Pryor Mountain Desert

A Montana Native Plant Society Naturalist's Guide

Donald H. Heinze
with Mark Taylor

Foreword by Don G. Despain

In memory of John Tuttle
naturalist, photographer, friend

To live in the hearts
of those we leave behind
is not to die.

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Foreword

During the formative period of my life, growing up near Lovell, I often surveyed the arid foothills of the Pryor and Bighorn Mountains. With fellow Boy Scouts, I camped and hiked there, played hide-and-seek among the junipers, and wondered about the flint chips and teepee rings I saw in abundance on the ground.

These things did not seem out of the ordinary to me. It did not occur to me to ask much about the forces that created my boyhood world. I accepted that this was just the way the world was made.

When I went away to school, I became acquainted with more of the world, and gained an appreciation for the surroundings of my youth. It was my increasing sense of wonder at my boyhood world that eventually led me to return to the scenes of my youth to write my doctoral dissertation on the vegetation ecology of this area.

In my studies, I learned of massive and subtle forces that form sedimentary layers of rock and then warp them into mountains. I learned of chemical reactions that allow plants to survive temperatures ranging from 120° to -50° Fahrenheit. I now marvel at what seemed to me as a boy to be ordinary.

The geographical and geological setting of the Pryor Mountains provide a unique setting for plant establishment, growth and development. This, together with the vagaries of past and present climate have given the southern foothills a true desert quality. A group of plants occur here that are quite isolated from others of their same species, but beautifully adapted to the many factors of their ecological space in the Pryors.

For those of us whose curiosity about the world around us includes the vegetable kingdom, this area provides a fascination that is difficult to equal. The authors of this booklet make a good start to bring together information from various sources to help us better understand the area and deepen our appreciation of it. I encourage you to take advantage of this opportunity.

After you read this booklet, take time to stand on a windswept ridge in this corner of the Big Horn Basin. Survey the cushion plants at your feet. Take in the junipers and other larger plants that stretch out before you. Take time to feel the rhythms of the Earth. Let the natural history flow through your heart. Let the wonder of it all seep into your soul and be glad that you can be here. ¤

—Don G. Despain, Ph.D.
Research Biologist, Yellowstone National Park

author of Yellowstone Vegetation

Preface

"Our chapter has responsibility for hosting the Montana Native Plant Society Annual Meeting," president Don Heinze announced in late 1993 to the members of the Billings-based Artemisia Chapter.

The members quickly decided that of all the places that they had visited on field trips, the Pryor Desert was the area they most wanted to share with the members statewide. Other chapters have mountains, other chapters have prairies and badlands, but no other chapter in the state has an area quite like this one.

Since our desert is filled with plants that are unfamiliar in other parts of the state, we knew people would need help with plant identification. The idea of preparing a simple plant list as a resource for people attending the annual meeting exploded into a plan to prepare a fairly complete naturalist's guide to the area.

This book contains abundant information that is useful, and much that is not treated in other books written for the amateur. Our treatment of plant community types is among the few we have seen in a book written in high-school level English. Also, our lexicon of botanical names is likely to help many readers to understand and use these names more comfortably.

After you have read this book, if you find an error, please let us know. We know from numerous personal surprises that the plant and bird lists are incomplete, so if you find an omission, tell us. Any suggestions for improvements are welcome.

On behalf of the Artemisia Chapter of the Montana Native Plant Society, welcome to the Pryor Desert.

—Billings, Montana. May, 1994

Acknowledgments

On an early field trip, Jennifer Lyman, a research botanist, showed us a list of plants known to exist in the Pryor Desert. This simple list inspired the book.

Geo-Research, Inc. (GRI), especially Thad Mauney, provided global positioning system equipment to allow us to create a clear map of the main roads and to prepare an accurate road log.

Jay Speilman, a BLM geologist, contributed most of the information on geology. Jim Hartung, an independent petroleum geologist, and Major Lee Ramseur and staff of the Defense Mapping Agency are acknowledged for their work and ideas.

Peter Lesica and Don Despain gave valuable comments and encouragement, as well as some important writing. We also acknowledge the staff of the Montana Natural Heritage Program, especially Margaret Beer and Cory Craig.

Rosanna Buehl, an award-winning newsletter designer, is responsible for the layout and graphics of the book. Additionally, she contributed a good deal of editorial expertise, and spent many months researching answers to various background questions.

The Montana Native Plant Society, and particularly its president, Linda Iverson, is gratefully acknowledged for its support.

Introduction to the Pryor Mountain Desert

The Pryor Mountain District of southern Carbon County, Montana has one of the most unusual floras of Montana. The arid climate and unusual and varied soils provide desert habitats that are unknown elsewhere in Montana. This area lies at the north end of the Bighorn Basin, a broad trough that extends south to central Wyoming.

This desert is many things to different people. To those of us interested in plants, it is botanically unique. Because of the climate, soils, and other unique geographic features, numerous species of desert plants reach the northern limit of their range in the Pryor Mountain Desert. Plant species grow here that appear nowhere else in Montana.

There is plenty of interesting animal life to be found in this desert. A novel feature is the Pryor Mountains Wild Horse Range in the eastern part of the area. These horses are reputed to be Spanish Barb, a rare, primitive breed of horse. Less well known, the desert also hosts at least three rare species of bats, and at least two rare species of fish.

The area is also rich archeologically. Petroglyphs, teepee rings, and projectile points are found in many places. Abundant fossils, both vertebrate and invertebrate, occur in the area.

There are consumptive uses, too. There is a limestone quarry

Please remember that removing vertebrate fossils is illegal, as is removing, altering or defacing any archeological items found on public land, including BLM or Forest Service land.

and there are many mining claims for bentonite. This area was also the site of a major rush of uranium prospecting in the middle 1950s, but little of this material was ever found in commercial quantities. The area currently is under grazing permit for cattle.

As you can see, the Pryor Mountain Desert is not the barren, lonely place that it may seem to many people. The area is unique in many respects. It has many values and uses, some of which are conflicting, all of which are important. ¤

Chapter One

The Setting

Geologic Foundation

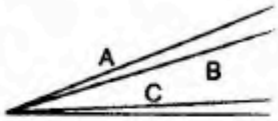
The Pryor Mountains are a northwest extension of the Bighorn Mountain Range. Uplift of the Pryors occurred at the same time as the Beartooth and Big Horn Mountains were forming, about 50 million years ago. The Pryor Mountain uplift extends from just south of Billings to northern Wyoming, west to nearly Red lodge, and east to an area near Hardin.

Uplift of the area began around the end of the Cretaceous Period, but it remained underwater until much of the area was covered by Tertiary Period deposits. Further uplift occurring in the late Tertiary Period placed the Pryor Mountains in their present position.

The blocks that make up the Pryor Mountains are uplifted along faults deep within the Earth's crust. Each block is tilted, with the greatest uplift on its northeastern corner. The southern two blocks are the highest and are the ones that interest us.

The southwest block forms Big Pryor Mountain, the highest mountain in the range. The southeast block forms East Pryor Mountain. Both mountains are actually east-west oriented ridges without definite summits.

The rocks in the Pryors record an almost complete history of the area from about one billion years ago (Precambrian Era) to the present (Cenozoic Era). The area has never been sub



Average slopes
These lines represent the slopes of (A) East Pryor Mountain on its east side; (B) both Big Pryor Mountain and East Pryor Mountain on their north sides,; and (C) both mountains on their south sides.

ject to glacial erosion, so the rocks observed are largely in the same positions in which they were originally deposited.

Among the older rock formations in the Pryor Desert is the Madison limestone, which forms the south slopes of the Pryor Mountains. This rock was deposited during the Mississippian Period of the Paleozoic Era. The rocks were sediments deposited in a marine environment, along the beaches that form the margin to the sea, or as channel and floodplain sediments of streams that flowed into the seas.

Younger formations overlie the Madison limestone on the more level terrain south of the mountain slopes. These are late Paleozoic and Mesozoic sediments, predominantly sandstones and shales. The particularly conspicuous red sandstones and siltstones of the Chugwater formation are dated to the Triassic Period of the Mesozoic Era.

The colors of the soil and rocks include greens, oranges, reds, and grays. Many of the colors are controlled by the oxidation state of iron. Greenish color suggests the presence of reduced iron. Orange suggests the presence of ferrous compounds (Fe_2). Red is associated with ferric compounds (Fe_3). The gray soils are likely to have formed from windblown volcanic ash falling out of the air during the Cretaceous Period. The bentonite, found abundantly in the area, is altered volcanic ash.

Erosion has since exposed the durable cores of each fault block; Precambrian rocks over a billion years old crop out near the Dryhead Overlook, along the east flank of East Pryor Mountain. Younger strata deformed by the faulting are often very colorful, and spectacularly outline the geologic folding.

The structures exposed by erosion and folding allow geologists to examine rocks that would otherwise lie several thousand feet below the Earth's surface. To dramatize the forces involved, consider the Madison Formation, which consists of limestone and dolomite about a thousand feet in thickness. These sediments were deposited in a shallow sea around 330 to 350 million years ago. Subsequent deposition of younger rocks has covered the Madison Formation with about one mile of sediment. These strata are now as much as 8,700 feet above sea level. Since most deposition occurs at or below sea level, total uplift is around two-and-one half miles.

Understanding Rock Origins

Fossils can tell something about the origins of the rocks that enclose them. Geologists assume that fossil animals and plants lived in environments similar to those we see them occupy today—the present is the key to the past. To put it simply, fish live in water, so we assume that the sediments that contain fossil fish were deposited under water.

Besides fossils, the rocks provide other indicators to their origins. Ripple marks and cross-bedding indicate water flowing over the freshly deposited, soft sediments. Mud cracks indicate periodic drying of the sediments.

The size and shape of the mineral grains in the rocks can tell something about the environment in which the sediments were deposited and the strength of the currents involved. Minerals such as gypsum, found layered between beds of Chugwater sandstone, indicate a warm climate with deposition along the shore of the prehistoric sea.

Fossils can be used to date the relative age of rocks. Geologists look for sequences of fossils to compare the age equivalent of rocks from wide areas across the world.

Some of the oldest fossils commonly found in the Pryors include the genera *Favosites* and *Halysites*, both colonial corals found in Madison limestones, dating to the Mississippian Period.

Certain fossils are especially valuable for dating rock formations, because they evolved rapidly and lived over only small intervals of time. They occupy only thin zones of sedimentary strata. These fossils become "guide" fossils for particular geologic ages.

An example of a guide fossil found in the Pryors is the oyster genus *Gryphaea*. It is a common fossil found in marine Jurassic sediments throughout the western United States and commonly found in the Pryor Desert. Early Jurassic rocks deposited in this area are also noted for their oyster, clam, snail, crinoid, belemnite and fish fossils. *Astrocoenia* is a branching coral found in early Jurassic rocks.

Although not unheard of, it would be unexpected to find Jurassic fossils of terrestrial animals such as dinosaurs in the Pryor Desert, because the area was underwater throughout most of the Mesozoic Era. Such fossils are relatively common, though, in the area of Shell, Wyoming, a short distance to the southeast.

Fossil plants dating from the late Tertiary Period, when the area of the Pryor Desert finally became dry land, indicate a warm, temperate climate. Redwood, gink[illegible]cess, tree fern and giant horsetails were native to the [illegible] Later, plants such as sycamore, hickory, alder, poplar and willow appeared.

Soils

Soils are classified mainly by their soil horizons. The term "soil horizon" describes the bands or layers one sees when one digs in the soil. Often seen in soils are layers of humus or organic matter, sand, or clay.

Soils found in the desert are of three kinds. Mollisols are deep, dark, relatively fertile soils that are formed under grassland vegetation. Aridisols are soils of arid regions and have only the thinnest band of organic matter. Entisols are recently formed soils that usually do not have soil horizons.

In general, soils of the northeast portion of the subject area are sandy and often chalky, while those in the south and west portions have a higher clay content and are often saline. Very sandy soils occur locally where they weather from sandstone outcrops.

Productivity of the vegetation is low in the desert due to the arid climate. As a result, soil development is minimal and the quantity of organic matter enriching the soil is low. Shallow soils formed over Chugwater sandstone are particularly barren. ¤

Climate

Rainfall

The climate of the Pryor Mountain Desert is harsh and semi-arid. Like all deserts, this area is effectively cut off from precipitation. It is in no fewer than three rain shadows: that of the Beartooth Mountains to the west, the Bighorn Mountains to the east, and the Pryor Mountains themselves to the north. To some degree, the Owl Creek Mountains to the southeast create a fourth rain shadow, also preventing moisture-laden air from reaching the Pryor Desert.

Winter and spring storms originating in the north Pacific lose much of their moisture in the coastal mountains and on the west side of the continental divide. Most of what is left is stopped by the Beartooths and the Pryors. Summer and fall storms originating in the Gulf of Mexico lose much of their moisture on their long journey across the Great Plains. Almost all of the rest is stopped by the Bighorns and the Owl Creek Mountains.

Most of what little precipitation the Big Horn Basin gets, enters through the gap between the Pryors and the Beartooths. This occurs only when the weather moves in from the north or northwest. Higher elevations tend to get more water than lower elevations.

The effect of the rain shadows is shown by precipitation records which have been taken at Yellowtail Dam and Bridger, Montana and Lovell, Wyoming. Yellowtail Dam is outside all the rain shadows mentioned above. Lovell, just to the southeast of the Pryor Mountain Desert, is in at least three rain shadows. Bridger, ten miles northwest of the Pryor Mountain

Desert, is in the rain shadow of the Beartooths but not of the Bighorns or Pryors.

As little precipitation as Lovell gets, it may be relatively wet compared to the desert north of it. Unofficial measurements taken in the late 1950's near Britton Spring suggest that the desert gets half as much precipitation as Lovell.

Table 1

Annual precipitation

Location	Annual precipitation	Rain shadows
Yellowtail Dam	18 inches	none
Bridger	13 inches	one
Lovell	7 inches	all four

In Bridger and Lovell, spring and early summer rainfall accounts for two-thirds of the annual precipitation, the balance coming as snow. This is the growing season for the Pryor plants. By midsummer the plants have become dry and are no longer growing. To make the heat and dryness worse, the desert is on a sunny, south facing slope. Much of the sparse moisture is lost to evaporation before the vegetation can get it.

Temperature

Temperature is also a factor which greatly influences the vegetation. The often intense heat of summer is similar to that of the Great Basin, far to the south. This favors the growth of Great Basin species.

Winters are usually much colder than those of the Great Basin, however. It is entirely possible that the reason Utah junipers are 20 feet tall in Nevada but rarely exceed 10 feet here is that the winters are more harsh here.

This is the farthest north that Utah juniper is found. Many other species, such as bud sagebrush, black sagebrush, birdsfoot sagebrush, yellow beeplant, spiny hopsage, and halogeton are likewise at the northern extreme of their range, because of the climate. ¤

Road Log

Map point	Odometer	Sight
A	**0.0**	**Start** Horseshoe Bend Ranger station. The landscape reminds one of Arizona more than Montana. Elevation is about 3,660 feet.
	1.3	Intersection: Horseshoe Bend turnoff and Highway 37. Turn south (left).
	2.0	Bighorn Canyon National Recreation Area boundary.
B	2.1	Intersection: Gypsum Creek Road and Highway 37. Turn west (right).
	2.3	White structure belongs to telephone company. Look for cottontail rabbits near building.
	3.7	Intersection and sign: Gypsum Springs Road ahead, Britton Springs Road north (right). Stay on Gypsum Creek Road.
	4.4	Shack to right. Note big bird nests in trees. They probably are blue heron nests.
	5.7	Sign in front of gray hills: "American Colloid Company" (Bentonite mining and processing) Bentonite is a clay that swells in water. It is used as drilling mud on oil wells, for sealing irrigation ditches, and as an addition to cement slurry to hold out water.
C	6.1	Intersection and sign: Road 7 ½ to the south (left) Gypsum Creek Road ahead. Stay on Gypsum Creek Road.
	7.6	Scars from recreational use of ATVs on the gray hills to the south of the road.
	8.6	Gyp Creek and privately owned hay meadows to the north of the road.

Road Log

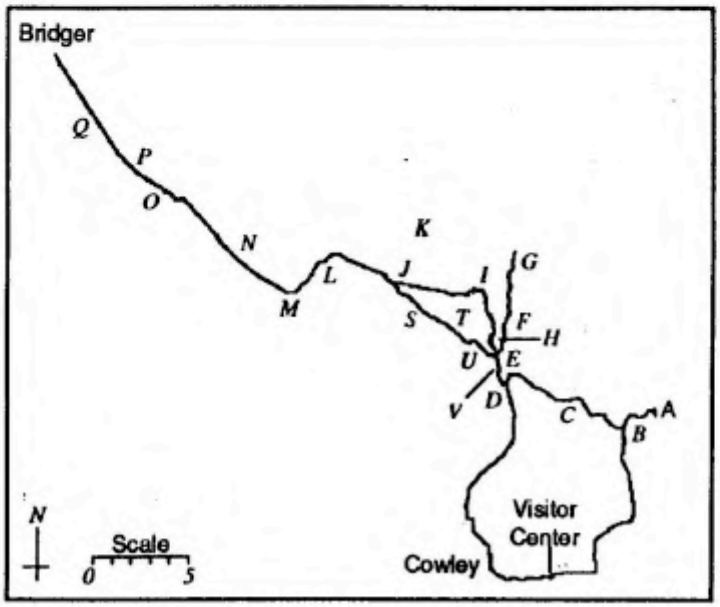
This is a guide to what you can see from the window of a car when driving around in the desert. We try to point out sights of cultural, geological, and biological interest. We try here to answer the questions we asked ourselves as we drove around compiling this log.

Map point	Odometer	Sight
	8.9	The gray, sterile soil here is altered volcanic ash. This soil is bentonitic, containing no organic matter and is nearly impervious to water. The "popcorn" surface is characteristic. Small niches and depressions are only places where plants can take hold.
	9.4	Gyp Creek Reservoir.
D	9.9	Intersection. Take fork to the west (right). County Road to the south (left) leads to Cowley.
	10.5	An eagle's nest has been observed here on the cliff in past years.
	10.9	Cattle guard. Nearby, the state line is marked by an iron marker.
	11.2	Cottonwood and some Russian-olive trees are near the creek.
E	11.7	Intersection of Crooked Creek, Helt, and Gyp Springs Roads at Gyp Spring - elevation about 4,600 feet.
	0.0	**Reset odometer** Destination: BLM—USFS boundary
	0.0	Proceed north, up Crooked Creek Road.
	0.3	White markers are mining claim locations, probably for bentonite.
	0.8	Enjoy the vista.
	1.1	Cattle guard. Excellent fossil hunting area. ***It is illegal to collect vertebrate fossils.
	2.0	Milepost 2
F	2.7	Creek to the east (right). Wind River milkvetch at this site (plant considered sensitive by the BLM). Elevation is about 4,750 feet.
	3.4	Note the reds, grays, yellows of soils in this area. Many of the reds, oranges, purples and greens are controlled by the oxidation state of iron. Gray soil is likely to be altered volcanic ash, probably Cretaceous in origin.
	4.1	Drinking basins for cattle to the east (right). Water is piped underground from a well higher up the hill. This opens the land to more grazing.

	4.5	Approaching Demijohn Flat.
	4.6	This Utah juniper forest is the densest in the Pryors because rain and snow can come down Crooked Creek Canyon and more water is available here. The trees are small, though, because the weather is so severe. Elevation is about 5,300 feet.
	5.0	Douglas fir in this area.
	5.7	To the west (left) is Lisbon Mountain - elevation 6,893 feet. Zigzag road leads to old uranium mines on top of the mountain.
	5.8	This is the northernmost range for Utah juniper. Rocky mountain juniper replaces it further north and at higher elevations.
G	6.2	Near the BLM—Forest Service Boundary. Elevation here is about 5,750 feet. Bitterroot (Montana State flower) is abundant in this area. To the southeast is a view of Horseshoe Bend.
		Turn around at this point.

Map 1:

Pryor Mountain Desert field trip



Map point	Odometer	Sight
E	12.4	Return to Gyp Spring. Intersection of Crooked Creek, Helt, and Gyp Springs roads - elevation about 4,600 feet.
	0.0	**Reset odometer** Destination: Warren
	0.0	Turn north on Helt Road, BLM road 1016.
	0.2	Note the Gardner's saltbush, the cushion plant on the flats here.
	0.9	Milepost 13. Note bluish-pink soil.
	1.4	Chugwater soils seen here are rather sterile, so grow little more than junipers and sagebrush.
H	2.0	Chugwater formation. Limber pine/Utah juniper association reminiscent of Great Basin pinyon pine/juniper associations. Wooly prince's plume is seen at several sites (this plant was considered rare until recently).
	3.3	Watch for mule deer.
	3.7	Road to the east (right) goes to Swamp Frog Mine. Note the rehabilitated mine area. Evidently, this parcel was reclaimed with only one kind of grass, one that did not take well yet.
	4.1	Proceed up hill. Note yellow soils near here.
	4.6	Black sagebrush/Utah juniper community. This is more like the Great Basin than the rest of Montana. Elevation is about 5,450 feet.
I	4.8	Wooly prince's plume is seen in this area.
	4.9	View of Cowley, Wyoming almost due south.
	5.8	Milepost 8.
	6.7	Cattle guard. Views of the Big Horn Mountains, the Big Horn Basin, and the Beartooth Mountains. Red Chugwater soils are dotted with juniper.
	7.7	Milepost 6.
	8.9	Intersection with Horse Haven Road. Note cushion plants so typical of desert. Admire view of Bighorns. Watch for horned larks.
J	9.3	Intersection of Helt and Gyp Spring Roads.

		Note the group of low-growing Utah juniper—these are about as low as they come.
	9.7	View of the Beartooth Mountains.
	10.0	Cattle guard, Milepost 4.
K	10.2	Bear Canyon Road (Road 1014) goes to the north and south. Watch for mountain bluebirds in this area. *Malacothrix torreyi* was found up Bear Canyon but cannot be found again.
	12.0	Stockman Trail (Road 1013) goes north.
	12.5	In 1991, during unusually wet season, many rare annuals appeared at base of mountains to the north (right).
	20.4	B-52 bomber practice range control site. (Do not approach—radio frequency radiation hazard).
L	21.1	Begin paved road. Sign: "Stockman Trail 1.5, Bear Canyon Road 3.5, Crooked Creek Road 13."
M	23.8	Alkaline riparian community near Warren: basin wild rye, greasewood, and some streambank willow.
	23.9	Warren. Intersection: Highway 310 and Helt Road. Warren was once a larger community, with its own post office from 1911 to 1953. It is the site of limestone shipping, the limestone used in sugar processing.
	0.0	**Reset odometer** Destination: Near Wade
	0.0	Gravel and lime processing plant ahead. Turn north (right) onto highway.
	0.8	Behind you is a view of the Bighorn Mountains that partly surround the Bighorn Basin. (You may want to look at this on your return to Warren.)
N	1.8	View to the rear of the Pryors. Alternating big sagebrush/black sagebrush communities. Big sagebrush is found on the deeper soil.
	3.5	Milepost 8. Birdsfoot sagebrush community type (a sensitive community type). Presence of low sage community type indicates low moisture and calcareous soil.

Map point	Odometer	Sight
	5.5	Milepost 10. Utah juniper/big sagebrush community type that is common here.
O	8.5	Milepost 13. Gardner's saltbush/birdsfoot sagebrush community type (a sensitive community type), and Gray's milkvetch (plant considered sensitive by the BLM)
P	10.7	Wade. Wade was a projected town site along the railroad. Once a store was here. Ranchers in the harsh surrounding country could never eke out enough of a living to support a store, so it folded.
Q	14.3	Gray's milkvetch (plant considered sensitive by the BLM) to the east (right).
M	28.6	Return to Warren.
	0.0	**Reset odometer** Destination: Gyp Spring
	2.4	Leave paved road. Road to left goes to limestone quarry. Take Helt Road (BLM Road 1016).
J	6.8	Intersection: Helt and Gyp Springs Roads. Watch for hawks in this area. Proceed on Gyp Springs Road (BLM Road 1015).
	7.9	Cattle guard
S	9.3	Bluebunch wheatgrass/low sagebrush community type. The bluebunch wheatgrass/black sage community type is listed as sensitive, but low sage is not reported in this area on any published list until now.
	10.5	Note how sagebrush stops at the toe of the hill to the left. The soil at the toe of the hill is better than soil on top of hill.
T	11.3	Gardner's saltbush / bud sagebrush community type.
U	12.6	Close ridge on west side is location of Geyer's milkvetch and blazing star - plants considered sensitive by the BLM. Elevation is about 4,800 feet.
V	13.2	Cushion prickly phlox site
E	13.8	Intersection: Gyp Spring, Helt, and Crooked Creek Roads. **End of log.**

Chapter Two

The Plants

Plants and Their Communities

The terms used for ecological units of plants vary, one authority using a term in a somewhat different way than another authority.

A *biome* is a broad ecological category. The term biome either describes a large geographical area that is covered everywhere with the same set of dominant species, or labels an area that may be small in size but is outstanding for its importance.

Biomes are subdivided into *plant community types*, a term which is often shortened to the word "type," or "vegetation type." A type is defined as any group of plants that is repeated over and over again when similar physical conditions are encountered.

The physical conditions that a botanist looks at when defining a vegetation type include ecological factors such as soil texture and chemistry, microclimate, availability of supplementary water, and the amount and kind of disturbance.

Soils can vary in many ways, including by depth, texture, ability to absorb and hold water, and the presence of chemicals such as salts or alkalis. Also, the rock beneath the surface in one area may create a water-table that is high enough to favor some deeply tap-rooted plants, but in another area the rock is so deep that water simply disappears into the earth after a rain, giving an advantage to some plants having broadly spreading fibrous roots.

A microclimate describes the minor variations in temperature, sunlight, moisture, and evaporation that occur between one small area and another area nearby. A rock formation may provide shelter from wind, changing the climate enough for taller plants to emerge than could survive just a little farther away.

Creeks can supply supplementary water, allowing plants to grow nearby that could not get enough water if they had to rely on rainfall alone. Livestock grazing, fire, and mechanical removal of vegetation and soil also influence the kinds of vegetation seen in an area. We will discuss the effect of disturbances in greater detail later in this chapter.

Naming Biomes and Plant Community Types

Biomes are usually given general names such as marsh, riparian, desert shrubland, grassland, coniferous forest, and so on.

For example, a tree-covered area covering many square miles might be described as a "coniferous forest biome." On the other hand, Montana riparian areas are usually small but far more important than their relative size would indicate. So, they merit a label as a "riparian biome."

Plant community types, plant associations, and plant communities are named after their most obvious, or dominant, vegetation. Usually they have two-part names: for example, "big sagebrush/bluebunch wheatgrass plant community type." Less frequently, we see single names, such as a "cheatgrass plant community type." Three-part names, such as "big sagebrush/bluebunch wheatgrass/needle-and-threadgrass plant community type" are also infrequent.

Plant Succession

There are two kinds of vegetation types: plant associations and plant communities.

If a vegetation type is stable and not changing, we call it a *plant association*. It does not change appreciably over a long period of time. Plant associations are the end point in plant succession and therefore are termed the *climax* vegetation type.

If a vegetation type is unstable, if the dominant plants are changing in response to environmental pressures, we call it a *plant community*. It represents one of a series of plant successional steps as the vegetation moves toward or away from the climax. Plant communities are also called *seral stages*. The term seral is related to the common word *series*.

Nature constantly moves toward equilibrium, balance, and stability. In a plant association there is no net change in either the species that compose the association, or in the area of ground that these species cover. Old plants become senile and die; new ones grow and replace them. Overall, there is no change.

Disturbance of an association sets plant succession in motion. Fires, plowing and overgrazing all have a similar effect on vegetation. In any case, after a disturbance one species replaces another.

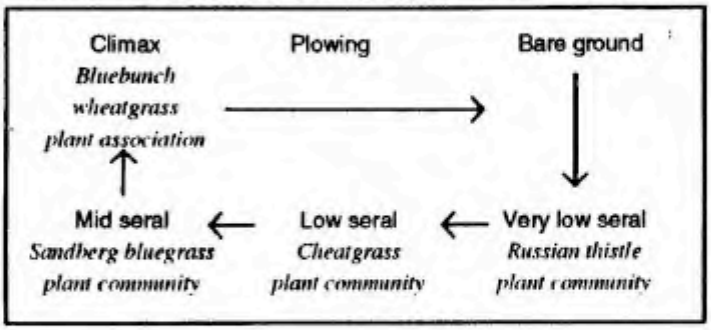
Here is an example of plant succession when a plant association is quickly removed by plowing. For this example, the dominant species in the association is bluebunch wheatgrass:

- The bluebunch wheatgrass is completely removed by plowing.
- Bare ground results.
- Russian thistle, an annual pioneer plant, vegetates the area. Thus a Russian thistle community, the first seral stage, results.
- During the next few years cheatgrass, a more vigorous annual plant, crowds out and replaces the thistle. Thus the second seral stage, a cheatgrass community, appears.
- Many years go by. Perennial grasses such as bluebunch wheatgrass and Sandberg bluegrass establish. Droughts occur. There is not enough moisture for the annual plants to grow, but the already established perennials can grow. Sandberg bluegrass, more drought tolerant than the bluebunch wheatgrass, eventually takes over.
- Many more years pass. The more vigorous bluebunch wheatgrass crowds out the bluegrass and the climax bluebunch wheatgrass association returns.

Figure 1 on the following page presents this succession in the form of a diagram.

Figure 1

Plant succession following rapid removal of plants



Here is an example of what happens when overgrazing denudes the land. Again, the dominant species in the association is bluebunch wheatgrass:

- Livestock overgraze the bluebunch wheatgrass plant association. They select the largest plant, bluebunch wheatgrass.
- This gives an advantage to the lower growing Sandberg bluegrass. Thus a Sandberg bluegrass community results.
- Livestock continue to overgraze. They select the most palatable plant available, Sandberg bluegrass. This gives the less palatable cheatgrass the advantage. Cheatgrass seeds prolifically and soon a cheatgrass plant community results.
- More overgrazing happens. The livestock are now reduced to eating cheatgrass. This gives the spiny, very prolific Russian thistle the advantage. A Russian thistle plant community results.
- The livestock, now desperate, eat the Russian thistle. Bare ground results.

If grazing pressure is reduced the area will heal over a long period of time:

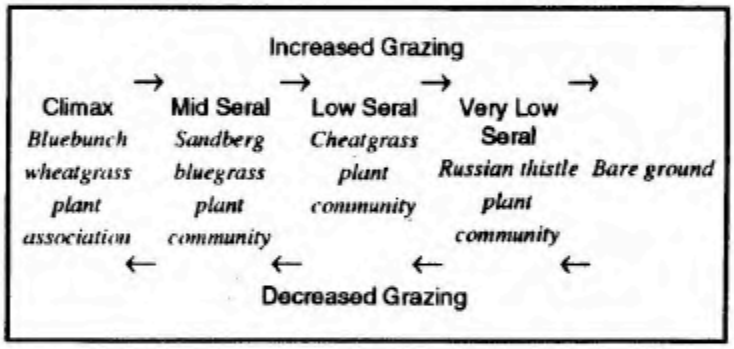
- The area is revegetated by the very prolific, grazing resistant Russian thistle.
- The thistle is mostly replaced by the more vigorous cheatgrass. A cheatgrass plant community returns. Some Sandberg bluegrass establishes, too.
- A drought comes. Droughts prevent most seedling establishment of annual plants such as Russian thistle and cheatgrass. Already established perennials, such as Sand

berg bluegrass, survive. After many droughts, the bluegrass replaces the cheatgrass. Some Western wheatgrass is able to establish itself also. A Sandberg bluegrass community results.

- The vigorous bluebunch wheatgrass, after several decades or more, replaces the weaker bluegrass, and the climax Western wheatgrass plant association returns. Note that the Western wheatgrass seldom replaces all the species; none of the other species are ever utterly absent.
- The vigorous bluebunch wheatgrass, after a long period of time (several decades or more) replaces the weaker bluegrass, and the climax bluebunch wheatgrass plant association returns. All species are rarely replaced completely, so lower seral species are usually present in the climax community.

Figure 2

Effects of grazing on plant succession



Summary

Plant communities are constantly changing. They are either moving toward or away from climax. Plant associations are the climax itself and are stable. Plant community type is a general term that includes both plant associations and plant communities. ¤

Pryor Biomes

In 1987, Dennis Knight and others at the University of Wyoming prepared a report for the U. S. National Park Service in which they catalogued the ecological units commonly found in the Bighorn Canyon National Recreation Area (BCNRA). The treatment here relies on Dr. Knight's work but uses somewhat different terms than he did to describe these units.

In the BCNRA, Dr. Knight found eight biomes:

- marsh
- riparian vegetation
- desert shrubland
- grassland
- Great Plains shrubland
- sagebrush steppe
- juniper and mountain mahogany woodlands
- coniferous woodlands and forests.

Of these, marsh and Great Plains shrubland covered very little area. Both biomes added together cover less than two percent of the entire BCNRA. Most of the land in the BCNRA is desert shrubland.

The biomes may be subdivided into plant community types. Some shifts in boundaries between the common community types will occur as a result of fire, disease, pressure of land use, and other reasons. Major shifts in boundaries are unlikely, barring catastrophe, because the dominant plants of a vegetation type cannot survive under the conditions that create the opportunity for another vegetation type. For example, sagebrush will not naturally take over grassland because the grasslands are supported on soils too shallow to support much sagebrush.

The Desert Shrubland Biomes

There are four major plant associations in this biome: Gardner's saltbush association, big sagebrush association, greasewood association, and big sagebrush/bluebunch wheatgrass association. All of these are characterized by relatively sparse vegetation and the presence of drought and salt tolerant plants in the *Chenopodiaceæ* family. The soils found in this biome tend to be relatively impervious to moisture.

The saltbush plant association

Saltbush plant association is characterized by the dominance of Gardner's saltbush (*Atriplex gardneri*). Associated species, those covering at least one percent, are listed in Table 2.

Table 2

Saltbush plant association

Common Name	Proper Name	Cover
Gardner's saltbush	*Atriplex gardneri*	12%
Bud sagewort	*Artemisia spinescens*	1%
Big sagebrush	*Artemisia tridentata*	1%
Pricklypear cactus	*Opuntia polyacantha*	1%
Indian ricegrass	*Oryzopsis hymenoides*	1%

The soils associated with this type are various, but tend to be salty and alkaline. They have a high capacity to hold water but there is very little rainfall and no groundwater is available. These plants tolerate, but do not necessarily prefer, salty, alkaline soil. This tolerance allows these plants a competitive advantage where salty, alkaline soils exist, but one cannot assume from the presence of these plants that the soil is salty and alkaline.

The greasewood plant association

Greasewood (*Sarcobatus vermiculatus*) dominates in this association. Other species found, those covering at least one percent, are listed in Table 3.

Table 3

Greasewood plant association

Common Name	Proper Name	Cover
Greasewood	*Sarcobatus vermiculatus*	21%
Scarlet globemallow	*Sphæralcea coccinea*	4%
Big sagebrush	*Artemisia tridentata*	2%
Shadscale	*Atriplex confertifolia*	1%
Douglas rabbitbrush	*Chrysothamnus viscidiflorus*	1%

Halogeton (*Halogeton glomeratus*), a poisonous exotic, may invade this type. It then becomes a greasewood/halogeton plant community. Knight mentions that often the greasewood association is characterized by 8% halogeton. If halogeton is present in substantial quantity, the community is seral.

The plants of the greasewood association tolerate salty, alkaline soils but are found in areas where there is more water available than is needed to support a saltbush association. A greasewood association may be found at low points in drainages, such as ravines, or near sources of underground water. The soils tend to be deep, have high capacity for holding water, and supplemental groundwater is available for at least part of the year.

The big sagebrush plant association

Big sagebrush (*Artemisia tridentata*) is the most frequently found plant in this association. Other species, those covering at least one percent, appear in Table 4.

Table 4

Big sagebrush plant association

Common name	Proper Name	Cover
Big sagebrush	*Artemisia tridentata*	7%
Needle-and-threadgrass	*Stipa comata*	2%
Three-awn grass	*Aristida purpurea*	1%
Bud sagewort	*Artemisia spinescens*	1%
Rubber rabbitbrush	*Chrysothamnus nauseosus*	1%
Indian ricegrass	*Oryzopsis hymenoides*	1%

The big sagebrush association in the desert shrubland biome differs from the sagebrush steppe biome, described later, because it is found at lower elevations. The sagebrush here grows with other plants more typical of the desert.

Associated soils are deeper than Basin grassland, discussed later, and there is no groundwater available. There is little water available from precipitation, but the soils are more receptive to moisture than the soils of the Basin grassland. Big sagebrush tends to prefer soils that are less salty than those tolerated by greasewood, but sometimes these plants are found together, so the presence of one plant or the other is not a perfectly reliable indicator of soil conditions.

The big sagebrush/bluebunch wheatgrass/needle-and-threadgrass plant association

This is a type similar to the big sagebrush type, but tends to occur at higher elevations and on relatively barren soils, such as those created from the Chugwater formation. The big sagebrush found in these communities tends to be found only in lower, more moist areas. Big sagebrush (*Artemisia tridentata*) is the most frequently found plant in this association. Other species, those covering at least one percent, are listed in Table 5.

Table 5

Big sagebrush/bluebunch wheatgrass/needle-and-threadgrass plant association

Common Name	Proper Name	Cover
Big sagebrush	*Artemisia tridentata*	8%
Bluebunch wheatgrass	*Elymus spicatus*	2%
Needle-and-threadgrass	*Stipa comata*	2%
Sandwort	*Arenaria hookeri*	1%
Three-awn grass	*Aristida purpurea*	1%
Rubber rabbitbrush	*Chrysothamnus nauseosus*	1%
Broom snakeweed	*Gutierrezia sarothræ*	1%

The Sagebrush Steppe Biomes

The sagebrush steppe is characterized by broad expanses of shrub and grassland, is a bit cooler than the desert shrublands, and is more moist. Two kinds of sagebrush steppe plant association are found: black sagebrush/big sagebrush association, and big sagebrush/blue grama association.

Sagebrush behaves like both a pioneer species and a climax species. It is found abundantly in disturbed areas. Once established, it is very competitive and is not replaced by other

kinds of plants. Its presence is noted to increase under grazing pressure. Sagebrushes are evergreen and capable of growing even during the warmer days of winter.

The presence of sagebrush suggests relatively deep, water-holding soils. Snow is likely to provide most of the water available from precipitation. There is no groundwater available, but the soil is quite receptive to moisture.

Black sagebrush/big sagebrush association covers more area and is associated with higher elevations and drier sites than big sagebrush/blue grama association.

Table 6

Black sagebrush/big sagebrush plant association

Common Name	Proper Name	Cover
Black sagebrush	*Artemisia nova*	28%
Big sagebrush	*Artemisia tridentata*	8%
Junegrass	*Koeleria macrantha*	5%
Threadleaf sedge	*Carex filifolia*	4%
Bluebunch wheatgrass	*Elymus spicatus*	3%
Broom snakeweed	*Gutierrezia sarothræ*	2%
Sandwort	*Arenaria hookeri*	1%
Blue grama	*Bouteloua gracilis*	1%
Hood's phlox	*Phlox hoodii*	1%

Table 7

Big sagebrush/blue grama plant association

Common Name	Proper Name	Cover
Big sagebrush	*Artemisia tridentata*	15%
Blue grama	*Bouteloua gracilis*	9%
Bluebunch wheatgrass	*Elymus spicatus*	4%
Needle-and-threadgrass	*Stipa comata*	3%
Threadleaf sedge	*Carex filifolia*	2%
Broom snakeweed	*Gutierrezia sarothræ*	2%
Junegrass	*Koeleria macrantha*	1%
Hood's phlox	*Phlox hoodii*	1%

Grassland Biomes

Grasslands are characterized by expanses of grass and forbs, dotted by very low numbers of shrubs. The most common

grass found in the entire BCNRA is bluebunch wheatgrass (*Elymus spicatus*). It is not found much on saline soils, though.

On the north end of the BCNRA are the mixed-grass prairie grassland association, similar to the northern Great Plains. Tracts of this type are found near Fort Smith and are not included in the Pryor Mountain Desert.

On the south side of the mountains, is the basin grassland association, similar to the Great Basin. The environment for this association is quite dry. Soils are shallow with no groundwater available, and there is so little precipitation that they will not support much sagebrush.

Mesas and ridges are covered with a third sort of grassland association, the windswept plateau grassland type. Species of this grassland association are very similar to the basin grassland association. Most of the forbs in this community type tend to be "cushion" types of plants. The only forbs found in this type that are not found much in the basin grassland are hymenoxys (*Hymenoxys acaulis*) and phlox (*Phlox muscoides*).

Because the mixed-grass prairie grassland association is not found in the desert, and the windswept plateau grassland association so resembles the basin grassland association, only the basin grassland plant association is listed in Table 8.

Table 8

Basin grassland plant association

Common Name	Proper Name	Cover
Bluebunch wheatgrass	*Elymus spicatus*	8%
Broom snakeweed	*Gutierrezia sarothrae*	4%
Blue grama	*Bouteloua gracilis*	3%
Sandwort	*Arenaria hookeri*	2%
Hood's phlox	*Phlox hoodii*	2%
Fringed sagewort	*Artemisia frigida*	1%
Whitlow-wort	*Paronychia sessiliflora*	1%
Needle-and-threadgrass	*Stipa comata*	1%

Juniper Woodland and Mountain Mahogany Biomes

These biomes occupy 40% of the land in the BCNRA. These tend to be made up of plant community types with sparse

vegetation. The plants often grow on shallow soils or even in fractured rock. Soils tend to be neutral to alkaline but not saline.

The plants in these biomes tend to have roots that can take advantage of moisture collected by deep cracks in rocks. Although these sites have been described as very dry, the water-trapping shallow soils and the cracks in bedrock have the effect of making these sites more moist than sites having deeper soils. What little moisture falls on the ground is quickly trapped by the rocks and can neither drain away nor evaporate. In an area where precipitation is less than 15 inches per year, when soil moisture is recharged infrequently, these soil conditions create a relatively more reliable source of moisture than deeper soils.

There are three basic associations: mountain mahogany shrubland association, juniper woodland association, and juniper/mountain mahogany woodland association. There is no clear relation of soil, elevation, or slope that would predict the emergence of one of these community types in preference to another. Differences in microclimate creating small areas that tend to be warmer than surrounding areas may favor juniper in some cases.

Table 9

Juniper woodland plant association

Common Name	Proper Name	Cover
Utah juniper	*Juniperus osteosperma*	16%
Black sagebrush	*Artemisia nova*	2%
Bluebunch wheatgrass	*Elymus spicatus*	2%
Broom snakeweed	*Gutierrezia sarothræ*	2%
Three-awn grass	*Aristida fendleriana*	1%

Stands of juniper in the Pryor desert have been dated to as much as 500 years old. These tend to be restricted to rocky ridges where they are not subject to fire.

There is a good deal of concern about the invasion of juniper into nearby grasslands or shrublands. Juniper competes with smaller herbaceous plants for water, sunlight, soil, and nutrients, and juniper itself produces chemicals that kill other plants. On the other hand, juniper provides valuable shelter

for wildlife, preserving warmth during the winter, and providing shade during the summer.

It is unclear whether or not juniper is invading the plant communities next to where it grows in the Pryors. In studies in the Great Basin, a similar environment to the Pryor desert, juniper appears to be controlled mainly by periodic fires, but there have not been fires in most of the Pryor desert for quite some time. The lack of fuel, due to the sparse vegetation, may be partially responsible for this absence of fire.

Stands of juniper appear to increase following heavy grazing. There are at least two important relationships that lead to the increase of juniper following grazing. In the first place, grazing may reduce the amount of fuel available for fires that would otherwise control the juniper. In the second place, the increase in sagebrush following livestock grazing may create a favorable environment for the growth of juniper. Sagebrush appears to act as a "nurse plant," providing shade and shelter for young juniper to get started.

Table 10

Juniper/mountain mahogany woodland plant association

Common Name	Proper Name	Cover
Mountain mahogany	*Cercocarpus ledifolius*	16%
Utah juniper	*Juniperus osteosperma*	11%

The ju[illegible]untain mahogany woodland association is regarded as possibly being a sensitive community type.

Table 11

Mountain mahogany shrubland plant association

Common Name	Proper Name	Cover
Mountain mahogany	*Cercocarpus ledifolius*	18%
Bluebunch wheatgrass	*Elymus spicatus*	3%
Utah juniper	*Juniperus osteosperma*	3%

The mountain mahogany shrubland association is found on shallow, rocky soils similar to those that support juniper. Stands of mountain mahogany older than 150 years of age are reported in the Pryor desert. ¤

Sensitive Plants and Plant Communities

Sensitive Species

In 1990, the Montana Natural Heritage Program listed twenty-four species of plants of special concern in the Pryor Mountain Desert. In addition, eleven species of limited distribution were believed to be found in the area. The size and number of the plant populations had never been assessed, though.

The BLM did not know which of these thirty-five species were truly rare and imperiled. The BLM contracted with Montana Natural Heritage Program to do an inventory of these plants in 1991. Peter Achuff, staff botanist for the Heritage Program, and Peter Lesica, an independent botany consultant, did the study.

Once they looked closely, these researchers found that twenty-six of these plant species actually were not rare. There simply had never been an intense survey for them before. One that actually is not rare is rabbit buckwheat (*Eriogonum lagopus*), a plant that had been under consideration for Federal Threatened or Endangered status.

Achuff and Lesica found that nine species from the original list of thirty-five really are rare. In addition, they found six other species that had never been known in the Pryors, four of which had never been found in Montana. All six now are considered to be rare in Montana.

Originally, Achuff and Lesica recommended these fifteen species for BLM Sensitive Plant Taxon status. Subsequently three species were deleted: two were found to be common elsewhere in the state, and the other could not be relocated in the Pryors.

The BLM has designated thirteen species as Sensitive Plant Taxa in the Pryor Mountains. Twelve of these are plants recommended by Lesica and Achuff, and the thirteenth is found in the high mountains, which is not part of the Pryor Mountain Desert study area. Table 12 lists these plants.

Table 12

Sensitive plants

Common Name	Proper Name
Geyer's milkvetch	*Astragalus geyeri**
Gray's milkvetch	*Astragalus grayi*
Wind River milkvetch	*Astragalus oreganus*
Obscure evening primrose	*Camissonia andina*†
Small evening primrose	*Camissonia parvula*†
Yellow beeplant	*Cleome lutea*
Desert cryptantha	*Cryptantha scoparia*†
Little buckwheat	*Eriogonum salsuginosum*†
Spiny hopsage	*Grayia spinosa*
Cushion prickly phlox	*Leptodactylon cæspitosum*
Desert dandelion	*Malacothrix torreyi*
Dwarf nama	*Nama densum*†
Shoshonea	*Shoshonea pulvinata***

* Previously unknown in the Pryor Desert
† Previously unknown in Montana
** In the high mountains, not in the desert

Sensitive Community Types

Plant community types can also be sensitive. The Pryor Mountain Desert, with its low precipitation and unique geological mat[illegible]s a logical place to hunt for such communities.

In 1993, the BLM contracted the Heritage Program to do a community inventory. Rob Develice, plant ecologist for the Heritage Program, and Peter Lesica did the study. They found twelve community types that the BLM considers candidates for Sensitive Plant Community Types. More work must be done to determine the rarity and imperilment of these community types in other parts of the state before they can be designated as sensitive. Table 13 lists these community types. ¤

Table 13

Potentially sensitive plant community types

Utah Juniper/ Bluebunch wheatgrass	*Juniperus osteosperma/* *Elymus spicatus*
Birdsfoot sagewort/ Bluebunch wheatgrass	*Artemisia pedatifida/* *Elymus spicatus*
Bluebunch wheatgrass/ Needle-and-threadgrass	*Elymus spicatus/* *Stipa comata*
Black sagebrush	*Artemisia nova*
Black sagebrush/ Bluebunch wheatgrass	*Artemisia nova/* *Elymus spicatus*
Birdsfoot sagebrush	*Artemisia pedatifida*
Birdsfoot sagebrush/ Gardner's saltbush	*Artemisia pedatifida/* *Atriplex gardneri*
Big sagebrush/ Gardner's saltbush	*Artemisia tridentata/* *Elymus lanceolatus*
Big sagebrush/ Thickspike wheatgrass	*Artemisia tridentata/* *Atriplex gardneri*
Utah juniper/curlleaf mountain mahogany	*Juniperus osteosperma/* *Cercocarpus ledifolius*
limber pine/ Rocky Mountain juniper	*Pinus flexilis/* *Juniperus scopulorum*
Bud sagebrush/ Gardner's saltbush	*Artemisia spinescens/* *Atriplex gardneri*

Endemic Species

A high proportion of plants that are found only in Montana, or a small area that includes part of Montana (endemic species), occur on soils derived from Madison limestone. Madison limestone is found throughout much of western Montana and in the Pryor Mountains. It is formed of ocean sediments deposited 330 to 350 million years ago, during the Mississippian Period of the Paleozoic Era.

As an example of an endemic species found on Madison limestone, the mascot of the Montana Native Plant Society, *Kelseya uniflora*, can be found on many of the higher Madison limestone ridges in the Pryors. The site of its discovery was another outcropping of Madison limestone near Helena, Montana.

Other species that occur in several areas of the state only on Madison limestone are found in the Pryors. These include *Eriog· ·mancum* (imperfect buckwheat), *Eritrichum howe ·*ward's alpine forget-me-not), and *Musineon vaginatum* (sheathed musineon).

Four species found only on Madison limestone are found in the immediate vicinity of the Pryor Mountains and nowhere else in the world. These include *Erigeron allocotus* (Big Horn fleabane), *Penstemon caryi* (Cary's beardtongue), *Shoshonea pulvinata* (shoshonea) and *Lesquerella lesicii* (Pryor Mountain bladderpod).

Lesquerella (bladderpod) has approximately 100 species, most of which are native to North America. In the *Brassicaceæ* (Mustard) family, it is second only to *Draba* (Whitlow grass) in the number of native North American species.

Many species of *Lesquerella* are distributed only in small, local or regional areas. Four species of *Lesquerella* are found only in Montana. No other genus gives us so many plants unique to Montana. All of these species have been described in the last ten years by Dr. Reed Rollins, the world's leading authority on North American members of the Mustard family.

Species of *Lesquerella* are low in stature and are usually found growing among sparse or cushion plant vegetation where shade is minimal. Two species of *Lesquerella* have been reported for the Pryor Mountain Desert: *L. alpina* (alpine bladderpod), and *L. lesicii* (Pryor Mountain bladderpod). A third species, *L. ludoviciana* (silvery bladderpod), also occurs in the Pryor Mountain area but not in the desert.

Lesquerella lesicii was discovered in 1991 and is currently known from a handful of limestone ridge tops on the east end of the Pryor Mountains. Officially known as *Lesquerella species novum 2* or "Undescribed Bladderpod," Dr. Rollins has proposed to call it after its discoverer, Peter Lesica, a botanist who has done extensive work in the Pryor Mountain Desert. Before this proposed name is accepted, though, the plant's description must be published in a botanical journal. Lesica suggested the name Pryor Mountain bladderpod as the plant's common name.

This rare plant grows in openings among Douglas fir or beneath mountain mahogany at about 6,000 to 7,500 feet. *Lesquerella lesicii* has leaves with long slender petioles and nearly round blades. The inflorescences lay on the ground, and the flower stalks become elongate and S-shaped in fruit. This combination of characteristics is unique among Montana *Lesquerellas.*

The recent discovery of *Lesquerella lesicii* shows that species new to science can still be found in Montana. ¤

Plant Checklist

Botanical name	Common name	Date	Notes
☐ *Achillea millefolium*	yarrow		
☐ *Agoseris glauca*	false dandelion		
☐ *Agropyron cristatum*	crested wheatgrass		
☐ *Allium textile*	textile onion		
☐ *Alyssum alyssoides*	yellow alyssum		
☐ *Alyssum desertorum*	dwarf alyssum		
☐ *Andropogon scoparius*	little bluestem		
☐ *Antennaria dimorpha*	dwarf pussy-toes		
☐ *Antennaria microphylla*	rose pussy-toes		
☐ *Antennaria parvifolia*	small-leaf pussy-toes		
☐ *Arabis holboellii*	rockcress		
☐ *Arenaria hookeri*	Hooker's sandwort		
☐ *Aristida purpurea*	three-awn		
☐ *Arnica fulgens*	meadow arnica		
☐ *Arnica sororia*	arnica		
☐ *Artemisia arbuscula*	low sagebrush		
☐ *Artemisia biennis*	sagewort, biennial wormwood		

Plant Checklist

This list of plants that are found in the Pryor Mountain Desert was compiled from the work of Achuff, Lesica, Lyman, and others. Please use it as a checklist of your own observations. Use the spaces to the right to note the date of observation, location, soil type, altitude, or other information.

- * *Indicates a plant thought to be sensitive that no longer is so*
- ** *Indicates a sensitive plant.*

Botanical name	Common name	Date	Notes
☐ *Artemisia cana*	silver sagebrush		
☐ *Artemisia frigida*	fringed sagewort		
☐ *Artemisia longifolia*	long-leaf sagewort		
☐ *Artemisia nova*	black sagebrush		
☐ *Artemisia pedatifida**	birdsfoot sagebrush		
☐ *Artemisia spinescens*	bud sagebrush		
☐ *Artemisia tridentata*	big sagebrush		
☐ *Asclepias speciosa*	showy milkweed		
☐ *Astragalus adsurgens*	standing milkvetch		
☐ *Astragalus agrestis*	purple field milkvetch		
☐ *Astragalus bisulcatus*	two-grooved milkvetch		
☐ *Astragalus chamaeleuce**	milkvetch, loco		
☐ *Astragalus cibarius*	milkvetch, loco		
☐ *Astragalus crassicarpus*	buffalo ground plum		
☐ *Astragalus drummondii*	Drummond's milkvetch		
☐ *Astragalus geyeri***	Geyer's milkvetch		
☐ *Astragalus gilviflorus*	threeleaved milkvetch		
☐ *Astragalus grayi***	Gray's milkvetch		
☐ *Astragalus hyalinus*	milkvetch		
☐ *Astragalus lotiflorus*	milkvetch, loco		
☐ *Astragalus miser*	milkvetch, loco		

☐ *Astragalus missouriensis*	Missouri milkvetch
☐ *Astragalus oreganus***	Wind River milkvetch
☐ *Astragalus purshii*	wooly pod milkvetch
☐ *Astragalus spatulatus*	draba milkvetch
☐ *Astragalus vexilliflexus*	bent-flowered milkvetch
☐ *Atriplex argentea*	saltbush
☐ *Atriplex canescens*	four-wing saltbush
☐ *Atriplex confertifolia*	shadscale
☐ *Atriplex gardneri*	Gardner's saltbush, Nuttall's saltbush
☐ *Atriplex suckleyi*	Suckley's saltbush
☐ *Avena sativa*	cultivated oats
☐ *Bouteloua gracilis*	blue grama grass
☐ *Bromus tectorum*	cheatgrass
☐ *Calochortus nuttallii*	sego lily, mariposa lily
☐ *Camelina microcarpa*	smallseed falseflax
☐ *Camissonia andina***	obscure evening primrose
☐ *Camissonia minor*	camissonia
☐ *Camissonia parvula***	small evening primrose
☐ *Camissonia scapoidea*	camissonia
☐ *Carex filifolia*	threadleaf sedge
☐ *Carex pensylvanica*	Pennsylvania sedge
☐ *Carex rossii*	Ross's sedge
☐ *Castilleja angustifolia*	narrowleaf Indian paintbrush

Botanical name	Common name	Date	Notes
☐ *Castilleja linariifolia*	Wyoming Indian paintbrush		Wyoming State Flower
☐ *Castilleja sessiliflora*	Indian paintbrush		
☐ *Cerastium arvense*	mouse-ear chickweed		
☐ *Cercocarpus ledifolius*	curlleaf mountain mahogany		
☐ *Chænactis douglasii*	dusty maiden, hoary chaenactis		
☐ *Chenopodium album*	lambsquarters		
☐ *Chenopodium fremontii*	Fremont's goosefoot		
☐ *Chrysothamnus nauseosus*	rubber rabbitbrush		
☐ *Chrysothamnus viscidiflorus*	yellow rabbitbrush		
☐ *Cirsium arvense*	Canada thistle		
☐ *Cirsium undulatum*	wavyleaf thistle		
☐ *Clematis occidentalis*	clematis, virgin's bower		
☐ *Cleome lutea***	yellow beeplant		
☐ *Collomia linearis*	collomia		
☐ *Comandra umbellata*	pale bastard toadflax		
☐ *Coryphantha missouriensis*	pincushion cactus		
☐ *Crepis acuminata*	tapertip hawksbeard		
☐ *Crepis atribarba*	hawksbeard		
☐ *Crepis intermedia*	gray hawksbeard		
☐ *Crepis modocensis*	hawksbeard		
☐ *Cryptantha ambigua*	miner's candle		

☐ *Cryptantha cana*	hoary miner's candle	
☐ *Cryptantha flavoculata**	miner's candle	
☐ *Cryptantha kelseyana*	Kelsey's cryptantha	
☐ *Cryptantha minima*	miner's candle	
☐ *Cryptantha scoparia***	desert cryptantha	
☐ *Cryptantha spiculifera*	miner's candle	
☐ *Cryptantha torreyana*	Torrey's cryptantha	
☐ *Cryptantha watsonii*	Watson's cryptantha	
☐ *Cymopterus acaulis*	cymopterus	
☐ *Cymopterus terebinthinus*	cymopterus	
☐ *Cystopteris fragilis*	fragile fern, bladder fern	
☐ *Dalea candida*	prairie clover	
☐ *Delphinium andersonii**	larkspur	
☐ *Delphinium bicolor**	little larkspur, Montana larkspur	
☐ *Descurainia pinnata*	tansy mustard	
☐ *Descurainia sophia*	flixweed	
☐ *Dodecatheon conjugens*	prairie shooting star	originally discovered by F. D. Kelsey
☐ *Draba oligosperma*	Whitlow grass	
☐ *Draba reptans*	Whitlow grass	
☐ *Elæagnus angustifolia*	Russian-olive	
☐ *Eleocharis palustris*	spike rush	
☐ *Ellisia nyctelea*	ellisia	
☐ *Elymus cinereus*	basin wild rye	

Botanical name	Common name	Date	Notes
☐ *Elymus elymoides*	squirreltail grass		
☐ *Elymus lanceolatus*	thickspike wheatgrass		
☐ *Elymus smithii*	western wheatgrass		
☐ *Elymus spicatus*	bluebunch wheatgrass		Montana State Grass
☐ *Erigeron allocotus**	Big Horn fleabane		
☐ *Erigeron cæspitosus*	daisy fleabane		
☐ *Erigeron ochroleucus*	bluff fleabane		
☐ *Eriogonum cernuum*	nodding eriogonum		
☐ *Eriogonum flavum*	yellow eriogonum		
☐ *Eriogonum lagopus**	rabbit buckwheat		
☐ *Eriogonum mancum*	wild buckwheat		
☐ *Eriogonum ovalifolium**	oval-leaf eriogonum		
☐ *Eriogonum pauciflorum*	wild buckwheat		
☐ *Eriogonum salsuginosum***	little buckwheat, smooth buckwheat		
☐ *Eritrichum howardii*	Howard's alpine forget-me-not		
☐ *Erysimum asperum*	prairie wallflower, prairie rocket		
☐ *Euphorbia brachycera*	spurge		
☐ *Euphorbia glyptosperma*	ridgeseed spurge		
☐ *Festuca octoflora*	sixweeks fescue		
☐ *Gaura coccinea*	scarlet gaura		
☐ *Gilia leptomeria*	gilia		

☐ *Gilia tweedyi*	bird's eye, gilia
☐ *Glycyrrhiza lepidota*	wild licorice
☐ *Grayia spinosa**	spiny hopsage
☐ *Gutierrezia sarothræ*	broom snakeweed, matchbrush
☐ *Halogeton glomeratus*	halogeton
☐ *Haplopappus acaulis*	goldenweed
☐ *Haplopappus armerioides*	thrift goldenweed
☐ *Haplopappus nuttallii*	goldenweed
☐ *Hedeoma drummondii*	false pennyroyal
☐ *Hedysarum boreale*	sweetvetch
☐ *Helianthus annuus*	common sunflower
☐ *Helianthus nuttallii*	Nuttall's sunflower
☐ *Heterotheca villosa*	hairy golden aster
☐ *Hordeum jubatum*	foxtail barley
☐ *Hymenopappus filifolius*	hymenopappus
☐ *Hymenoxys acaulis*	stemless hymenoxys, Butte marigold
☐ *Hymenoxys torreyana*	Torrey's hymenoxys
☐ *Ipomopsis congesta*	fairy trumpet
☐ *Ipomopsis pumila*	fairy trumpet
☐ *Ipomopsis spicata*	fairy trumpet
☐ *Iva axillaris*	poverty weed
☐ *Ivesia gordonii*	ivesia
☐ *Juniperus osteosperma*	Utah juniper

Botanical name	Common name	Date	Notes
☐ *Juniperus scopulorum*	Rocky Mountain juniper		
☐ *Kelseya uniflora*	kelseya		MNPS mascot
☐ *Koeleria macrantha*	junegrass		
☐ *Krascheninnikovia lanata*	winterfat, whitesage		
☐ *Lappula myosotis*	stickseed		
☐ *Lappula redowskii*	stickseed		
☐ *Lepidium perfoliatum*	clasping pepperweed		
☐ *Leptodactylon cæspitosum***	cushion prickly phlox		
☐ *Leptodactylon pungens*	prickly phlox		
☐ *Lesquerella alpina*	alpine bladderpod, alkaline bladderpod		
☐ *Lesquerella sp. novum* (*Lesquerella lesicii***)	undescribed bladderpod (Pryor Mountain bladderpod)		
☐ *Lewisia rediviva*	bitterroot		Montana State Flower
☐ *Linum lewisii*	flax		
☐ *Lithospermum incisum*	stoneseed		
☐ *Lomatium foeniculaceum*	yellow prairie parsley		
☐ *Lomatium orientale*	salt and pepper		
☐ *Lomatium triternatum*	wild parsley, nineleaf biscuitroot		
☐ *Lupinus argenteus*	silver lupine		
☐ *Lupinus pusillus*	low lupine		
☐ *Lygodesmia juncea*	rush skeletonweed		

☐ *Machæranthera canescens*	spiny aster, purple aster
☐ *Malacothrix torreyi***	desert dandelion
☐ *Malcolmia africana*	malcolmia
☐ *Melilotus officinalis*	yellow sweetclover
☐ *Mentzelia albicaulis*	small-flowered stickleaf, evening star
☐ *Mentzelia dispersa*	blazing star
☐ *Mentzelia pumila**	blazing star
☐ *Mertensia oblongifolia*	leafy bluebell
☐ *Microsteris gracilis*	microsteris
☐ *Mirabilis linearis*	umbrellawort
☐ *Monolepsis nuttalliana*	povertyweed
☐ *Monroa squarrosa*	false buffalograss
☐ *Musineon divaricatum*	leafy musineon
☐ *Musineon vaginatum*	sheathed musineon
☐ *Nama densum***	dwarf nama
☐ *Nothocalais troximoides*	false dandelion, nothocalais
☐ *Œnothera albicaulis*	plains evening primrose
☐ *Œnothera cespitosa*	desert evening primrose
☐ *Œnothera latifolia*	evening primrose
☐ *Opuntia polyacantha*	plains pricklypear
☐ *Orobanche fasciculata*	clustered broomrape
☐ *Orobanche ludoviciana*	broomrape
☐ *Oryzopsis hymenoides*	Indian ricegrass

Botanical name	Common name	Date	Notes
☐ *Oryzopsis micrantha*	littleseed ricegrass		
☐ *Oxytropis besseyi*	stemless locoweed, Bessey's pointvetch		
☐ *Oxytropis sericea*	silky crazyweed, white pointvetch		
☐ *Parietaria pensylvanica*	pellitory		
☐ *Paronychia sessiliflora*	nailwort, Whitlow-wort		
☐ *Pellæa suksdorfiana*	rock fern, cliff-brake fern		
☐ *Penstemon aridus*	stiffleaf penstemon		
☐ *Penstemon eriantherus*	fuzzytongue penstemon		
☐ *Penstemon laricifolius*	larchleaf penstemon		
☐ *Penstemon nitidus*	shining penstemon, waxleaf penstemon		
☐ *Pentaphylloides floribunda*	shrubby cinquefoil		
☐ *Phacelia glandulosa*	phacelia		
☐ *Phacelia hastata*	whiteleaf phacelia		
☐ *Phacelia ivesiana*	phacelia		
☐ *Phacelia linearis*	threadleaf phacelia		
☐ *Phlox hoodii*	Hood's phlox		
☐ *Phlox muscoides*	phlox		
☐ *Physaria acutifolia*	twinpod		
☐ *Physaria didymocarpa*	twinpod		
☐ *Pinus flexilis*	limber pine		
☐ *Pinus ponderosa*	ponderosa pine		

☐ *Plantago major*	broadleaf plantain
☐ *Plantago patagonica*	wooly plantain
☐ *Platyschkuhria integrifolia*	platyschkuhria
☐ *Poa pratensis*	Kentucky bluegrass
☐ *Poa secunda*	Sandberg bluegrass
☐ *Polanisia trachysperma*	clammyweed
☐ *Polygonum douglasii*	smartweed
☐ *Polypogon monspeliensis*	rabbitfoot polypogon, rabbitfoot grass
☐ *Populus deltoides*	cottonwood
☐ *Potentilla hippiana*	cinquefoil
☐ *Potentilla pensylvanica*	prairie cinquefoil
☐ *Pseudotsuga menziesii*	Douglas-fir
☐ *Psoralidium tenuiflorum*	scurf-pea
☐ *Puccinellia nuttalliana*	alkali grass
☐ *Ranunculus testiculatus*	bur buttercup
☐ *Rhus trilobata*	sumac
☐ *Ribes cereum*	wax current, western redcurrent
☐ *Ribes oxyacanthoides*	current, gooseberry
☐ *Ribes setosum*	current, gooseberry
☐ *Rorippa nasturtium-aquaticum*	watercress
☐ *Rumex crispus*	curly dock
☐ *Rumex venosus*	wild begonia
☐ *Salix exigua*	streambank willow

Botanical name	Common name	Date	Notes
☐ *Salix lutea*	yellow willow		
☐ *Salsola australis*	Russian thistle		
☐ *Sarcobatus vermiculatus*	greasewood		
☐ *Schoenocrambe linifolia*	basin mustard		
☐ *Senecio canus*	senecio, groundsel		
☐ *Senecio crassulus*	senecio, groundsel		
☐ *Solanum triflorum*	cutleaf nightshade		
☐ *Sphæralcea coccinea*	scarlet globemallow, apricot mallow		
☐ *Sphæromeria capitata**	rock-tansy		
☐ *Sporobolus airoides*	alkali sacaton		
☐ *Sporobolus cryptandrus*	sand dropseed		
☐ *Stanleya pinnata*	prince's plume, desert plume		
☐ *Stanleya tomentosa*	wooly prince's plume		
☐ *Stephanomeria runcinata*	skeletonweed		
☐ *Stipa comata*	needle-and-threadgrass		
☐ *Stipa viridula*	green needlegrass		
☐ *Streptanthella longirostris*	streptanthella		
☐ *Suæda nigra*	sea blite		
☐ *Tetradymia canescens*	spineless horsebrush		
☐ *Tetradymia spinosa*	horsebrush		
☐ *Thelsperma marginatum*	greenthread		

☐ *Townsendia hookeri*	Easter daisy, early townsendia
☐ *Townsendia incana**	Easter daisy
☐ *Townsendia spathulata**	Easter daisy
☐ *Verbena bracteata*	prostrate vervain
☐ *Veronica anagallis-aquatica*	speedwell
☐ *Vicia americana*	American vetch
☐ *Viola adunca*	early blue violet
☐ *Viola nuttallii*	prairie violet, valley yellow violet
☐ Wyethia scabra	rough mule's ears
☐ Xylorhiza glabriuscula	woodyaster
☐ Yucca glauca	Great Plains yucca
☐ Zigadenus elegans	mountain deathcamas, white camas
☐ Zigadenus venenosus	deathcamas

Chapter Three

Lexicon of the Local Genera

A Lexicon
is a dictionary, especially of Greek or Latin terms. A lexicon is also a list of the vocabulary of a particular field of study. We present a lexicon of the botanical names for the plant genera found in the Pryor Mountain Desert.

Achillea • Named for Achilles - reputedly the first to use it in medicine

Agoseris • Greek *aix* goat; *seris* chicory

Agropyron • Greek *agrios* wild; *pyros* wheat

Allium • Celtic *all* hot - juice burns the eyes; Latin word for garlic

Alyssum • Greek *a* not; *lyssa* enraged - plant allays anger

Andropogon • Greek *andr* man; *pogon* beard - refers to the hairy spikelets

Antennaria • Latin *antenna* sailyard - refers to the feathery seed heads that resemble antennas

Arabis • "From Arabia" - suggests the plant's ability to grow in dry situations

Arenaria • Greek *arena* sand - the habitat of the plant

Aristida • Latin *arista* awn

Arnica • Greek *arnikis* lamb's skin - suggests the texture of the leaves

Artemisia • Named for Artemis, the Greek goddess of the wild, uncultivated parts of the earth

Asclepias • Named for Aesklepios, god of medicine and son of Apollo

Astragalus • Greek *astron* star; *gala* milk - belief that the plant improved milk yield

Atriplex • Latin, from Greek *atraphaxys* - name for plants of this genus

Avena • Latin name for oats

Bouteloua • Named for Claudio (1774-1842) and Estevan (1776-1813) Boutelou, Spanish botanists

Bromus • Greek *bromos* name for the oat - denotes food

Calochortus • Greek *kalos* beautiful; *chortos* grass - refers to the leaves

Camelina • Greek *chamai* on the ground; *linon* flax - a weed in flax fields

Carex • Latin name for this plant, perhaps derived from Greek *keirein* to cut - referring to the sharp leaves (note English common name: shear-grass)

Castilleja • Named for Domingo Castillejo, a Spanish botanist

Cerastium • Greek *keras* horn - refers to the form of the seed vessel

Cercocarpus • Greek *kerkos* tail; *carpos* fruit - refers to the long styles

Chaenactis • Greek *chaino* gape; *aktis* ray - referring to the appearance of the flowers

Chenopodium • Greek *chenos* goose; *podos* foot - refers to shape of the leaves

Chrysopsis • Greek *crysos* gold; *opsis* face

Chrysothamnus • Greek *crysos* gold - named for its yellow-golden flowers

Cirsium • Greek *kirsos* swollen vein - a spiny plant that supposedly cures swelling of the veins if one is pricked by the spines

Clematis • Greek *klema* vine-branch

Cleome • Greek *kleio* shut - describes parts of the flower, same word root as *clitoris*

Collomia • Greek *kolla* glue - refers to the sticky seed coverings

Comandra • Greek *kome* hair; *aner* or *andros* man - has hairy-based stamens

Coryphantha • Greek *koryphe* a cluster; *anthos* flower

Crepis • Greek *krepis* sandal - name used by Pliny

Cryptantha • Greek *kryptos* hidden; *anthos* flower - refers to flowers of a South American species of this genus

Cymopterus • Greek *kyma* wave; *pteron* wing

Cystopteris • Greek *kystis* bladder; *pteris* fern

Delphinium • Greek *delphin* dolphin - the spur resembles a dolphin's head

Descurainia • Named for Francois Descurain (1658-1740), French botanist

Dodecatheon • Greek *dodeka* twelve; *theoi* gods - plant is protected by the Greek gods

Draba • Greek *drabe* acrid - name applied by Dioscorides

Eleocharis • Greek *helos* marsh; *charis* grace - sometimes spelled "heleocharis"

Ellisia • Named for John Ellis (1710-76), an English botanist

Elymus • Greek *elumos* - name for a grain

Erigeron • Greek *er* spring; *geron* old man - some species are hoary (white) in the spring

Eriogonum • Greek *eryon* wool; *gonu* joint - the stems have downy joints

Eritrichum • Greek *eryon* wool; *trichos* hair - woolliness of the original species of this genus

Erysimum • Greek *eryo* to draw - the plant was used as a "mustard" plaster to produce blisters

Euphorbia • Named for Euphorbus, physician to the King Juba II of Mauretania

Festuca • Latin name for a grass

Gaura • Greek *guaros* superb or proud - refers to the habit of the plant

Gilia • Named for Felipe Luis Gil, a Spanish botanist

Glycyrrhiza • Greek *glykos* sweet and *rhiza* root - root has sweet juice

Grayia • Named for Asa Gray (1810-88), a preëminent American botanical systematist, a specialist who constructs a system

Gutierrezia • Named for Pedro Gutierrez, a Spanish botanist

Halogeton • Greek *halos* salt; *geiton* neighbor - refers to the habitat

Haplopappus • Greek *haplous* simple; *pappos* seed-down

Hedeoma • Greek *hedys* sweet; *osme* odor

Hedysarum • Greek *hedusaron* - name adopted from Theophrastis but reference is obscure

Helianthus • Greek *helios* sun and *anthos* flower

Hordeum • Latin name for barley - used by Livy

H' pappus • Greek *hymen* membrane; *pappos* pappus

Hymenoxys • Greek *hymen* membrane; *oxys* sharp - refers to the pappus scales

Iva • Old name of obscure origin for some medicinal plant

Ivesia • Named for Eli Ives (1779-1861), an American physician, botanist, and Yale professor

Juniperus • Celtic *juniperus* rough; Latin name for juniper

Kelseya • Named for Rev. Francis Duncan Kelsey (1849-1905), an American amateur botanist who lived in Helena

Koeleria • Named for George Wilhelm Koeler (1765-1807), a German botanist

Lappula • Latin *lappa* a bur - diminutive form, "little bur"

Lepidium • Greek *lepis* scale - refers to scalelike fruit

Leptodactylon • Greek *leptos* thin or fine; *daktylos* finger - refers to the segments of the leaves

Lesquerella • Named for Leo Lesquereau (1805-89), an American bryologist, a specialist in mosses

Lewisia • Named for Meriwether Lewis (1774-1809), an American explorer

Linum • Greek *linon* flax

Lithospermum • Greek *lithos* stone; *sperma* seed - describes the seed

Lomatium • Greek *loma* a border - refers to the winged fruit

Lupinus • Latin *lupus* wolf - old belief that Lupine ravages the soil as a wolf ravages the fold

Lygodesmia • Greek *lygos* a pliant twig; *desme* a bundle - refers to the habit of the plant

Malacothrix • Greek *malakos* soft; *thrix* hair - referring to the pappus

Malcolmia • Named for William Malcolm (1778-1805), an English gardener

Melilotus • Greek *meli* honey; *lotos* name for a clover-like plant

Mentzelia • Named for C. Mentzel (1622-1701), a German botanist

Mertensia • Named for F. C. Mertens (1764-1831), a German botanist

Microsteris • Greek *mikros* small; *sterizo* to support - refers to the size of the plant

Mirabilis • Latin *mirabilis* wonderful

Monolepis • Greek *monos* solitary; *lepis* scale - has a distinctive solitary sepal

Munroa • Named for William Munro (1818-80), an English agrostologist, a specialist in grasses

Musineon • From the Greek name for fennel, another member of this same plant family

Nama • Greek *nama* a spring - reference is obscure

Oenothera • Greek *oinos* wine; *thera* imbibing - name used by Theophrastis but the reference is obscure

Opuntia • Latin name for a plant other than the cactus now identified by this name

Orobanche • Greek *orobos* vetch; *anchen* choke

Oryzopsis • Greek *oruza* rice; *opsis* like - has the appearance of rice

Oxytropis • Greek *oxys* sharp; *tropis* keel

Parietaria • Latin *paries* wall - refers to the typical habitat

Paronychia • Greek name used by Dioscorides for an inflammation of the fingernails that supposedly could be cured by this plant

Pellaea • Greek *pellos* means dark - refers to the dark leaf stalks

Penstemon • Greek *pente* five and *stemon* stamen

Phacelia • Greek *phakelos* a bundle - refers to the flowers

Phlox • Greek *phlox* a flame - refers to the brilliant flowers

Physaria • Greek *physa* bladder

Pinus • Latin *picnus* pitch - the old Latin name of the pine

Plantago • Latin *planta* sole of the foot

Pl[illegible]ria • Greek *platys* broad

Poa • Greek name for grass

Polanisia • Greek *polys* many; *anisos* unequal - stamens are of unequal length

Polygonum • Greek *polys* many; *gonu* joint - numerous joints on the stem

Polypogon • Greek *poly* much; *pogon* beard - refers to the long awns

Potentilla • Latin *potens* powerful - refers to reputed medicinal qualities

Pseudotsuga • Greek *pseudo* false; Japanese *tsuga* hemlock

Psoralea • Greek *psora* itch or mange - referring to the rough or scab-like glands

Puccinellia • Named for Benedetto Puccinelli (1808-50), an Italian botanist

Ranunculus • Greek *rana* little frog - from Pliny, because many species prefer marshy habitat

Rhus • Greek *rhodos* red - the color of the fruit

Ribes • Arabic name for this plant

Rorippa • Saxon *rorippen* - their common name for the plant

Rumex • Latin name for this plant - from Pliny

Salix • C[illegible]*l* near; *lis* water - Latin name for willow, from [illegible]

Salsola • Latin *salsus* salty - refers to either habitat or taste of the plant

Sarcobatus • Greek *sarko* flesh; *batos* bramble - refers to leaves and branches

Schoenocrambe • Greek *schoenus* a rush; *krambe* cabbage

Senecio • Latin *senex* old man - referring to the white hairs of some species

Sitanion • Greek *sitos* grain

Solanum • Latin *solamen* comforting - some species were said to have sedative qualities

Sphaeralcea • Greek *sphaira* globe and *alcea* mallow - seed pods are in globular heads

Sporobolus • Greek *spora* seed; *ballein* throw - the seeds often drop from their seed cases

Stanleya • Named for Lord Edward Stanley (1775-1851), an English ornithologist

Stephanomeria • Greek *stephanos* wreath; *mereia* a division - reference is obscure

Stipa • Greek *stipe* feathery

Streptanthella • Greek *streptos* twisted; *anthos* flower - diminutive form, refers to the curled margins of the petals

Suaeda • Arabic *suwayd* - their name for a plant of this genus

Tetradymia • Greek *tetradymos* fourfold - refers to the shape of the flower heads

Thelesperma • Greek *thele* nipple; *sperma* seed - refers to the shape of the seed

Townsendia • Named for David Townsend (1787-1858), an American amateur botanist

Tragopogon • Greek *tragos* goat; *pogon* beard

Verbena • Latin name for any of certain sacred boughs - from Pliny

Veronica • Perhaps named for Saint Veronica

Vicia • Latin *vinco* bind - what the tendrils do; from Ovid

Viola • Latin name for this plant - from Virgil

Wyethia • Named for Nathanial Wyeth (1802-56), an American explorer and botanist who collected plants in northwestern Montana and northern Idaho.

Xylorhiza • Greek *xylo* wood; *rhiza* root

Yucca • Peruvian name for this plant

Zigadenus • Greek *zygnuo* join and *adena* gland - describes the glands of the flowers

Chapter Four

The Birds

The list presented here is based on P. D. Skaar's *Montana Bird Distribution* (1992), but is limited to Montana quarter latilongs (QLL) 41C and 41D. The list was prepared for us by the Montana Natural Heritage Program.

For more information about the latilong system of geographic division, we refer the reader to Montana Bird Distribution.

Among those birds found on this list, the American white pelican is ranked globally as very rare, and breeding occurrences are ranked as imperiled in Montana. It has been sighted in QLL 41D.

Bird species are not well documented for this area, so if you see a bird missing from this list, please send a record of your observation to the Montana Natural Heritage program. Sightings of common birds may be submitted on a plain piece of paper or the form in Appendix B. ¤

Table 14

Birds of the Pryor Mountain Desert

☐ American goldfinch	☐ green-tailed towhee	☐ rock wren
☐ American kestrel	☐ hermit thrush	☐ rufous hummingbird
☐ American white pelican	☐ house finch	☐ savannah sparrow
☐ barn swallow	☐ lark sparrow	☐ song sparrow
☐ black-billed magpie	☐ lazuli bunting	☐ tree swallow
☐ black-headed grosbeak	☐ MacGillivray's warbler	☐ turkey vulture
☐ blue grouse	☐ mountain bluebird	☐ western tanager
☐ bobolink	☐ northern oriole	☐ western wood-pewee
☐ calliope hummingbird	☐ olive-sided flycatcher	☐ white-throated swift
☐ chipping sparrow	☐ pine siskin	☐ yellow warbler
☐ chukar	☐ pinyon jay	☐ yellow-breasted chat
☐ golden eagle	☐ red-tailed hawk	

Appendix A

Unrecorded Plant Report Form

In an area as little studied as the Pryor Mountain Desert region has been so far, there are opportunities to make new, significant discoveries every day. Even if you are not a botanist, you can participate in this scientific process. In fact, amateur contributions play a important role in botany.

If you find a plant that does not appear on the Plant List in this book, please fill out the form. Send it to Don Heinze at 1176 Minuteman Dr., Billings, MT 59105. Or you can send your report via the Internet to Blue Creek @AOL.COM.

Observer's Name _____

Address: _____

Daytime phone: _____ *Evening phone:* _____

Other observers: _____

_____

Species observed: _____

_____

Describe the plant you observed: _____

_____

_____

Growth stage: ☐ *vegetative* ☐ *bud* ☐ *in bloom* ☐ *past bloom* ☐ *dormant*

How did you rule out similar species? _____

_____

_____

Nearest landmark (e.g. milepost 6, Helt Road) _____

Actual location: _____

_____

Describe as much as you can about the habitat, elevation, soil conditions, nearby plants, condition of range: _____

_____

_____

Appendix B

Quarter Latilong (QLL) Recording Sheet

QLL: _____ *Observer:* _____

Address _____ *Phone:* _____

Common Name of Bird	*Status**	*Date*	*Location*

* *Status Codes*
- **B** direct evidence of breeding
- **b** indirect or circumstantial evidence of breeding
- **t** observed, no evidence of breeding
- **W** overwintering
- **w** overwintering not yet documented, but species observed at least once between Dec. 15 and Feb. 15

Send list to: Montana Bird Distribution Update, Natural Heritage Program, 1515 East Sixth Avenue, PO Box 201800, Helena, MT 59620-1800

About This Book

This is the first edition of *Pryor Mountain Desert: A Montana Native Plant Society Naturalist's Guide*. This edition includes:

- geographic overview of the Pryor Desert
- road log of sights you can see from your car window as you drive
- list of bird species documented for the desert
- description of the biotic community we see today
- authoritative listing of known plant species
- lexicon of names of local plant genera

This book contains abundant information that is not treated in most other books written for the amateur. Our treatment of plant community types is the among the few discussions of the kind we have seen in a book written in high-school level English.

Theoretical information is linked in concrete ways to the local situation. Use of scientific terms is kept to a minimum but not entirely avoided. Our lexicon of botanical names for local plant genera is likely to help many readers to understand and use these names more comfortably.

About the authors

Donald H. Heinze, M.S. provides the principal authority and technical knowledge for this book. He is a botanist working for the Bureau of Land Management since 1967, and has worked throughout the western United States, from Mexico to the Canadian border. Don is the rare and sensitive plant specialist for the BLM region serving Montana, North Dakota and South Dakota. Don, who lives with his wife Linda in Billings, Montana, is the author of the recently published book *Willows of Montana*.

Mark Taylor, M.A., a nationally certified school psychologist, works in rural schools scattered through Yellowstone, Carbon, and Big Horn counties. His interest in native plants begins with a prairie restoration project he and his wife, Rosanna, are pursuing in their backyard in the hills south of Billings. His role in this book was to ask questions that only a layperson could think of, and to put the answers into something approaching everyday English. Mark is editor of *Indian Legends from Mission San Juan Bautista*.