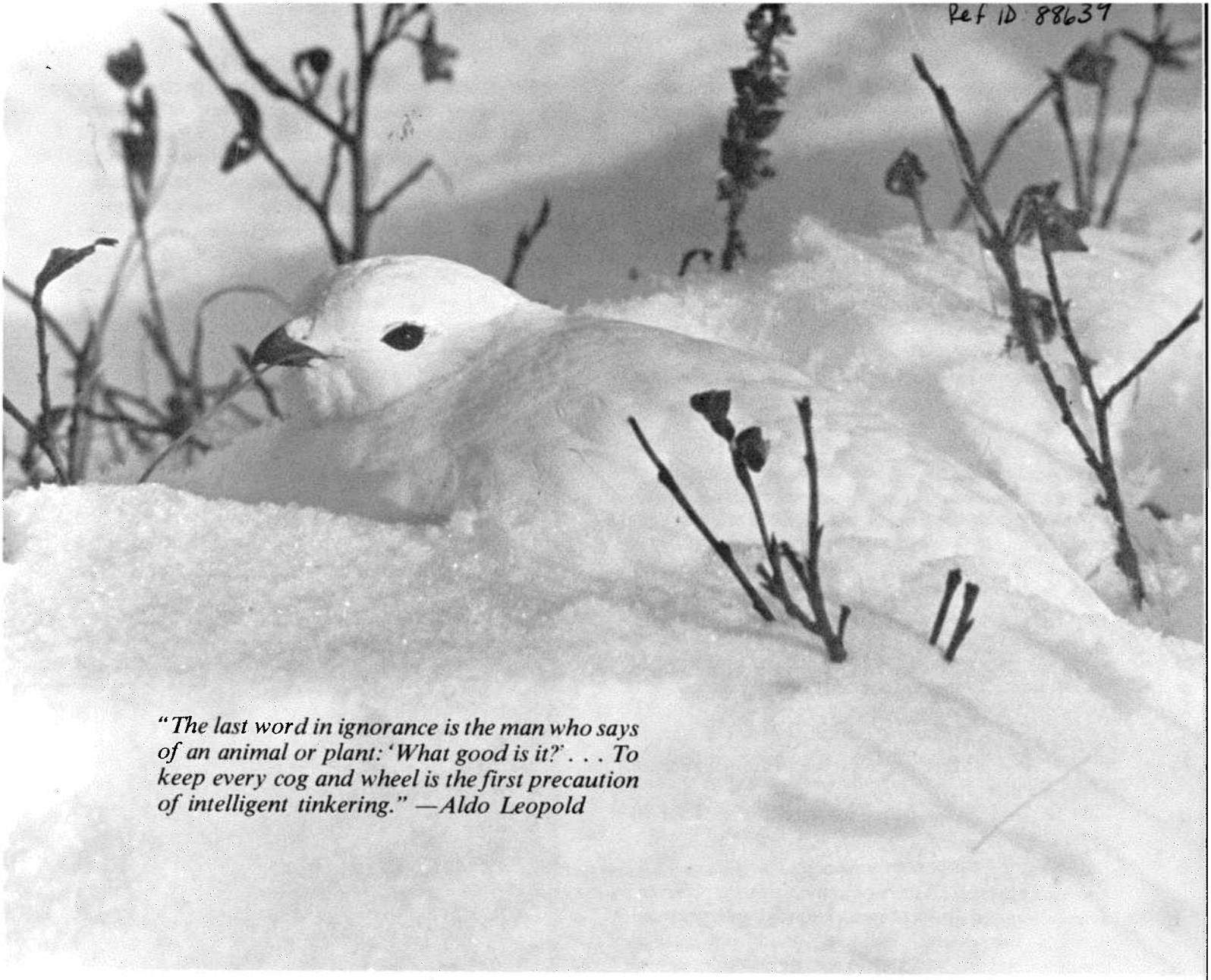


"The last word in ignorance is the man who says of an animal or plant: 'What good is it?' . . . To keep every cog and wheel is the first precaution of intelligent tinkering." —Aldo Leopold

Danny On

building a natural area system for montana

WYMAN C. SCHMIDT

Research Silviculturist with the USDA Forest Service, Intermountain Forest and Range Experiment Station, Ogden, Utah. Mr. Schmidt is stationed at the Forestry Sciences Laboratory at Missoula, maintained in cooperation with the University of Montana.

W. P. "BUSTER" DUFOUR

Project Coordinator, Bitter Root Resource Conservation and Development Project, USDA Soil Conservation Service. Mr. Dufour is stationed in Hamilton, Montana.

Just what is a natural area? Most people have an inkling, but few have tried to define the term. To many, it is simply a secluded woodland, or a landscape lacking evidence of man's presence. But to others, it has a more precise definition. For instance, when nearly 100 Montana scientists, educators, land managers, and interested citizens met recently, they defined natural areas this way: ". . . areas of land or water representing significant natural features or processes, which are designated for their scientific and educational values."

What do natural areas look like? They are usually small, ranging from 10 to 1,000 acres, although both larger and smaller areas are not uncommon. They are essentially pristine lands where man's activities have not influenced natural phenomena, and where natural processes have been allowed to dominate. They can be forest, grassland, or aquatic ecosystems, geologic or zoologic phenomena, or combinations of any of these.

What are natural areas used for? Their primary purposes are as follows:

1. To provide representative examples of natural ecosystems.
2. To provide opportunities for study of plant succession and other biological and physical phenomena over long periods of time.
3. To provide "benchmark" values for monitoring changes in natural processes and systems brought about by man's activities.
4. To serve as "gene pools" for long-term maintenance of genetic diversity.
5. To serve as preserves for rare and endangered species.

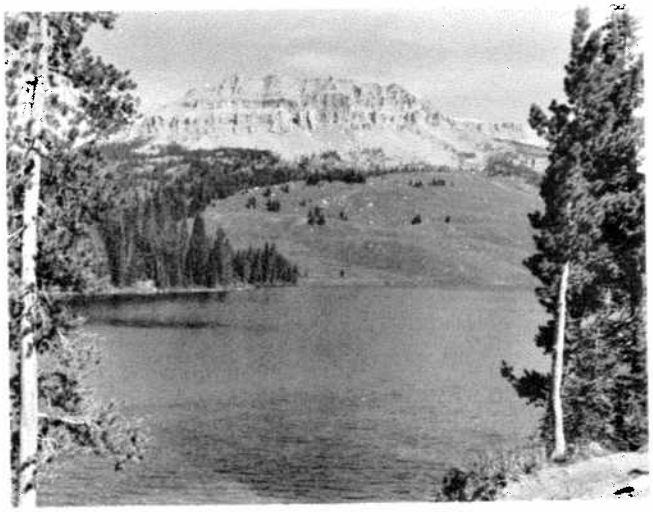
Obviously, protection from man's disturbance is of primary importance if these objectives are to be achieved. Scientific and educational uses are encouraged, provided they do not destroy resources or disrupt natural processes. Because recreational use and resource removal easily change a "natural" area of limited acreage to an "unnatural" area, these activities are usually excluded.

How do natural area systems come into being? Federal statutes provide for establishment of natural areas on lands administered by federal agencies such as the USDA Forest Service and USDI Bureau of Land Management. In addition, some states have enacted legislation enabling and directing the establishment of natural areas on state and, in some cases, on private lands. Many of the eastern and midwestern states have aggressively pursued natural area establishment, but have been hampered by a shortage of undisturbed sites. In the West, Oregon and Washington have made substantial progress toward building their natural area systems. Idaho, Utah, Nevada, and New Mexico have begun, but like Montana, have a lot of work ahead of them.

Recognizing the need for a coordinated and professional approach to natural area planning in Montana, the natural area committees of three professional societies—the Society of American Foresters, the Society for Range Management, and the Soil Conservation Society of America—sponsored two Montana natural area workshops in 1974. These workshops, each involving nearly 100 Montanans, served as a catalyst in bringing together interested parties and in setting in motion a concerted effort toward establishing a Montana Natural Area System.

The first workshop was designed to identify the people and organizations most interested and involved in natural area work in the State, and to foster an exchange of ideas on definitions, policies, and status of natural area work.[1] The workshop's participants, although differing on minor points of terminology, priorities, and establishment methods, agreed on the basic natural area concept and on the need for a Montana Natural Area System.

The second workshop was aimed primarily at developing an inventory of natural area *needs* in Montana. With this goal in mind, five working groups were formed: Forest, Grass and Shrubland, Aquatic, Geologic, and Zoologic. During this workshop, the working groups began developing the inventory of natural area needs and the classification scheme needed to describe Montana's natural phenomena.



USDA Forest Service

Natural areas are not necessarily as striking as this subalpine area in the Beartooth Mountains, but all have a beauty of their own for some observers.

Also early in 1974, an independent but closely related event took place: The Montana Legislature passed the "Montana Natural Areas Act of 1974" (see next article for details). Among other things, the Act provides for the creation of a Natural Areas Advisory Council to "make recommendations to the Board [the Board of State Land Commissioners] for the administration of the natural

[1] From this group, a Montana Natural Area Committee, composed of eight members, was selected to act as a steering committee. The Committee members are Wyman C. Schmidt (Society of American Foresters), "Bus" Dufour (Soil Conservation Society of America), Paul Conrad (Society for Range Management), Robert Pfister (Forest Working Group), John Taylor (Grass and Shrubland Working Group), Bill Hicks (Geologic Working Group), Andrew Sheldon (Aquatic Working Group), and Charles Jonkel (Zoological Working Group).

areas system and additions thereto from State, Federal, County, or private land." Thanks to this sound legislation, the Montana natural area concept was given legal definition and standing at a time when grassroots support was gaining momentum and the technical groundwork was being laid.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF MONTANA . . .

. . . in the expanses of Montana there are natural areas possessing significant scenic, educational, scientific, biological, and/or geological values, or areas possessing these characteristics to a degree promising their restoration to a natural state; that since the development of these areas is an irreversible commitment of a finite and diminishing resource of fundamental importance, the remaining areas should be preserved for the benefit of this and future generations; and that currently there are no regulations promulgated by the state or local governments to insure adequate protection for natural areas. It is the intention of the legislative assembly to establish a system for the protection of natural or potentially natural areas in order to preserve their natural ecosystem integrity in perpetuity. . . .

MONTANA NATURAL AREAS ACT OF 1974

What Have the Five Working Groups Done?

The working groups have begun to develop the classification schemes for their respective areas of interest. For example, the Forest Working Group has divided Montana's forests into classes or "cells" based on the predominant tree species, such as ponderosa pine, western larch, and Douglas-fir. When the classifications have been completed, the vegetative, aquatic, geologic, and zoologic phenomena that should be represented in the Montana Natural Area System can be readily identified.

To facilitate classification, the State has been divided into six geographic subdivisions (figure 1). The following sections describe in more detail the cell classifications being developed by the Working Groups.

Forest

The Forest Working Group has focused on establishing a cell system encompassing all of the diverse forest types found in Montana with the goal of identifying and preserving samples of "typical" or "representative" forest communities. To facilitate this goal, the Group has adopted the S.A.F. Forest Cover Types (Society of American Foresters 1954) to serve as the basic classification for Montana forest natural areas. Undoubtedly, there are many unique forest situations that should be included in a natural area system, but it is difficult to classify them and systematically search them out. As such areas are found, they will be included among the potential candidates for natural area designation.

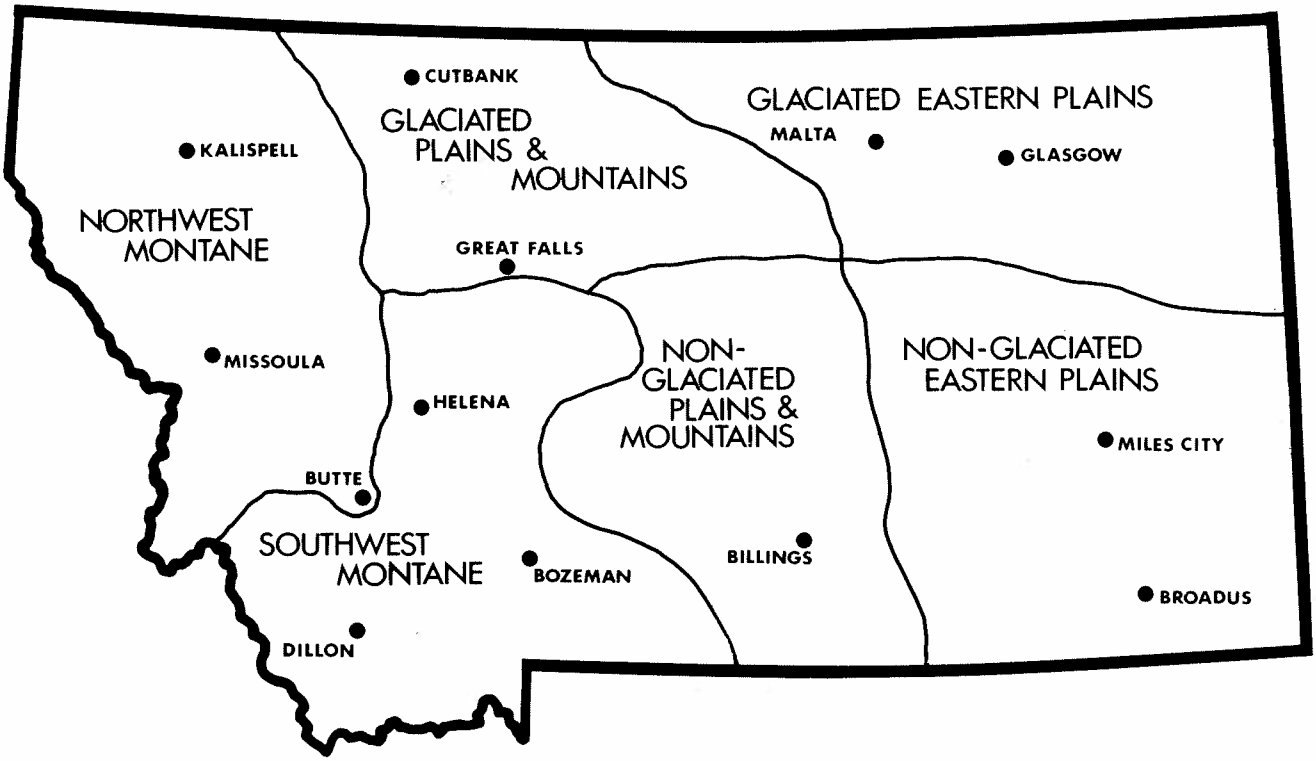


Figure 1.—Because Montana encompasses such a wide range of natural conditions, it has been separated into six geographic subdivisions: (1) northwest montane, (2) southwest montane, (3) glaciated plains and mountains, (4) non-glaciated plains and mountains, (5) glaciated eastern plains, and (6) non-glaciated eastern plains. For more complete descriptions of these regions, see Fenneman (1931), Perry (1962), and Thornbury (1965).

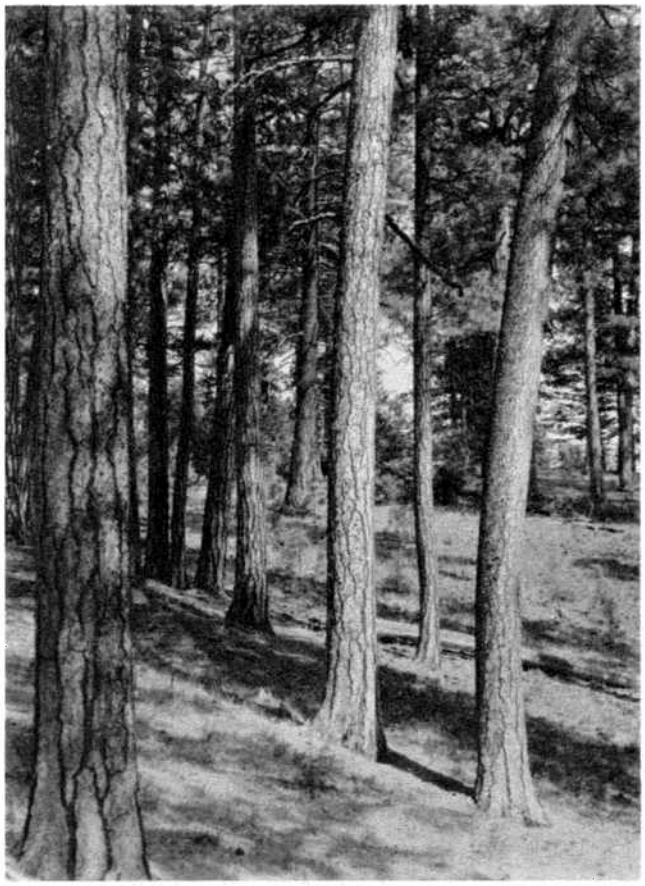
The cell system for Montana forests is based on the Forest Cover Types occurring in each of the state's six geographic subdivisions (table 1). A representative natural area system should include at least one example of each cover type found in each of the six geographic areas. In areas where a cover type is widespread and ecologically diverse (including several habitat types, for instance), more than one natural area may be necessary to fill a cell. On the other hand, the total number of forest natural areas will probably be less than the number of cells, because two or more cover types will usually be found in each natural area.

Although the cell structure is based on S.A.F. Forest Cover Types, greatly differing environmental features and vegetation sometimes occur within a single cover type. To deal with this problem, natural area proposals will also include descriptions of specific habitat types (Pfister et al. 1974). These habitat types may eventually be used to make a more detailed evaluation of natural areas. Vegetation descriptions based on Kuchler's (1964)

TABLE 1.—Forest natural area needs in Montana by geographic subdivision

S.A.F. cover type	Priority	Number of proposed natural areas					
		Northwest montane	Southwest montane	Glaciated plains & mountains	Glaciated eastern plains	Non-glaciated plains & mountains	Non-glaciated eastern plains
201 white spruce	2	1	2	—	—	1	—
203 poplar-birch	2	2	—	1	—	—	—
205 mountain hemlock-subalpine fir	1	1	—	—	—	—	—
206 Engelmann spruce-subalpine fir	3	2*	2*	2	—	2	—
208 whitebark pine	3	1	1	1	—	1	—
210 interior Douglas-fir	3	2*	1*	2	—	2	—
212 larch-Douglas-fir	3	1*	—	—	—	—	—
213 grand fir-larch-Douglas-fir	2	2	—	—	—	—	—
214 ponderosa pine-larch-Douglas-fir	1	2	—	—	—	—	—
215 western white pine	2	1*	—	—	—	—	—
217 aspen	1	2	1*	?	—	1	—
218 lodgepole pine	3	2	2*	1	—	1	—
219 limber pine	2	1	1	1	—	1	—
220 Rocky Mt. juniper	2	1	?	?	—	1	—
222 cottonwood-& 235 willow	1	2	2	2	2	2	2
224 western hemlock & 227 western redcedar	2	2	—	—	—	—	—
228 western redcedar	2	2	—	—	—	—	—
237 interior ponderosa pine	1	2	2	2	2	1?	2*

* = Already represented to some extent in one of the following established Research Natural Areas: Coram (NW Montana), Cliff Lake and Sheep Mt. (SW Montana), Poker Jim (Non-glaciated E. Plains).
— = Cover type does not occur in this geographic subdivision.
? = Not certain that the type exists in this geographic subdivision.



USDA Forest Service

This ponderosa pine stand would fill a forest cell needed to complete the natural area system.

potential natural vegetation types will also be maintained to aid in record-keeping.

Table 1 also contains priorities for establishing natural areas. Top priority (1) is listed for types that are seldom found in already-protected areas such as wildernesses or national parks. Lowest priority (3) is indicated for types that are commonly found in parks, wildernesses or other areas currently managed to preserve natural features.

The Forest Working Group has also established initial procedures for obtaining and evaluating natural area proposals. About 20 representatives from government agencies, universities, and private companies have participated in meetings to date. Future meetings will deal with establishment, use, and protection of natural areas.

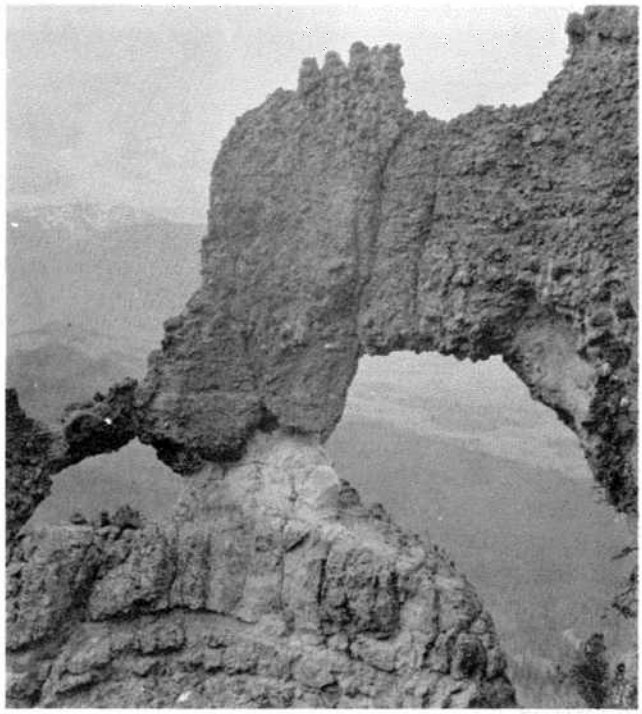
Dr. Robert Pfister, who leads the Intermountain Forest & Range Experiment Station's Forest Ecosystems Project based in Missoula, is chairman of the Forest Working Group.

Geologic

The Geologic Working Group has begun by defining the geologic features and phenomena that might warrant recognition for natural area status.

A review of previous work by the U.S. Geological Survey in relation to National Landmark identification has proven beneficial and provides a partial basis for the classification the Group has tentatively adopted. The U.S.G.S. has developed concise criteria for two major themes: (1) the "History of Landforms," which deals with time and processes that have shaped the earth's surface, and (2) the "History of Lifeforms," which deals with the fossil record.

In addition to these two broad themes, the Geologic Group proposes inclusion of several other important factors in the classification system. Among these additions would be the genesis, or origin, of the rock types in Montana. In the broadest sense, rock types fall into three major categories: sedimentary, igneous, and metamorphic. Many classic folds and faults that bear mute evidence of the geologic forces shaping the earth's crust are found throughout the State. These structural features definitely deserve recognition.



USDA Forest Service

Geologic phenomena, such as this natural arch of weathered conglomerate, should be included in natural areas whenever possible.

Montana is rich in metallic and nonmetallic mineral deposits, as well as fossil fuels such as coal and oil. The Group recognizes that economic geology and natural area preservation are not fully compatible, but it would seem desirable to maintain at least some examples of ore deposition and fossil fuel environment, such as mineral veins and coal seams.

As soon as the Geologic Group has decided on the phenomena to be considered, procedures for delineating and evaluating geologic natural areas will be completed and a cell system will be developed.

Billy Hicks, Regional Geologist for the USDA Forest Service's Northern Region headquarters in Missoula, is chairman of the Geologic Working Group.

Aquatic

Aquatic habitats are defined largely by their physical features (Sheldon 1972) rather than by their living inhabitants. Most aquatic organisms are small, difficult to identify, and present only seasonally. A classification based on indicator species or associations would be time-consuming and would require the service of specialists who are unavailable within the State. Useful biological descriptions of aquatic natural areas may come later, but it is unlikely that biological data will play a major role in the selection process.

The Aquatic Working Group has developed an initial classification for inventory of aquatic natural areas that recognizes three zones: alpine, upland-montane, and lowland. Within these zones, four habitats are recognized: lakes, streams, springs, and bogs or marshes. Further subdivision of habitats by size, chemistry, and thermal properties is possible and may be necessary. However, the proposed zonation automatically includes much of the variation in habitat characteristics. Although examples of the 12 major types are not found in all six geographic subdivisions of the state, the simple classification implies a substantial number of aquatic natural areas for Montana. Additional sites could be selected by using such criteria as the presence of threatened species and extreme physical or chemical properties.

Because aquatic habitats are strongly affected by changes of all types throughout the watershed, selection and maintenance of aquatic natural areas is difficult (Luther and Rzoska 1971). The ideal aquatic site will

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Aquatic habitats such as this bog should be represented in a complete natural area system. The larch-fir forest in the background would also add to the value of a natural area here.

include the adjacent land necessary for its maintenance. This ideal will be met only in small watersheds; larger bodies of water will remain vulnerable (Sheldon 1970). Selection of aquatic sites must be closely coordinated with selection of terrestrial areas.

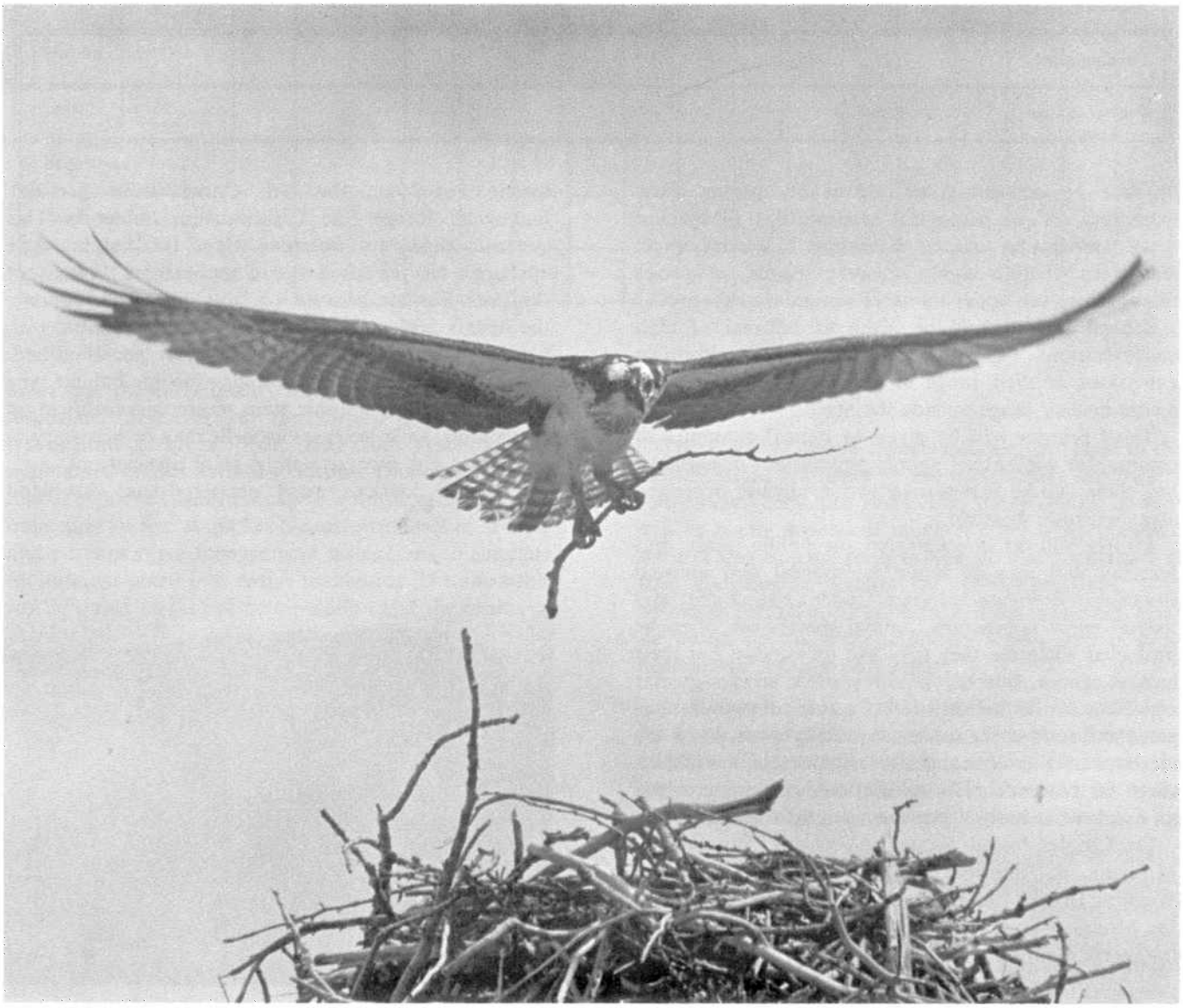
Dr. Andrew Sheldon, Associate Professor of Zoology and Wildlife Biology at the University of Montana, is chairman of the Aquatic Working Group.

Zoologic

The Zoologic Group has begun to define criteria for selecting and documenting important terrestrial areas (table 2), and to develop a standard system for describing zoological natural areas throughout the six geographic subdivisions in Montana.

Once such criteria, guidelines, and recording systems have been formalized, the Group will prepare two inventories: one listing zoological features already protected in some manner, and a second listing potential zoological natural areas yet to be established in each of the geographic subdivisions. Care will be taken to include all zoological elements, whether spectacular, rare, or inconspicuous, and to overlap or combine recommended zoological natural areas with vegetative, aquatic, or geologic natural areas. Furthermore, the Zoologic Group will aid the other Groups by helping to locate forest, grassland, shrubland, aquatic, or geologic natural areas *within* existing protected zoologic sites (refuges, game ranges, sanctuaries, etc.).

Top priority will be given to the following sites: important feeding, denning, nesting, and breeding areas where habitat protection is most critical; areas occupied



Danny On

Special attention should be given to bird and animal species with specific nesting or denning requirements, such as the osprey, which requires large trees with dead tops along rivers or lakes.

TABLE 2.—A preliminary list of zoological natural area needs in Montana by geographic subdivision (proposals pending further investigation)

Zoological importance	Priority	Northwest montane	Southwest montane	Glaciated plains & mountains	Glaciated eastern plains	Non-glaciated plains & mountains	Non-glaciated eastern plains
Rare or endangered species							
Relict populations							
Outermost range extensions							
Breeding (nesting, etc.) areas							
Unusual or unique species relationships							
Feeding areas							
Migration routes							
Denning areas							
Critical habitat							

by rare or unusual combinations of species; areas exhibiting unique ecological relationships of species; areas representing unusual extensions of species range; and areas wherein highly sensitive species or species relationships are under threat of serious disturbance.

Second priority will be given to unusual or high concentrations of species, and to species at the outermost extensions of their range in Montana, but which are secure in their range outside the State.

Third priority will be given to typical examples of common or widespread animal populations or habitats, but these will be inventoried within already protected areas wherever possible.

Efforts will be concentrated on public lands, but searches will also be made for typical and unusual situations on private holdings. Under existing state and federal game regulations, animal species can often be protected wherever they may live or wander, but their habitat cannot. New regulations provide an ever-greater capability for the preservation of species. However, non-game and food-chain species, especially those which are inconspicuous or economically unimportant, are seldom cared for adequately; the natural area concept provides an excellent opportunity to improve their status.

Dr. Charles Jonkel, School of Forestry, University of Montana, is Interim Chairman of the Zoological Working Group; Dennis Flath, Non-game Biologist with the Montana Fish and Game Department, will provide long-term continuity for the Group.

Grassland and Shrubland

The Grassland and Shrubland Working Group has built a cell structure to identify natural area needs using a matrix based on the Soil Conservation Service's Ecological Range Site Classification (table 3). This system, while less intensive than the habitat type approach, has the advantage of applicability throughout the State. Further, because it is based on soil and climate, the matrix cells should be somewhat comparable with habitat types as additional typing is accomplished. Natural area descriptions will also include habitat type information in geographic areas where this classification is available. In some cases subcells may be necessary to delineate local, rare, or unique plant associations.

Montana contains many grassland and shrubland

John E. Taylor

Prairie sandreed grass dominates this native grassland along the Rosebud River in eastern Montana; such vegetative types are excellent natural area candidates.

TABLE 3.—Grassland/shrubland natural area needs in Montana by geographic subdivision and precipitation zone

	Northwest montane			Southwest montane			Glaciated plains & mountains			Glaciated eastern plains		Non-glaciated plains & mountains			Non-glaciated eastern plains	
Range sites	10-14	15-19	20-24	10-14	15-19	20-24	10-14	15-19	20-24	10-14	15-19	10-14	15-19	20-24	10-14	15-19
Wetland																
Saline lowland			—			—										
Sands			—			—										
Sandy																
Silty																
Clayey																
Shallow																
Gravel																
Very shallow																
Saline upland			—			—		—	—		—		—	—		
Shale	—	—	—	—	—	—		—	—		—					—

— = Range site does not occur in this subdivision.

areas that presently qualify for natural area status. An important objective of the Group is to identify representative areas that may be systematically *maintained* in their natural condition. On rangeland, this maintenance of condition can be a subtle, yet extremely important factor. It implies a controlled level of grazing and perhaps other management restrictions to simulate the original grazing by native herbivores. The allowable (or desirable) degree of manipulation and the means of manipulation in natural areas need to be carefully considered.

Many of the best examples of grass/shrubland vegetation in Montana are on private land. Thus, the private landowner has a crucial role to play in natural area designation and maintenance. Another question, as yet unresolved, relates to the optimum number, size, and distribution of natural areas. The Group feels that the *original* (i.e. pre-Columbian) importance and distribution of plant associations should weigh heavily in setting priorities. Of course, availability of areas, coincidence with other natural area types (forest, aquatic, zoologic, geologic), and projected uses will be considered as well.

The chairman of the Grassland/Shrubland Working Group is Dr. John E. Taylor, Department of Animal and Range Sciences, Montana State University, Bozeman.

Where Are We Now?

The Working Group reports indicate that some of the classifications are ready to use, while others still require refinement. They also reveal that the Working Groups will be highly dependent on each other when potential natural area sites are being evaluated. The importance of this cooperation cannot be overemphasized. The Montana natural areas movement, if it is to succeed, must be based on an interdisciplinary effort, and it must accomplish the following goals:

1. It must build a complete and comprehensive natural area *system,* not merely preserve a collection of biological oddities. This means including examples of all the important natural features found in Montana, but at the same time avoiding unnecessary duplication.

2. It must build a *highly integrated* system of natural areas. It is apparent from the classifications developed by the Working Groups that many cells will have to be filled before the system is completed. Therefore, highest priority should be given to areas that fill as large a number of cells as possible. For example, one natural area could conceivably include 10 to 15 cells—four forest cells, three grass and shrubland cells, two aquatic cells, and so on. In some cases this degree of efficiency may not be possible or

desirable, but it is advantageous for setting priorities and should remain as a primary goal.

3. It must reduce conflicts with other land uses to the extent possible. In searching for potential natural areas, lands already reserved should be explored first. If the natural features being sought are unavailable on these

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This area near the Helena National Forest illustrates a mixture of aquatic, zoologic, geologic, forest, and grass and shrubland values. Areas with a diversity of features should have top priority in natural area selection.

lands, the search should be extended to other public lands. Private lands should be considered as a last resort. Land exchanges or gifts (perhaps with life-tenancy stipulations) may offer possibilities for establishing natural areas on private lands.

What's Ahead?

The next steps planned for Montana's natural areas are to complete the cell classifications, to develop lists of potential sites suitable for filling the cells, to work with land managers in formally establishing high priority natural areas, to write scientific descriptions of all natural areas, and to catalogue those natural areas available and suitable for scientific and educational use.

We feel this stepwise approach provides a logical framework for establishing a Montana Natural Area System. However, it also illustrates some of the hurdles that need to be crossed. Those involving the technical or scientific knowledge base can likely be crossed without too much difficulty by the dedicated group of Montanans involved in this effort. However, the key item in any natural area program is "formally establishing natural areas." The support needed to cross this formidable hurdle must come from the broad base of public and private land managers—they make the ultimate land-use decisions. Of prime importance is that they understand the natural area concept (that is one goal of this paper), and that they consider natural area status for all pristine sites being evaluated in the land-use planning process. Both the Montana Natural Area Committee and the Natural Areas Advisory Council (see next article) stand ready to assist all managers in these decisions.

To date, only a few natural areas have been formally designated in Montana. We are fortunate that the State has many excellent de facto natural areas from which to make future choices. Few states still have this opportunity—they waited too long. We must not let the recent legislative progress and early grassroots support for a natural area system in Montana lull us into complacency, and hence into delay. Economic growth and population increase are steadily encroaching on many prime areas. Thus it is imperative that we move quickly in establishing the Montana Natural Area System—our opportunities will never be greater than they are now.

Literature Cited

Fenneman, N. M. 1931. Physiography of the western United States. McGraw-Hill. 534 pp.

Kuchler, A. W. 1964. Potential natural vegetation of the conterminous United States. Amer. Geog. Soc. Spec. Publ. 36. 116 pp. and map.

Luther, H. E., and J. Rzoska. 1971. Project Aqua. IBP Handb. 21. Blackwell, Edinburgh. 320 pp.

Perry, E. S. 1962. Montana in the geologic past. Mont. Bur. Mines and Geol. Bull. 26. 78 pp. Map p. 17.

Pfister, Robert D., Bernard L. Kovalchik, Stephen F. Arno, and Richard C. Presby. 1974. Forest habitat types of Montana. USDA Forest Serv. Int. Forest and Range Exp. Stn.—Northern Region Mimeo. Rep. 213 pp.

Sheldon, A. L. 1970. Streams for research. Proc. 19th South. Water Resources and Pollution Control Conf.: 127-131.

Sheldon, A. L. 1972. A quantitative approach to the classification of inland waters. *In* Natural environments—studies in theoretical and applied analysis. J. V. Krutilla (ed.). John Hopkins Press. pp. 205-261.

Society of American Foresters. 1954. Forest cover types of North America. Soc. Amer. Forest., Wash., D.C. 67 pp.

Thornbury, W. D. 1965. Regional geomorphology of the United States. John Wiley and Sons. 609 pp.