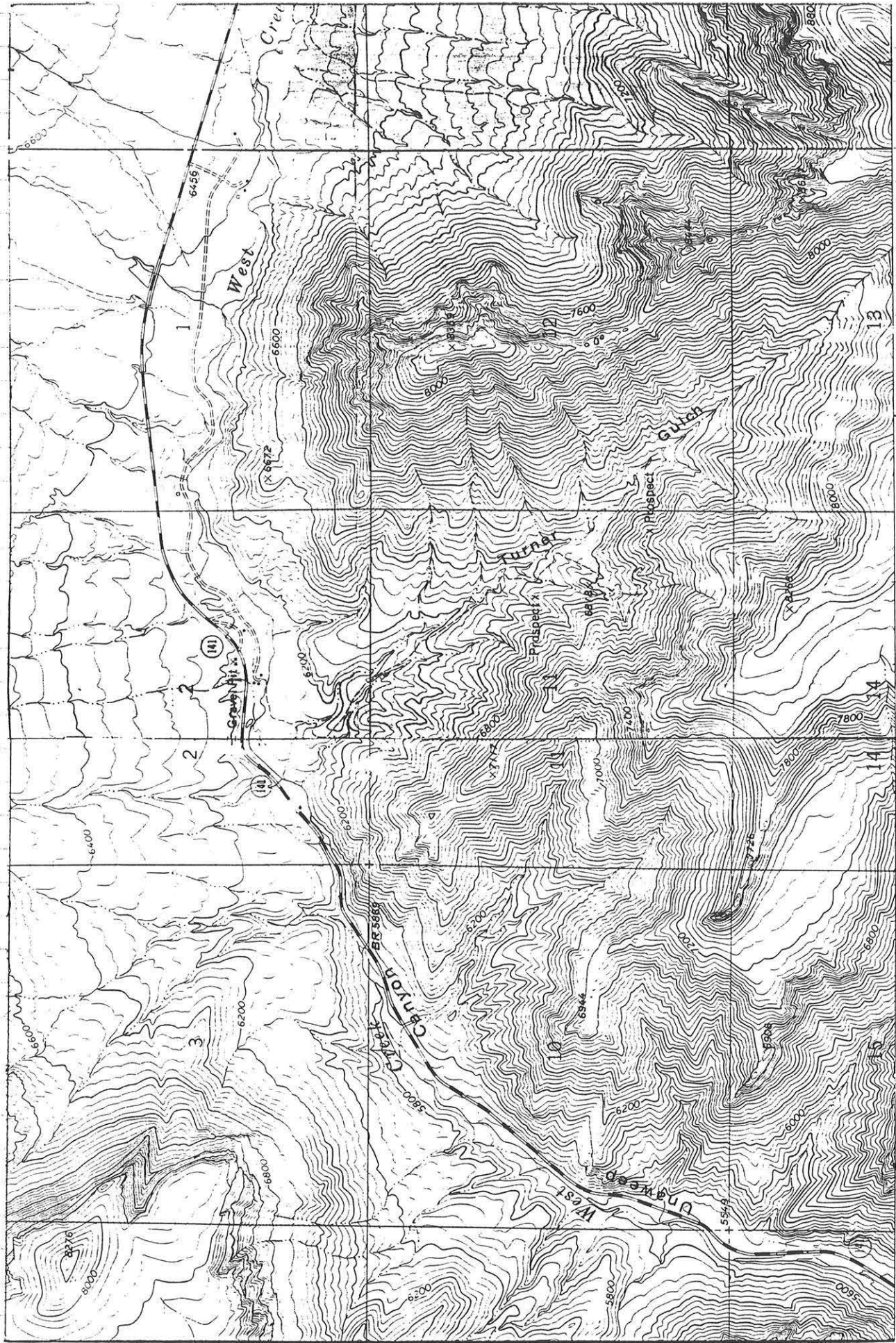




POTENTIAL GROUNDWATER RECHARGE AREA

- SPRING SUPPORTING NOKOMIS FRITILLARY COLONY

MAP 1 OVERLAY 1  
HYDROLOGIC BOUNDARIES  
FOR NOKOMIS FRITILLARY  
COLONIES



MAP 2A UNAWEEP CANYON  
STUDY AREA (WEST)

NELSON

U.S. (BLM)

U.S.

B. CASTO

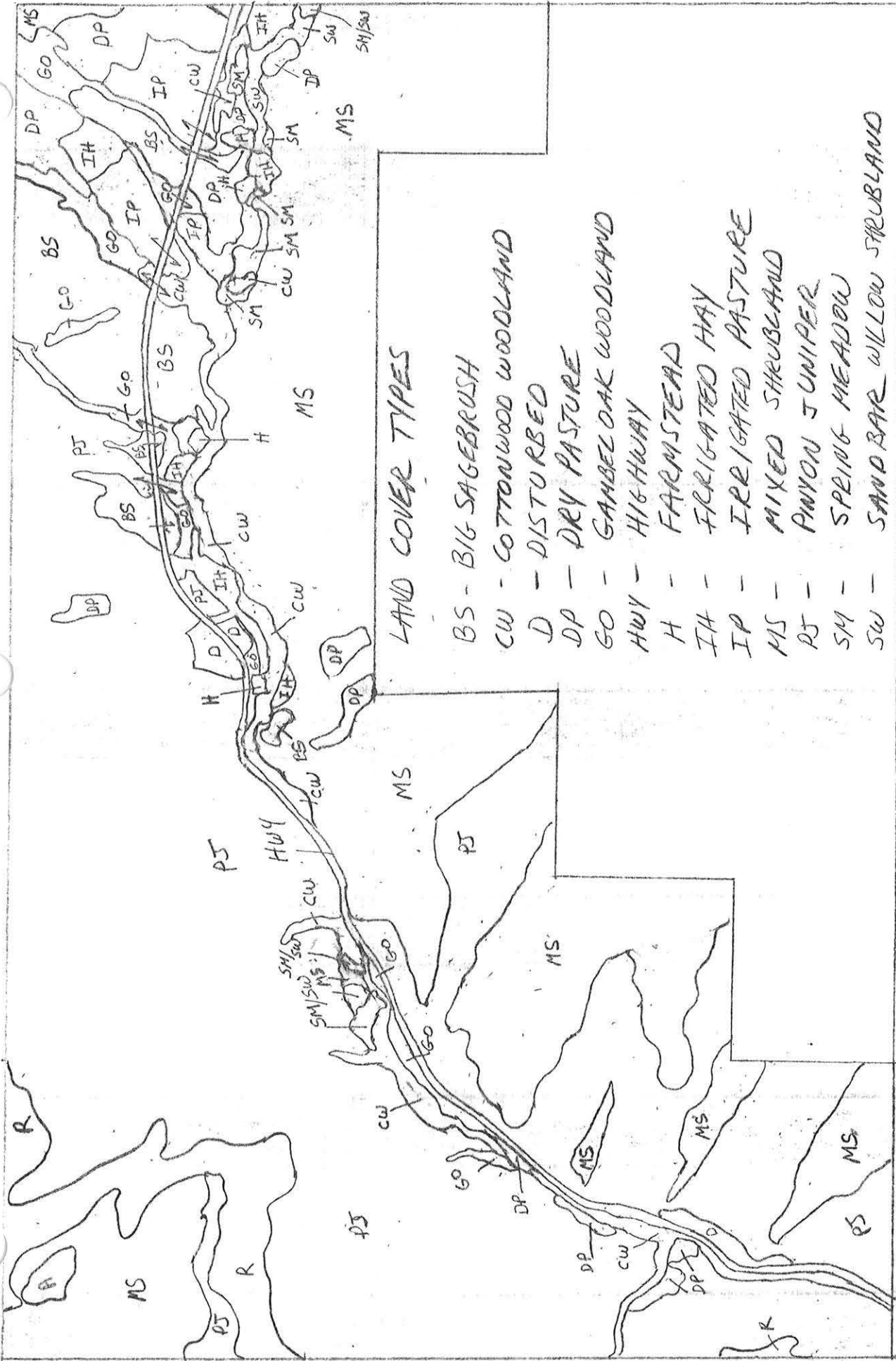
U.S.  
(BLM)

B. CASTO

B. CASTO

MAP 2A - OVERLAY I

LAND OWNERSHIP

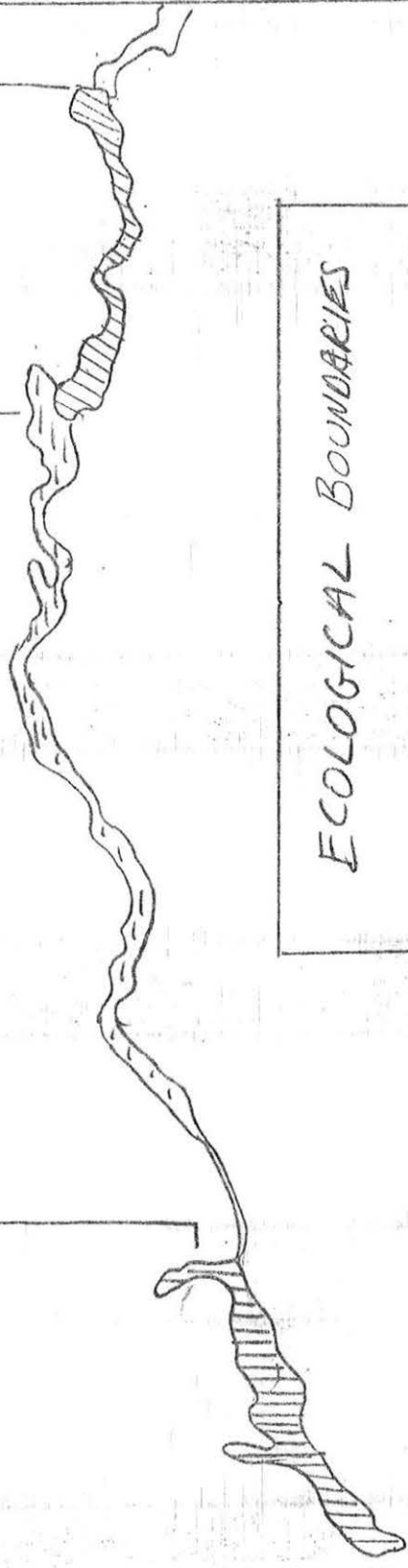


MAP 2A - OVERLAY 2

LAND COVER TYPES

UNAWEEP SEEP  
RESEARCH  
NATURAL AREA

NELSON  
SITE



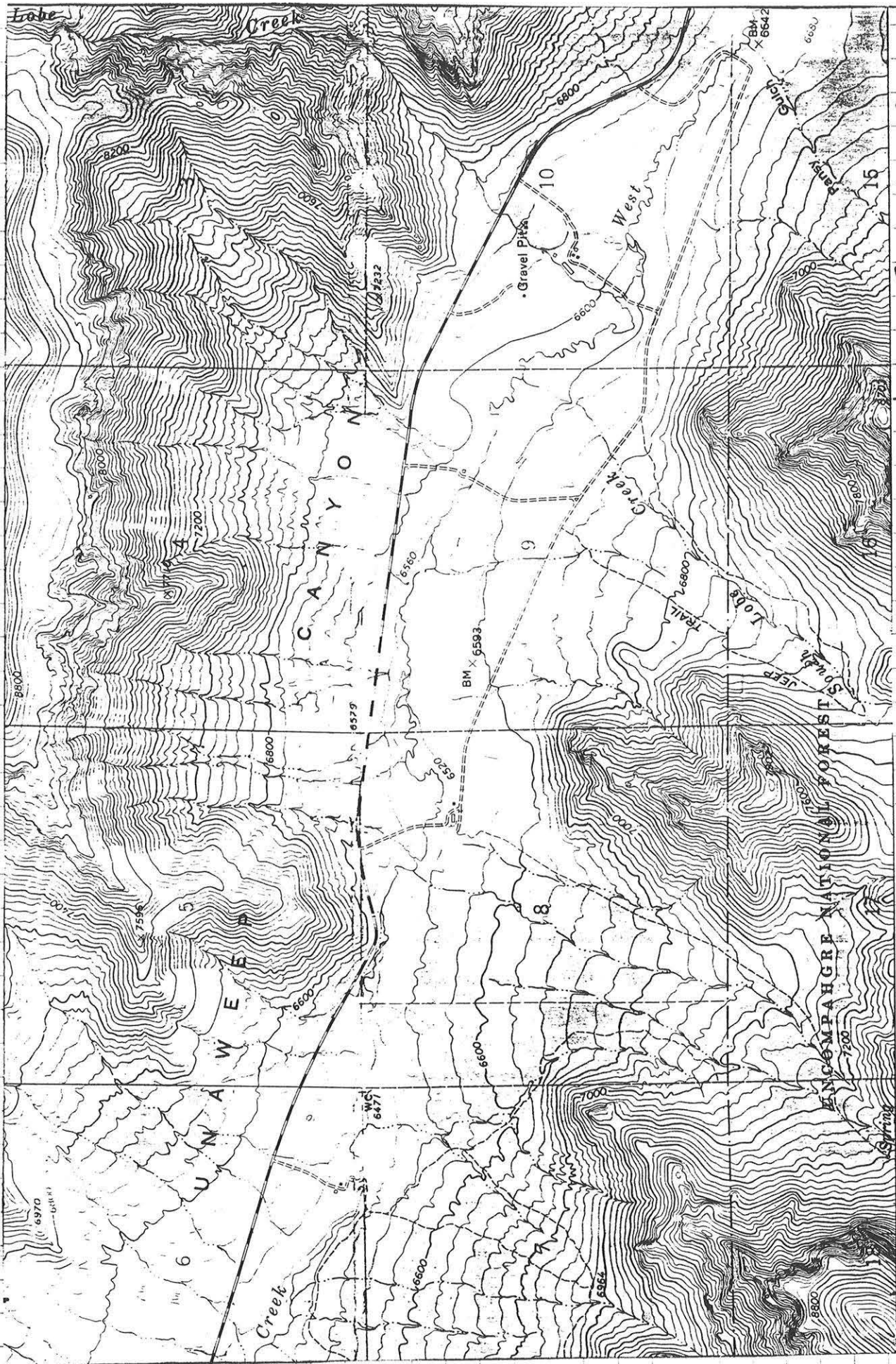
ECOLOGICAL BOUNDARIES

NOKOMIS FRITILLARY  
COLONY BOUNDARY

RIPARIAN HABITAT  
CONTINUITY BOUNDARY

MAP 2A - OVERLAYS

ECOLOGICAL BOUNDARIES



MAP 2.B UNAWEEP  
CANYON STUDY AREA (EAST)

NELSON

B. CASTO

U.S.  
(BLM)

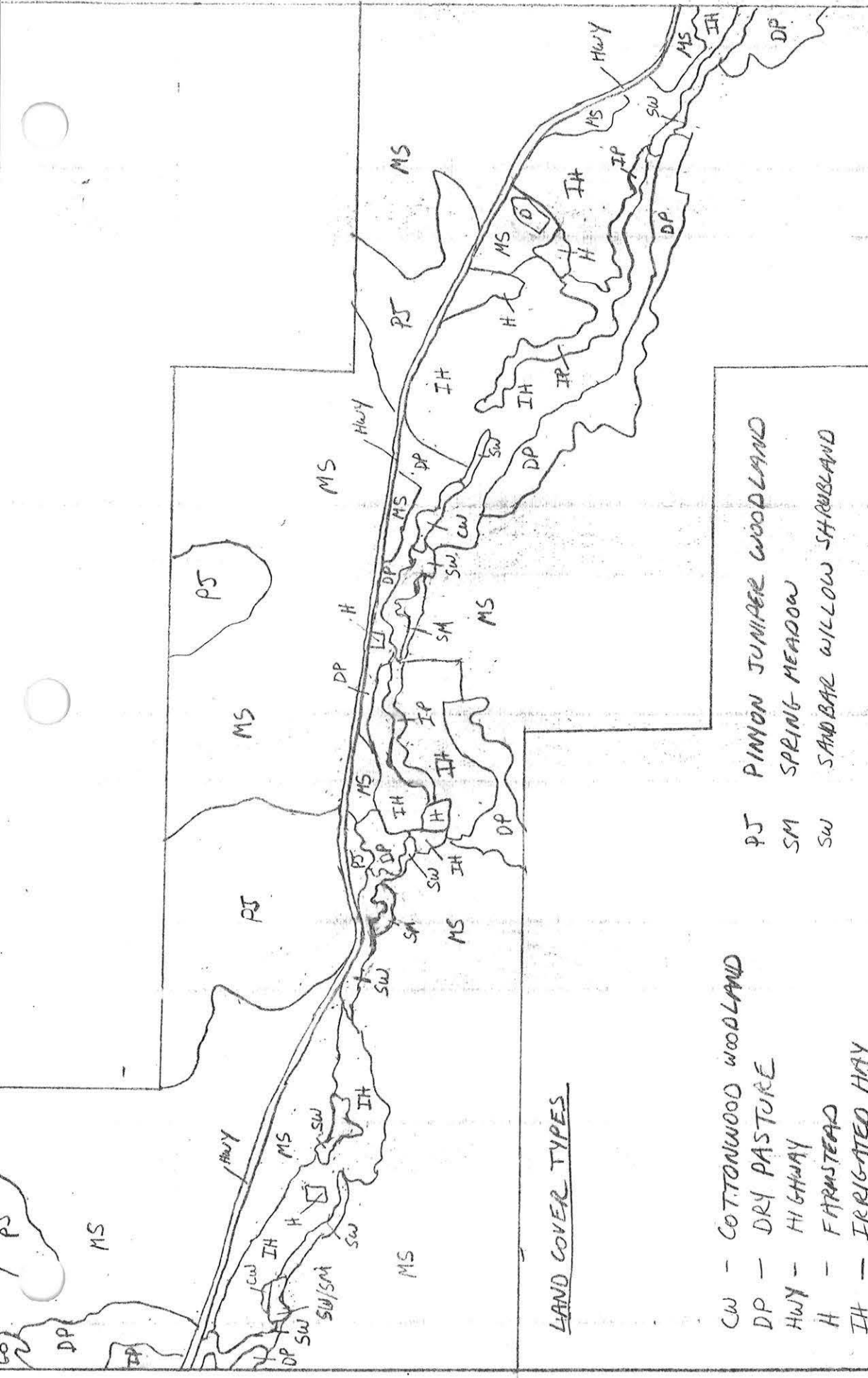
JAMES  
MASSEY

ROBERT  
MASSEY

KITSON, CRAIG

MAP 2 B-OVERLAY 1

LAND OWNERSHIP



LAND COVER TYPES

- CW - COTTONWOOD WOODLAND
- DP - DRY PASTURE
- Hwy - HIGHWAY
- H - FARMSTEAD
- IH - IRRIGATED HAY
- IP - IRRIGATED PASTURE
- MS - MIXED SHRUBLAND

- PJ - PINNON JUNIPER WOODLAND
- SM - SPRING MEADOW
- SW - SANDBAR WILLOW SHRUBLAND

MAP 2B-OVERLAY 2

LAND COVER TYPES



CASSTO  
SITE

ROBERT  
MASSEY  
SITE

JAMES  
MASSEY  
SITE



ECOLOGICAL BOUNDARIES

NOKOMIS FRITILLARY  
COLONY BOUNDARY



RIPARIAN HABITAT  
CONTINUITY BOUNDARY



MAP 2B - OVERLAY 3

ECOLOGICAL BOUNDARIES

Map Unit

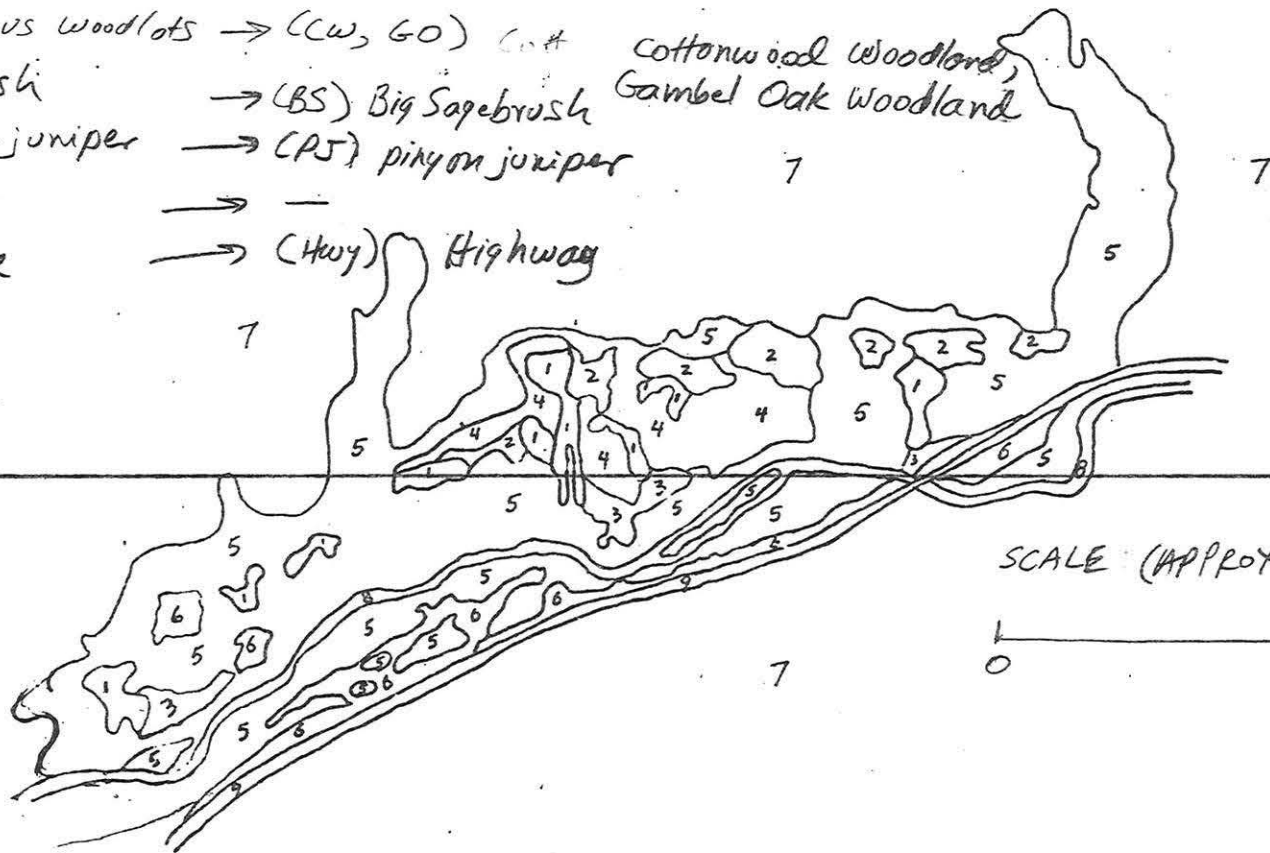
Arnold 1979

ELLIS

- |   |                    |   |   |
|---|--------------------|---|---|
| 1 | Seep Meadow        | → | (SM) Spring Meadow  |
| 2 | willow thickets    | → | (LW) Sand bar willow Shrubland                            |
| 3 | Marsh              | → | (SM) Spring Meadow  |
| 4 | Rosa - Phragmites  | → | (MS) Mixed Shrubland                                      |
| 5 | Deciduous woodlots | → | (CW, GO) (cont. Cottonwood Woodland, Gambel Oak Woodland) |
| 6 | Sagebrush          | → | (BS) Big Sagebrush  |
| 7 | pinon-jumper       | → | (PJ) pinon juniper  |
| 8 | Stream             | → | —   |
| 9 | roadside           | → | (Hwy) Highway   |

U.S. (BLM)

B. CASTO



SCALE (APPROXIMATE):



SOURCE:  
ARNOLD (1979)

MAP 3 UNAWEEP SEEP  
RESEARCH NATURAL AREA  
LAND COVER TYPES

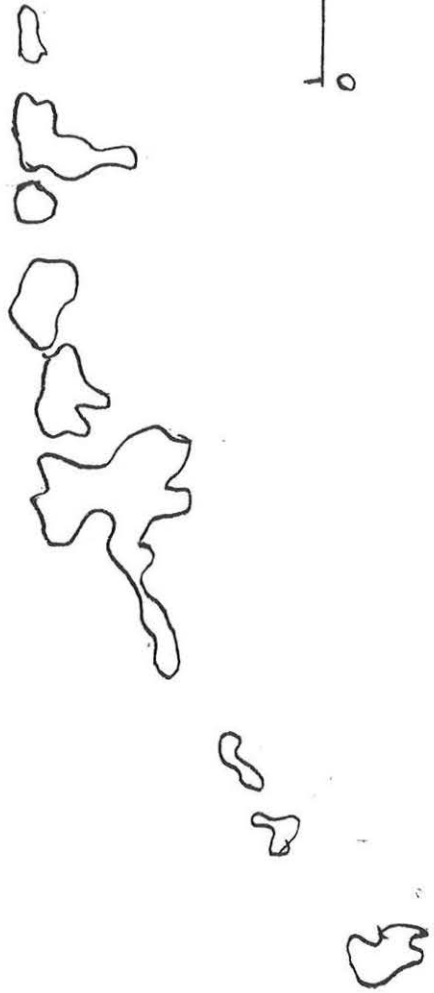


-- ESTIMATED NOKOMIS FRITILLARY COLONY BOUNDARY

v v v FOODPLANT VIOLET AREA

⊙ ⊙ NOKOMIS FRITILLARY OVIPOSITION SITES - ARNOLD (1979) and 1989 OBSERVATIONS

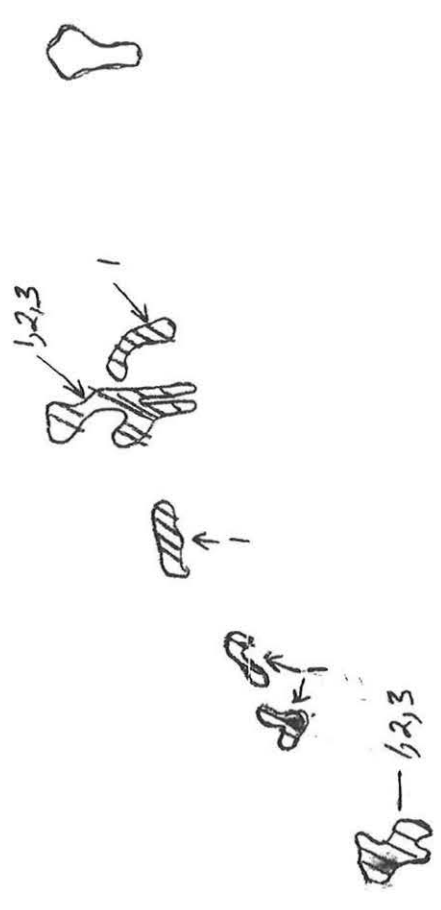
MAP 3 OVERLAY 1  
NOKOMIS FRITILLARY  
HABITAT ELEMENTS




0 500ft

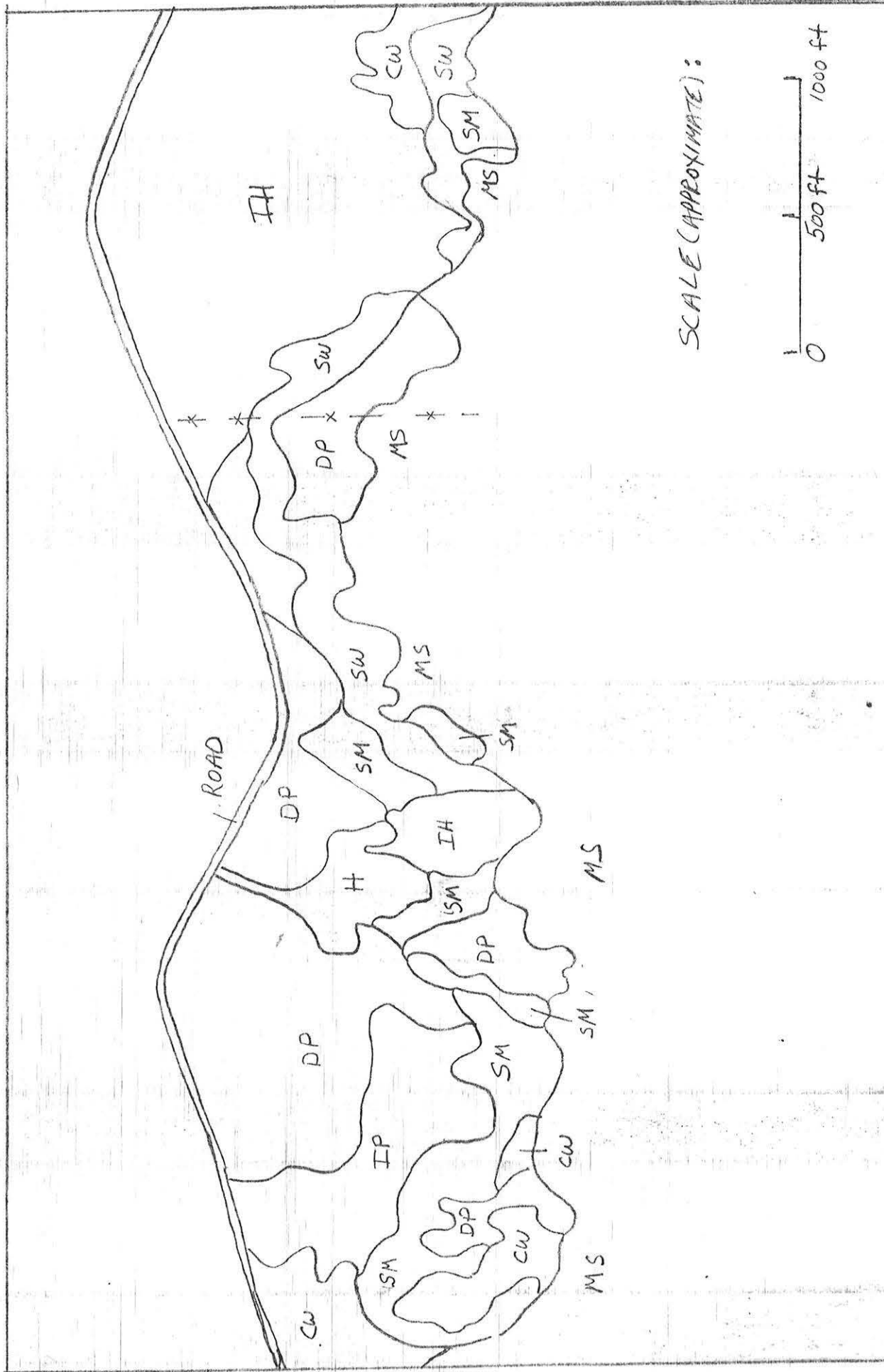
MAP 3 OVERLAY 2

SPECIAL PLANT COMMUNITIES  
SPECIES - HELLBORINE ORCHID  
EPIPACTIS GIGANTEA



 — SPIKE RUSH/HELLEBORINE ORCHID ASSOCIATION  
 MEADOWS WITH OTHER SPECIAL CONCERN PLANT SPECIES:  
 1) DIC-HANTHELIUM ACUMINATUM, 2) SORGHASTRUM NUTANS, 3) PANICUM VIRGATUM

MAP 3 OVERLAYS  
 SPECIAL PLANT COMMUNITIES/  
 SPECIES — SPIKE RUSH/  
 HELLEBORINE ORCHID ASSOCIATION

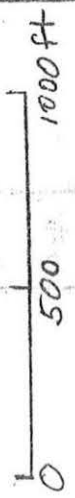


MAP 4 NELSON AND  
CASTO SITES - LAND COVER  
TYPES

CW - COTTONWOOD WOODLAND	IH - IRRIGATED HAY	SM - SPRING MEADOW
DP - DRY PASTURE	IP - IRRIGATED PASTURE	SW - SANDBAR WILLOW SHRUBLAND
H - FARMSTEAD	MS - MIXED SHRUBLAND	

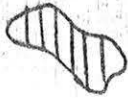


SCALE (APPROXIMATE):




-- ESTIMATED NOKOMIS FRITILLARY COLONY BOUNDARY  
 (v) FOODPLANT VIOLET AREA  
 (•••) NOKOMIS FRITILLARY OBSERVATION SITES - 1989 OBSERVATIONS

MAP 4 - OVERLAY 1 NELSON  
 AND CASTO SITES -  
 NOKOMIS FRITILLARY HARMONY SITE



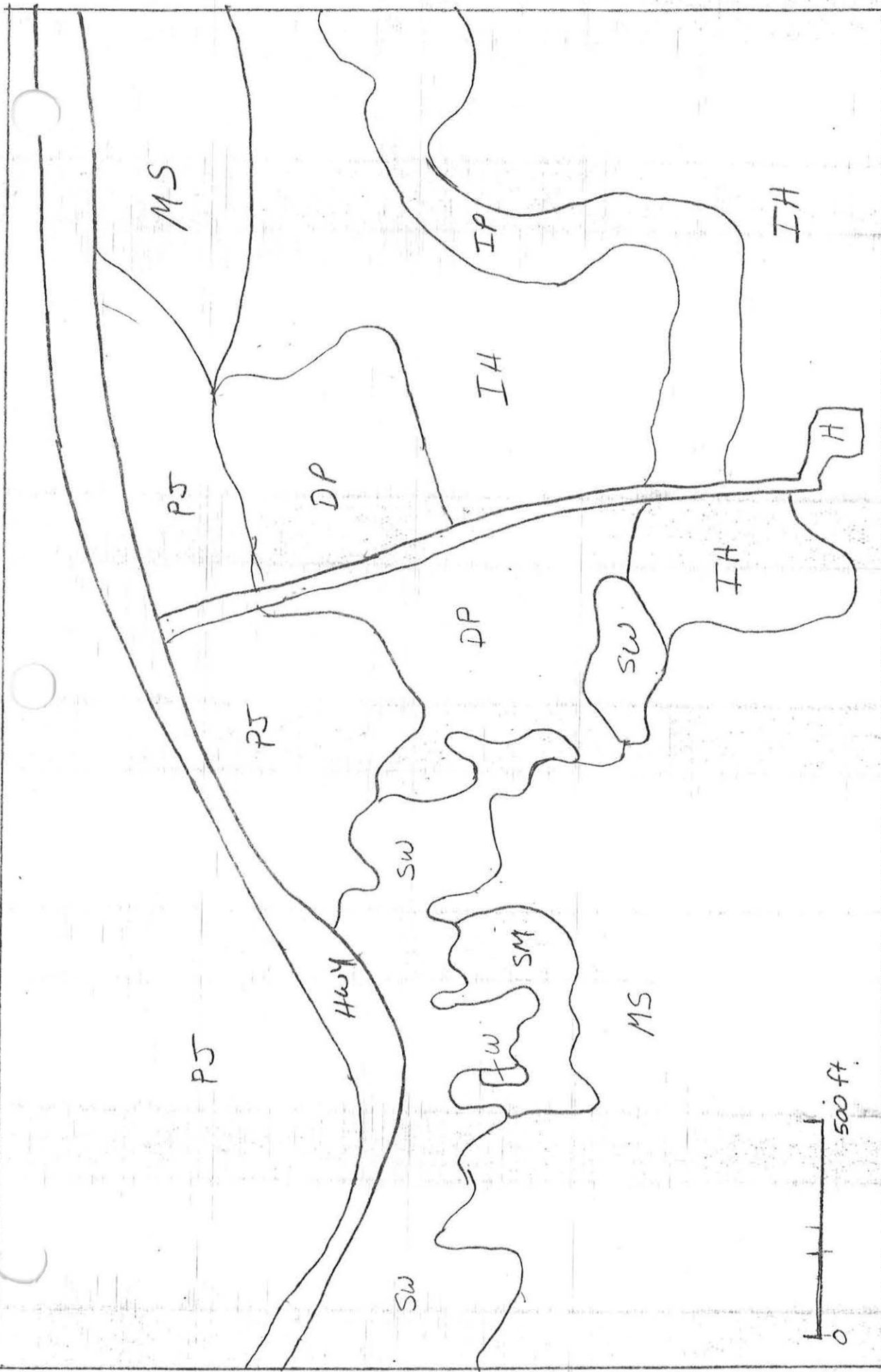
SCALE (APPROXIMATE):



 Carex/Alnus tenuifolia Association

MAP 4 - OVERLAY 2 NELSON  
AND CASTO SITES -  
SPECIAL PLANT COMMUNITIES + SPECIES





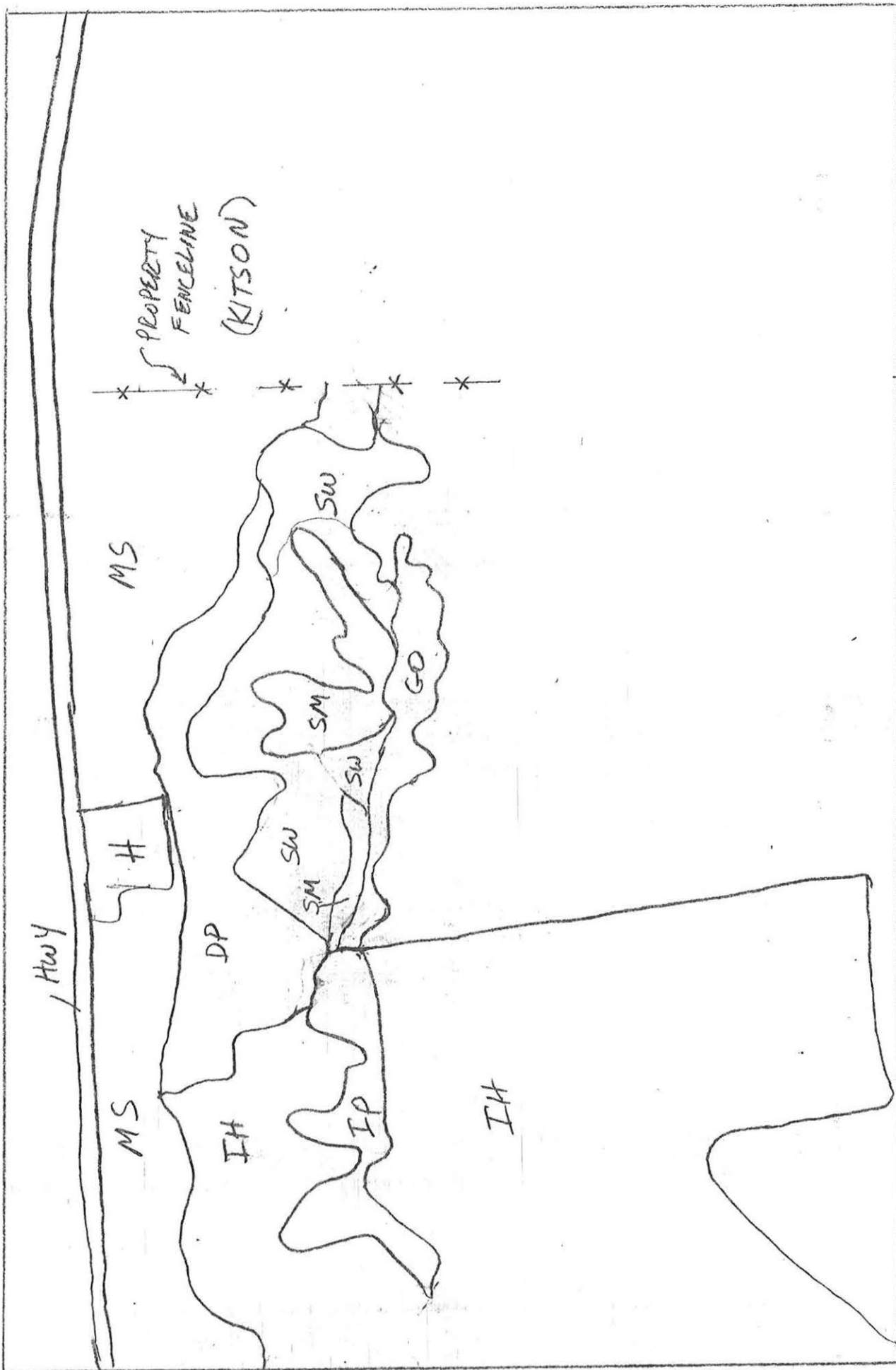
MAP 5 ROBERT MASSEY  
 SITE - LAND COVER TYPES

DP - DRY PASTURE	HWY - HIGHWAY	W - WATER
IH - IRRIGATED HAY	MS - MIXED SHRUBLAND	
IP - IRRIGATED PASTURE	PS - PINYON JUMPER	
H - FARMSTEAD	SM - SPRING MEADOW	
	SW - SANDBAR_WILLOW	



--- ESTIMATED NOKOMIS FRITILLARY COLONY BOUNDARY  
VVV FOOD PLANT VIOLET AREA  
●● NOKOMIS FRITILLARY OBSERVATION SITES - 1989 OBSERVATIONS

MAP 5 OVERLAY 1  
NOKOMIS FRITILLARY  
HABITAT ELEMENTS



MAP 6 - JAMES MASSEY  
SITE  
LAND COVER TYPES

IH - IRRIGATED HAY	GO - GAMBEL OAK WOODLAND	SW - SAWBAR WILLOW SHRUBLAND
IP - IRRIGATED PASTURE	H - HOUSE	
DP - DRY PASTURE	MS - MIXED SHRUBLAND	
	SM - SPRING MEADOW	



--- ESTIMATED NOKOMIS FRITILLARY COLONY BOUNDARY

v v v FOODPLANT VIOLET AREA

○ ○ NOKOMIS FRITILLARY OVIPOSITION SITES

MAP 6 - OVERLAY 1

NOKOMIS FRITILLARY  
HABITAT ELEMENTS