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The Utah Ecology Project: Ecological Impact of Weather Modification Studies in the Uinta Mountains

United States Deparment of the Interior, Bureau of Reclamation

THE UTAH ECOLOGY PROJECT:

ECOLOGICAL IMPACT OF WEATHER MODIFICATION STUDIES IN THE UINTA MOUNTAINS, UTAH

Resources of the Uinta Mountains

by

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Corrections on "Resources of
The Uinta Mountains" Report

Page 6, line 13: eliminate s from "cabins".

Page 8, Figure 2: shading for distribution of precipitation through time failed to print. Values by month are given below:

Month	Northern Mts.	Uinta Basin
January	5.0 cm	1.5 cm
February	5.0	1.3
March	5.0	1.7
April	4.0	1.8
May	3.8	1.8
June	3.1	1.8
July	2.5	1.9
August	3.4	2.3
September	2.6	1.9
October	3.4	2.3
November	4.3	1.1
December	5.0	1.3

Page 15, last line of "Indian Reservation" paragraph: following comma insert "the Agency was moved to a site near Hanna".

Page 19, line 18: 360 angiosperm genera rather than 356. Also 1,053 angiosperm species rather than 1,012.

Page 19, lines 23 - 28: number of species for sunflowers, grasses, sedges, mustards, scrophs, and legumes should be 175, 126, 86, 60, 51, and 53 respectively.

Page 20, line 11: add this sentence "Similarly the oakbrush zone is omitted because data are unavailable.

Page 23, line 18: delete "such".

Page 24, lines 1 - 3: delete all of lines 1 and 2 and the word climax on line 3.

Page 24, line 17: lodgepole not bodgepole.

Page 28, line 1: add Y to "wind".

Page 28, line 21: U.S. Forest Service rather than "U.S. Department of Interior".

Page 31, line 6: insert be in front of "designated".

Page 31, line 16: 10^6 rather than "10^9".

Page 31, line 20: substitute were for "was".

Page 34, line 12: substitute summer for the second "snow".

THE RESOURCES OF THE UINTA MOUNTAINS, UTAH

Location

The Uinta Mountains are located in extreme northeastern Utah and northwestern Colorado. The major portion of the range and all areas rising above 3,050 m (10,000 ft) lie within five Utah counties (Daggett, Duchesne, Summit, Uintah and Wasatch). The high elevation segment of the range in Utah is commonly referred to as the High Uintas. This report will consider only the so-called High Uintas.

Area and Elevation

The High Uintas include an area of about 15,091 km^2 (5,433 mi^2) above the 2,135 m (7,000 ft) contour. Within that area, 26 peaks rise to more than 3,965 m (13,000 ft) above sea level (Hansen 1969). King's Peak at an altitude of 4,126 m is the highest point in the State of Utah.

Physical Features

Topography. The Uintas are unique in that they are the only major mountain range in North America whose long axis is oriented east-and-west. The range rises abruptly from adjacent plains to form a series of relatively flat ridges that retain massive snow drifts on their leeward margins until late summer. The plateau-like ridges are separated by deep glacial valleys or extensive glaciated plains dotted by an almost unnumberable array of ponds and lakes. Ridge tops and flanks are often little more than outcrops of naked rock. John Wesley Powell, in an early geological report on the eastern end of the High Uintas described the landscape in the following manner. "Above all it is the rocky region; rocks are strewn along the valleys, over the plains and plateaus;

the cañon walls are of naked rock; long escarpments or cliffs of rock stand athwart the country, and everywhere are mountains of rock" (Powell 1876).

The landscape is not heavily vegetated anywhere. Forests are usually open and slow growing. Meadow are often picturesque and verdant but are rarely highly productive. Large areas support plants only in rock crevices and along the edges of large boulders. Drainage bottoms of glaciated valleys are commonly a complex mosaic of gravel bars, willow thickets, and wet meadows.

Geology. The Uintas owe their existence to an early Cenozoic uplift of a deep (over 15,250 m) sequence of sedimentary beds which had been accumulating in the Uinta trough throughout most of recorded geologic time (Hansen 1969). The oldest recorded rocks now exposed in the area (Red Creek Quartzite) are shown to be about 2.3 billion years old by radiometric dating methods (Figure 1). The gigantic anticlinal uplift that forms the range rises abruptly from the floor of the Kamas valley on the west, but its upward incline is more gentle at the east end of the range in northwestern Colorado. Deep crustal movements have pushed the crest of the anticline northward until it is asymmetrical with a steep northern face and a more gentle south slope.

Except for a few igneous dikes intruded into the oldest sedimentary rocks in the range, the High Uintas are composed entirely of sedimentary materials (Hansen 1969). Igneous activities have otherwise been completely absent during the development of the range (Emmons 1907). The ravages of some 70 million years of erosion have stripped off the younger geologic strata from the apex of the Uinta anticline leaving

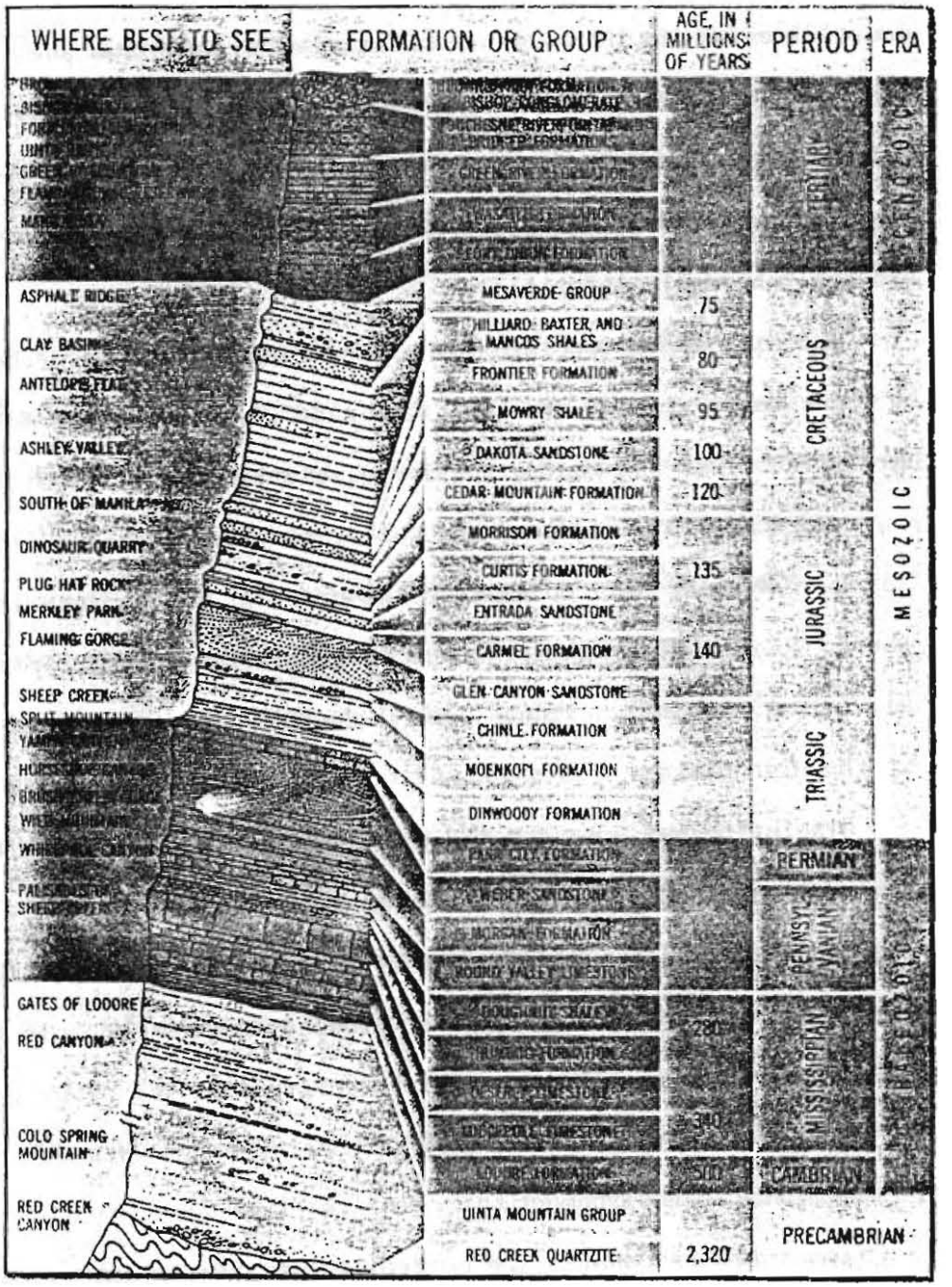


Figure 1. Generalized cross-section of the rock formations of the eastern Uinta Mountains (from Hansen 1969).

quartizites of the Uinta Mountain Group of Precambrian age to dominate most of the landscape above 3,050 m elevation. The generally reddish colored Uinta Mountain Quartzite is hard and deficient in the elements required by plants, thus soils develop slowly on that parent material and are inherently infertile.

The high elevation interior of the range has been further modified by three major glacial events in the past 60,000 years (Bradley 1936). During the first and most extensive glaciation, over 2,500 km^2 of the range were buried under ice, and valley glaciers pushed out onto the plains of Wyoming some 60 km from the crest of the ancient anticline (Hansen 1969). Today the evidence of glaciation in the forms of mountain lakes, moraines, cirques, and U-shaped valleys can be seen throughout the High Uintas.

Glaciation has enhanced the depressing effect of hard and nutrient poor rock on plant growth by scouring away or burying such soils as had developed prior to the Pleistocene at high elevations. Shallow, impoverished soils combine with short growing seasons and cold temperatures to make the High Unitas a harsh environment for plant growth. The low plant productivity of the interior of the range is a consequence of the inhospitable environment.

Limestones and shales are currently confined to the edges (particularly the western flank) of the range. Deciduous forests of aspen and thickets of oak are widespread above 1,900 m on limestones and calcareous shales, but coniferous forests and alpine herblands dominate the areas where soils are derived from quartzite.

Soils. Uinta landforms and their soils are complex. The soils are almost always immature and poorly developed above 2100 m elevation. Drainage of such soils is commonly extreme; either excessively well drained or undrained with attendant high water tables (Arnold and Olson 1964).

In poorly drained areas around the numerous lakes of the area, deep peats and mucks are often observed. Such deposits may be several meters deep and characteristically have pH values of 4.8 - 5.0 (Jatkar, Rushforth, and Brotherson 1978, Stutz 1951, and Christensen and Harrison 1961).

Upland soils at higher elevations are usually shallow, stoney or gravelly, acidic (pH of 4.3 - 6.2) and heavily leached (Harper 1977, Wagner 1973, Lewis 1970, and Murdock 1951). Ridge crests may have almost no soil due to glacial action and water erosion. Such upland landforms are not conducive to good plant growth, since they hold minimal nutrient reserves and store little water. Stream flow from such landscapes is unusually generous, since the areas accumulate deep snow packs (25 to 50 cm of water per unit area) but retain little of the melt water in the soil profile.

Soils in the foothill zone of the Uintas are often derived from calcareous substrates such as limestones, shales, and limey sandstones. In such areas, soils are circumneutral to basic, rather well developed and possessed of mollic epipedons. Such soils are as productive as the moisture supply will permit: there is no apparent growth suppression due to nutrient deficiencies as at higher elevations on soils derived from quartzite. Locally at both high and low elevations where slopes are steep, water is abundant, and the unconsolidated surface material is

deep, slopes are unstable. Construction of roads or trails through such material commonly results in soil slippages that necessitate additional construction work and produce accelerated siltation in streams.

Major Streams and Lakes. The Uintas are a major watershed of Utah. Four of the state's major rivers rise there (the Bear, Duchesne, Provo, and Weber) as do several major tributaties that enter the Green River before it passes through Flaming Gorge Canyon (e.g., Blacks Fork, Burnt Fork, Henrys Fork, and Smiths Fork). In addition over 1000 lakes and ponds lend variety to the Unita landscape (Tanner 1930). More popular lakes include Chain, Echo, Grandaddy, Kidney, Lilly, Lost, Mirror, and Red Castle. The lake-type environment has been greatly expanded by construction of many reservoirs for water storage throughout the Uintas. Some of the larger reservoirs include Flaming Gorge, Meeks Cabins, Moon Lake, Steinaker, and Trial Lake.

In general, both stream and lake waters are cold, crystal clear and nutrient poor in the Uintas. Fish growth is usually slow because of the oligotrophic waters and the shortness of the ice-free season. All streams that drain the area support a diversity of native and introduced fish species, but most of the lakes and ponds did not support fish originally. Most of the region's lakes that can support fish year-round (about one-half the total) are now regularly stocked with eastern brook and cutthroat trout by the Utah Division of Wildlife Resources (Vincent, Gates and Regenthal 1963 a, b, and c and Gates and Regenthal 1964).

Climate

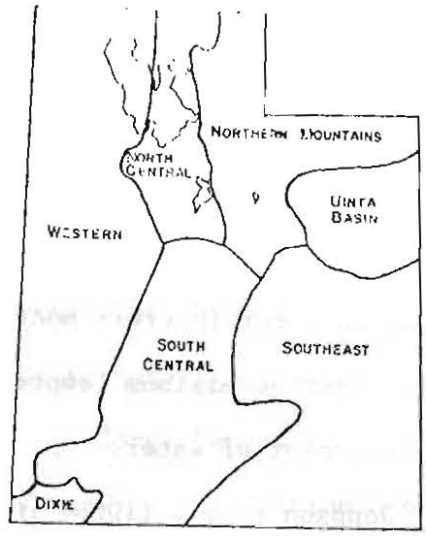
Temperature. In the absence of weather stations operated year-long in the High Uintas, we have resorted to general climatic maps extrapolated

from valley stations by Jeppson et al. (1968). Their maps suggest that mean yearly temperature may be as low as -1.7 C at high elevation and 2.2 C in the foothill zone. Temperatures rarely exceeds 24 C at 3,000 m elevation; average daily maxima are about 18 C in July. Freezing temperatures are known to occur in every month of the year at elevations in excess of 3,000 m. Average maximum temperatures in January never rise above the freezing point of water.

Precipitation. Jeppson et al. (1968) indicate that the crest of the Uinta backbone receives in excess of 100 cm of precipitation per year. Evidence presented below suggests that that may be an over estimate. Jeppson et al. (1968) show that precipitation drops to 40 cm in the foothill zone. Since there are several long-term weather stations in the foothills, this last value is reasonably reliable.

At higher elevations, the bulk of the annual precipitation comes in the period October 1 through April 30 (the so-called soil recharge period). As seen in Figure 2, the shape of the annual precipitation curve is different in the Uinta Mountains and the adjacaent Uinta Basin. At higher elevations, roughly two-thirds of the annual precipitation accumulates in the recharge period, but in the Uinta Basin only about half the annual total falls during the cool season (October 1 - April 30). Consequently, higher elevation sites not only receive more precipitation but less of it is lost to physical evaporation. Thus a greater percentage of the annual precipitation is available for runoff or use by growing plants at higher elevations.

Data on distribution of summer rainfall in time and space are not available for the Uintas, but Whaley and McWhirter (1975) have summarized



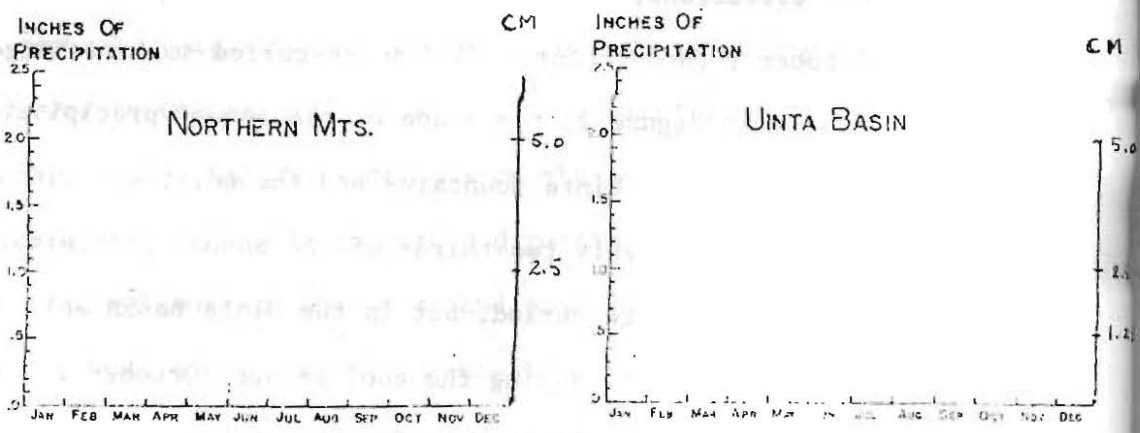


Figure 2. Climatic zones of Utah (above) and distribution of precipitation across the annual gradient in two climatic zones of northeastern Utah (below). Each time-precipitation graph is based upon a composite of all official U.S. Weather Stations in the climatic zone.

all available data for 47 snowcourses in those mountains. All snowcourses used in their report had at least 15 years of data. As summarized in Table 1, the snowcourses show that no altitudinal zone accumulates more than 40 cm of water in the April 1 snowpack in the average year. If the data from Jeppson et al. (1968) in Figure 2 are reliable (and indications are that the data are valid), it seems unlikely that any significant portion of the Uinta Mountains receives more than 80 cm of precipitation per year. This conclusion seems necessary, since the evidence is good that more precipitation falls in the winter period than in the summer.

As expected, snowpack increases with elevation in the Uintas, but the rate of increase does not appear to be uniform (Table 1). There is a sharp increase in depth of snowpack in the elevational zone between 2,750 and 3,050 m. Above 3.050 m, the rate of increase in snow depth with increase in elevation drops back to a value consistent with that observed below 2,750 m.

Winter precipitation becomes progressively more reliable in both time and space as one moves to higher elevations in the Uintas (Table 1). This conclusion is based on the fact that the coefficient of variation values reported in the last two rows of Table 1 decrease with increasing elevation.

History

Native Peoples. The Uinta Mountains were the ancestral home of Shoshone speaking Indians who called themselves Utes. Modern anthropologists refer to those peoples as Fremonts, a more inclusive term than Utes (Jennings 1960). Although only Christian Era archeological

Table 1. - Snowpack characteristics in the Uinta mountains. All data are drawn from "Summary of Snow Survey Measurements for Utah: 1924-74," a report prepared by Whaley and McWhirter (1975).

Characteristic	Elevation Zone (m)				
	2,135-2,440	2,440-2,745	2,745-3,050	3,050-3,355	>3,355
No. Snow Courses	10	12	13	9	3
Average Elevation of Courses (m)	2,317	2,584	2,861	3,163	3,396
Average Years of Record/Course	28	29	27	16	15
Average April 1 Water Content (cm)	22.0	25.8	35.5	36.3	38.5
Maximum April 1 Water Content (cm)[1]	38.5	50.5	65.5	51.0	46.3
Minimum April 1 Water Content (cm)[1]	9.5	4.5	14.8	25.3	31.0
April 1 Snow Density (cm Snow/cm Water)	3.10	3.24	3.34	3.49	3.75
Average Temporal Coefficient of Variation for Water Content (%)[2]	44.6	39.0	27.8	29.7	21.9
Average Spatial Coefficient of variation for Water Content (%)[3]	39.1	52.5	44.2	23.4	19.8

1. Both maximum and minimum April 1 water content values represent long term average values for single snow courses, not all-time maximum or minimum values.

2. Coefficient of variation = $\frac{\text{Standard deviation}}{\text{mean}}$ x 100. C.V. values were computed for each snow course and averaged for all courses within a zone. These values thus represent variation among years at single snow courses.

3. C.V. values are based on the long-term means for all courses in an altitude class. The mean and standard deviation for the long-term means of all courses in an altitude class are used to compute the C.V. values; these values thus represent variation among sites

sites are known for primitive man in the areas here considered, there is presumptive evidence that he has been in the area for over 10,000 years (Untermann and Untermann 1958).

The Utes were unable to converse verbally with the Paiute and Goshiute Indians of nearby northwestern Utah because of deep differences in dialects, even though all were Shoshone speakers. Language differences were paralleled by other cultural differences from west to east among these native residents of Utah. The Utes were wealthier, more mobile and more warlike than their Paiute and Goshiute relatives to the west. Such differences arose primarily from the nature of the natural environments in which they lived. To the west, native peoples were hunters and gatherers at the time of initial contact with white men. Environmental harshness in their desert homeland made it impossible for large groups to exist in any single location; survival alone consumed the vast majority of their energy leaving none for war and little for ornamentation. Moister environments along the shoulders of the Uintas made it possible for the Utes to afford horses, beaded clothing and feather headdresses. New ideas flowed into the Ute culture via occasional contacts with Plains Indians from still farther east.

The Utes waged war with the Blackfeet of Idaho, the Comanches of the plains and the ever increasing population of white men (Jennings 1960). The great Chief Walker who often warred with white settlers throughout the Intermountain West was Ute.

Spanish Fathers. The shoulders of the Uinta Mountains cradled all of the early white contacts in Utah history. Fathers Dominguez and Escalante, the intrepid Franciscan Fathers from Santa Fe, entered Utah

on September 13, 1776, by crossing the Green River near the present site of Jensen, Utah, on the southeast corner of the Uintas (Chavez and Warner 1976). The Dominguez-Escalante party is considered to include the first white men to enter Utah. They came seeking a new overland route between the Catholic colonies of New Mexico and that at Monterey on the California coast. They also evaluated new sites for possible missions.

Fur Traders. William H. Ashley, trapper and trader and first white explorer of the gorge of the Green River through the Uintas, reached the northeast shoulder of the Uintas in April 1825 (Gowans 1976). Other mountain men had reached the Uintas earlier (e.g., in May 1825, Ashley found Etienne Provost and his company still at their winter camp at the confluence of the White and Green Rivers. John Weber and several hundred white men and Indians spent the same winter in the Cache and Salt Lake Valleys of northern Utah), but Ashley was destined to become the chief fur trader of the region because of his unique scheme to organize an annual rendezvous in the Rockies where mountain men and Indians alike could conveniently trade beaver pelts for supplies. His first rendezvous occurred in late June and early July 1825 on a large and lush meadow on the northeast corner of the Uintas along what is now known as Henry's Fork some 20 miles west of its confluence with the Green River. The site is in the state of Wyoming. That first rendezvous attracted a surprisingly large contingent of mountain men: Ashley gives the number as 120 including such well-known names as Etienne Provost, Jedediah Smith, and John H. Weber. All of the foregoing have been honored by having Uinta streams named for them (Gowans 1976).

Forts. Eventually, established trails and heavier traffic permitted established trading posts or so-called "forts" to prosper and rendered obsolete the rendezvous concept. The earliest trading post in the region and the first white settlement in Utah was Fort Robidoux, established in 1832 at the junction of the Uinta and Whiterocks Rivers in the Uinta Basin on the South Slope of the Uintas. The Fort existed only 12 years before it was burned to the ground in 1844 by Indians infuriated by the cruel and unprincipled conduct of the fort's founder, French trapper and trader Antoine Robidoux (Untermann and Untermann 1958).

Fort Crockett was established in 1837 by three fur traders named Sinclair, Craig, and Thompson. The Fort was located in the eastern end of Brown's Hole in northwestern Colorado and on the east end of the Uintas. The Fort apparently catered to Santa Fe rather than to St. Louis trade and for that reason is almost forgotten by western historians who have not seriously researched Santa Fe connections in our area (Purdy 1959). The Fort lasted less than seven years, since John C. Fremont found but a pile of ashes when he visited the site in 1843. How the Fort met its end is unknown.

The largest and most important trading post in the region was Fort Bridger, established in 1842 by the famous mountain man, Jim Bridger. Settlers on both the Oregon Trail and the California Trail passed through Fort Bridger until the Greenwood Cutoff was opened in 1844. In 1844 alone, 1500 emigrants took the Greenwood Cutoff and by-passed Fort Bridger (Gowans and Campbell 1975). Settlers moving through the Fort again increased in numbers when the Hastings Cutoff to California was opened in 1946.

Settlers arriving at Fort Bridger usually had money but equipment was generally in disrepair, draft animals (both cattle and horses) were emaciated and footsore, and supplies were depleted. Bridger's blacksmith shop, sleek draft animals, and surplus supplies were eagerly sought by all comers and his business flourished. Situated as it was on an island in the floodplain of Black's Fork, Fort Bridger offered copious cold, clear water, lush pastures, and cool shade from aspen and willows. The road weary draft animals which Bridger took in addition to money for his sleek animals quickly regained strength in the verdant pastures along Blacks Fork and were traded within weeks to other travellers at a handsome profit. Fort Bridger was thus a welcome oasis for travellers in an arid region and a most lucrative business for its owner. The Fort figured prominentaly in western history until 1890 when the U.S. Army closed down their operations there (Gowans and Campbell 1975).

Because of continuing legal conflicts between Bridger and the new Mormon government of the Territory of Deseret (which included Fort Bridger), the fort was finally sold to the Mormon church in 1855. Their active control of the Fort lasted only two years. In order to slow the movement of the U.S. Army into Utah at the outset of the so-called Utah War, Mormon forces abandoned and then burned the entire Fort on October 2, 1857. On September 9, 1859, the U.S. Army officially confiscated the remains of Fort Bridger and established a large military reserve on the site without offering any compensation to the Mormon owners of the site (Gowans and Campbell 1975).

Yet another forgotten Fort also existed along the North Slope of the Uintas. Fort Supply was established on a bench between Smith's Fork and

Black's Fork Rivers in December 1853. It was located near the present site of Robertson, Wyoming. This was a Mormon fort established during the height of difficulties with Jim Bridger. Fort Supply was clearly to have been an alternative stopping place to Fort Bridger. The thousands of Mormon emigrants arriving annually would now have no necessity to shop at Fort Bridger and enrich an open enemy of their group. It should be noted in passing that Bridger had grounds for resentment against his new neighbors, since they had sought to legislatively take over river ferries that had been operated by mountain men for two decades and to levy taxes on the fort which Bridger had built five years before the Mormons entered the Green River Valley.

Fort Supply's existence was always uncertain. The Fort was abandoned in July 1854 and reoccuppied in May 1855. Feeble agricultural efforts and missionary work to the Indians occupied the settlers until the approaching U.S. Army forced final abandonment of the Fort in 1857. The entire Fort was burned on the same day that Fort Bridger was put to the torch (Gowans and Campbell 1976).

Indian Reservation. In 1861, President Abraham Lincoln issued a proclamation that made a large part of the South Slope of the Uintas an Indian Reservation. The first Indian Agency was established on the southwestern corner of the Uintas in 1864 at the head of Daniels Canyon. In 1865, on the Duchesne River (Untermann and Untermann 1958).

Cattle Industry. The cattle industry supported the first permanent white settlements along the shoulders of the Uintas. As noted earlier, Jim Bridger maintained large cattle herds for trading with emigrants. He apparently supplied animals to pioneer herdsmen such as Jack Robinson, early stockman of Daggett County, Utah. Robinson was mentioned as a

prosperous cattleman of the North Slope of the Uintas as early as 1859 by the famous publisher and politician, Horace Greeley (Purdy 1959). Another early stockman on the North Slope was Jim Baker, originally a mountain man and respected wilderness guide. Baker's herds were distributed along Henry's Fork. Bakers son, Dick, became the first postmaster in Daggett County and guide for the Yale Scientific Expedition which unearthed the famous dinosaur fossil beds along the Green River on the southeastern edge of the Uintas (Purdy 1959).

White settlements along the South slope of the Uintas came slowly. Although Mormon explorers visited the Uinta Basin in 1847 and 1861, both parties recommended against colonization there because of high elevations and short growing seasons. White settlers took up the first homesteads in the Basin in the 1870's. These became cattle ranches with cultivated fields that grew primarily wild hay. Uintah County was not established until 1880 (Untermann and Untermann).

Bad Men. The shoulders of the Uintas have also sheltered some of the West's most disreputable rustlers, train robbers, swindlers, and murderers. The notorious John Slack-Phil Arnold diamond swindle was perpetrated on the edge of the Uintas at Diamond Peak in extreme northwestern Colorado. The swindlers "salted" a claim with real gems and sold it in 1872 for a small fortune. The buyers included such notables as Wm. C. Ralston (California's leading banker), Baron Ferdinand Rothschild of London and Horace Greeley of New York. Henry Janin, one of America's leading mining experts, had "verified" the authenticity of the find. The fraud may well have gone unchallenged had not the pride of Clarence King of the U.S. Geological Survey been wounded by the deal. King had just published a

geological survey of the region wherein he had declared the area devoid of precious metals and gems. King spared no effort to demonstrate that Slack and Arnold only looked innocent--he ultimately proved them to be expert conmen (Purdy 1959).

Brown's Hole, a remote, topographically complex and desolate region in northwestern Colorado was the hideout of a number of small-time cattle rustlers in the 1890's. The infamous Tom Horn, a killer-for-hire employed by the large cattle companies, murdered rustlers from ambush on three different occasions in Brown's Hole. The famous "Wild Bunch" lead by the wayward Mormon, Butch Cassidy (Robert Leroy Parker), also based their outlaw operations in the desolate reaches of Brown's Hole on the east end of the Uintas during the 1890's (Purdy 1959).

Transcontinental Railroad. The Uintas also made a significant contribution to the nation's most ambitious engineering project of the nineteenth century, the transcontinental railroad. During 1867 and 1868, the railroad inched westward across the Wyoming plains. A large percentage of the ties that supported the steel rails originated in lodgepole pine forests on the North slope of the Uintas. Colonies of hardy Finns lived year-around in the High Uintas felling lodgepole and squaring them into ties with hefty broadaxes. The Finns or "Tie-hackers" as they were called often dumped the ties into North Slope rivers at floodtide and floated them to their destination on the railroad right-of-way (Colton 1967 and Beulah Marshall, personal communication). The coming of the railroad triggered major cultural changes in the region and hastened the end of the frontier.

PLANT RESOURCES

Nonvascular Plants

Algae. A total of 173 genera and 831 species of algae are known from the Uinta Mountains (Appendix IIA). About one-third of the algal genera and over 60% of the algal species are contributed by diatoms and desmids. In both lakes and streams, the algae make an important contribution to food chains in Uinta aquatic systems. Since taxonomic work on the algae of the Uintas has been extensive, the list of species reported in Appendix IIA is probably over 90% complete.

Fungi. A total of 113 genera and 233 species of fungi have been reported from the Uintas (Appendix IIA). Some groups such as the fleshy fungi have been collected well while other groups such as the soil microfungi and parasitic fungi have never been studied seriously in the area. Thus, the list of fungal species of the Uintas could probably be doubled by paying close attention to neglected groups. Since fungi play a major role in nutrient cycling and pathological processes in ecosystems, there is a definite need for additional fungal research in the Uintas.

Lichens. The known lichen flora of the Uintas consists of but 39 species (Appendix IIA). That number may be increased by as much as an order of magnitude with additional collecting. Lichen cover contributes almost all the organic matter available on hundreds of hectares of quartzite outcrops and talus heaps at high elevations in the Uintas.

Mosses and Liverworts. These primitive green plants are represented by 59 genera and 139 species in the study area. The lists presented in

Appendix IIA are perhaps 80 to 90% complete for these organisms thanks to the tireless efforts of the late Dr. Seville Flowers, University of Utah, Salt Lake City.

The liverworts are rarely important constituents of any Uinta ecosystem. In contrast, mosses are major producers in many wet meadows, on many rocky faces, and in some aquatic situations.

Vascular Plants

The vegetative cover of most terrestrial locations on earth is heavily dominated by vascular plants. We recognized three major groups of vascular plants in the Uintas: ferns and fern allies, gymnosperms, and angiosperms or flowering plants. As in most other land situations, flowering plants far out-number the two other groups in respect to number of species in the Uintas (see Appendix IIB and the following table).

Group	No. Genera	No. Species
Ferns and Allies	11	20
Gymnosperms (Conifers, etc.)	6	15
Angiosperms (Flowering Plants)	356	1,012

Seven flowering plant families contribute over half the vascular plant species in the Uintas. Those families are:

Family	No. Genera	No. Species
Compositae (Sunflowers)	54	172
Graminae (Grasses)	39	124
Cyperaceae (Sedges)	5	85
Cruciferae (Mustards)	28	54
Scrophulariaceae (Scrophs)	12	50
Leguminosae (Legumes)	11	47
Rosaceae (Roses)	19	43

The vascular plant flora is reasonably well-known in the area but intensive collecting will undoubtedly add new species. The list in Appendix IIB is likely to be over 95% complete, however.

Vegetation and Vegetational Dynamics

Major Types. The vegetation of the Uintas is complex and could profitably be subdivided into over a score of distinct phytosociological types. For the purposes of this report, however, it seems best to maintain a broad classification scheme. Accordingly, only the vegetation types listed in Table 2 will be recognized. A significant community type of the South Slope, the Utah juniper type, is not listed in Table 2, because data for the type could not be found.

The vegetational types in Table 2 are arranged roughly in the order that the types are encountered in the field as one ascends from the base of the mountains to their crest. Although the sagebrush-grass community is the first encountered as one approaches the mountains, the average elevation of stands of that community which are reported by Proctor (1971) is greater than that for either aspen or lodgepole stands (Table 1), even though these latter communities reach maximum development above the sagebrush zone. This incongruity arises because sagebrush has a broad elevational tolerance and many isolated stands at high elevations were sampled by Proctor.

The plant production data in Table 2 include only that growth produced between ground level and a height of 2 meters. Accordingly production from trees is largely ignored. Under that sampling bias, the forests are less productive than adjacent herblands: the reverse would be true if both forest stratum and understory production were considered.

Table 2. - Characteristics of various vegetative types in the Uinta Mountains. Information has been gleened from various reports as noted. Proctor (1971) reports on over 400 sites, but we have summarized only the first 200 in his report.

Vegetational Type	No. of Site Sampled	Average Elevation (m)	Dominant Plant life form in the forage	Annual Above Ground Production Below 2 m (Kg/Ha)	Source of Information
Sagebrush-Grass	26	2530	Shrubs and Grasses	855 ± 352	Proctor 1971
Aspen Forest	33	2313	Shrubs and Forbs	570 ± 321	Proctor 1971
Lodgepole Pine Forest	37	2335	Forbs and Grass	405 ± 398	Proctor 1971
Willow Thickets	4	2330	Shrubs and Grass	2044 ± 934	Proctor 1971
Meadows					
Dry	29	2573	Grasses and Forbs	488 ± 206	Proctor 1971
Forb	32	2550	Forbs and Grass	1250 ± 780	Proctor 1971
Mesic	29	3200	Grasses and Forbs	1074	Harper 1977
Wet	10	2250	Graminoides	2262 ± 1363	Proctor 1971
Wet	?	> 3500	Graminoides	1437	Lewis 1970
Subalpine Fir Forest	9	2500	Forbs and Shrubs	441 ± 461	Proctor 1971
Engelmann Spruce Forest					
Mid-elevations	20	2560	Forbs and Shrubs	675 ± 763	Proctor 1971
Moderately High elevat.	30	3200	Forbs and Grasses	828	Harper 1977
High elevations	?	> 3500	Forbs and Grasses	392	Lewis 1970
Alpine Tundra					
Moderately High elevat.	21	3420	Forbs and Grasses	773	Harper 1977
High Elevations	?	> 3500	Forbs and Grasses	610	Lewis 1970

The data in Table 2 demonstrate that Uinta communities are generally poor producers of plant material. Production is generally lower at high elevations than for comparable topographic situations at lower elevations. That pattern is probably a consequence of shorter growing seasons and poorer soils at higher elevations. Given comparable topographic and growing season conditions, better watered sites out-produce more xeric sites.

In passing, it should be pointed out that all above-gound plant production cannot be utilized by animals. Over half the annual production should be left to supply the plant's own energy requirements. Furthermore, a portion of the surplus tissue is usually unpalatable and not usable by animals. Lewis (1970) used a 40% utilization value in arriving at stocking rates for sheep on Uinta tundra ranges (i.e. only 40% of the total above-ground production was considered to be harvestable, if plant vigor was to be maintained).

Areal Extent. The two most widespread communities in the Uintas are sagebrush-grass and lodgepole pine. Although actual extent of the communit types listed in Table 2 is currently unavailable, it is likely that sagebrush-grass and lodgepole pine combine to cover over 60% of the study area. Alpine tundra and meadows probably account for between 10 and 15% of the area. The remainder of the area is divided among the remaining plant communities, barren exposures of rock and talus, and lakes and ponds.

Successional Dynamics. Vegetational composition is never static anywhere, but time conditioned trends in composition of the vegetation of the Uintas are unusually conspicuous. Two basically different kinds of change have been recognized historically in vegetational succession:

primary and secondary. Primary successions are those in which sites that have never supported plants take a progressively different plant cover through time. Two types of primary succession are identifiable: xerarch and hydrarch. Xerarch primary successions are exemplified by those in which bare rock or raw glacial till on drained slopes is progressively changed as soils form or mature and the plant cover assumes greater stature and stability. Hydrarch successions are seen as depressions that hold ponds or lakes slowly fill with water borne sediments and autochthonous organic matter until the site eventually becomes a terrestrial rather than an aquatic environment. Characteristically, primary successions move slowly with their duration being measured in centuries or even millenia.

Secondary successions describe those vegetational processes that occur on sites that are denuded as by fire or avalanche without destroying the soil and its organic components. Secondary successions move relatively fast with their duration often being measured in decades.

Primary successions are everywhere at work at high elevations in the Uintas. Lichens and mosses colonize such rock surfaces and enhance the weathering processes. As soils begin to accumulate, a progression of vascular plants occupy a given site. Successional processes in the alpine tundra zone of the Uintas have been well summarized by Murdock (1950), Hayward (1952), and Lewis (1970). All agree that the primary successions there are very slow and frequently disrupted by frost action.

Primary hydrarch successions in the Uintas have been studied by Stutz (1951) and Christensen and Harrison (1961). Special attention has been devoted to the invasion of trees into the peat filled glacial depressions of the Uintas by Firmage (1969) and Yuan (1971). Both conclude that the peat filled depressions will not proceed to a forest climax,

depressions of the Uintas by Firmage (1969) and Yuan (1971). Both conclude that the peat filled depressions will not proceed to a forest climax, but will remain dominated by meadow vegetation unless a climatic change occurs that will lower the water table in the depressions.

Secondary successions in the study area are being induced regularly by fires, insect attacks, logging operations, and locally abusive grazing practices. Forest successional dynamics following fire and logging are discussed tangentially by both Proctor (1971) and Henderson et al. (1977). Aspen and lodgepole pine forests are often initiated by forest fires, although both forest types appear to be climax on some sites. Subalpine fir and Engelmann spruce are normally late successional species that depend upon aspen and/or lodgepole pine to properly condition a site for their invasion.

The mountain pine bark beetle is even more influential than fire and logging as a destroyer of lodgepole pine forests at the present time in the Uintas. Fire suppression by the U.S. Forest Service throughout most of this century has permitted the bulk of the Uinta bodgepole pine forests to reach maturity. The mountain pine beetle preferentially attacks mature lodgepole trees and eventually kills them (Amman 1977 and Amman et al. 1977). As a consequence, the Uintas are now experiencing a series of beetle epidemics that annually destroy or greatly reduce the canopy coverage of hundreds of hectares of lodgepole pine forests.

Successional processes following logging in the Uintas are complex and poorly understood. In some cases, forest removal produces a microhabitat so harsh that tree seedlings establish poorly if at all. In other cases, aspen dominates cutover areas. In yet other cases, coniferous species invade cleared areas, but there are no reliable models

for predicting which species will come to dominance on the site. A series of studies of successional dynamics on cutover areas is much needed. In this respect, a plant cover-type map of portions of the upper Bear River drainage prepared in 1972 by Van Balen (1973) may prove helpful in analysis of forest dynamics on cutover areas there.

Secondary successional processes in the alpine tundra zone are locally initiated by abusive grazing by sheep. Recovery rates on such sites have not been studied, but both Lewis (1970) and Thilenius (1975) discuss problems associated with such sore spots and suggest that recovery will probably require long time intervals.

Uses of Vegetation. The plant cover of the Uintas serves a myriad of functions. The most fundamental value of that cover undoubtedly lies in its ability to stabilize soils and control erosion. In addition, the green mantel of vegetation fuels all food chains in the area--without it there could be no animal life. The relationship between wild vertebrate animals and various North Slope vegetative types has recently been detailed in a valuable study by Winn (1976). Urness has studied the feeding behavior of mule deer and elk on the North Slope. He concludes that logging can greatly enhance big game habitat, provided that the logging is confined to small areas (5-20 ha) scattered throughout maturing lodgepole pine forests (Cox 1977). A final value of plant cover is aesthetic: green meadows set in a dark forest or flecks of golden aspen in a September landscape of lodgepole have a value even though none know how to compute it!

Rare Species

None of the vascular species listed in Appendix IIB appear on the official endangered species list which was released by the U.S. Department

of Interior on July 1, 1975 (Federal Register, Vol. 40(127), part V, pages 27880-27883). Six species on our list do appear as threatened species on the Department of Interior list, however. Species listed as threatened are:

Cryptantha stricta
Mertensia viridis var. *cana*
Mertensia viridis var. *dilatata*
Parrya rydbergii
Penstemon acaulis
Penstemon uintahensis

Other endemic or unusual plants of the Uintas that are listed by Welsh et al. (1975) are given in the introductory section of Appendix IIB.

ANIMAL RESOURCES

Invertebrate Animals

The invertebrates of the Uinta Mountains have been little studied and are thus poorly known. Economic considerations have resulted in the insects being better known than any other invertebrate group, but even in that group probably less than a third of the species have been collected and reported. The listings presented in Appendix IIC are grossly incomplete, but more adequate lists are unknown to us.

The mountain pine bark beetle (*Dendroctonus monticolae* - family Scolytidae) through its lethal attacks on lodgepole pine may exert a greater economic impact on the Uinta Mountains than any other animal occuring there.

Vertebrate Animals

Fishes. A total of 22 species are reported from the Uinta Mountains (Appendix IID). Nine of those species are not native to the streams and lakes of the area. Fish species diversity is considerably greater in the streams that drain into the Colorado River as opposed to those that

run into the Great Basin. The Utah cutthroat trout is native to the Uintas, but through hybridization, the original species is probably extinct.

No endangered fish species occur in the area considered in this study.

Amphibians and Reptiles. Cold temperatures and generally oligotrophic waters appear to combine to keep the number of amphibian and reptile species low in the Uintas. Only 8 amphibian and 15 reptile species are known from the study area (Appendix IIE). None of the species are considered to be endangered or threatened.

Birds. The Uintas support the richest avian fauna in the state of Utah. A total of 186 species are recorded for the area (Appendix IIF). The great diversity of species is attributable to ecological variability in the terrestrial environment and the presence of over 600 lakes that maintain a permanent aquatic community. None of the bird species are considered to be endangered or threatened.

Wild Mammals. In all, 82 species of mammals exclusive of man have been recorded at one time or another in the wild in the Uintas (Appendix IIG). Six of those species (i.e., the gray wolf, grizzly bear, fisher, wolverine, bison, and otter) are now believed to be extinct in the area. The endangered black-footed ferret may occasionally pass through the area, but it is not known to maintain a resident population there. No other endangered species are known from the area, but current hunting pressures may threaten the existence of the Canada Lynx.

Domestic Mammals. Cattle, horses, and sheep utilize Uinta ranges during the summer months. Cattle are normally confined to lower elevations, gentler slopes, and nonforested areas. Sheep are better

adapted for the cold, wind herblands at high elevations and for forested ranges. Horses utilize the ranges under special permits for herding or recreation use.

HUMAN ACTIVITIES

Management Agencies

The U.S. Forest Service manages the bulk of the core of the Uinta Mountains and far more land than any other agency in the area according to Bureau of Land Management (1978) Land Status Map. The next largest block of land above 2100 m elevation is apparently controlled by private individuals. Both BLM and the Bureau of Indian Affairs manage large blocks of land on the south and east slopes of the range. The Uinta and Ouray Indian Reservation extends for over 80 km along the South Slope and includes considerable acreages above the 2500 m contour. BLM holdings are concentrated on the east and southeast edges of the range. Land owned by the State of Utah includes sizeable acreages on Tabby Mountain north of Fruitland, in the area south and west of Manila and scattered throughout BLM holdings on the east and southeast edges of the Uintas. Private land above 2100 m elevation is abundant north and east of Strawberry Reservoir, between Diamond Mountain and Flaming Gorge Reservoir, west of Manila, and along the northwest corner of the range. The U.S. Department of Interior manages the Flaming Gorge National Recreation Area. Wildlife throughout the entire area under consideration is managed by the Utah Division of Wildlife Resources. Streamflow and water physical characteristics are monitored by the U.S. Geological Survey, Division of Water Resources. Snow courses are maintained by the Soil Conservation Service.

The Utah Division of Wildlife Resources estimates (see John 1977) that summer range land ownership for seven deer herd units that occur on the Uinta Mountains (Units 19, 20, 22, 22B, 24, 25, and 26 including about 1,568,700 ha) is distributed as shown below.

	Agency					
	Forest Service	Private	BLM	Indian Reservation	Utah State	Other
%	66.1	24.1	4.3	3.6	1.9	0.1

Nonbiological Resources

Minerals. The absence of igneous activities in the history of the Uintas has left them notably devoid of mineral deposits. Even the deep gravel deposits around the fringes of the range have been little exploited because of their remoteness from suitable markets. There is coal withdrawal in the Currant Creek drainage on the South Slope.

Petroleum. Petroleum has been discovered on all sides of the Uinta uplift. The Uinta Basin field on the South Slope is particularly productive.

Water. The Uintas are the source of about 1.8 km^3 (1.6×10^6 acre feet) of surface runoff water in the average year (Jeppson et al. 1968). About 68% of that water feeds into the Green River, a major tributary of the Colorado. The remaining water finds its way into the Great Basin. Since hydrologists maintain that water-yielding areas in Utah occur only above about 2,000 m elevation (Croft and Bailey 1964), most of the runoff water noted above originates on the Uinta Mountains per se, with an area of roughly 1.5×10^6 ha. Accordingly, the Uintas appear to be yielding about 12 cm of runoff water per cm^2 of surface.

The runoff water is used locally for power generation and irrigation. A large percentage of the water that originates on watersheds that feed into the Green River eventually finds its way into the Colorado (Wasatch National Forest 1976).

Detailed watershed studies have been carried on at the East Fork of Smiths Fork Barometer Watershed since 1968 (Potyondy 1976 a and b). Status of the watershed is currently under review by the Wasatch National Forest. Continued operation of the watershed recording network is uncertain.

Biological Resources

Recreation. The Uintas are a major recreation ground for the population centers along the Wasatch Front in Utah. The Flaming Gorge Recreation Area attracts visitors from a much wider sphere than the remainder of the area. To cope with the visitors, management agencies have developed dozens of picnicing and/or camp sites on the Uintas (see multipurpose map 4 prepared by the Utah Travel Council, 1977 for exact locations and kinds of recreation developments in the area).

Recreation guides have been prepared for the Uinta area by a variety of government agencies and private individuals. Hiking trails across the Uintas have been summarized by Davis (1974). A general story of Uinta recreation opportunities and lore has been published by Lambert (1964). Evans and Belknap (1973 and 1974) have prepared sophisticated travel guides for the Flaming Gorge Dinosaur National Monument and the Desolation Canyon area. The Primitive Area of the Ashley and Wasatch National Forests has been described in considerable detail in a booklet prepared by the Intermountain Region of the U.S. Forest Service

(1967). The Intermountain Region of the Forest Service prepared a pocket-sized description of the area in 1972.

The Primitive Area as currently constituted includes the nuclear area of the High Uintas and has an area of about 81,500 ha (201,385 acres). The Intermountain Region of the Forest Service (1967) proposed that the Primitive Area be expanded to a size of 130,770 ha and designated as a Wilderness Area. At this time, that proposal has not been acted upon but there are strong pressures to move the proposal along (Bauman 1978). Currently in excess of 35,000 people hike, horseback ride, fish, or hunt in the Primitive Area annually (High Uintas Wilderness Coalition 1978). That use appears to be divided among activities in roughly the following way: hiking (27%), fishing (33%), back country camping (40%). The foregoing breakdown is drawn from annual recreation summaries made by the Ashley National Forest.

Total recreation use on lands controlled by the U.S. Forest Service currently appears to be running close to 3×10^9 visit days per year. The use distribution among the Forests is roughly 50% on the Ashley, 42% on the Wasatch and 8% on the Uinta (only a portion of the Uinta National Forest extends onto the Uinta Mountains). The three major contributors to the visitor day total was broken down roughly as follows on the Ashley National Forest in the early 1970's: camping (33%), fishing (20%), and hiking (13%). Hunting contributed about half as many visitor days as fishing. Similar use distribution appears to hold elsewhere on the Uintas as well.

Summer home developments are scattered throughout the Uintas, but the total number of homes is not large (probably less than 1000).

Recreation at private residences and camping areas on the Ashley National Forest contributed less than 5% of total visitor days in the early 1970's.

Even though hunting accounts for fewer visitor days than fishing, big game hunting particularly is a major activity on the Uinta Mountains. The range supports the largest of Utah's three moose herds (Wilson 1971 and Babcock 1977) and large elk and deer herds. In 1976, 45 bull moose were harvested on the Uintas (John and Fair 1977). The range also provided a harvest of 791 elk in 1976, roughly one-third of the elk harvested in Utah that year. During the period 1970-1976, an average of 1500 mule deer per year were harvested on the Uintas. The deer harvest was made by an average annual force of 4300 hunters, each of whom spent an average of 3.6 days in pursuit of their buck (John and Fair 1977).

In an experimental attempt at enriching the upland game bird resource in Utah, the Division of Wildlife Resources reintroduced ptarmigan into the tundra areas of the High Uintas in 1976. The population is apparently reproducing in its new home in Painter Basin near Kings Peak (Hall 1978).

Commercial Uses--Trapping. The number of fur bearers removed from the Uintas annually is unknown, but it is known that commercial trappers take muskrat and beaver in large number there annually. Other fur bearers on the range include the coyote, lynx, martin, and weasel.

Commercial Lodges. A popular lodge exists at Moon Lake on the South Slope. At least two other commercial lodges exist on the North Slope. The Lodge at Mirror Lake burned a few years ago and will not be rebuilt.

Commercial Logging. Over 44% of the volume of saw logs harvested in Utah originates on the Uinta Mountains (Setzer and Throssell 1977).

The timber is milled at plants in Evanston, Heber, and Vernal among other places. The total volume of timber harvested on the Uintas amounts to just slightly over 4.6×10^5 cubic meters per year (5 million cubic feet). The harvest is distributed among species as follows:

Species	%
Lodgepole Pine	58.6
Engelmann Spruce	30.8
Douglas Fir	5.5
Aspen	3.1
True Firs	1.3
Ponderosa Pine	0.7

Significantly only about 1.1% of the annual harvest comes from dead trees (Setzer and Throssell 1977). Considering the large volume of lodgepole killed annually by the mountain pine beetle, failure to harvest dead trees amounts to a large loss.

Commercial Grazing. The Uinta Mountains provide summer grazing for 119,709 animal unit months (an AUM is equal to one cow with calf at side or 5 ewes with lambs). The AUM's are allotted about equally to cattle and sheep (52.1% and 45.7% respectively). Horse account for 2.2% of the AUM's with most of those being recreation riding horses on the Ashley National Forest. The AUM's are distributed among Forests as shown below.

	AUM's		
Forest	Cattle	Sheep	Horses
Ashley	35,368	18,749	2,300
Uinta	8,032	18,272	-
Wasatch	18,989	17,653	346

CONTROLS ON HUMAN ACTIVITIES

Governmental

Both the Forest Service and BLM regulate multiple use activities under rather firm quidelines. Lumbering, grazing, and most recreation

activities are managed by those agencies. Hunting activities are controlled by the Utah Division of Wildlife Resources.

Natural

Winter. Deep snow, cold temperatures and difficulty of access severely limits human activities in the Uintas in winter. Logging and oil well maintenance roads are kept open to moderate elevations throughout the winter at several locations around the periphery of the range. All such activities are carried on by private concerns. The State of Utah maintains snowmobiling trail heads throughout the winter at several points around the range, but few snowmobilers venture more than a few kilometers away from the trail head.

Summer. Summer activities are affected by late lying snow and snow thunder storms which reach peak frequency in August. A lightening storm in the tundra country is a frightening experience for those that have survived one. Such storms have taken the lives of a few back country hikers.

Fire. Wildfires in the study area are common and do exert an influence on human activities although we know of no losses of human life from wildfires in the Uintas. Fires do cause significant economic losses, however.

We have summarized the fire records that pertain to the Uintas from both the Ashley and the Wasatch National Forests. An average of 58% of the fires reported on the two Forests over the period 1961-1974 were started by man. Man caused fires like natural (lightening) fires reach maximum frequency in July and August. Of the over 500 fires reported, the average distribution through time is shown on the following page.

	Month						
	May	June	July	August	September	October	November
Ave. % All Fires	1.0	5.5	29.5	27.0	14.5	15.5	0.0

The slight rise in fire frequency in October is attributable to heavier human use during the annual deer hunt which traditionally occurs in that month in Utah. Less than 3% of reported fires burn more than 4 hectares (10 acres).

Snow Avalanches. The absence of concentrated human activities in the bottoms of deep canyons in the winter has spared the Uintas of avalanche disasters such as are common at the ski resorts along the Wasatch Front in Utah. Uinta landforms are less precipituous than those of the Wasatch (Stevens 1970), but steep leaward slopes of high elevation ridges in the Uintas nevertheless accumulate deep snow drifts that regularly release avalanches. Fortunately few humans venture close to such slopes in the Uintas in winter.

Access Routes. Two blacktopped highways cross the ends of the Uintas. Utah Highway 150 (the so-called Mirror Lake Highway) crosses the west end of the range running between Kamaa and Evanston, Wyoming. On the east end of the range, Utah Highway 44 connects Vernal with Dutch John and Manila. Gravel roads extend into most major stream drainages, but the entire heart of the range is roadless.

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APPENDIX I

MAJOR CONTACTS KNOWLEDGABLE ABOUT UINTA RESOURCES

Name and Address	Specialty
Gene D Amman Principal Entomologist Intermountain Forest & Range Experiment Station Ogden, Utah 84401	Bark Beetles
Ted Arnow District Chief, Water Resources Division U.S. Geological Survey Federal Bldg. --125 South State St. Salt Lake City, Utah 84138	Water Resources
Wm. H. Babcock Game Biologist Utah Division of Wildlife Resources 1596 West North Temple Salt Lake City, Utah 84116	Moose
Dr. James L. Baer Dept. of Geology Brigham Young University Provo, Utah 84602	Petroleum Geologist
Milo Barney Division of State Lands State Capitol Bldg. Salt Lake City, Utah 84101	Land Policy for Utah
Dr. George Bohort Bee Taxonomy Lab--USDA Utah State University Logan, Utah 84322	Entomology (particularly Diptera) and Hymenoptera
Dwight Bunnell Upland Game Supervisor Utah Division of Wildlife Resources 1596 West North Temple Salt Lake City, Utah 84116	Ptarmigan
Dr. Jerran Flinders Dept. of Botany and Range Science Brigham Young University Provo, Utah 84602	Mammalogy
Dr. Bertrand F. Harrison 655 N. 1130 E. Provo, Utah 84601	Botanist & Environmentali

Dr. Jan A. Henderson Dept. of Forestry Utah State University Logan, Utah 84322	Forest Classification
Jim Kimball Wasatch National Forest 4438 Federal Bldg. 125 South State St. Salt Lake City, Utah 84138	Game Biologist
Dan Lawrence Director, Utah Division of Water Resources 435 State Capitol Salt Lake City, Utah 84114	Water Resources
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Dr. Kent McKnight Plant Science Research Division Agricultural Research Service USDA Beltsville, Maryland 20705	Fungi and Summer Home Residences
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Dr. Samuel R. Rushforth Department of Botany Brigham Young University Provo, Utah 84602	Water Quality

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Homer Stapley Chief, Big Game Research Utah Division of Wildlife Resources 1596 West North Temple Salt Lake City, Utah 84116	Big Game
Dr. Dale J. Stevens Dept. of Geography Brigham Young University Provo, Utah 84602	Geomorphology
Rodney Stone Fishery Biologist Utah Division of Wildlife Resources 1596 West North Temple Salt Lake City, Utah 84116	
Dr. Vasco M. Tanner Monte L. Bean Museum Brigham Young University Provo, Utah 84602	Zoologist & Environmentalist
Dr. Wilmer W. Tanner Department of Zoology Brigham Young University Provo, Utah 84602	Herpetologist
Dr. Phil Urness Dept. of Wildlife Resources Utah State University Logan, Utah 84322	Big Game Behavior
Dr. Stanley L. Welsh Monte L. Bean Museum Brigham Young University Provo, Utah 84602	Endangered Plant Spec
Dr. David S. Winn Research Biologist Wasatch National Forest 125 South State St. Salt Lake City, Utah 84138	North Slope Ecosystem

APPENDIX II

SPECIES LISTS

APPENDIX A

CHECKLIST OF THE CRYPTOGAMIC FLORA OF THE UINTA MOUNTAINS, UTAH

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Provo, Utah 84602

This list of cryptogamic species including algae, fungi, lichens, mosses and liverworts is a result of numerous collections over the past 50 years. Several works are unpublished but specimens have either been placed in the BYU herbarium or species lists were made available by the workers. Although this list is rather extensive, it is not a complete list of all cryptogams in the Uinta Mountains. For example, the list of phycomycetes is a result of a single study at Lily Lake. Streams would undoubtedly support a somewhat different phycomycete flora. The micro and parasitic fungi listed are also seriously under-represented. The total number of species present in those groups in the region in question would undoubtedly amount to a few hundred.

The algae make up about two-thirds of the total cryptogamic flora. Two fine studies, one of the diatoms of the Provo River and another of the desmids of Lily Lake account for over one-half of the total number of algae listed. The rest are primarily blue-greens with only a few representatives from the euglenoids, dinoflagellates and red algae.

Summary of Cryptogamic Species

	Genera	Species
BLUE GREEN ALGAE	37	126
YELLOW-BROWN ALGAE	47	281
DIATOMS	40	261
GREEN ALGAE	80	413
DESMIDS	20	253
EUGLENOIDS	4	6
DINOFLAGELLATES	2	2
RED ALGAE	3	3
WATER MOLDS	19	34
SLIME MOLDS	11	19

CUP FUNGI	20	47
LOCULASCOMYCETES	2	2
IMPERFECT FUNGI	2	2
RUSTS & SMUTS	2	2
FLESHY FUNGI	57	127
LICHENS	21	39
MOSSES	42	102
LIVERWORTS	17	37
TOTAL	366	1242

ALGAE	173	831
FUNGI	113	233
LICHENS	21	39
MOSSES & LIVERWORTS	59	139

The following references were used in compiling the list of algae. The numbers after each species correspond to these references.

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THE ALGAE

CYANOPHYTA (BLUE-GREEN ALGAE)

CHROOCOCCALES

CHROOCOCCACEAE

ANACYSTIS MARGINATA 3
APHANOCAPSA ELACHISTA 3,5,6
A. ENDOPHYTICA 3
A. GREVILLEI 3,6
A. PULCHRA 5
A. VIRESCENS 3
A. SP. 9
APHANOTHECE CLATHRATA
A. SAXICOLA 3,6
A. STAGNINA 3,6
A. SP. 10
CHROOCOCCUS COHAERENS 3,6
C. LIMNETICUS 5
C. MACROCOCCUS 3
C. MINUTUS 5
C. PRESCOTTII 3
C. TURGIDUS 3,5,6,9
COELOSPHAERIUM DUBIUM 5
C. KUETZINGIANUM 3,5,6
C. NAEGELIANUM 11
C. SP. 3,9,10
EUCAPSIS ALPINA 6
GLOEOCAPSA CALCAREA 3
G. SP. 3,6,9
GOMPHOSPAERIA APONINA 3
G. LACUSTRIS 5
G. SP. 10
MERISMOPEDIA ELEGANS 3,5,6,10
M. GLAUCA 5
M. NOVA 5
M. SP. 3,9
MICROCYSTIS AERUGINOSA 3,5,6,9
M. FLOS-AGUAE 3
M. INCERTA 3,9
M. PULVEREA 5,6
M. SP. 3
RHABDODERMA LINEARE 3
SYNECHOCOCCUS SP. 6
SYNECHOCYSTIS SP. 6

ENTOPHYSALIDACEAE

HETEROHORMGONIUM SCHIZODICHOLOMUM 3

CHAMAESIPHONALES

CHAMAESIPHONACEAE

CHAMESIPHON SP. 3

OSCILLATORIALES

OSCILLATORIACEAE

LYNGBYA AERUGINEO 5
L. CONTORTA 5
L. MAJOR 3,6
L. MARCENSIANA 5,6

L. NANA 5,6
L. SP. 9
L. SP. 9
MICROCOLEUS PALUDOSUM 5
M. SP. 6
OSCILLATORIA AGHARDI 1,5
O. AMOENA 11
O. AMPHIBIA 3,5,6
O. ANGUSTISSIMA 6
O. ANIMALIS 3,6
O. CURVICEPS 5
O. CRUENTA 3,6
O. FORMOSA 3,6
O. GEMINATA 5
O. LEMERMANNII 3
O. LIMOSA 5
O. NIGRO-VIRIDIS 3
O. PROLIFICA 3
O. SANETA 3
O. SPLENDIDA 3
O. TENUIS 3,6
O. SP. 3,9
O. SP. 9
PHORMIDIUM AMBIGUUM
P. ANGUSTISSIMUM 6
P. INCRUSTATUM 3
P. TENUE 3
P. SP. 3
P. SP. 9
P. SP. 10
SCHIZOTHRIX SP. 6
SPIRULINA PRINCEPS 5
S. SP. 9
TRICHODESMIUM ERYTHRAEUM 5

NOSTOCALES

NOSTOCACEAE

ANABAENA FLOS-AGUAE 3,6
A. INAEQUALIS 3,5,6
A. OSCILLARIODDES 3,6
A. VARIABLIS 6
A. SP. 9
A. SP. 9
A. SP. 10
A. SP. 11
ANABOENOPSIS SP. 9
AULOSIRA SP. 3
NODULARIA AMORICA 11
NODULARIA HARVEYANA 3, 11
N. SPOMIGENA 3
N. SP. 5
NOSTOC COMMUNE 5
N. MUSCORUM 5
N. PALUDOSUM 3
N. PISCINALE 3
N. PRUNIFORME 9

N. SPHAEROIDES 3
N. VERRUSOSUM 3, 11
N. SP. 6
N. SP. 3
N. SP. 10
N. SP. 9
N. SP. 9

STIGONEMATACEAE

HAPALOSIPHON SP. 6
H. SP. 9
H. SP. 10
NOSTOCHOPSIS SP. 9
STIGNEMA TURTACEUM 3
S. SP. 3

SCYTONEMATACEAE

DESMONEMA SP. 9
MICROCHAETE ROBUSTA 5
SCYTONEMA SP. 10
TOLYPOTHRIX LANATA 5,6
T. LIMBATA 3
T. PENCILLATA 5
T. TENUIS 6
T. SP. 3
T. SP. 9
T. SP. 10

RIVULARIACEAE

CALOTHRIX PARIENTINA 11
DICOTHRIX MENEGHINIANA 5
D. ORSINIANA 5
RIVULARIA SP. 9
R. SP. 11

CHLOROPHYTA (Green Algae)

CHLOROPHYCEAE

VOLVOCALES

CHLAMYDOMONADACEAE

CHLAMYDOMONAS SP. 6,9

VOLVOCACEAE

EUDORINA SP. 6
GONIUM PECTORALE 6
G. SP. 9
PANDORINA MORUM 3,6,9
PLEODORINA SP. 9
VOLVOX SP. 6, 10

TETRASPORALES

TETRASPORACEAE

TETRASPORA CYLINDRICA 3
T. GELATINOSA 3
T. LUBRICA 3,5
T. SP. 6
T. SP. 9

GLEOOCYSTACEAE

ASTEROCOCCUS LIMNETICUS 3,5
GLOEOCYSTIS AMPLA 6
G. GIGAS 5,6
G. SP. 3

G. SP. 9

CHLOROCOCCALES

CHLOROCOCCACEAE

CHARACIUM AMBIGUUM 3
C. ELLIPSOIDEA 3
C. PRINGSHEII 3
C. SP. 6
C. SP. 8
CHLOROCOCCUM HUMICOLA 6
C. SP. 3
PLANKTOSPHAERIA GELATINOSA 3
P. SP. 6
TETROEDRON SP. 9

PALMELLACEAE

PALMELLA MUCOSA 3
SPHAEROCYSTIS 3,6

HORMOTILACEAE

PALMODICTYON VARIUM 5,6

OOCYSTACEAE

ANKISTODESJUS FLACATUS 3,5,6
A. F. VAR. MIRABILIS 5
A. SP. 2
A. SP. 9
CLOSTERIOPSIS SP. 6
EREMOSPHAERA VIRIDIS 3,6
GLOEOTAENIUM LOITLESBERGERIANUM 5
KIRCHNERIELLA OBESA 6
NEPHROCYTIUM LIMNETICUM 3
N. LUNATUM 3
N. OBESUM 5
OOCYSTIS CRASSA 5
O. ROTUNDA 5
O. SOLITARIA 5
O. SP. 6
QUADRIGULA CHODATII 6
SELENASTRUM GRACILE 6
S. WESTII 3,6

DICTYOSPHAERIACEAE

DICTROSPHAERIUM ACUTA 3
D. PULCHELLUM 3,5,6
WESTELLA BORTYOIDES 3
W. LINEARIS 5

SCENEDESMACEAE

COELASTRUM SP. 6
CRUCIGENIA RECTANGULARIS 3
SCENEDESMUS ARMATUS 9
S. BIJUGA 3,6
S. DENTICULATUS 6
S. DIMORPHUS 6
S. OBLIQUUS 5,6
S. QUADRACAUDA 5
S. QUADRISPINA 3,6
S. SP. 3
S. SP. 6

HYDROCITACEAE

HYDRODICTYON RETICULATUM 3
PEDIASTRUM ANGULOSUM 3
P. BORYANUM 3,5,6,9
P. DUPLEX 3,6
P. PERTUSUM 3
P. SCULPTATUM 5
P. TETRAS 3,6
P. YETRAODON 5
SORASTRUM AMERICANA 3

ULOTRICHALES
ULOTRICHACEAE
BINUCLEARIA TETRANA 5
HORMIDIUM SP. 9
H. SP. 10
ULOTHRIX SUBTILLISSIMA 5
U. TENUISSA 3, 11
U. VARIABILES 11
U. ZONATA 1,3,6,11
U. SP. 3
U. SP. 9
U. SP. 10
MICROSPORACEAE
MICROSPORA LOEFGRENII 5
M. STAGNORUM 5
M. WILLEANUM 3,5
M. SP. 6
M. SP. 9
M. SP. 10

ULVALES
ULVACEAE
MONOSTROMA QUATERNARIUM 11
PRASIOLACEAE (SHIZOGONIACEAE)
SCHIZOGONIUM SP.

CHAETOPHORALES
CHAETOPHORACEAE
CHAETOPHORA ELEGANS 3,6,11
C. INCRASSATA 5
C. SP. 9
DRAPARNALDIA GLOMERATA 3,6
D. SP. 3
D. SP. 9
D. SP. 10
MICROTHAMNION SP. 6
PROTOCOCCUS VIRIDIS 6
STIGEOCLONIUM SP. 3
S. SP. 9
CHAETOSPHAERIDIACEAE
CHAETOSPHOERIDIUM SP. 9
DICRANOCHAETACEAE
DICRANOCHAETE RENIFORMIS 5

OEDOGONIALES
OEDOGONIACEAE
BULBUCHAETE SP. 5
B. SP. 9
B. SP. 10

OEDOGONIUM SP.
O. SP. 3
O. SP. 5
O. SP. 9
O. SP. 10
O. SP. 5
O. SP. 5
O. SP. 5

SPHAEROPLEALES
SPHAEROPLEACEACE
SPHAEROPLEA ANNULINA 3
S. SP. 3

SIPHONOCLADALES (CLADROPHORADES)
CLADORPHORACEAE
CLADOPHORA GLOMERATA 3,11
C. KUETZINGIANA 11
RHIZOCLONIUM HEEROGLYPHICUM 5

ZYGNEMATALES
ZYGNEMATACEAE
MOUGEOTIA CAPUCINA 3,6
M. GENUFLEXA 3
M. LAETEVIRENS 3
M. PARVULA 3,5,6
M. SP. 1 9
M. SP. 2 9
SPIROGYRA COMMUNIS 3,6
S. CRASSA 3,6
S. DECIMINA 3,6
S. DUBIA 6
S. GREVILLEANA 3,6
S. INFLATA 3,6
S. NEGLECTA 3
S. PARVULA 3
S. PROTICALIS 3,11
S. VARIANS 5
S. WEBERI 3,6
S. SP. 1
S. SP. 3
S. SP. 5
S. SP. 9
S. SP. 9
S. SP. 11
ZYGNEMA CRUCIATUM 5
Z. CYLINDRICUM 5
Z. ERICETORUM 5
Z. INSIGNE 3,5,6,11
Z. PECTINATUM 3
Z. SP. 1
Z. SP. 3
Z. SP. 9
ZYGONOGONIUM SP. 9
Z. SP. 10
MESOTAENIACEAE
CYLINDROCYSTIS CONFERTA 5
C. SP. 6

GONATOZYGON SP. 6
MESOTOENIUM SP. 9
M. SP. 10
NETRIUM SP. 9
SPIROTAENIA CONDENSATA 6
S. SP. 9

DESMIDIACEAE

ARTHRODESMUS BULNHEIMII VAR. SUBINC
A. CONVERGENS 3,6
A. FRAGILIA 6
A. INCUS 6
A. TRIANGULARIS 7
A. T. VAR. INFLATUS 7
A. SUBULATUS 6
A. RALFSII 7
CALACYLINDRUS MINUTUS 3
CLOSTERIUM ABRUPTUM 3,6,8
C. ACEROSUM 6,11
C. ANGUSTATUM 7
C. ARCHERIANUM 7
C. CALOSPORUM 7
C. COSTATUM 7,8
C. CYNTHIA 7
C. DECUSSATUM 3
C. DELPONTEI 3
C. DIANE 7
C. D. VAR ACUTUM 3
C. DIDYMOTOCUM 7
C. EHRENBERGII 3,6
C. ENSIS 3
C. INTERMEDIUM 7
C. JUNCIDUM 3,6,7
C. J. VAR. ELONGATUM 7
C. KUTZINGII 3,6,7
C. LANCEOLATUM 6,7,8
C. LATERALE 7
C. LINEATUM 3,6,7,8
C. LUNULA 3,6
C. MACILENTUM 3,6,7
C. MONILIFORME 3,8
C. PARVULUM 3,6,7,8
C. PSEUDODIANAE 7
C. PUSILLUM 7
C. RALFSII VAR. HYBRIDUM 7
C. ROSTRATUM 6, 10
C. STRIOLATUM 3,6,7
C. SP. 7
C. SP. 7
C. SP. 7
C. SP. 7
C. SP. 7
C. SP. 2
C. SP. 3
C. SP. 5
C. SP. 6

COSMARIUM ANGULOSUM 7
C. ANGULOSUM VAR. CONCINNUM 8
C. AMOENUM 7
C. BIOCULATIM 7,8
C. BOECKII 7
C. BOTRYTIS 1,6
C. BROOMII 6
C. CIRCULARE 3,6
C. CONNATUM 7
C. CONTRACTUM 7
C. CONSTRICTUM 3
C. COSTATUM 8
C. CRENATUM 3,6,8
C. CUCUMIS 7
C. DENTICULATUM F. BORGEI 7
D. DEPRESSUM 6
C. DIFFICILE 7
C. ELEGANTISSIMUM F. MINOR 7
C. ELOISIANUM VAR. DEPRESSUM 7
C. EXCAVATUM 3,6
C. FURCATOSPERMUM 7
C. HAMMERI 7
C. H. VAR. PROTUBERONS 9
C. INTERMEDIUM 3
C. ISTHMOCHONDRUM 7
C. MARGARITATUM 3,6,8
C. MARGARITIFERUM 7,8
C. MELANOSPORUM 7
C. MENEGHINII 3,7,8
C. MONILIFORME 3,6,7
C. NITIDULUM 7
C. NORVEGICUM 7
C. OBTUSATUM 7
C. OCHTHODES 3
C. ORBICULATUM 6,7
C. ORNATUM 6,7
C. ORTHOSTICHUM 7
C. OVALE 6
C. PHASEOLUS 6
C. P. VAR. ELEVATUM 7
C. PORTELLA 3
C. PROTIANUM 7
C. PSEUDOCONNATUM 7
C. PSEUDAMOENUM 7
C. P. VAR. BASILARE 7
C. PSEUDOPYRAMINATUM 7
C. PUNCTULATUM 8
C. PYCNOCHONDRUM 3,6
C. PYRAMINDATUM 3,6
C. QUADRATULUM 7
C. QUADRIFARIUM F. HEXASTICHA 7
C. QUINARIUM F. IRREGULARIS 7
C. REFUSUM 3,6
C. RENIFORME 6

C. SPECIOSUM 6
C. *SUBCOMINUS* 9
C. SUBCRENATUM 7,8
C. S. VAR. ISTHMOCHONDRUM 8
C. SUBEXCAVATUM 7
C. SUBSPECIOSUM 7
C. S. VAR. VALIDIUM 8
C. SUBTURGIDUM F. MINOR 8
C. SUPRASPECIOSUM 3,6
C. TETRAPHTHALMUM 3,6
C. TINCTUM 7
C. TRACHYPLEURUM VAR. MINUS 7
C. TUMIDUM 7
C. TURPINII 8
C. T. VAR. EXMIUM 8
C. UNDULATUM 3,6,7
C. VENUSTUM 7
C. VIRIDE 7
C. V. F. GLABRA 7
C. SP. 7
C. SP. 7
C. SP. 7
C. SP. 7
C. SP. 7
C. SP. 5
DESMIDIUM COARCTATUM 7
D. C. VAR. AMBRICUM 5
D. CYLINDRICUM 7
D. QUADRATUM 7
D. SWARTZII 3,5,6,7
D. SP. 3
DOCIDIUM BACOLUM 10
EUASTRUM AMERICANUM 3
E. ANSATUM 3,6,7,8
E. ABOENSE 7
E. BIDENTATUM 7,8
E. BINALE 6
E. BINALE F. GUTWINSKII 7
E. CRASSUM 3,7
E. DENTICULATUM 7
E. DIDELTA 3,6,7,8
E. ELEGANS 3,6,7,8
E. E. VAR NOVAE SEMLIAE 7
E. E. VAR. EVERETTENSE 3
E. EBERETTENSE 6
E. GEMMATUM 6,8
E. HUMEROSUM 7
E. INSULARE 3,7
E. OBESUM 7
E. PECTINATUM 5
E. PINNATUM 3,6
E. PULCHELLUM 6
E. SPINOSUM 3
E. VERRUCOSUM 3,6,10

E. V. VAR. RHOMBOIDEUM 8
E. SP. 3
E. SP. 6
E. SP. 7
GONATOZYGON BREBISSONII 8
GYMNOZYGA BREBESONII 3,6
G. MONILITORMIS 5
G. SP. 7
HYALOTHECA DISSILIENS 3,5,6,7
H. MUROSA 3,8
H. UNDULATA 7
MICRASTERIAS AMERICANCA 6,7,8
M. APICULATA VAR. BRACHYPTERA 7
M. CONFERTA 3,7
M. DENTICULATA 3,6,7
M. DEPAUPERATA VAR. WOLLEI 7
M. FIBRIATA 3
M. FURCATA 3,6
M. MURICATA 3,6,7
M. OSCITANS 7
M. PAPILLIFERA 6,7
M. PINNATIFIDA 3,7
M. RADIATA 6,7
M. ROTATA 3,6,7
M. SOL 7
M. TRUNCATA 7
M. SP. 3
M. SP. 7
NETRIUM DIGITUS 3,6,7
N. D. VAR. CONSTRICTUM 8
N. INTERRUPTUM 3,6
N. NAGELII 7
N. OBLONGUM 7
N. SP. 3
ONYCHONEMA FILIFORME 7
PENIUM CLOSTERIOIDES 3
P. INTERRUPTUM 3
P. MARGARITACEUM 3,6
P. MINUTUM 7
P. SPIROSTRIOLARUM 8
P. SP. 7
P. SP. 7
P. SP. 7
P. SP. 7
PLEUROTAENIUM CORONATUM VAR. NODULOSUM 3,8
P. EHRENBERGII 7,8
P. MAXIMUM 5,7
P. NODOSUM 3,6,7
P. TRABECULA 3,6,7
P. T. VAR. RECTUM 7,8
P. TRUNCATUM 3,8
P. SP. 3
SPHAEROZOSMA FILIFORME 3,6
S. GRANULATUM 3,8

S. PULCHRUM 3
S. WALLICHII VAR. ANGLICUM 7
SPONDYLOSIUM PLANUM 7
S. SP. 5
STAURASTRUM ACULEATUM 7
S. ALTERNANS 7
S. ANATINUM 7
S. ARCTISCON 3,7
S. BRASILIENSE VAR. LUNDELLII 7
S. CERASTES 7
S. CONCINNUM 6
S. CORONULATUM 6
S. CORNUTUM 7
S. CRENULATUM 6
S. CUSPIDATUM 7
S. DILATATUM 7
S. ECHINATUM 3,6
S. FURCATUM 7
S. GLADIESUM 7
S. GRACILE VAR. CORONULATUM 7
S. GRALLATORIUM 3,6
S. GRANDE 8
S. HEXACERUM 7
S. MACROCERUM 3,6
S. MARGARITACEUM 7
S. MUTICUM 3,6
S. NATATOR VAR. CRASSUM 8
S. OPHIURA 3,6,7,8
S. ORBICULARE 3
S. PLOYMORPHUM 3,6,7
S. POLYTRICHUM 8
S. PUNCTULATUM 7,8
S. PSEUDOFURCIGERUM 3
S. PYGMAEUM 3
S. QUATERNIUM 3
S. ROTULA 3
S. SEBALDI 3
S. SETIGERUM 7
S. SPONGIOSUM 7
S. VESTITUM 8
S. SP. 3
S. SP. 10
TRIPLOCERAS GRACILE 3,7
T. VERTICILLATUM 3,7
T. SP. 3
XANTHIDIUM ANTILOPAEUM 3,6,7
X. ARMATUM VAR. FISSUM 7
X. COLUMBIANUM 3,6
X. CRISTATUM 3,6,7

CHAROPHYCEAE

CHARALES

CHARACEAE

CHARA SP. 3
C. SP. 6

C. SP. 11
NITELLA SUBGLOMERATA 3

CHRYSOPHYTA (YELLOW-BROWN ALGAE)
XANTHOPHYCEAE
MISCHOCOCCALES
SCIADACEAE
OPIOCYTIUM CAPITATUM 6,9
O. COCHLEANE 3,6
O. GRACILIPES 6
O. MAJUS 3,6
O. PARVULUM 6,9
TRIBONEMATALES
TRIBONEMATACEAE
TRIBONEMA BOMBYCINUM 3,5,6,11
T. B. VAR. TENUE 5
T. MINOR 6
T. MINUS 3
T. UTRICULOSUM 3,5
T. SP. 3
T. SP. 10
T. SP. 1. 9
T. SP. 2. 9
VAUCHERIALES
VAUCHERIACEAE
VAUCHERIA SESSILIS 11
V. SP. 11
CHRYSOPHYCEAE
CHROMULINALES
HYDRURACEAE
HYDRURUS FOETIDUS 3,5
ICGRINIBADALES
DINOBRYACEAE
DINOBRYON SP. 9
SYNURACEAE
MALLOMONAS CAUDATA 3
SYNURA SP. 6

BACILLARIOPHYTA (DIATOMS)
BACILLARIOPHYCEAE (DIATOMACEAE)
RHIZOSOLENIALES
COSCINODISCACEAE
CYCLOTELLA MENEGHINIANA 1,4
C. STRIATA VAR. BIPUNCTATA 4
MELOSIRA DICKIEI 4
M. DISTANS 1,4
M. GRANULATA 4
M. VARIANS 3,4
M. SP. 3,5
STEPHANODISCUS ASTRAEA VAR. MINUTULA 4
S. NIAGARAE 4
S. SP. 3
FRAGILARIALES
FRAGILARIACEAE
AMPHICAMPA SP. 3,9
ASTERIONELLA FORMOSA 4,9

CERATONEIS ACUS 11
DIATOMA ANCEPS 1,4
D. ELONGATUM 10
D. HIEMALE VAR. HIEMALE 1,3,4,6
D. H. VAR. MESODON 1,4,11
D. TENUE 1,4
D. TENUE VAR. ELONGATUM 4
D. VULGARE 1,4
D. VULGARE VAR. GRANDE 1,6
D. SP. 2
D. SP. 9
FRAGILARIA BREVISTRIATA 1,4
F. CAPUCINA VAR. MESOLEPTA 4
F. CONSTRUENS VAR. BINODIS 4
F. C. VAR. VENTER 1
F. LEPTOSTAURON 1,4
F. PINNATA 1,4
F. VAUCHERIAE 1,4
F. VIRESCENS 3,6
F. SP. 2
F. SP. 3
F. SP. 9
F. SP. 11
HANNEA ARCUS 1,4
H. A. VAR. AMPHIOXYS 1,4
MERIDION CIRCULARE 4
M. C. VAR. CAPITATA 1
M. C. VAR. CONSTRICTUM 4
M. SP. 9
OPEPHORA MARTYII 1
SYNEDRA DELICATISSIMA 1
S. INCISA 1
S. PARASITICA 4
S. RADIANS 1
S. RUMPENS 1,4
S. SPLENDENS 3
S. SUBAEQUALIS 3
S. ULNA 1,3,4,6,11
S. U. VAR. RAMESI 1
S. SP. 3
S. SP. 6
TABELLARIA FENESTRATA 1,4
T. FLOCCULOSA 3,4,5,6,11
T. SP. 2
T. SP. 9
TETRACYCLUS LACUSTRIS 1,4,10
T. SP. 3
T. SP. 9

EUNOTIALES

EUNOTIACEAE

EUNOTIA ARCUS 4
E. BIGIBBA 4
E. CURVATA 4
E. DIODON 4

E. INCISA 4
E. LUNARIS VAR. SUBARCUATA 4
E. PECTINALIS VAR. MINOR 1,4
E. PERPUSILLA 1,4
E. PRAERUPTA VAR. BIDENS 4
E. P. VAR. INFLATA 4
E. QUATERNARIA 4
E. SEPTENTRIANALIS 4
E. SERRA 4
E. SUDETICA 4
E. TENELLA 4
E. SP. 6,9

ACHNANTHALES

ACHNANTHACEAE

ACHNANTHES AUSTRIACA 4
A. CLEVI VAR. ROSTRATA 4
A. FLEXELLA 1
A. LANCEOLATA 1,4
A. LANCEOLATA VAR. DUBIA 1,4
A. L. VAR. OMISSA 1,4
A. LATEROSTRATA 1
A. LINEARIS VAR. LINEARIS 4
A. LINEARIS F. CURTA 4
A. MARGINULATA 4
A. MINUTISSIMA 4
A. PERAGALLI 1,4
A. P. VAR. FOSSILIS 1
A. SUBLAEVIS VAR. CRASSA 4
A. SP. 11
COCCONEIS PEDICULUS 4
C. PLACENTULA 11
C. PLACENTULA VAR. LINEATA 1,4
C. THUMENSIS 1
C. SP. 2
C. SP. 3
RHOICOSPHENIA CURVATA 4

NAVICULALES

NAVICULACEAE

AMPHIPLEURA SP. 11
ANOMOEONEIS SERIANS VAR. BRACHYSIRA 4
A. VITREA 1,4
BREBISSONIA BOECHII 3
C. BACILLUM 4
C. V. VAR. TRUNCATULA 4
C. SP. 9
DIPLONEIS ELLIPTICA 4
D. SMITHII 1
FRUSTULIA RHOMBOIDES 1,3,4,6
F. R. VAR. CRASSINERVIA 4
F. VULGARIS 1,4
GYROSIGMA OBTUSATUM 4
G. SP. 3
G. SP. 11
MASTOGLOIA SMITHII 4

NAVICULA AMPHIGOMPHUS 3
N. ANGUSTA 4
N. APPENDICULATA 6
N. BREBISONII 6
N. CAPITATA 1,4
N. CRYPTOCEPHALA 4
N. C. VAR. VENETA 4
N. CUSPIDATA 4
N. DICEPHALA 1
N. ELGINENSIS 4
N. EXIGUA VAR. CAPITATA 4
N. FORMIS 6
N. GRACILIS 3
N. GIBBULA 4
N. GYSINGENSIS 4
N. HALOPHILA 4
N. LAEVISSIMA 4
N. LANCEOLATA 3
N. LYRA 6
N. MUTICA 1,4
N. M. VAR. NIVALIS 4
N. M. VAR. STIGMA 1
N. M. VAR. UNDULATA 1
N. PARAMUTICA VAR. BINODIS 4
N. PELLICULOSA 4
N. PSEUDOSCUTIFORMIS 4
N. PUPILA VAR. ELLIPTICA 4
N. P. VAR. RECTANGULARIS 1
N. RADIOSA 4
N. R. VAR. TENELLA 1,4
N. RHYNCHOCEPHALA 3,4,6
N. SALINARUM 1
N. SCUTUM 3,6
N. SEMINULUM VAR. HUSTEDTII 4
N. SUBADNATA 4
N. SUBTILLISSIMA 4
N. TRIDENTATA 1
N. TRIPUNCTATA 4
N. VANHEURCHII 4
N. VARIOSTRIATA 4
N. VENTRALIS 1
N. VENTRICOSA 3
N. VIRIDIS 6
N. VIRIDULA 4
N. SP. 2
N. SP. 9
N. SP. 11
NEIDIUM BINODE 4
N. BISCULEATUM 1,4
N. DUBIUM 1,4
N. IRIDIS 4
N. TEMPERI 4
P. ABAUJENSIS 4
PINNULARIA ACUMINATA 4

P. A. VAR. ROSTRATA 4
P. BICEPS 4
P. BOREALIS 4
P. BRAUNII 4
P. B. FO. BIUNDULATA 4
P. DACTYLUS 4
P. DIVERGENTISSIMA 4
P. EPISCOPALIS VAR. SUBELLIPTICA 4
P. INTERMEDIA 1,4
P. LATA 4
P. MAJOR 4
P. M. VAR. TRANSVERSA 4
P. MESOLEPTA 4
P. MICROSTAUREN 4
P. RUPTESTRIS 4
P. VIRIDIS 3,10
STAURONEIS ANCEPS FO GRACILIS 4
S. A. FO LINEARIS 4
S. FLUMINEA 4
S. IGNORATA 4
S. KRIEGERI 4
S. PHOENICENTERON 4
S. SMITHII 1,4
S. SP. 11

CYMBELLACEAE

AMPHORA OVALIS 3,4,11
CYMBELLA AFFINIS 1,4
C. AMPHICEPHALA 1,4
C. ASPERA 1,4
C. CISTULA VAR. MACULATA 4
C. CUSPIDATA 4
C. CYMBIFORMIS 3,4,6
C. EHRENBERGII 3,5
C. GRACILIS 1,4
C. HETEROPLEURA 4
C. MEXICANA 4
C. MICROCEPHALA 1
C. NAVICULIFORMIS 4
C. SINUATA 4
C. TUMIDULA 4
C. TURGIDA 4
C. VENTRICOSA 1,4
C. SP. 2
C. SP. 3
C. SP. 6
C. SP. 10
C. SP. 11

GOMPHONEMACEAE

GOMPHONEIS HERCULEANA 4
GOMPHONEMA ACUMINATUM VAR. CORONATUM 4
G. ACUMINATUM VAR. TURRIS 4
G. ANGUSTATUM 4
G. A. VAR. PRODUCTA 4
G. BOHEMIAN F. ABREVIATUM 1

G. CONSTRICTUM VAR. CONSTRICTU
G. CONSTRICTUM VAR. CAPITATUM
G. GEMINATUM 4
G. LANCEOLATUM 1,4
G. MONTANUM 4
G. OLIVACEUM 1,3,4
G. OLIVACEUM VAR. CALCAREA 4
G. PARVULUM 4
G. PSEUDOOLIVACEUM 1
G. SP. 2
G. SP. 3
G. SP. 9
G. SP. 11

EPITHEMIALES
EPITHEMIACEAE

DENTICULA ELEGANS 1,4
EPITHEMIA GIBBERULA 1,3
E. SOREX 4
E. SP. 9
RHOPALODIA GIBBERULA 4
R. GIBBA 11
R. SP. 9

NITZSCHIALES
NITZSCHIACEAE

HANTZSCHIA AMPHIOXYS 4
H. A. VAR. VIVAX 4
NITZSCHIA AMPHIBIA 1,4
N. DISSIPATA 4
N. FRUSTULUM 1
N. LINEARIS 4
N. PALEA 1,4
N. SINUATA VAR. TABELLARIA 1,4

SURIRELLALES
SURIRELLACEAE

CAMPYLODISCUS SP. 3
CYMATOPLEURA SOLEA 4
SURIRELLA ANGUSTATA 1,4
S. BISERATA 4
S. DELICATISSIMA 4
S. ELEGANS 11
S. LINEARIS 4
S. OVALIS 1,4
S. OVATA 4
S. STRIATULA 3
S. SP. 1
S. SP. 3
S. SP. 6
S. SP. 10

EUGLENOPHYTA (EUGLENOIDS)
EUGLENALES
EUGLENACEAE

EUGLENA ACUS 6
E. PICIFORMIS 6
E. SP. 9

LEPOCINCLIS SP. 6
PHACUS SP. 6
P. SP. 9
TRACHELOMONAS SP. 6

PYRRHOPHYTA (DINOFLAGELLATES)
DINOPHYCEAE
DINOKONTALES
GYMNODINIACEAE

GYMNODINIUM SP. 6
G. SP. 9

GLENODINIACEAE

GLENODINIUM SP. 6

RHODOPHYTA (RED ALGAE)
BANGIALES
BANGIACEAE

CHROOTHECE CRYPTARUM 5

NEMALIONALES
BATRACHOSPERMACEAE

BATRACHOSPERMUM MONILIFORME 3

LEMANEACEAE

LEMANEA FUCINA 3,11

THE FUNGI

Next to the algae, the largest group of cryptograms known in the Uinta Mountains is the fungi. Nearly 75% of the 233 species of fungi are contributed by the macrofungi (fleshy and cup fungi). The next largest sections are the water and slime molds. There are only a couple of species known in each of the following groups: loculascomycetes, imperfect fungi and rusts and smuts.

References for the fungal flora are as follows:

1) Collections in the BYU herbarium, Provo, Utah.

2) Personal collections and unpublished data of K. H. McKnight and E. M. Christensen.

3) Pollack, F. G. and K. H. McKnight. 1972. The nomenclature and morphology of Gloiosphaera clericiana. Mycologia 64:415-421.

4) McKnight, K. H. 1952. A Study of the fleshy fungi of Utah. M.S. Thesis, Brigham Young University, Provo, Utah.

5) Dublin, M. V. C. 1967. Taxonomy and ecology of the fleshy fungus flora of the snowbanks in the Mirror Lake region of the Unita Mountains. Dissertation, Brigham Young Univ., Provo, Utah.

6) Rooney, H. M. and K. H. McKnight. 1972. Aquatic phycomycetes of Lily Lake, Utah. Great Basin Naturalist 32:181-189.

Taxonomy for the fungi is after R. W. G. Dennis, 1968 (British Ascomycetes, Verlag Von J. Cramer, Lehre, Germany), L. C. C. Krieger, 1967 (The mushroom handbook, Dover Publications, Inc., New York), and G. C. Ainsworth, F. K. Sparrow and A. S. Sussman, 1973 (The Fungi: An advanced treatise, Volumes IVA and IVB. Academic Press, New York).

MYXOMYCOTA
- MYCOMYCETES (SLIME MOLDS)
  - MYXOGASTROMYCETIDAE
    - LICEALES
      - RETICULARIACEAE
        - LYCOGALA EPIDENDRUM 5
    - TRICHIALES
      - TRICHIACEAE
        - ACRYRIA VERSICOLOR 2
        - A. VITELLINA
        - HEMITRICHIA ABIETINA 1
        - HEMITRICHIA CLAVATA 1
        - H. MONANUM 1,2
        - PROTOTRICHIA METALLICA 1,2
        - TRICHIA CONTORTA 5
        - TRICHIA SUBFUSCA 1
    - STEMONITALES
      - STEMONITACEAE
        - DIACHEOPSIS INSESSA 1
        - ENTERTHONEMA MELANOSPERMUM 2
        - LAMPRODERMA ATROSPORUM 2
        - L. CARESTIAE 1,2
        - L. VIOLACEUM VAR. SAUTERI 5
    - PHYSARALES
      - PHYSARACEAE
        - FULIGO INTERMEDIA 2
      - DIDYMIACEAE
        - DIDERMA SP. 1
        - DIDYMIUM APICULATULA 2
        - D. DUBIUM 2
        - D. OLYMPIANA 2

EUMYCOTA
- ASCOMYCOTINA
  - DISCOMYCETES (CUP FUNGI)
    - PEZIZALES
      - PEZIZINEAE
        - MORCHELLACEAE
          - MORCHELLA ANGUSTICEPS 5
          - M. CONICA 2
          - SARCOSPHAERA CORONARIS 1

PEZIZACEAE
PEZIZA SYLVESTRIS 2
P. VIOLACEAE 2
P. SP. 2
P. SP. 5
P. SP. 5
P. SP. 5
HELVELLACEAE
HELVELLEAE
HELVELLA ELASTICA 1
H. ESCULENTA 5
H. GIGAS 5
H. LACUNOSA 1
H. SP. 2
DISCINEAE
DISCINIA PERLATA 2,5
GYROMITREAE
GYROMITRA GIGAS 2
PYRONEMATACEAE
SCUTELLINIOIDEAE
ALEURIEAE
PSEUDOCOLLEMA CARTILAGINEUM 1
SOWERBYELLEAE
CALOSCYPHA FULGENS 2
SCUTELLINEAE
CHEILYMENIA COPRINARIA 1,2,5
C. STERCOREA 2
C. SP. 1. 2
C. SP. 2. 2
SCUTELLINIA SCUTELLATA 1
OTIDEOIDEAE
MYCOLACHNEAE
HUMARIA SP. 1
OTIDEEAE
PSILOPEZIA HYDROPHYLIA 5
ASCOPHANOIDEAE
THELEBOLEAE
LASIOBOLUS EQUINUS 1
L. RUBER 2
ASCOBOLACEAE
ASCOBOLUS FURFURACEUS 2
SARCOSCYPHINEAE
SARCOSOMATACEAE
SARCOSOMATEAE
PLECTANIA NANNFELDTII 1,2
HELOTIALES
LEOTIACEAE
HYMENOSCYPHOIDEAE
HYMENOSCYPHYS CITRINUM 5
LEOTIOIDEAE
LEOTIEAE
BULGARIA SP. 2
ENCOELIOIDEAE
CENANGIUM SP. 1
HYALOSCYPHACEAE

HYALOSCYPHOIDEAE
LACHNEAE
DASYSCYPHA AGASSIZII 1,2,5
D. ARIDUS 1,2,5
D. PUDIBUNDIS 1
D. SYDOWII 1
D. SP. 2
D. SP. 2
D. SP. 2
TRICHOSEYPHELLOIDEAE
LACHNELLULA ARIDA 1
L. SUECICA 1

LOCULOASCOMYCETES
PLEOSPORALES
PLEOSPORACEAE
HERPOTRICHIA NIGRA 5
SPORORMIACEAE
SPORORMIA ONTARIENSIS 2

DEUTEROMYCOTINA
HYPOHMYCETES
GLOIOSPHAERA CLERCIANA 3
SLEROTIUM 5

EUMYCOTA
MASTIGOMYCOTINA (WATER MOLDS)
CHYTRIDIOMYCETES
CHYTRIDIALES
OLPIDACEAE
OLPIDIUM ENDOGENUM 6
O. PENDULUM 6
RHIZIDIACEAE
RHIZOPHYLCTIS ROSEA 6
CHYTRIDIACEAE
CHYTRIDIOIDEAE
CHYTRIDIUM ACUMINATUM 6
MEGACHYTRIACEAE
NOWAKOWSKIELLA RAMOSA 6
MEGACHYTRIUM WESTONII 6
BLASTOCLADIALES
BLASTICLADIACEAE
BLASTOCLADIA ANGUSTA 6
B. PRINGSHEIMII 6
B. RAMOSA 6
B. SP. 6
MONOBLEPHARIADALES
GONAPODYCAEAE
GONAPODYA POLYMORPHA 6
G. PROLIFE 6
MONOTOLEPNARIDACEAE
MONOBLEPHARIS INSIGNIS 6
M. POLYMORPHA
OOMYCETES
SAPROLEGNIALES
SAPROLEGNIACEAE
ACHYLA AMERICANA 6
A. KLEBSIANA 6

A. OBLONGATA 6
A. SP. 6
PROTOACHYLA PARADOXA 6
PYTHIOPSIS CYMOSA 6
SAPROLEGNIA DELICA 6
S. FELAX 6
S. HYPOGNA 6

LEPTOLEGNIELLACEAE
LEPTOLEGNIELLA KERATINOPHILIUM 6
L. SP. 6

LEPTOMITALES
LEPTOMITACEAE
APODACHYLA BRANCHYEMA 6
LEPTOMITUA LACTEUS 6

RHIPIDIACEAE
RHIPIDIUM AMERICANUM 6
R. INTERRUPTUM 6
R. THAXTERI 6
SAPROMYCES ANDROGYNOUS 6
S. ELONGATA 6

PERONOSPORALES
PYTHIACEAE
PYTHIUM SP. 6
PHYTOPHTHORA SP. 6

EUMYCOTA
BASIDIOMYCOTINA (FLESHY FUNGI)
TELIOMYCETES
UREDINALES
CRONARTIUM COMANDRAE 1
GYMNOSPORANGIUM SP. 1

HYMENOMYCETES
PHRAGMOBASIDIOMYCETIDAE
AURICULARIALES
AURICULARIACEAE
AURICULARIA AURICULARIUS 2

~~HOLOBASIDIOMYCETIDAE~~
DACRYMYCETALES
GUEPINIOPSIS ALPINUS 1,2,5

APHYLLOPHORALES
CORTICIACEAE
PENIOPHORA POLYGONIA 1
PHLEBIA ALBIDA 1
TRECHISPORA VAGA 1

CLAVARIOID BASIDIOMYCETES
CLAVARIA AUREA 1
C. PISTILLARIS 1
C. PURPUREA 4

THELEPHORACEAE
THELEPHORA CARYOPHYLLEA 1
T. SP 2
CORTICUM CORRAGE 2
C. SP. 1. 5
C. SP. 2. 5

HYDNACEAE
HYDNOIDEAE

HYDNEAE
HYDNUM IMBRICATUM 1
H. REPANDUM 1
POLYPORACEAE
FOMES IGNIARIUS 1
FOMES NIGROLIMITATUS 1
F. PINI VAR. ABIETIS 1,5
F. PINICOLA 1,2,5
F. SP. 5
LENZITES SEPIARIA 1,5
POLYPORUS ABIETINUS 2,5
P. ALBOLUTEUS 5
P. ELEGANS 2
P. LAPPONICUS 5
P. LEUCOSPONGIA 1,2,5
P. PERENNIS 1
P. RESINOUS 1
P. VOLVATUS 1,2
P. SP. 5
TRAMETES AMERICANA 5
STEREACEAE
STEREUM RUGISPORUM 2,5
AGARICALES
BOLETACEAE
BOLETUS EDULUS 1
B. ZELLERI 1
SUILLUS BREVIPES 1
HYGROPHORACEAE
HYGROPHORUS ANGELESIANUS 5
H. BAKERENSIS 1
H. CAMAROPHYLLUS 5
H. CONICUS 1
H. GLIOCYCLUS 1
H. MINATUS 1
H. SUBALPINUS 5
HYPHOLOMA SUBLATERITIUM 1
TRICHOLOMATACEAE
CLITOCYBE ALBIRHIZA 1,2
C. FLACCIDA 1
C. GIBBA 1
C. PSEUDOIRINA 1
C. SQUAMULOSA 1
COLLYBIA ACERUATA 1
C. NILELLINA 1
C. VELUTIPES 1
C. SP. 2
C. SP. 2
C. SP. 5
FLAMMULINA VELUTIPES 2
LENTINELLUS MONTANUS 5
LEUCOPAXILLUS TRICOLOR 1
LYOPHYLLUM MONTANUM 1,2,5
L. SP. 2
L. SP. 2
MARASMIUS MACULATA 1

	M. PICEICOLA 1
	M. SP. 2
	MELANOLEUCA SP. 2
	M. SP. 2
	MYCENA HAEMATOPUS 1
	M. OVERHOLTSII 2,5
	M. PURA 2
	M. SP. 2
	OMPHALINA EPICHYSIUM 2
	O. SP. 2
	TRICHOLOMA MYOMYCES 1,2
	T. SAPONACEAE 2
	XEROMPHALINA CAMPANELLA 2,5
ENTOLOMATACEAE	
	ENTOLOMA SP. 2
AMANITACEAE	
	AMANITA INAURATA 1
PLUTEACEAE	
	PLUTEUS CERUINUS 1,2
LEPIOTACEAE	
	LEPIOTA PRAEMAGNA 1
AGARICACEAE	
	ARMILLARIN LUTEOVIREN 1
	A. MELLEQ 1
	A. ZELLERI 1
	RHODOPHYLLUS SERICEUS 5
BOLBITIACEAE	
	AGROCYBE AEGERITA 2
STROPHARIACEAE	
	PHOLIOTA FULVOZONATA 2
	P. VERNALIS 2
	STROPHARIA AMBIGUA 1
	S. HORNEMANNII 1
	S. SQUAMOSA 1,2
COPRINACEAE	
	COPRINUS MICACEUS 2
	C. SP. 2
	PSATHYRELLA SP. 2
CORTINARIACEAE	
	CORTINARIUS AHSII 1
	C. BIVELUS 2
	C. DISTANS 1
	C. GENTILLIS 1
	C. GLAUCOPUS 1
	C. LANIGER 1
	C. RAPHANOIDES 2
	C. SEMISANGUINEUS 1
	C. SP. 5
	C. SP. 5
	C. SP. 2
	C. SP. 2
	C. SP. 2
	CREPODIDOTUS SP. 2,5
	GALERINA AUTUMNALIS 1
	GALERINA LATISPORA 1

G. SP. 2
GHYNIPILUS SAPINEUS 1
HEBELOMA SINAPIZANS 1
THAXTEROGASTER PINGUIS (GASTEROID) 1
TUBARIA SP. 2
T. SP. 2

PAXILLACEAE
PAXILLUS INVOLUTUS 1

RUSSULACEAE
RUSSULA BREVIPES 1
R. EMETICA 1
R. FRAGILIS 1
R. XERAMPELINA 1
LACTARIUS DELICIOSUS 1
L. PAYETTENSIS 1
L. REPRAESENTANEUS 1
L. RUTUS VAR. SEPTENRIONALIS 1
L. UVIDUS 1

HYMENOGASTRALES
RHIZOPOGONACEAE
RHIZOPOGON RUBESCENS 1
R. SP. 2

GASTEROMYCETES
LYCOPERDALES
GEASTRACEAE
GEASTRUM CAMPESTRE 1
G. FLORIFORME 1

LYCOPERDACEAE
BOVISTA PLUMBEA 1
CALVITIA FUMOSA 1,5
DISCISEDA SERUINUS 2,5
LYCOPERDON PELLATUM 1
L. PYRIFORME 1
L. UMBRINUM 1

NIDULARIALES
NIDULARIACEAE
CRUCIBULUM VULGARE 5

LICHEN FLORA

The lichens of the Uinta Mountains are predominately from the order Lecanorales. Only two species outside of this order have been reported. The list of lichens is mainly from the work of S. Flowers and H. A. Imshaug.

BIBLIOGRAPHY FOR LICHEN TAXONOMY

1) Flowers, S. 1954. Some lichens of Utah. Utah Acad. Sci., Arts and Letters 31:101-105.

2) Imshaug, H. A. 1957. Alpine lichens of western United States and Adjacent Canada. I. Macrolichens. Bryologist 60(3):177-272.

3) Collections in the herbarium of Brigham Young University, Provo, Utah.

4) Personal collections of D. C. Anderson.

Taxonomy follows that of M. E. Hale, Jr. and W. L. Culberson, 1970 (A fourth checklist of the lichens of the continental United States and Canada. Bryologist 73:499-553. Reprinted 1975.)

EUMYCOTA
ASCOMYCOTINA
DISCOMYCETES (LICHENS)
LECANORALES

PLACYNTHIACEAE
PSOROMA HYPNORUM 1

PELTIGERACEAE
PELTIGERA APHTHOSA 1,4
P. CANINA 1,2

LECIDEACEAE
LECIDEA ATROBRUNNEA 1
L. DECIPIENS 4
L. GLOBEFERA 4
RHIZOCARPON BADIOATRUM 3,4
R. DISPORUM 1
R. GEOGRAPHICUM 1,4

CLADONIACEAE
CLADONIA PYXIDATA 1,2
C. SQUAMOSA 1
C. SYMPHYCARPA 1
C. TURGIDA 1
C. SP. PC

UMBILICARIACEAE
UMBILICARIA VIRGINIS 2,4
U. SP. 4

ACAROSPORACEAE
ACAROSPORA CHLOROPHANUM 4
A. FUSCATA 1

LECANORACEAE
AGRESTIA HISPIDA 4
LECANORA GIBBOSULA 3
L. NOVEMEXICANA 4
L. POLYTROPA 4

CANDELARIACEAE
CANDELARIELLA ARCTICA 3

PARMELIACEAE
CETRARIA CUCULLATA 4
C. TILESI 1,2
HYPOGYMNIA INTESTINIFORMIS 2
PARMELIA CHLOROCHROA 1,4
P. CONSPERA 1
P. LINEOLA 1
P. TARACTICA 2

USNEACEAE

ALECTORIA MINUSCULA 2
CORNICULARIA ACULEATA 2
DACTYLINA MADREPORIFORMIS 2

BUELLIACEAE

RINODINA NIMBOSA 3,4

PHYSCIACEAE

PHYSCONIA MUSCIGENA 2

TELOSCHISTACEAE

XANTHORIA ELEGANS 1,3,4
XANTHORIA SP. 4

PYRENOMYCETES

SPHAERIALES

VERRUCARIACEAE

VERRUCARIA SP. 4

FUNGI IMPERFECTI

LEPRARIA MEMBRANACEA 4

MOSS FLORA

Of the 102 species of mosses listed here, over one-half of them are reported only in the Flaming Gorge study by S. Flowers. The entire list of mosses is a result of the extensive collections of Dr. Seville Flowers. The references include three of his works.

1) Flowers, S. 1973. Mosses: Utah and the West. BYU Press, Provo, Utah.

2) Flowers, S. 1973. Mosses of Utah new to science. Bryologist 76:286-292.

3) Flowers, S. et. al. 1960. Ecological studies of the flora and fauna of Flaming Gorge Reservoir Basin, Utah and Wyoming. Univ. of Utah, Division of Biological sciences, Anthropological paper No. 48.

The moss taxonomy follows H. A. Crum, W. C. Steere and L. E. Anderson, 1973 (A new list of mosses of North America north of Mexico. Bryologist 76:85-130.)

BRYOPHYTA

MUSCI (MOSSES)

SPHAGNIDAE

SPAGNACEAE

SPHAGNUM CAPILLACEUM 1
S. FUSCOM 1
S. WARNSTORFII 1

BRYIDAE

DICRANALES

DICRANACEAE

CERATODON PURPUREUS 1,3

DICRANELLA SCHREBERIANA 1
DICRANOWEISIA CRISPULA 3
DICRANUM SPADICEUM 1
D. SCOPARIUM 1
D. TAURICUM 3
DISTICHIUM CAPILLACEUM 1,3
D. C. VAR. CURVATUM 2
D. INCLINATUM 1
PARALEUCOBRYUM ENERVE 1

POTTIALES

POTTIACEAE

BARBULA VINEALIS 3
BRYOERYTHROPHYLLUM RECURVIROSTRUM 3
DESMATODN CERNUS 3
D. HEIMII 3
D. LATIFOLIAS 1
D. LAUREI
D. OBTUSIFOLIUS 3
DIDYMODON TOPHACEUS 3
PTERYGONEURON OVATUM 3
STEGONIA LATIFOLIA VAR. PILIFERA 1
TORTULA MUCRONIFOLIA 3
T. NORVEGICA 3
T. RURALIS 3
T. R. VAR. HIRSUTA 3

ENCALYPTACEAE

ENCALYPTRA CILIATA 1
E. VULGARIS 3

GRIMMIALES

GRIMMIACEAE

GRIMMIA AGASSIZII 1
G. AFFINIS 1
G. ALPICOLA VAR. DUPRETII 3
G. ANODON 3
G. CALYPTRATA 3
G. HARTMANII VAR. ANOMALA 1
G. MONTANA 1
G. PLAGIOPODIA 3
G. TENERRIMA

FUNARIACEAE

FUNARIA HYGROMETRIC 3

EUBRALES

BRYACEAE

BRYUM ARGENTEUM 3
B. BICOLOR 1
B. CAESPITICIUM 3
B. CREBERRIMUM 3
B. GEMMIPARUM 3
B. PALLESCENS 3
B. PSEUDOTRIQUETRUM 3
B. WEIGELII 3
LEPTOBRYUM PYRIFORME 3
POHLIA BULBIFERA L
P. PROLIGERA 1
P. ROTHII 1

P. WAHLENBERGII 3

MNIACEAE

MNIUM AFFINE 3
M. MARGINATUM 3

BARTRAMIACEAE

PHILONOTIS FONTANA 3
P. F. PUMILA 3

TIMMIACEAE

TIMMIA BAVARICA 3

ISOBRYALES

FONTINALACEAE

FONTINALIS ANTIPYRETICA 1
F. ANTIPYRETICA VAR. OREGONENSIS 1
F. HYPNOIDES 1
F. NEO-MEXICANA 1
DICHELYMA FALCATUM 1

CLIMACIACEAE

CLIMACIUM DENDROIDES 1

ORTHOTRICHCAEAE

ORTHOTRICHUM AFFINE 3
O. ANOMALUM 3
O. CUPULATUM 3
O. HALLII 3
O. LAEVIGATUM 3
O. M. F. VERMICULARE 2
O. RUPESTRE 3
O. STRANGULATUM 3

HYPNOBRALES

LESKEACEAE

LESCURAEA RADICOSA VAR. PALLIDA 1
L. INCURVATA TENUIRETIS 3
PSEUDOLESKEELA TECTORUM 3

AMBLYSTEGIACEAE

AMBYLSTEGIUM JURATSKANUM 3
A. VARIUM 3
CALLIERGON CORDIFOLIUM 1
C. STRAMINEUM 1
CAMPYLIUM CHRYSOPHYLLUM 1
C. POLYGAMUM 1
CRATONEURON FILICINUM 3
DREPANOCLADUS ADUNCUS 3
D. UNCINATUS 3
HYGROAMBLYSTEGIUM TENAX VAR. SPINIFOLIUM 3
HYGROHYPNUM OCHRACEUM VAR. FLACCIDUM 1
H. SMITHII 1
LEPTODICTYUM TRICHOPODIUM 3
SCORPIDIUM TRUGESCENS 1

BRACHYTHECIACEAE

BRACHYTHECIUM COLLINUM 3
B. RIVULARE 3
B. VELUTINUM 3
B. V. VAR. VENUSTUM 3
RHYNCHOSTEGIELLA COMPACTA 3
TOMENTHYPNUM NITENS 1

PLAGIOTHECIACEAE

PLAGIOTHECIUM DENTICULATUM 1

HYPNACEAE

HYPNUM LINDBERGII 1
H. PRATENSE 1
H. REVOLUTUM 3
H. VAUCHERI 3
ISOPTERYGIUM PULCHELLUM 1
ORTHOTHECIUM DIMINUTIVUM 1

POLYTROCHALES

POLYTRICHACEAE

POLYTRICHUM PILIFERUM 1

LIVERWORT FLORA

The liverworts known from the Uinta mountains are reported by Dr. S. Flowers in two works.

1) Flowers, S. 1961. The Hepaticae of Utah. Univ. of Utah biological Series 12(2):1-107.

2) Flowers, S. et. al. 1960. Ecological studies of the flora and fauna of Flaming Gorge Reservoir Basin, Utah and Wyoming. Univ. of Utah, Division of Biological Sciences, Anthropological Paper No. 48.

Taxonomy follows H. S. Conrad, 1956 (The mosses and liverworts, Wm. C. Brown Co. Publishers, Dubuque, Iowa.)

BRYOPHYTA

HEPATICAE (LIVERWORTS)

MARCHANTIALES

RICCIACEAE

RICCIA BEYRICHIANA 1
R. GLAUCA 1

MARCHANTIACEAE

CLEVEA HYALINA 1
CONOCEPHALUM CONICUM 2
C. SP. 1
MARCHANTIA POLYMORPHA 2
PREISSIA QUADRATA 2
P. SP. 1

JUNGERMANNIALES

METZGERIACEAE

RICCARDIA PINGUIS 1,2
PELLIA APIPHYLLA 1
P. NEESIANA 1,2

JUNGERMANNIACEAE

BLEPHAROSTOMA TRICHOPHYLLUM 1
CALYPOGEIA TRICHOMANIS 1
CEPHALOZIA BICUSPIDATA 1
C. MEDIA 1
C. PLENICEPS 1
CHILOSCYPHUS GEMMIPARUS 1

C. PALLESCENS 1
C. POLYANTHUS 1
C. RIVULARIS 1
JUNGERMANNIA PUMILA 1
J. P. VAR. RIVULARIS 2
LOPHOCOLEA MINOR 1
LOPHOZIA ALPESTRIS 1
L. BANTRIENSIS 1
L. HATCHERI 1
L. HETEROCOLPA 1
L. INCISA 1
L. LYCOPODIOIDES 1
L. PORPHYROLEUCA 1,2
L. VENTRICOSA 1
RADULA COMPLANATA 1
S. CURTA 1
S. SUBALPINA 1
SCAPANIA UNDULATA 1
S. U. VAR. OAKSEI 1

APPENDIX B

CHECKLIST OF THE VASCULAR PLANTS OF THE UINTA MOUNTAINS, UTAH

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In this compilation, all known publications dealing with the taxonomy of the vascular flora of the Uinta Mountains have been searched. In addition, many unpublished collections made by Dr. Stanley L. Welsh are cited. I acknowledge with gratitude my debt to Mr. Sherel Goodrich of the U.S. Forest Service who prepared the initial checklist on which this expanded list is based. His original list included about 850 taxa: the present list has been expanded to 1047 species and 373 genera.

The families of vascular plants are arranged phylogenetically. Genera and species within a genus are arranged alphabetically following the family. Following each species name, one to several numbers occur: These designate the source of my information concerning the species in the Uinta Mountains. The numbers refer to the following references:

1) Goodrich, Sherel. 1975. Checklist of vascular plants of the Ashley National Forest. Mimeographed List.

2) Graham, Edward H. 1937. Botanical studies in the Uinta Basin of Utah and Colorado. Ann. Carnegie Mus., Pittsburgh, 26: 1-432.

3) Lewis, Mont E. 1970. Alpine rangelands of the Uinta Mountains, Ashley and Wasatch National Forests, Region 4. Mimeographed Report Distributed by Region 4 of the U.S. Forest Service, Ogden, Utah.

4) Pammel, L. H. 1913. The grasses of the Uintah Mountains and adjacent regions. Proc. Iowa Acad. Sci. 20: 133-149.

5) Christensen, Earl M. and B. F. Harrison. 1961. Ecological study area at Lily Lake in the Uinta Mountains, Utah. Proc. Utah Acad. Sci., Arts and Letters 38: 36-49.

6) Welsh, Stanley L. Various dates. Unpublished records of plants personally collected in the Uinta Mountains. Personal Fieldbooks.

7) Flowers, Seville. 1944. Ferns of Utah. Bulletin of the University of Utah, Biological Series, Vol. IV (No. 6): 1-87.

8) Peterson, Steven R. 1969. Ecology of waterfowl in the Uinta Mountains. Utah State Division of Fish and Game, Publication No. 69-1: 1-57.

9) Flowers, S. et al. 1960. Ecological studies of the flora and fauna of Flaming Gorge Reservoir Basin, Utah and Wyoming. University of Utah Anthropology Papers, No. 48: 1-256.

Nomenclature follows Holmgren and Reveal (1966, Checklist of the Vascular Plants of the Intermountain Region. U.S. Forest Service Research Paper INT 32) in most cases. Species not listed by them follow the nomenclature of Harrington (1964, Manual of the Plants of Colorado, Sage Books, Denver).

Fourteen taxa of the Uinta Mountains appear on the endangered, threatened, extinct, rare or restricted list for Utah (Welsh, S. L., N. D. Atwood, and J. L. Reveal, 1975. Endangered, threatened, extinct, endemic, and rare or restricted Utah vascular plants. Great Basin Naturalist 35: 327-376). The following taxa and their status is taken from Welsh et al. 1975.

Botrichium boreale var. obtusilobum: rare, possibly threatened.
Castilleja leonardi: endemic to Utah, locally common and neither threatened or endangered.
Cryptantha stricta: rare, neither threatened or endangered.
Cypripedium fasciculatum: rare and endangered; widespread throughout the Northwest U.S.
Elaeagnus commutata: restricted, local and possibly extirpated in Utah.
Gilia stenothyrsa: endemic, common and neither threatened nor endangered.
Helictotrichon mortonianum: rare and endangered.
Hermidium alipes var. pallidum: endemic, rare and endangered.
Lesquerella utahensis: endemic, rare to locally common.
Mertensia viridis var. cana: rare and restricted, possibly threatened.
Mertensia viridis var. dilatata: rare, known only from type specimen.
Parrya rydbergii: endemic, rare and threatened.
Penstemon acaulis: restricted, rare and threatened.
Penstemon leonardii: endemic, not threatened or endangered.
Penstemon uintahensis: endemic, rare, restricted and threatened.

DIVISION PTERIDOPHYTA
- OPHIOGLOSSACEAE
  - BOTRYCHIUM
    - BOREALE 7
    - LUNARIA 7
- POLYPODIACEAE
  - ATHYRIUM
    - FILIX-FOEMINA 7
  - CHEILANTHES
    - FEEI 8
  - CRYTOGRAMMA
    - ACROSTICHOIDES 1,2,7
  - CYSTOPTERIS
    - FRAGILIS 1,2,7
  - PELLAEA
    - BREWERI 7
  - POLYSTICHUM
    - LONGHITIS 7
  - PTERIDIUM
    - AQUILINUM 1,2
  - WOODSIA
    - OREGANA 2
    - SCOPULINA 2,7
- EQUISETACEAE
  - EQUISETUM
    - ARVENSE 1,2,7
    - HYEMALE 1,2
    - KANSANUM 7
    - LAEVIGATUM 2,7
- ISOETACEAE
  - ISOETES
    - BOLANDERI 5,7
    - HOWELLII 6
    - MURICATA 5
- SELAGINELLACEAE
  - SELAGINELLA
    - DENSA 2,7
    - MUTICA 8
    - WATSONI 2,7

DIVISION SPERMATOPHYTA

SUBDIVISION GYMNOSPERMAE
- PINACEAE
  - ABIES
    - CONCOLOR 1,2
    - LASIOCARPA 1,2
  - PICEA
    - ENGELMANNII 1,2
    - PUNGENS 1,2
  - PINUS
    - CONTORTA 1,2
    - EDULIS 1,2
    - FLEXILIS 1,2,6
    - LONGAEVA 1

PONDEROSA 1,2
PSEUDOTSUGA
MENZIESII 1,2
CUPRESSACEAE
JUNIPERUS
COMMUNIS 1,2,6
OSTEOSPERMA 1
SCOPULORUM 1,2
EPHEDRACEAE
EPHEDRA
NEVADENSIS 1
VIRIDIS 1
SUBDIVISION ANGIOSPERMAE
CLASS MONOCOTLYLEDONEAE
TYPHACEAE
TYPHA
LATIFOLIA 1
SPARGANIACEAE
SPARGANIUM
ANGUSTIFOLIUM 1,2,5
MINIMUM 2,4,5
MULTIPEDUNCULATUM 1,5
POTAMOGETONACEAE
POTAMOGETON
ALPINUS 1
AMERICANA 2
FILIFORMIS 1,6
FOLIOSUS 9
GRAMINEUS 6
NODOSUS 9
NUTANS 1
PECTINATUS 8,9
PUSILLUS 9
JUNCAGINACEAE
TRIGLOCHIN
MARITIMA 1
PALUSTRIS 1,6
ALISMACEAE
SAGITARIA
CUNEATA 9
ALISMA
TRIVIALE 9
GRAMINEAE
SUBFAMILY FESTUCOIDEAE
TRIBE FESTACEAE
BROMUS
ANOMALUS 1,2,4
CARINATUS 1
CILIATUS 1,2,4
INERMIS 1,2
POLYANTHUS 1,4
TECTORUM 1
CATABROSA

AQUATICA 1,2,6
DACTYLIS
GLOMERATA 1
DISTICHLIS
SPICATA 1,4
FESTUCA
ARUNDINACEA 1
IDAHOENSIS 1
OCTOFLORA 1,4
OVINA 1,2,4,5,6
BRACHYPHYLLA
OVINA
RUBRA 1,4
THURBERI 1,4
GLYCERIA
BOREALIS 1,2
ELATA 2
GRANDIS 1
PAUCIFLORA 5
STRIATA 1
HESPEROCHLOA
KINGII 1,2,4
MELICA
BULBOSA 1,4
PHRAGMITES
COMMUNIS 4
POA
ALPINA 1,2,4,6
AMPLA 1
ANNUA 1
ARIDA 4
BULBOSA 1
CANBYI 1,4
COMPRESSA 1
CURTA 1,2
CUSICKII 1,6
EPILIS 1,2,4
FENDLERIANA 1,4
GRACILLIMA 1,4
INTERIOR 1,2
JUNCIFLORA 1
LEPTOCOMA 4
NERVOSA 2,4,5,6
NEVADENSIS 1
PALUSTRIS 1,2
PRATENSIS 1,4
REFLEXA 1,2,5
RUPICOLA 1
SANDBERGII 1,2,4,6
PUCCINELLIA
AIROIDES 1
DISTANS 1
PAUCIFLORA 1,2

SCHIZACHNE
PURPURASCENS 1
TRIBE HORDEAE
AGROPYRON
CRISTATUM 1
DASYSTACHYUM 1,2,4
GRIFFITHSII 1
INTERMEDIUM 1
PSEUDOREPENS 4
REPENS 1
RIPARIUM 1
SAXICOLA 2
SCRIBNER 1
SMITHII 1,4
SPICATUM 1,2
SUBSECUNDUM 1,2,4,6
TRACHYCAULUM 1,6
TRICHOPHORUM 1
ELYMUS
CANADENSIS 4
CINEREUS 1,4
GLAUCUS 1,2,4
MACOUNII 1
SALINA 1
HORDEUM
BRACHYANTHERUM 1,4
JUBATUM 1,4
SITANION
HYSTRIX 1,2,4,5
TRIBE AVENEAE
ARRHENATHERUM
ELATIUS 1
DANTHONIA
CALIFORNICA 1,2
INTERMEDIA 1,2,4,5
UNISPICATA 1
DESCHAMPSIA
CAESPITOSA 1,2,4,5,6
ELONGATA 1,4
HELICTOTRICHON
MORTONIANUM 3,4
KOELERIA
CRISTATA 1,2,4
TRISETUM
MONTANUM 4
SPICATUM 1,2,4,5,6
WOLFII 1,2,4,5
TRIBE AGROSTIDEAE
AGROSTIS
BOREALIS 4,5
EXARATA 1,2,4
HUMILIS 1
IDAHOENSIS 1
PALUSTRIS 1

SCABRA 1,2,6
THURBERI 2,5
VARIABILIS 1,2,5
ALOPECURUS
ALPINUS 1,2
AEQUALIS 1,2,4,5
PRATENSIS 1
ARISTIDA
FENDLERIANA 1
LONGISETA 1
BLEPHARONEURON
TRICHOLEPIS 1
CALAMAGROSTIS
CANADENSIS 1,2,4,5,6
INEXPANSA 1,4
NEGLECTA 1
PURPURASCENS 1,2,6
SCOPULORUM 1,2
MUHLENBERGIA
ANDINA 4
ASPERIFOLIA 1
FILIFORMIS 1,4,5
RACEMOSA 1,4
RICHARDSONIS 1,4
ORYZOPSIS
ASPERIFOLIA 1
EXIGUA 1
HYMENOIDES 1,4
MICRANTHA 1
PHLEUM
ALPINUM 1,2,4,5,6
PRATENSE 1,4
SPOROBOLUS
AIROIDES 1,4
CYPTANDRUS 1
STIPA
COLUMBIANA 1,2
COMATA 1,4
LETTERMANI 1,4
SCRIBNERI 4
TRIBE ZOYSIEAE
HILARIA
JAMESII 1
TRIBE CHLORIDEAE
BECKMANNIA
SYZIGACHNE 4,5
BOUTELOUA
GRACILIS 1
SPARTINA
GRACILIS 4
TRIBE PHALARIDEAE
HIEROCHLOE
ODORATA 1,2,4,5

PHALARIS
ARUNDINACEA 1
SUBFAMILY PANICOIDEAE
TRIBE PANICEAE
ECHINOCHLOA
CRUSGALLI 1
CYPERACEAE
CAREX
ABLATA 3
ALBO-NIGRA 1,3
ANGUSTIOR 1,3,5
AQUATILIS 1,3,5
ATHROSTACHYA 1,3
ATRATA 3,5
ATROSQUAMA 1
AUREA 1,3,5,6
BELLA 1,3
BIGELOWII 3
BIPARTITA 3
BREVIPES 1
BRUNESCENS 1,3,5
BUXBAUMII 1
CANESCENS 1,3,5
CAPILLARIS 1,3
CAPITATA 3
CHALCIOLEPIS 3
DISPERMA 1,3,5
DOUGLASII 1,3
DRUMMONDIANA 1,3
EBENA 1,3
EGGLESTONII 1,3
ELEOCHARIS 1,3
ELYNOIDES 1,3
ENGELMANNII 1
EPAPILLOSA 1,3
FESTIVELLA 1,3
FOENEA 1
GEYERI 1,3
HASSEI 3
HAYDENIANA 1,3
HEPBURNII 1,3
HETERONEURA 1
HOODII 1,3
ILLOTA 1,3,5
INTERIOR 1,3
KELLOGII 1,3,5
LANUGINOSA 1,3,5
LASIOCARPA 1
LEPORINELLA 1,3
LEPTALEA 1
LIMOSA 1,3
MEDIA 1,3
MICROPTERA 1,3,5,6

MISANDRA 1,3
NEBRASKENSIS 1,3
NELSONII 1,3
NOVA 1,3,5
NIGRICANS 1,3,5,6
OBTUSATA 1,3
OCCIDENTALIS 1,3
PACHYSTACHYA 1
PAUPERCULA 1,3,5
PELOCARPA 1,3
PETASATA 1,3
PHAEOCEPHALA 1,3
PHYSOCARPA 1,3,5
PRAECEPTORUM 3
PRAEGRACILIS 1,3
PRATICOLA 1,3
PSEUDOSCRIPOIDES 1,3,5
PYRENAICA 3
RAYNOLDSII 1,3,5
ROSSII 1,3
ROSTRATA 1,3,5,6
SCOPULORUM 1
SIMULATA 1
STRAMINIFORMIS 1
SUBFUSCA 1
SUBNIGRICANS 3
TOLMIEI 1,3
VALLICOLA 1,3
VERNACULA 3,5
VESICARIA 3
VIRIDULA 1
XERANTHICA 1,3

ELEOCHARIS
ACICULARIS 8,9
BOLANDERI 2
MACROSTACHYA 1,2,5
PAUCIFLORUS 9

ERIOPHORUM
CHAMISSONIS 1,2

KOBRESIA
MYSUROIDES 1,2

SCIRPUS
CAESPITOSUS 5
MICROCARPUS 1

LEMNACEAE

LEMNA
TRISULCA 9

JUNCACEAE

JUNCUS
ALBESCENS 2
ALPINUS 1
ARTICULATUS 1
BADIUS 1

BALTICUS 1
BUFONIUS 1,2
CASTANCUS 2
CONFUSUS 1
DRUMMONDII 1,2,5
ENSIFOLIUS 1,2
FILIFORMIS 1
HALLII 1,5
LONGISTYLIS 1,2
MERTENSIANUS 1,2,5
PARRYI 1,2
SAXIMONTANUS 1,2
TENUIS 1,6
TWEEDYI 1
VASEYI 9
XIPHIOIDES 2

LUZULA
CAMPESTRIS 1
PARVIFLORA 5
PEPERI 2,5
SPICATA 1,2,5,6

LILIACEAE

ALLIUM
ACUMINATUM 1,2
BREVISTYLUM 1,2
CERNUUM 1
SCHOENOPRASUM 1
TEXTILE 1

BRODIAEA
PULCHELLA 2

CALOCHORTUS
GUNNISONII 2
NUTTALLII 1,2,6

DISPORUM
TRACHYCARPUM 1

ERYTHRONIUM
GRANDIFLORUM 1,2,5,6

FRITILLARIA
ATROPURPUREA 2

LLOYDIA
SEROTINA 1,2

SMILACINA
RACEMOSA 1,2,6
STELLATA 1,2,6

STREPTOPUS
AMPLEXIFOLIUM 1

VERATRUM
CALIFORNICUM 1,2,5

YUCCA
Spp. 1

ZIGADENUS
ELEGANS 1,2,6
PANICULATUS 1

VENENOSUS 1,2

IRIDACEAE

IRIS
MISSOURIENSIS 1,2,6
SISYRINCHIUM
HALOPHILUM 6
MONTANUM 1,6
OCCIDENTALE 2
RADICATUM 1

ORCHIDACEAE

CALYPSO
BULBOSA 1,2
CORALLORHIZA
MACULATA 1,2
MERTENSIANA 2
STRIATA 2,5
TRIFIDA 5
CYPRIPEDIUM
FASCICULATUM 1,2
EPIPACTIS
GIGANTEA 2
HABENARIA
DILATATA 1,2,5,6
HYPERBOREA 2,6
UNALASCENSIS 1,6
VIRIDIS 1
SPIRANTHES
ROMANZOFFIANA 1,2,5,6

CLASS DICOTYLEDONAE

SALICACEAE

POPULUS
ANGUSTIFOLIA 1,2
TREMULOIDES 1,2,6
SALIX
AMYGDALOIDES 1,2
ARCTICA 2
BEBBIANA 1,2,6
BRACHYCARPA 1
CASCADENSIS 1,2
DRUMMONDIANA 1,2,5
EXIGUA 1,2
GEYERIANA 1,2
GLAUCA 1,5
LASIANDRA 1,2,6
MONTICOLA 2
MYRTILLIFOLIA 1,2
NIVALIS 1,2
ORESTERA 2
PHYLICIFOLIA 1,2,5
PSEUDOCORDATA 2
RIGIDA 1,2
SCOULERIANA 1,2,6
WOLFII 1,2

BETULACEAE
- ALNUS
  - TENUIFOLIA 1,2
- BETULA
  - GLANDULOSA 1,2,5
  - OCCIDENTALIS 1,2,6

FAGACEAE
- QUERCUS
  - GAMBELII 1,2

MORACEAE
- HUMULUS
  - AMERICANUS 1

URTICACEAE
- URTICA
  - DIOICA 1

LORANTHACEAE
- ARCEUTHOBIUM
  - AMERICANUM 1
  - CAMPYLOPODUM 1
  - DOUGLASSII 1

SANTALACEAE
- COMANDRA
  - PALLIDA 1,2

POLYGONACEAE
- ERIOGONUM
  - ALATUM 1,2
  - ARCUATUM 2
  - AUREUM 2
  - BATEMANI 1,6
  - BREVICAULE 6
  - CAMPANULATUM 1
  - CERNUUM 1,2
  - CORYMBOSUM 1,2,6
  - ELATUM 8
  - GORDONI 1
  - HERACLEOIDES 1,6
  - JAMESII 1
  - MICROTHECUM 1,6
  - OVALIFOLIUM 1
  - RACEMOSUM 1,6
  - SALSUGINOSUM 1
  - UMBELLATUM 1,2,6
- OXYRIA
  - DIGYNA 1,6
- POLYGONUM
  - AMPHIBIUM 1,2
  - AVICULARE 2
  - BISTORTOIDES 1,5,6
  - CONVOLVULUS 1,2
  - DOUGLASII 1,2,6
  - KELLOGII 9
  - VIVIPARUM 1,2
  - WATSONII 1

RUMEX
ACETOSELLA 1,2
CRISPUS 1,2
OCCIDENTALIS 1
PAUCIFOLIUS 2,6
SALICIFOLIUS 1,6

CHENOPODIACEAE

ATRIPLEX
CANESCENS 1,6
CONFERTIFOLIA 1
GARDNERI 1
ROSEA
TRIDENTATA 1
CHENOPODIUM
ALBUM 1
CAPITATUM 2,6
FREMONTII 1,2
GLAUCUM 1
LEPTOPHYLLUM 1,2
RUBRUM 1
EUROTIA
LANATA 1,6
GRAYIA
SPINOSA 1,2,6
HALOGETON
GLOMERATUS 1
KOCHIA
AMERICANA 1
SCOPARIA 1
MONOLEPIS
NUTTALLIANA 1,2,6
PUSILLA 1
SALSOLA
KALI 1
SARCOBATUS
VERMICULATUS 1
SUAEDA
FRUTICOSA 1

AMARANTHACEAE

AMARANTHUS
CRAECIZANS 8
HYBRIDUS 1

NYCTAGINACEAE

ABRONIA
ELLIPTICA 1
FRAGRANS 6
HERMIDIUM
ALIPES 2
OXYBAPHUS
LINEARIS 1

PORTULACACEAE

CLAYTONIA

LANCEOLATA 1,2,6
LEWISIA
PYGMAEA 1,2,6
REDIVIVA 1
TRIPHYLLA 5
CARYOPHYLLACEAE
ARENARIA
CONGESTA 1,2,5,6
FENDLERI 1
HOOKERI 1,6
KINGII 8
LATERIFLORA 2
OBTUSILOBA 1,2,6
RUBELLA 2,6
CERASTIUM
ARVENSE 1
BEERINGIANUM 1,2,6
BRACHYPODUM 1
NUTANS 9
VULGATUM 1,6
LYCHNIS
DRUMMONDII 1,2
KINGII 1,2
PARONYCHIA
PULVINATA 1,2
SESSILIFLORA 1,6
SAGINA
SAGINOIDES 2,6
SILENE
ACAULIS 1,2
MENZIESII 1,2
SPERGULARIA
MARINA 6
RUBRA 6
STELLARIA
CALYCANTHA 2
CRISPA 2
JAMESIANA 1,2
LONGIPES 1,2
UNBELLATA 1,2
NYMPHAEACEAE
NUPHAR
POLYSEPALUM 1,2,5
NYMPHAEA
ODORATA 9
RANUNCULACEAE
ACONITUM
COLUMBIANUM 1,2,5
ACTAEA
RUBRA 1,2
ANEMONE
CYLINDRICA 2

MULTIFIDA 1,2
PATENS 1
AQUILEGIA
CHRYSANTHA 2
COERULEA 1,2,6
FLAVESCENS 1
MICRANTHA 2
SCOPULORUM 6
CALTHA
LEPTOSEPALA 1,2,5,6
CLEMATIS
COLUMBIANA 1,2
HIRSUTISSIMA 1,2
LIGUSTICIFOLIA 1,2
PSEUDOALPINA 2
DELPHINIUM
BICOLOR 2
GEYERI 1,6
NELSONI 1,2,6
OCCIDENTALE 1,2
RANUNCULUS
ALISMAEFOLIUS 2
ADONEUS 1
AQUATILIS 1,5,6
CARDIOPHYLLUS 1,2
CIRCINATUS 9
CYMBALARIA 1,2
ESCHSCHOLTZII 1,5
FLABELLARIS 9
FLAMMULA 1,5,6
GLABERRIUMS 1,2,6
GMELINII 9
INAMOENUS 1,2,6
MACOUNII 2
NATANS 9
ORTHORHYNCHUS 5
SCELERATUS 1,2
TESTICULATUS 1
THALICTRUM
ALPINUM 6
FENDLERI 1,2,6
SPARSIFLORUM 1,2
TROLLIUS
LAXUS 1,2,5,6

BERBERIDACEAE
BERBERIS
REPENS 1,2

FUMARIACEAE
CORYDALIS
AUREA 1,2,6

CAPPARIDACEAE
POLANSIA
DODECANDRA 8

CRUCIFERAE

ARABIS
- DRUMMONDII 1,2,6
- GLABRA 2
- HIRSUTA 2
- HOLBOELLII 1,2
- LEMMONI 1,2
- LYALLII 2
- PENDULINA 1

BARBAREA
- ORTHOGERAS 1,2

BRASSICA
- CAMPESTRIS 1

CAMELINA
- MICROCARPA 8

CAPSELLA
- BURSA-PASTORIS 1,2

CARDAMINE
- BREWERI 6
- CORDIFOLIA 1,2,6
- PENSYLVIANICA 1,2

CARDARIA
- DRABA 1

CAULANTHUS
- CRASSICAULIS 1,2

CHORISPORA
- TENELLA 1

DESCURAINIA
- CALIFORNICA 2,6
- PINNATA 1
- RICHARDSONII 1,2
- SOPHIA 1,6

DRABA
- AUREA 1,2
- CRASSIFOLIA 2
- LANCEOLATA 2
- NEMOROSA 1,2
- OLIGOSPERMA 1,6
- PRAEALTA 5
- STENOLOBA 1,2,6

ERYSIMUM
- ARGILLOSUM 1
- ASPERUM 2,6

ISATIS
- TINCTORIALIS

LEPIDIUM
- DENSIFLORUM 1
- LATIFOLIUM 1
- MONTANUM 1,6
- VIRGINICUM 8

LESQUERELLA
- ALPINA 1
- UTAHENSIS 2,6

MALCOMIA
AFRICANA 1
NASTURTIUM
OFFICINALE 1,2
PARRYA
RYDBERGII 1
PHOENICAULIS
EURYCARPA 2
PHYSARIA
AUSTRALIS 1,2
RORIPPA
ALPINA 5
OBTUSA 9
SINUATA 1
SISYMBRIUM
ALTISSIMUM 1
LINIFOLIUM 1,2
SMELOWSKIA
CALYCINA 1,2,6
STANLEYA
PINNATA 1
VIRIDIFLORA 6
STREPTANTHELIA
LONGIROSTRIS 6
STREPTANTHUS
CORDATUS 1,2
THELYPODIUM
INTEGRIFOLIUM 8
THLASPI
ARVENSE 1
FENDLERI 1,2,6

CAPPARIDACEAE

CLEOME
LUTEA 1
SERRULATA 1,6

CRASSULACEAE

SEDUM
DEBILE 5
RHODANTHUM 1,2,5,6
ROSEUM 1
STENOPETALUM 1,2,6

SAXIFRAGACEAE

HEUCHERA
CYLINDRICA 1
PARVIFLORA 1,2
JAMESIA
AMERICANA 2
LITHOPHRAGMA
BULBIFERA 2
PARVIFLORA 2
MITELLA
PENTANDRA 1,2,5
STAUROPETALA 1,2,6

PARNASSIA
FIMBRIATA 1,6
PALUSTRIS 1
PHILADELPHUS
MICROPHYLLUS 1,2
RIBES
AUREUM 1,2
CEREUM 1,2,6
INERME 1,2
LACUSTRE 1,2
MONTIGENUM 1,2,6
VISCOSISSIMUM 1,2,6
WOLFII 2
SAXIFRAGA
DEBILIS 2
HIRCULUS 1
ODONTOLOMA 1,2,5,6
RHOMBOIDEA 1,2,5,6

ROSACEAE

AMELANCHIER
ALNIFOLIA 1,2
PUMILA 3
UTAHENSIS 2,6
CERCOCARPUS
LEDIFOLIUS 1,2
MONTANUS 1,2
CRATAEGUS
DOUGLASII 1,2,6
DRYAS
OCTOPETALA 1
FRAGARIA
VIRGINIANA 1,2,6
GLAUCA 1
VESCA 8
GEUM
MACROPHYLLUM 1,2,6
ROSSII 1
TRIFLORUM 1
HOLODISCUS
DUMOSUS 1,2
IVESIA
GORDONII 1,5,6
PERAPHYLLUM
RAMOSISSIMUM 2
PETROPHYTUM
CAESPITOSUM 1
PHYSOCARPUS
ALTERNANS 2
MALVACEUS 1,2,6
POTENTILLA
ANSERNIA 1,2
BIENNIS 1

CONCINNA 1,2
DIVERSIFOLIA 1,2,5,6
FRUTICOSA 1,2,6
GLANDULOSA 1,2,6
GRACILIS 1,2,6
NIVEA 1
NORVEGICA 2
OVINA 1
PENSYLVANICA 1
PLATTENSIS 1
QUINQUIFOLIA 2
PRUNUS
VIRGINIANA 1,2,6
PURSHIA
TRIDENTATA 1,2
ROSA
ACICULARIS 2
MANCA 1
NUTKANA 2
WOODSII 1,6
RUBUS
IDAEUS 1,2
PARVIFLORUS 1,2
SANGUISORBA
MINOR 1
SIBBALDIA
PROCUMBENS 1,2,5
SORBUS
SCOPULINA 1,6

LEGUMINOSEAE

ASTRAGALUS
ABORIGINUM 1
ADSURGENS 1
AGRESTIS 1,6
AMPHIOXYS 1
ARGOPHYLLUS 6
BISULCATUS 1,6
CANADENSIS 6
COLTONI 1
CONVOLLARIUS 1,6
DIVERSIFOLIUS 8
KENTROPHYTA 1,6
MISER 1,6
PATTERSONI 6
SPATULATUS 1
TENNELLUS 1,6
GLYCYRRHIZA
LEPIDOTA 1,2,6
HEDYSARUM
BOREALE 1
OCCIDENTALE 1
LATHYRUS

LANSZWERTII 2,6
LEUCANTHUS 1,6
PAUCIFLORUS 2,6
LUPINUS
ALPESTRIS 6
ARGENTEUS 1,2,6
CAUDATUS 1,2
LEPIDUS 1
LEUCOPHYLLUS 1,6
PUSILLUS 1
SERICEUS 6
MEDICAGO
HISPIDA 1
LUPULINA 1,6
SATIVA 1
MELILOTUS
ALBA 1
OFFICINALIS 1
OXYTROPIS
DEFLEXA 1,6
LAMBERTII 1,2
GERICEA 2,6
THERMOPSIS
MONTANA 1,2,6
TRIFOLIUM
ANDINUM 1
DASYPHYLLUM 1
GYMNOCARPON 1,2,6
HYBRIDUM 1,6
LONGIPES 1,2,6
PARRYI 1,2,5,6
PRATENSE 1
PROCUMBENS 1
REPENS 1,2,6
VICIA
AMERICANA 1,6

GERANIACEAE

ERODIUM
CICUTARIUM 1
GERANIUM
BICKNELLII 1
CAESPITOSUM 1
FREMONTII 1,6
RICHARDSONII 1,2,6
VISCOSSISSIMUM 1,2

LINACEAE

LINUM
KINGII 1,2,6
LEWISII 1,2,6

EUPHORBIACEAE

EUPHORBIA
ALBOMARGINATA 8

FENDLERI 1
GLYPTOSPERMA 8
ROBUSTA 1,6
SERPYLLIFOLIA 2

CALLITRICHACEAE
CALLITRICHE
HERMAPHRODITICA 5
PALUSTRIS 5
VERNA 6

ANACARDIACEAE
RHUS
RADICANS 1
TRILOBATA 1,6

CELASTRACEAE
GLOSSOPETALON
NEVADENSE 1
PACHISTIMA
MYRSINITES 1,2

ACERACEAE
ACER
GLABRUM 1,2
GRANDIDENTATUM 1,2,6
NEGUNDO 1

RHAMNACEAE
CEANOTHUS
FENDLERI 1,2
MARTINII 2,6
VELUTINUS 1,2,6

MALVACEAE
ILIAMNA
RIVULARIS 6
MALVA
NEGLECTA 1
SIDALCEA
CANDIDA 1,2
SPHAERALCEA
COCCINEA 1,6

HYPERICACEAE
HYPERICUM
ANAGALLOIDES 5
FORMOSUM 1,2

VIOLACEAE
VIOLA
ADUNCA 1,2,5
CANADENSIS 2
MACLOSKEYI 5
NUTTALLII 1,6
NEPHROPHYLLA 1,2,5,6
PALUSTRIS 2
PURPUREA 2
VALLICOLA 2

LOASACEAE
- MENTZELIA
  - ALBICAULIS 1,2
  - NUDA 1
  - PUMILA 8

CACTACEAE
- MAMMILLARIA
  - spp. 1
- OPUNTIA
  - HYSTICINA 8
  - RHODANTHA 8
  - spp. 1
- PEDIOCACTUS
  - SIMPSONI 6

ELAEAGNACEAE
- ELAEAGNUS
  - ANGUSTIFOLIA 1
  - COMMUTATA 6
- SHEPERDIA
  - ARGENTEA 1,6
  - CANADENSIS 1,2

ONAGRACEAE
- EPILOBIUM
  - ADENOCAULON 1,6
  - ALPINUM 1,2,5,6
  - ANGUSTIFOLIUM 1,2,6
  - GLANDULOSUM 1,2,5,6
  - LATIFOLIUM 6
  - PALUSTRE 9
  - PANICULATUM 2
- GAYOPHYTUM
  - NUTTALLII 1,2
  - RACEMOSA 2
  - RAMOSISSIMUM 2
- OENOTHERA
  - ALBICAULIS 1
  - BRACHYCARPA 1
  - BREVIFLORA 2
  - CAESPITOSA 2
  - CORONOPIFOLIA 1,2
  - FLAVA 1,6
  - HOOKERI 1
  - PALLIDA 8
  - SCAPOIDEA 1
  - TRICHOCALYX 1

HALORAGIDACEAE
- HIPPURIS
  - VULGARIS 1
- MYRIOPHYLLUM
  - SPICATUM 1

UMBELLIFERAE

ANGELICA
ARGUTA 2
PINNATA 1,2
ROSEANA 1,2,6
CICUTA
DOUGLASII 1
CYMOPTERIS
ANISATUS 1
HENDERSONII 1,2
JONESII 8
LONGIPES 1,2
PURPURASCENS 1
TEREBINTHINA s
HERACLEUM
LANATUM 1
LIGUSTICUM
FILICINUM 1,2,5,6
PORTERI 1,2
LOMATIUM
GRAYI 1,2,6
MACROCARPUM 2
NEVADENSE 2
NUTTALLII 8
TRITERNATUM 1,6
OROGENIA
LINEARIFOLIA
OSMORHIZA
CHILENSIS 1,2
DEPAUPERATA 1,2,6
OCCIDENTALIS 1,2,6
PODISTERA
EASTWOODAE
PSEUDOCYMOPTERUS
MONTANUS 2
SIUM
SUAVE 9

CORNACEAE
CORNUS
STOLONIFERA 1,2

PYROLACEAE
CHIMAPHILA
UMBELLATA 1
PTEROSPORA
ANDROMEDEA 2,6
PYROLA
ASARIFLOIA 1,2,6
MINOR 1
SECUNDA 1,2,6
VIRENS 1,2

ERICACEAE
ARCTOSTAPHYLOS

NEVADENSIS 2
PATULA 1
UVA-URSI 1,2,6
GAULTHERIA
HUMIFUSA 2,5,6
KALMIA
POLIFOLIA 1,2,5
LEDUM
GLANDULOSUM 1,2,5
VACCINUM
CAESPITOSUM 2,5
MEMBRANACEUM 1
MYRTILLUS 1
OCCIDENTALE 1,2,5
SCOPARIUM 1,2,5

PRIMULACEAE
ANDROSACE
SEPTENTRIONALIS 1,2
DODECATHEON
ALPINUM 2
JEFFREYI 5
PULCHELLUM 1,2
GAUX
MARITIMA 1
PRIMULA
PARRI 1,2,5

GENTIANACEAE
FRASERA
SPECIOSA 1,2,5,6
GENTIANA
AFFINIS 1,2,6
ALGIDA 1,2
AMARELLA 1,2,6
CALYCOSA 1,5,6,
DETONSA 1,6
FREMONTII 1
HELOPETALA 1
PARRYI 1,2,5
PLEBEIA 2
PROSTRATA 2,6
TENELLA 2

MENYANTHACEAE
MENYANTHES
TRIFOLIATA 1,5

APOCYNACEAE
APOCYNUM
ANDROSAEMIFOLIUM 1

ASCLEPIADACEAE
ASCLEPIAS
ASPERULA 8
CRYPTOCERAS 1
SPECIOSA 1,2

POLEMONIACEAE
- COLLOMIA
  - GRANDIFLORA 2
  - LINEARIS 1,2
- GILIA
  - AGGREGATA 1,2,6
  - CONGESTA 1,2
  - LEPTOMERIA 1
  - PUMILA 1
  - SINUATA 1
- LEPTODACTYLON
  - PUNGENS 1
  - WATSONI 2
- LINANTHUS
  - HARKNESSII 2
- MICROSTERIS
  - GRACILIS 1,2
- PHLOX
  - CONDENSATA 1,2
  - HOODII 1,2
  - LONGIFOLIA 1,2
  - MULTIFLORA 2
  - STANSBURYI 1
- POLEMONIUM
  - EXIMIUM 1
  - FOLIOSISSIMUM 1,2,6
  - OCCIDENTALE 1,2,6
  - PULCHERRIMUM 1,2
  - VISCOSUM 1,2

HYDROPHYLLACEAE
- HYDROPHYLLUM
  - CAPITATUM 1,2
- NAMA
  - DENSUM 2
- NEMOPHILA
  - BREVIFOLIA 2
- PHACELIA
  - CRENULATA 1
  - GLANDULOSA 2
  - HASTATA 1,2
  - HETEROPHYLLA 2,5,6
  - IDAHOENSIS 1
  - IVESIANA 1
  - SERICEA 1,2

BORAGINACEAE
- CRYPTANTHA
  - AFFINIS 8
  - AMBIGUA 2
  - FLAVA 1,2
  - FLAVOCULATA 1,6
  - KELSEYANA 1
  - NANA 2

ROLLINSII 1
SERICEA 1
STRICTA 2
CYNOGLOSSUM
OFFICINALE 1
ERITICHIUM
NANUM
HACKELIA
FLORIBUNDA 1,2,6
PATENS 1,2
LAPPULA
ECHINATA 2
REDOWSKII 1,2
LITHOSPERMUM
INCISUM 1,2
MULTIFLORUM 1
RUDERALE 1
MERTENSIA
ARIZONICA 1,2
BREVISTYLA 2
CILIATA 1,2,5,6
FUSIFORMIS 1,2
LANCEOLATA 6
VIRIDIS 1,2
PLAGIOBOTHRYS
SCOULERI 6

VERBENACEAE

VERBENA
BRACTEATA 1

LABIATAE

AGASTACHYE
URTICIFOLIA 1
DRACOCEPHALUM
NUTTALLII 1
MARRUBIUM
VULGARE 1
MENTHA
ARVENSIS 1
MOLDAVICA
PARVIFOLIA 1
MONARDELLA
ODORATISSIMA 1,2
PRUNELLA
VULGARIS 1

SOLANACEAE

HYOSCYAMUS
NIGER 1

SCROPHULARIACEAE

BESSEYA
WYOMINGENSIS 1
CASTILLEJA

APPLEGATEI 6
CHROMOSA 2
FLAVA 6
LEONARDI 6
LINARIAEFOLIA 1,2,6
MINIATA 1,2,6
OCCIDENTALIS 1
PULCHELLA 1
RHEXIFOLIA 1,2,5,6
SEPTENTRIONALIS 1,2,5,6
VISCIDA 6

COLLINSIA
PARVIFLORA 1,2

CORDYLANTHUS
RAMOSUS 2

MIMULUS
GUTTATUS 1,2
LEWISII 1,2
MOSCHATUS 1
PRIMULOIDES 1,2

ORTHOCARPUS
LUTEUS 1,2
TOLMEI 1,2

PEDICULARIS
BRACTEOSA 1,2,3,5,6
CENTRANTHERA 2
GROENLANDICA 1,2,5,6
PARRYI 1,2
RACEMOSA 1,2,5,6

PENSTEMON
ACAULIS 1
CAESPITOSUS 1
COMARRHENUS 2
EATONI 1
HUMILIS 1,2,6
LEONARDI 6
OSTERHOUTII 1
PACHYPHYLLUS 1,6
PALMERI 1
PROCERUS 1,2,6
RADICOSUS 1
SPECIOSUS 1
STRICTUS 1
SUBGLABER 2,6
UINTAHENSIS 1,2
WATSONII 1,2
WHIPPLEANUS 1,2,5,6

SCROPHULARIA
LANCEOLATA 1,2

SYNTHYRIS
PINNATIFIDA 1,6

VERBASCUM
THAPSUS 1,2
VERONICA
AMERICANA 1,2
ANAGALLIS-AQUATICA 1
PEREGRINA 1
SERPYLLIFOLIA 2,5,6
WORMSKJOLDII 1,2,5,6

LENTIBULARIACEAE
UTRICULARIA
MINOR 9
VULGARIS 9

OROBANCHIACEAE
OROBANCHE
FASCICULATA 1,2
LUDOVICIANA 2
UNIFLORA 5

PLANTAGINACEAE
PLANTAGO
ERIOPODA 1
MAJOR 1
PATAGONICA 1
TWEEDYI 1

RUBIACEAE
GALIUM
APARINE 1
BIFLORUM 2
BOREALE 1,2,6
TRIFIDUM 1,2
TRIFLORUM 2

CAPRIFOLIACEAE
LINNEAE
BOREALIS 1
LONICERA
INVOLUCRATA 1,2,5,6
UTAHENSIS 1,2
SAMBUCUS
CERULEA 1,2,6
RACEMOSA 1,2,6
SYMPHORICARPOS
ALBUS 1
OREOPHILUS 1,6

VALERIANACEAE
VALERIANA
CAPITATA 6
EDULIS 1,2
OCCIDENTALIS 1,6

CAMPANULACEAE
CAMPANULA
ROTUNDIFOLIA 1,2,5,6
PARRYI 1
UNIFLORA 1,2

PORTERELLA
CARNOSULA 6

COMPOSITAE

ACHILLEA
MILLEFOLIUM 1,2,5
AGOSERIA
AURANTIACA 1
GLAUCA 1,2,6
Var. GLAUCA 1
LACINIATA 1
MONTICOLA 1
AMBROSIA
ARTEMISIIFOLIA 1
ANAPHALIS
MARGARITACEA 1,6
ANTENNARIA
ALPINA 1
ANAPHALOIDES 2,6
CORYMBOSA 1,2,5
DIMORPHA 2
PARVIFLOIA 1,2
ROSEA 1,2,6
UMBRINELLA 2,6
ARCTIUM
MINUS 1
ARNICA
CHAMISSONIS 1,6
CORDIFOLIA 1,2,6
FULGENS 1
LATIFOLIA 1,2
MOLLIS 1,2,5,6
PARRYI 1,2
PUMILA 2
RYDBERGII 1,6
SORORIA 2
ARTEMISIA
ARBUSCULA 1,6
BIENNIS 1
CAMPESTRIS 1
CANA 1,6
DRACUNCULUS 1,2,6
FRIGIDA 1,2,6
LUDOVICIANA 1,6
MICHAUXIANA 2
SCOPULORUM 1,2
TRIDENTATA 1,2,6
ASTER
ALPIGENUS 2
BRACHYACTIS 1
CHILENSIS 1,6
COMMUTATUS 6

EATONII 6
ENGELMANNII 1,6
FOLIACEUS 1,5,6
GLAUCODES 1,2,6
HESPERIUS 1,6
INTEGRIFOLIUS 1
OCCIDENTALIS 1
PERELEGANS 1
BAHIA
DISSECTA 6
BALSAMORHIZA
HOOKERI 1
SAGITTATA 1,2
BRICKELLIA
CALIFORNICA 1
GRANDIFLORA 2
OBLONGIFOLIA 2
CARDUUS
NUTANS 1,6
CENTAUREA
CHEANACTIS
ALPINA 1,2
DOUGLASII 1,2
STEVIOIDES 8
CHRYSOPSIS
VILLOSA 1,6
CHRYSOTHAMNUS
GREENII 2
NAUSEOSUS 1,6
PARRYI 2,6
VISCIDIFLORUS 1,2,6
CIRSIUM
ACRVENSE 1
EATONI 2,6
PULCHELLUM 2
POLYPHYLLUM 2
SCARIOSUM 1,2
SUBNIVEM 2
UNDULATUM 6
VULGARE 1
CONYZA
CANADENSIS 1
CREPIS
ACUMINATA 1
ATRABARBA 1
INTERMEDIA 2
MODOCENSIS 1
OCCIDENTALIS 2
ERIGERON
ACRIS 2
APHANACTIS 1

CAESPITOSUS 1
COMPOSITUS 1,2,6
CONCINNUS 1
DIVERGENS 1,2
EATONII 1,2
ENGELMANNII 1,2,6
FLAGELLARIS 1,2
GLABELLUS 1,2
LEIOMERUS 1,2,6
LONCHOPHYLLUS 1,2,6
PEREGRINUS 1,5,6
PUMILUS 1,2
SIMPLEX 1,2
SPECIOSUS 1,2,6
SUBTRINERVIS 1,2
SUPERBUS 1
URSINUS 1,2,6

FRANSCRIA
ACANTHICARPA 8

GAILLARDIA
ARISTATA 1,2,6
PINNATIFIDA 8

GNAPHALIUM
PALUSTRE 1

GRINDELIA
SQUARROSA 1,6

GUTIERREZIA
SAROTHRAE 1,6

HAPLOPAPPUS
ACAULIS 1
ARMERIOIDES 1
MACRONEMA 1
PARRYI 1,6
SUFFRUTICOSUS 2
UNIFLORUS 1

HELENIUM
HOOPSII 6

HELIANTHELLA
MICROCEPHALA 6
QUINQUENERVIS 1,2
UNIFLORA 1,2

HELIANTHUS
ANNUS 1
NUTTALLII 2

HIERACIUM
ALBIFLORUM 1,6
FENDLERI 1
GRACILE 1,5,6
SCOULERT 1

HYMENOPAPPUS
FILIFOLIUS 1,6

HYMENOXYS
- ACAULIS 1
- GRANDIFLORA 1,2
- RICHARDSONII 1

IVA
- AXILLARIS 1
- XANTHIFOLIA 1

LACTUCA
- PULCHELLA 1
- SERRIOLA 1

LEUCELENE
- ERICOIDES 1

LYGODESMIA
- GRANDIFLORA 1

MACHAERANTHERA
- CANESCENS 1,6
- COMMIXTA 6
- GRINDELIOIDES 6
- LAETEVIRENS 1

MADIA
- GLOMERATA 1

MALOCOTHRIX
- TORREYI 1

MICROSERIS
- NUTANS 1,2

PETRADORIA
- PUMILA 1

RUDBECKIA
- OCCIDENTALIS 1,2

SENECIO
- ATRATUS 1,2
- CANUS 1,2
- CRASSULUS 1,6
- CYMBALARIOIDES 2,5,6
- EREMOPHILUS 1,2,5,6
- DIMORPHYLLUS 1
- FENDLERI 6
- FREMONTII 1,2
- HYDROPHILUS 1
- INTEGERRIMUS 1,2,6
- MULTILOBATUS 1,6
- PSEUDAUREUS 1
- SERRA 1,2,6
- SPARTIOIDES 1,6
- SPHAEROCEPHALUS 6
- TRIANGULARIS 1,2,5,6
- WERNERIAEFOLIUS 1

SOLIDAGO
- CANADENSIS 1,2,6
- MULTIRADIATA 1,5,6

NANA 2
PARRYI 2
SPATULATA 1,2,6
SONCHUS
ARVENSIS 1
STEPHANOMERIA
TENUIFOLIA 1,2
TANACETUM
NUTTALLII 1,3
TARAXACUM
LYRATUM 3
OFFICINALE 1,6
TETRADYMIA
AXILLARIS 1
CANESCENS 1,6
SPINOSA 1
TOWNSENDIA
EXSCAPA 8
INCANA 1
MONTANA 2
TRAGOPOGON
DUBIUS 1
VIGUIERA
MULTIFLORA 1,2
WYETHIA
AMPLEXIEAULIS 2
SCABRA

APPENDIX C

CHECKLIST OF THE INVERTEBRATE ANIMALS OF THE UINTA MOUNTAINS, UTAH

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INTRODUCTION

The invertebrates of the Uinta Mountains have been little studied and are thus poorly known. Economic considerations have resulted in the insects being better known than any other invertebrate group, but even in that group probable less than a third of the species have been collected and reported. The listings that follow are grossly incomplete, but adequate lists are not known to me.

Nematodes, segmented worms and insects are likely to be the invertebrates having the greatest significance for man in this area. The nematodes probably have a deleterious effect on most plant and animal species at one time or another. The segmented worms exert a desirable effect on soils through their impact on soil mixing and incorporation of organic matter into the soil body. Their influence is most important on moist alluvial soils, soils underlying deciduous trees and shrubs, and soils of the better watered sagebrush communities. The bark beetle (Dendroctonus monticolae - family Scolytidae) through its lethal attacks on lodgepole pine may exert a greater economic impact on Uinta Mountain ecosystems than all other invertebrates combined.

SUMMARY OF INVERTEBRATE SPECIES KNOWN FROM THE UINTA MOUNTAINS

Animal Group	No. of Species Known
Fresh Water Sponges	2
Flat Worms	1
Rotifers	4
Nematodes	1
Gastropods	21
Pelecypods	1
Segmented Worms	4
Crustaceans	17
Ticks, Spiders, and Allies	9
Insects	273
Total	333

The list of invertebrate animals that appears below has been compiled from the following list of publications.

Anderson, M. A. 1963. Study of the productivity of the periphyton and macro-invertebrates of Smith - Morehouse Creek, Summit County, Utah. Unpublished Masters thesis, Brigham Young University, Provo, Utah.

Chamberlain, R. V. and D. T. Jones. 1930. A descriptive catalog of the Mollusca of Utah. Univ. of Utah Biol. Series 1(1):1-203.

Flowers, S. et al. 1959. Ecological studies of the flora and fauna of Flaming Gorge Reservoir Basin, Utah and Wyoming. Univ. of Utah Division of Biological Sciences, Anthropological Paper No. 48:1-256.

Pearson, W. D. et al. 1968. Macroinvertebrates in the Green River below Flaming Gorge Dam, 1964-65 and 1967. Proc. Utah Acad. Sci., Arts and Lett. 45:148-167.

Tanner, V. M. 1931. A preliminary report on a biological survey of the Uinta Mountain lakes. Utah Acad. Sci., Arts and Lett. 8:155-158.

Tanner, V. M. 1932. Ecological and distribution notes on fresh water sponges and bryozoa of Utah. Utah Acad. of Sci., Arts, and Lett. 9:113-115.

INVERTEBRATES OF THE UINTA MOUNTAINS

Porifera (Sponges)
- *Spongilla lacustris*
- *Fredericella saltana*

Platyhelminthes (Flatworms)
- *Turbellaria* Sp.
- *Aschelminthes*

Rotifera (Rotifers)
- *Anarara cochlearis*
- *Polyarthra platyptera*
- *Conochilus unicornis*
- *Notops sp.*

Menatoda (Nematodes)
- *Heterodera radicicola*

Mollusca (Mollusks)

Gastropoda (Snails)
- *Musculium uintaense*
- *Plysella ampullacea*
- *Planorbis vermicularis*
- *Oreohelix strigosa*
- *Gonyodiscus shimeki*
- *Pisidium marci*
- *Vallonia gracilicosta*
- *Microphysula ingersolli*
- *Pupilla blandi*

Vitrina alaskana
Euconulus fulvus
Zonitoides arborea
Punctum pygmaeum
Stagnicola palustris
Fossaria obrussa
Gyraulus parvus
Physella ampullacea
Paludestrina longinqua
Valvata humeralis
Physa sp.
Lymnacidae (not identified to genus)
Pelecypoda (Bivalved Mollusks)
Pisidium sp.
Annelida (Segmented Worms)
Oligochaeta (Earthworms)
Lumbricus terrestris
Enchytraeus sp.
Hirudinea (Leeches)
Piscicola sp.
Oligobdella biannulate
Arthropoda (Jointed-Footed Animals)
Crustacea (Water Fleas, etc.)
Branchinecta coloradensis
Sida crystallin
Holopedium gibberum
Daphnia pulex
D. longispina
Scapholeplinia mucronata
Ceriodaphnia sp.
Eurycereus lamellatus
Alona affinis
Polyphemus pediculus
Diaptomus shoshone
D. sp.
Cyclops sp.
Gammarus limnaeus
Ostracoda (Ostracods)
Genus unknown
Amphipoda (Amphipods)
Hyallella sp.
Gammarus sp
Acarina (Mites and Ticks)
Ornithodorus aquilae
O. parperi
Dermacentor andersoni
Haemaphysalis leporis-palustris
Ixodes sp.
Ischyropoda armatus
Haemolaelaps glasgowi
Eubrachylaelaps circularis
Whartonia perplexa
Ephemeroptera (Mayflies)
Siphlonutus occidentalis

Ameletus sp.
A. chloraps
Caenis sp.
Centroptilum sp.
Isonychia sicca
Lachiania powelli
Heptagenia elegantula
H. sp.
Cinygmula par
C. sp.
Rhithrogena undulata
R. hageni
Epeorus longimanus
E. albertae
Pseudiron sp.
Anepeorus rusticus
Ametropus albrighti
Callibactis doddsi
C. fuscus
C. nigritus
C. sp.
Bactis tricaudatus
B. intermedius
B. bicaudatus
B. insignificans
B. sp.
Brachycercus sp.
Tricorythodes minutus
T. sp.
Ephemerella inermis
E. doddsi
E. tibialis
E. grandis
Leptophlebia gravastella
Paraleptophelbia pallipes
P. sp.
Choroterpes albiannulata
Traverella albertana
Hexagenia limbata
Ephemera simulans
Ephoron album
Pentagenia sp.

Odonata (Dragonflies)

Ophiogomphys severus
Gomphys intricatus
Aeshna interrupta
A. palmata
Libellula pulchella
L. quadrimaculata
Sympetrum corruptum
S. danae
S. occidentale
S. madidum
S. pallipes

S. rubicundulum
S. sp.
Argia sp.
Plecoptera (Stoneflies)
Pteronarcys californica
Pteronarcella badia
Nemoura californica
N. venusta
N. basametsa
N. cinctipes
Paraleuctra sara
Perlomyia utahensis
Capnia confusa
C. glabra
C. gracilaria
C. nana
C. uintahi
C. logana
C. lemoniana
Eucapnopsis brevicauda
Brachyptera pacifica
Arcynopterx signata
A. parallela
Isogenus aestivalis
I. modestus
Diura knowltoni
Isoperla ebria
I. fulva
I. patricia
I. pinta
Paraperla frontalis
Utaperla sopladora
Alloperla severa
A. pallidula
A. borealis
A. coloradensis
A. lamba
A. signata
A. pintada
Acroneuria pacifica
Claassenia sabulosa
Perlesta sp.
Orthoptera (Grasshoppers, crickets, and allies)
Dissosteira carolina
Melanoplus femur-rubrum
M. bivitattus
Anabrus simplex
Nemobius fasciatus
Stenopelmatus fasciatus
Anoplura (True lice)
Hoplopleura hesperomydis
Neohaematopinus inornatus
Polyplax auricularis
Hemiptera (Bugs)

Gerridae (genus unknown)
Notonectidae (genus unknown)
Naucoridae
Ambrysus
Corixidae
Megaloptera corydalus
M. Sialidae
Homoptera (Cicadas, aphids, and allies)
Ceresa bubalus
Aphididae
Cicada sp.
Philaenus sp.
Coleoptera (Beetles)
Cicindela limbalis
C. repanda
Omus californicus
Chlaenius sericeus
Megasattus erosus
Chilocorus stigma
Coccinella transversoguttata
Dendroctonus monticolae
Helodidae (genus unknown)
Heleroceridae (genus unknown)
Chrysomelidae (genus unknown)
Elmidae (genus unknown)
Dryopidae (genus unknown)
Hydracnidae (genus unknown)
Hydrophilidae (genus unknown)
Hippodamia covergens
Phyllophaga fervida
Batyleoma suturale
B. sp.
Prionus californians
Tetraopes femoratus
Haliplidae (genus unknown)
Dytiscidae (genus unknown)
Gyrinidae (genus unknown)
Trichoptera (Caddisflies)
Cheumatopsyche sp.
Hydropsycha sp.
Agraylea sp.
Hydroptila sp.
Leptocerus sp.
Leptocella sp.
Brachycentrus sp.
Neuronia sp.
Glossosoma sp.
G. sp.
Lepidoptera (Butterfiles and moths)
Aglais antiopa
Papilio rutulus
Peiris protodice
Vanessa carye

Zerene eurydice
Pyralidae (genus unknown)
Diptera (Two-winged flies)
Aedes dorsalis
A. campestris
A. melanimon
A. nigromaculis
A. spencerii
A. vexans
Nephrotoma erythrophrys
N. ferrupinea
Tipula sp.
Chrysops carbonaria
C. discalis
C. fulvaster
Tabanus aegrotus
T. punetifer
Anthomyiidae (genus unknown)
Empididae (genus unknown)
Rhagionidae (genus unknown)
Stratiomyidae (genus unknown)
Ceratopogonidae (genus unknown)
Chironomidae (genus unknown)
Simuliidae
Asilus sp.
Cyrtopogon sp.
Dasyllis sp.
Hybomitra rhombica
H. tetrica
Mallophora sp.
Promachus sp.
Dolichopus sp.
Peckia sp.
Baccha sp.
Syritta sp.
Eurycephala sp.
Calliphora sp.
Lucilia illustris
Neobellier sp.
Ravinia sp.
Sarocophaga bullata
S. sp.
Fabriciella spinosa
Drymeia sp.
Hylemyia cilicrura
H. sp.
Blephariceridae (genus unknown)
Psychodidae (genus unknown)
Culicidae (genus unknown)
Siphonaptera (Fleas)
Monopsyllus sp.
M. wagneri
Opisocrostis labis

Orchopeas sp.
O. sexdentatus
Callistopsyllus terinus
C. sp.
Catallagia decipiens
Cediopsylla inaequalis
Hymenoptera (Bees, wasps, and allies)
Tenthredinidae (genus unknown)
Siricidae (genus unknown)
Ichnenmonidae (genus unknown)
Ophioninae (genus unknown)
Braconidae (genus unknown)
Cynipidae (genus unknown)
Chalcidodae (genus unknown)
Torymidae (genus unknown)
Eurytomidae (genus unknown)
Formicidae (genus unknown)
Chrysididae (genus unknown)
Nyssonidae
Tachysphex sp.
Philanthidae (genus unknown)
Pemphredonidae
Trypoxylon sp.
Sphex sp.
Sceliphron sp.
Ammophila sp.
Sphecinae (genus unknown)
Crabronidae (genus unknown)
Dimorphidae (genus unknown)
Alyssonidae (genus unknown)
Mutillidae (genus unknown)
Tiphiidae (genus unknown)
Eumenidae (genus unknown)
Psammocharidae (genus unknown)
Vespidae
Colletes sp.
Halictus sp.
Agapostemon sp.
Lasioglossum sp.
Perdita sp.
Diadasia sp.
Anthophora sp.
Hemisia sp.
Tetralonia sp.
Nomada sp.
Nomadopsis sp.
Megachile sp.
Coelioxys sp.
Hesperapis sp.
Heriades sp.
Apis sp.
Bombus sp.
Myrmica lobicornis

M. brevispinosa
M. brevinodis
M. scabrinodis
Pogonomyrmex occidentalis
Pheidole pilifera
Monomorium minimum
Solenopsis molesta
Leptothorax canadensis
Porymyrmex pyramicus
Tapinoma sessile
Campanotus vicinus
C. herculeanus
C. pennsylvanicus
Lasius americanus
L. niger
L. favus
L. umbratus
Formica fusca
F. neorufibarbis
F. neoclara
F. altipetens
F. obscuripes
F. puberula
F. perpilosa
F. neogagates

APPENDIX D

CHECKLIST OF THE FISHES OF THE UINTA MOUNTAINS, UTAH

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This list of species of fishes reported from the Uinta Mountain region was compiled from the following references:

1) Sigler, W. F. and R. R. Miller. 1963. The Fishes of Utah. Publication of the Utah State Dept. of Fish and Game. 203 pp.

2) Smith, G. R. 1959. Annotated list of the Fishes of the Flaming Gorge Reservoir Basin. Appendix A in Ecological Studies of the flora and fauna of Flaming Gorge Reservoir Basin, Utah and Wyoming. Univ. of Utah Division of Biological Sciences, Anthropological Paper No. 48.

3) Tanner, V. M. 1936. A study of the fishes of Utah. Utah Acad. Sci., Arts, and Letters 13:155-183.

Numbers appearing after each species correspond to these references and indicate the source of information for that particular species. Taxonomy follows that used in Sigler and Miller (1963).

Of the twenty two species reported, nine of them have been introduced into Utah waters. The Utah cutthroat trout was native to this area, but through hybridization the original species is probably extinct. Two resultant subspecies, Salmo clarki and S. pleuritecus, are present in the streams of the Uinta Mountains. Currently, S. pleuriticus is being managed in some streams to preserve its identity, since it frequently hybridizes with S. gairdneri (rainbow trout).

FISHES OF THE UINTA MOUNTAINS

SALMONIDAE (Trout)

Oncorhynchus nerka (Kokanee) 1. Introduced to Utah from Washington in 1922.
Prosopium williamsoni (Rocky Mountain Whitefish) 2,3
Salmo aguabonita (Golden Trout) 1. Introduced from California.
S. clarki (Cutthroat trout) 1,2,3
S. gairdneri (Rainbow trout) 1,2,3
S. pleuriticus (Colorado cutthroat) 3
S. trutta (Brown trout) 2. Introduced to United States in 1883.
Salvelinus fontinalis (Brook trout) 1,3. Introduced from eastern U.S.A. at unknown but historic date.
Thymallus arcticus (Arctic grayling) 1. Introduced in 1899.

CATOSTOMIDAE (Sucker)

Catostomus latipinnis (Flannelmouth sucker) 2
Pantosteus delphinus (Bluehead sucker) 2
Xyrauchen texanus (Humpback sucker) 2,3

CYPRINIDAE (Minnow)

Cyprinus carpio (Carp) 2,3. Introduced to Utah in 1881.
Gila cypha (Humpback chub) 2
G. robusta (Bonytail) 2,3
Pimephales promelas (Fathead minnow) 2
Ptychocheilus lucius (Colorado squawfish) 1,2,3
Rhinoichthys osculus (Speckled Dace) 1,2
Richardonius balteatus (Redside shiner) 1,2,3. Introduced prior to 1950.

ICTALUEIDAE (Catfishes)

Ictaluris melas (Black bullhead) 2. Introduced from Mississippi drainage.
I. punctatus (Channel catfish) 2,3. Introduced to Utah in 1888.

COTTIDAE (Sculpins)

Cottus bairdi (Colorado mottled sculpin) 2

APPENDIX E

CHECKLIST OF THE AMPHIBIANS AND REPTILES OF THE UINTA MOUNTAINS, UTAH

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SCAPHIOPODIDAE
Scaphiopus hammondi (Great Basin spadefoot) 2,3,4,5
S. intermountainus (Great Basin spadefoot) 7
BUTONIDAE
Bufo boreas (Boreal toad) 1,2,3,6
B. woodhousei (Rocky mountain toad) 2,3,5
HYLIDAE
Pseudacris nigrita (Western Chorus frog) 5
P. triseriata 1,2,3,6
RANADAE
Rana pipiens (Western leopard frog) 1,2,3,4,5,7

REPTILES OF THE UINTA MOUNTAINS

REPTILIA
DIAPSIDA
SQUAMATA
IGUANIDAE
Crotaphytus wislizeni (Yellowhead collard lizard) 3,5
Phrynosoma douglassi (Eastern short horned lizard) 3,4,5,7
Sceloporus graciosus (Great Basin sagebrush lizard) 3,4,5,7
S. undulatus (Northern Plateau lizard) 3,4,5,7
Urosaurus ornatus wrightii (Northern cliff lizard) 4,7
Uta stansburiana (Northern side-blotched uta) 3,5
TEIIDAE
Cnemidophorus tigris (Northern whiptail) 5
COLUBRIDAE
Coluber constrictor (Western yellow bellied racer, western blue racer) 3,4,5,7
Lampropeltis doliata (Utah milk snake) 5
Masticophis taeniatus (Desert striped whipsnake) 3,5
Pituophis catenifer (deserticola) (Great Basin gopher snake) 3,4,5
P. melandleueus (Great Basin gopher snake) 7
Sonora semiannulata (Great Basin ground snake) 3,5
Thamophis elegans (Wandering garter snake) 4,5,7
T. ordinoides vagrans (Wandering garter snake) 3
CROTALIDAE
Crotalus viridis (Midget faded rattlesnake, yellow rattlesnake) 4,5,7

APPENDIX F

BIRDS OF THE
UINTA MOUNTAINS, UTAH

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INTRODUCTION

The Uinta Mountains support the richest avain fauna in the state of Utah. Great ecological variability in the terrestrial environment and over 600 lakes capable of supporting a permanent aquatic community are undoubtedly responsible for the great diversity of birds. In all, 186 bird species are known from the range (see following Table and appended species list).

SUMMARY OF UINTA BIRDS

Group	No. of Species
Water Fowl	23
Shore Birds	14
Raptors	16
Upland Gamebirds	9
All Others	124
Total	186

In the species list which follows, the numbers following each species name refer to the following references.

1) U.S. Forest Service. 1976. Draft environmental statement - North Slope land use plan. Wasatch National Forest, Salt Lake City, Utah. 145 p.

2) Behle, W. H. and J. Ghiselin. 1958. Additional data on the birds of the Uinta Mountains and Basin of northeastern Utah. Great Basin Nat. 18:1-22.

3) Peterson, S. R. 1969. Ecology of waterfowl in the Uinta Mountains. Utah Division of Fish and Game, Publication 69-1:1-57.

4) Behle, W. H. and M. L. Perry. 1975. Utah birds: checklist, seasonal and ecological occurrence charts and guides to bird finding. Utah Museum of Natural History, University of Utah, Salt Lake City. 142 p.

5) Hayward, C. L., C. Cottam, A. M. Woodbury and H. H. Frost. 1976. Birds of Utah. Great Basin Naturalist Memoirs 1(1):1-229.

6) Hayward, C. L., D. E. Beck, and W. W. Tanner. 1958. Zoology of the Upper Colorado River Basin. I. The biotic communities. Brigham Young University Science Bulletin, Biological Series 1(3):1-74.

7) Hayward, C. L. 1952. Alpine biotic communities of the Uinta Mountains, Utah. Ecol. Monogr. 22:93-120.

Abundance Key:

A = Abundant = Seen daily in large numbers
C = Common = Seen daily but in restricted numbers
U = Uncommon = Infrequently seen
O = Occasional = Seldom seen
R = Rare = Only one or two observations
* = Transient
N = No abundance data given

BIRDS OF THE UINTA MOUNTAINS

SPECIES

Common Name	Scientific Name	Abundance	Source of Information
Common Loon	Gavia immer	O	4,5
Western Grebe	Aechmophorus occidentalis	O	4
Great Blue Heron	Ardea herodias	C	1,4,5
Black-crowned Night Heron	Mycticorax Nycticorax	*	1,4,5
American Bittern	Botaurus lentiginosus	*	1,5
Mallard	Anas platyrhyncho	C	1,3,4,5
Wood Duck	Aix sponsa	O	1,3
Pintail	Anas acuta	U	1,3,4
Green-winged Teal	Anas carolinesis	U	1,3,4,5
Cinnamon Teal	Anas cyanoptera	O	1,3,4
Blue-winged Teal	Anas discors	O	1,3,4
American Widgeon (Baldpate)	Mareca americana	O	1,3,4,5
Shoveler	Spatual clypeata	O	1,3,4,5
Lesser Scaup	Aytha affinis	O	1,3,4
Redhead	Aytha americana	O	1,3,4,5
Ring-necked Duck	Aytha collaris	U	1,3,4,5

Common Name	Scientific Name	Abundance	Source of Information
Buffle-head	Bucephala albesta	O	1,3,4,5
Common Goldeneye	Bucephala clangula	O	1,3
Common Merganser	Mergus merganser	O	1,3
Red-breasted Merganser	Mergus serrator	O	1,3,4
Ruddy Duck	Oxyura jamaicensis	O	1,3
Canada Goose	Branta canadensis	O	1,3
American Coot	Fulica americana	O	1,3,4
Goshawk	Accipiter gentilis	O	1,2
Sharp-shinned Hawk	Accipiter striatus	U	1,2,7
Red-tailed Hawk	Buteo jamaicensis	U	1,2,4,7
American Rough-legged	Buteo lagopus	U	1,2
Golden Eagle	Aquila chrysaetos	C	1,2,4
Marsh Hawk	Circus cyaneus	N	1,2,4
Cooper's Hawk	Accipiter cooperii	R	1,2
Swainson's Hawk	Buteo Swainsoni	R	1,2,4
Pigeon Hawk	Falco columbarius	R	1,5
Prairie Falcon	F. mexicanus	N	2
Sparrow Hawk	Falco sparverius	U	1,2,4
Turkey Vultures	Cathartes aura	U	1,5
Ospreys	Pandion haliaetus	R	1,4,7
Blue or Dusky Grouse	Dendragapus obscurus	U	1,2,4
Ruffed Grouse	Bonasa umbellus	U	1,2
Ring-necked Pheasant	Phasianus colchicus	N	5
Sage Grouse	Dentrocercus urophasianus	O	1,2

Common Name	Scientific Name	Abundance	Source of Information
Ptarmigan	Lagopus leucurus	N	5,7
Chukar	Alectoris graeca	U	1
California Quail	Lophortyx californicus	N	2
Killdeer	Charadriidae vociferus	O	1,4
Sora	Porzana carolina	N	2
Spotted Sandpiper	Actitis macularia	C	1,2,4
Solitary Sandpiper	Tringa solitaria	O	1
Wilson's Snipe	Capella gallinago	*	1
Western Willet	Catoptrophorus semipalmatus	R	1
Baird's Sandpiper	Erolia bairdii	R	1
Least Sandpiper	Erolia minutilla	R	1
Semipalmated Sandpiper	Ereunetes pusillus	R	1
Western Sandpiper	E. mauri	R	1
Avocet	Recurvirostra americana	*	1
Black-necked Stilt	Himantopus mexicanus	N	1
California Gull	Larus californicus	O	4
Franklin's Gull	Larus pipixcan	*	1
Mourning Dove	Zenaidura macroura	U	1,2,6
Rock Dove (Domestic Pigeon)	Columba livia	R	1
Bandtailed Pigeon	C. fasciata	N	2,6
Screech Owl	Otus asio	R	1,6
Great Horned Owl	Bubo virginianus	O	1,2,6
Long-eared Owl	Asio otus	*	1,2,6
Nuttall's Poorwill	Phalaenoptilus nuttalli	U	1,2,4,6

Common Name	Scientific Name	Abundance	Source of Information
Nighthawk	Chordeiles minor	U	1,2,6
White-throated Swift	Aeronautes saxatalis	R	1,2,6
Broad-tailed Hummingbird	Selasphorus platycercus	U	1,2,4,7
Rufous Hummingbird	S. rufous	N	2
Black-chinned Hummingbird	Archilochus alexandri	R	1,5,6
Belted Kingfisher	Megaceryle alcyon	U	1,2,4
Red-shafter Flicker	Colaptes cafer	C	1,2,4
Pileated Woodpecker	Hylatomus pileatus	*	1,2
Hairy Woodpecker	Dendrocopos villosus	O	1,2,4
Three-toed Woodpecker	Picoides tridactylus	O	1,2
Alpine Three-toed Woodpecker	P. arcticus	N	4
Yellow-bellied Sapsucker	Sphyrapicus varius	O	1,2
Williamson's Sapsucker	S. thyroideus	O	1,2
Downy Woodpecker	Dendrocopes pubesceus	O	1,2
Western Kingbird	Tyrannus verticalis	N	5,6
Eastern Kingbird	T. tyrannus	N	2,6
Horned Lark	Eremophila alpestris	C	1,2,4,5
Violet-green Swallow	Tachycineta thalassina	O	1,2,4
Say's Phoebe	Sayornis saya	N	2,6
Purple Martin	Progne subis	U	1
Traill's Flycatcher	Empidonax traillii	N	2,6
Hammond's Flycatcher	E. hammondii	N	2,6
Dusky Flycatcher	E. oberholseri	N	2
Gray Flycatcher	E. wrightii	N	6
Ash-throated Flycatcher	Myiarchus Cinerascens	N	6

Common Name	Scientific Name	Abundance	Source of Information
Tree Swallow	Iridoprocne bicolor	R	1,4,5
Bank Swallow	Riparia riparia	R	1,6
Rough-winged Swallow	Stelgidopteryx ruficollis	R	1,2,6
Barn Swallow	Hirundo rustica	R	1,2,6
Cliff Swallow	Petrochelidon pyrrhonota	R	1,2,6
Western Wood Peewee	Contopus sordidulus	N	2,6
Olive-sided Flycatcher	Nuttallornis borealis	N	2
Canada Jay (Gray)	Perisoreus canadensis	C	1,2,6
Clark's Nutcracker	Nucifrage columbiana	O	1,2,4,6,7
Steller's Jay	Cyanocitta stelleri	C	1,2
Scrub Jay	Aphelocoma coerulescens	O	1,2
Magpie	Pica pica	U	1,2,4
Crow	Corvus brachyrhynchos		4,6
Raven	Corvus corax	O	1,6
Pinyon Jay	Gymnorhinus cyanocephala	R	1,2,6
Mountain Chickadee	Parus gambeli	C	1,2,4,5
Black-capped Chickadee	P. atricapillus	C	1,2,5
Plain Titmouse	P. inornatus	U	1,5
Bushtit	Psaltriparus minimus	U	1,5
Red-breasted Nuthatches	Sitta canadensis	O	1,2
White-breasted Nuthatches	S. carolinensis	U	1,2,5
Pygmy Nuthatch	Sitta Pygmaea	U	1,5
Brown Creeper	Certhia familiaris	O	1,2,5
Water Ouzel	Cinclus mexicanus	C	1,2,4,5
Rock Wren	Salpinctes obsoletus	C	1,2,4,5,7

Common Name	Scientific Name	Abundance	Source of Information
House Wren	Troglodytes aedon	R	1,2,5
Bewick's Wren	Thryomanes bewickii	O	1,5
Long-billed Marsh Wren	Telmatodytes palustris	O	1,5
Canyon Wren	Catherpes mexicanus	R	1,5
Western Mockingbird	Mimus polyglottos	O	1,5
Sage Thrasher	Oreoscoptes montanus	C	1,2,4,5
Robin	Turdus migratorius	C	1,2,4,5,
Hermit Thrush	Hylocichla guttata	O	1,2,4,7
Olive-backed Thrush	Hylocichia ustulata	O	1,2
Mountain Bluebird	Sialia currucoides	O	1,2,4
Western Bluebird	Sialia mexicana	R	1
Townsend's Solitaire	Myadestes townsendi	R	1,2,4,6,
Ruby-crowned Kinglet	Regulus calendula	C	1,2,4,6,
Golden-crowned Kinglet	R. satrapa	N	2
Blue-gray Gnatcatcher	Polioptila caerulea	U	1,6
American Pipit	Anthus spinoletta	A	1,2,4,6
Mountain Pipit	A. rubescens alticola	C	7
Northern Shrike	Lanius excubitor	R	1,2,6,
Loggerhead Shrike	Lanius ludovicianus	U	1,6
Waxwings	Bombycillidae	N	1
Starling	Sturnus vulgaris	R	1,2,4,6
Solitary Vireo	Vireo solitarius	U	1,2,6
Warbling Vireo	V. gilvus	R	1,2,6
Orange-crowned Warbler	Vermivora celata	O	1,2,6
Audubon's Warbler	Dendroica auduboni	C	1,2,4,6

Common Name	Scientific Name	Abundance	Source of Information
Townsend's Warbler	D. townsendi	O	1,2,6
Virginia's Warbler	Vermivora Virginiae	R	1,5
MacGillivray's Warbler	Oporornis tolmiei	N	2,6
Yellow Warbler	Dendroica petechia	C	1,2,6
Black-throated Gray Warbler	D. nigrescens	R	1,6
Yellowthroat	Geothlypis trichas	O	1,2,6
Yellow-breasted Chat	Icteria virens	C	1,2,6,
Wilson's Warbler	Wilsonia pusilla	O	1,2,6,
American Redstart	Setophaga ruticilla	N	2
House Sparrow	Passer domesticus	R	1,6
Meadow Lark	Sturnella neglecta	C	1,4,6
Yellow-headed Blackbird	Xanthocephalus xanthocephalus	*	1,4,6
Red-winged Blackbird	Agelaius phoeniceus	R	1,2,4,6
Bullock's Oriole	Icterus bullockii	*	1,6
Brewer's Blackbird	Euphagus cyanocephalus	O	1,4,6
Cowbird	Molothrus ater	*	1,2,6
Western Tanager	Piranga ludoviciana	U	1,2,6
Black-headed Grosbeak	Pheucticus melanocephalus	N	2,6
Cassin's Purple Finch	Carpodacus cassinii	C	1,2,4,7
Pine Grosbeak	Pinicola enucleator	C	1,2,4,7
Black Rosy Finch	Leucosticte atrata	C	1,2,4,7
Pine Siskin	Spinus pinus	O	1,2,4,6
Red Crossbill	Loxia curvirostra	R	1,2,4
Green-tailed Towhee	Chlorura chlorura	U	1,2,4,6,7
Gray-headed Junco	Junco caniceps	A	1,2,4,7

Common Name	Scientific Name	Abundance	Source of Information
Chipping Sparrow	Spizella passerina	C	1,2,4,6
White-crowned Sparrow	Zonotrichia leucophrys	C	1,2,4,6
Fox Sparrow	Passerella iliaca	O	1,2,4
Lincoln's Sparrow	Melospiza lincolnii	R	1,2,6
Indigo Bunting	Passerina cyanea	*	1
Lazuli Bunting	Passerina amoena	*	1,2,6
Evening Grosbeak	Hesperiphona vespertina	R	1,6
House Finch	Carpodacus mexicanus	C	1,2,6
Common Redpoll	Acanthis flammea	R	1,6
Goldfinch	Spinus tristis	R	1,2,6
Rufous-sided Towhee	Pipilo erythrophthalmus	R	1,2,6
Lark Bunting	Calamospiza melanocorys	N	2
Vesper Sparrow	Pooecetes gramineus	*	1,2,4,6
Lark Sparrow	Chondestes Grammacus	*	1,6
Sage Sparrow	Amphispiza belli	U	1,6
Slate-colored Junco	Junco hyemalis	R	1,2,6
Oregon Junco	Junco oreganus	R	1,2
Tree Sparrow	Spizella arborea	R	1,6
Brewer's Sparrow	Spizella breweri	C	1,6
Song Sparrow	Melospiza melodia	*	1,2,4,6
Lapland Longspur	Calcarius lapponicus	N	2
Snow Bunting	Plectrophenax nivalis	N	2

APPENDIX G

CHECKLIST OF THE MAMMALS OF THE UINTA MOUNTAINS, UTAH

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The following list of mammals of the Uinta Mountains has been compiled from the five references listed below. Numbers following each species name indicate which of the following references list that species.

1. U.S. Forest Service. 1976. Draft environmental statement - North Slope land Use plan. Wasatch National Forest, Salt Lake City, Utah. 145 p.
2. Hayward, C. Lynn. 1952. Alpine biotic communities of the Uinta Mountains, Utah. Ecol. Monogr. 22:93-119.
3. Svihla, R. D. 1931. Mammals of the Uinta Mountains Region. J. of Mammalogy 12:256-266.
4. Sparks, Earl A. 1974. Checklist of Utah wild mammals. Utah State Division of Wildlife Resources, Publication No. 74-3. 33 p.
5. Flowers, S. et al. 1959. Ecological studies of the flora and fauna of Flaming Gorge Reservoir Basin, Utah and Wyoming. Univ. of Utah Anthropological Paper No. 48:1-256.

In all, 82 species of mammals exclusive of man have been recorded at one time or another in the Uinta Mountains. Six of those species (i.e., the gray wolf, grizzly bear, fisher, wolverine, bison, and otter) are now believe to be extinct in the area. The endangered black-footed ferret may occasionally pass through the area but is not known to maintain a resident population there: the same is true for 8 other species (4 of whom are bats). No endangered species occur in area, but current hunting pressures may threaten the existence of Canada Lynx.

In the list, abundance is indicated with a letter. The abundance key is as follows:

A = abundant, seen daily by careful observers

C = common, often seen
U = uncommon, infrequently seen
O = occasional, seldom seen
R = rare, only one or two recorded observations
* = transient
E = now extinct in the area
N = no abundance data reported

SPECIES CHECKLIST

SPECIES		Abundance and
Common Name	Scientific Name	Data Sources
Masked Shrew	Sorex cinereus	R 1,5
Vagrant Shew	S. vagrans	U 1,4,5
Water Shrew	S. palustris	O 1,3,4,5
Long-eared Myotis	Myotis evotis	* 1,4,5
Little Brown Myotis	M. lucifugus	O 1,4,5
Long-legged Myotis	M. volans	U 1,4
Small-footed Myotis	M. subulatus	R 1
Silver-haired Bat	Lasionycteris noctivagans	* 1,4,5
Townsend Big-eared Bat	Plecotis townsendii	N 5
Western Pipistrel	Pipistrellus nesperus	* 1
Mexican Free-tailed Bat	Tadarida brailiensis	N 4
Big Brown Bat	Eptesicus fuscus	* 1,4
Hoary Bat	Lasiurus cinereus	U 4,5
Least Chipmunk	Eutamias minimus	A 1,2,4,5
Cliff Chipmunk	E. dorsalis	U 1,3,4
Say Chipmunk	E. quadrivittatus	N 4
Uinta Chipmunk	E. umbrinus	A 1,3,4,5
Yellow-bellied Marmot	Marmota flaviventris	C 1,2,4
Thirteen Lined Ground Squirrel	Citellus tridecemlineatus	N 5

SPECIES		Abundance and
Common Name	Scientific Name	Data Sources
Richardson Ground Squirrel	C. richardsoni	R 1,4
Uinta Ground Squirrel	C. variegatus	R 1,4
Rock Rabbits	Ochotona princeps	C 1,2,4,5,
Nuttall's Cottontail	Sylvilagus nuttallii	C 1,3,4,5
Snowshow Hare	Lepus americanus	C 1,4,5
Whitetail Jack Rabbit	L. townsendii	C 1,3,4
Black-tailed Jack Rabbit	L. californicus	C 1,4
Desert Cottontail	Sylvilagus auduboni	O 1
Coyote	Canis latrans	O 1,3,4
Gray Wolf	C. lupes	E 1,3,4,5
Red Fox	Vulpes fulva	R 1,4,5
Gray Fox	Urocyon cineroargenteus	R 1,4,5
Black Bear	Ursus americanus	O 1,3,4,5
Grizzly Bear	U. horribilis	E 1,3
Raccoon	Procyon lotor	* 1,4
Ring-tailed Cat	Bassariscus astutus	* 1,4
Martin	Martes Americana	O 1,2,4
Fisher	M. pennant	E 1,4,5
Long-tailed Weasel	Mustela frenata	U 1,2,4
Mink	M. vison	O 1,3,4
Badger	Taxidea taxus	O 1,3,4
Western Spotted Skunk	Spilogale putorius	R 1,3,4
River Otter	Lutra canadensis	E 1,3,4,5
Striped Skunk	Mephitis mephitis	C 1,3,4
Ermine	Mustela erminea	R 1,2,4

SPECIES		Abundance and
Common Name	Scientific Name	Data Sources
Wolverine	Gulo luscus	E 3,4,5
Golden-mantled Ground Squirrel	Citellus lateralis	C 1,2,3,4
White-tailed Prairie Dog	Cynomys leucurus	U 1,3,4
Red Squirrel	Tamiasciurus hudsonicus	C 1,4,5
Northern Flying Squirrel	Glaucomys sabrinus	O 1,3,4,5
Northern Pocket Gopher	Thomomys talpoides	A 1,2,3,4,5
Great Basin Pocket Mouse	Perognathus parvus	U 1,3,4
Wyoming Pocket Mouse	P. fasciatus	U 1,4
Kangaroo Rat	Dipodomys sp.	N 3,4
Beaver	Castor canadensis	C 1,3,4
Deer Mouse	Peromyscus maniculatus	A 1,2,4
Brush Mouse	P. boylii	N 3,4
Canyon Mouse	P. crinitus	O 1,3,5
Northern Grasshopper Mouse	Onychomys leucogaster	R 1
Brushytail Wood Rat	Neotoma cinerea	R 1,3,4,5
Boreal Redback Vole	Clethrionomys gapperi	U 1,2,3,4,5
Heather Vole	Phenacomys intermedius	* 1,2,4,5
Western Harvest Mouse	Reithrodontomys megalotis	R 1
Mountain Vole	Microtus montanus	C 1,2,4
Long-tailed Vole	M. longicaudus	C 1,2,4
Water Vole	M. richardsoni	U 1,4
Sagebrush Vole	Lagurus curtatus	U 1,4,5
Muskrat	Ondatra zibethica	C 1,3,4
Western Jumping Mouse	Zapus princeps	U 1,3,4,5

SPECIES		Abundance and
Common Name	Scientific Name	Data Sources
Porcupine	Erethizon dorsatum	U 1,3,4
Black-footed Ferret	Mustela nigripes	* 1
Mountain Lion	Felis concolor	O 1,3,4,5
Canada Lynx	Lynx canadensis	O 1,4,5
Bob Cat	Lynx rufus	U 1,4
American Elk	Cervus canadensis	C 1,3,4,
Mule Deer	Odocoileus hemionus	A 1,2,4
Moose	Alces alces	C 1,4
Antelope	Antilocapra americana	O 1,3,4
Bison	Bison bison	E 1,4,5
Mountain Sheep	Ovis canadensis	R 1,2,4,5
House Mouse	Mus musculus	O 1
Norway Rat	Rattus norvegicus	* 1