Wickenburg, Ariz. By the time she was 12, Ruby was training her horse, Tony, to do tricks. Soon they were performing in rodeos all over Arizona and doing benefit shows for the children in the Phoenix area. After Tony's premature death, Ruby trained another horse, Taffy. Between the ages of 18 and 19, Ruby was queen of the World's Championship Rodeo at Glendale, Ariz., and appeared in the film "Trigger Gold" as the daughter of the Kane family. She was offered a place in Monty Montana's Wild West Show but declined because she was too busy roping. Her friends and teachers were Frank Macias and Everrett Bowman. As a member of the Girl's Rodeo Association, she was the World's Champion Team Roper in 1951, 1952, and 1953, and the World's Champion Ribbon Roper of 1953 and runner-up World's Champion calf roper in 1953 and 1954. Ruby was inducted into the National Cowgirl Hall of Fame in 1982. The Hall of Fame recognizes the spirit, strength, courage and stamina of western women. Miss Gobble is also a quarter-horse breeder and an accomplished guitar player. Her rendition of "Careless Love" could send anyone into stitches.

Between 1954 and 1966, Gretchen acquired full possession of the 11,000 deeded acres. For 20 years Gretchen and Ruby have worked to improve the entire operation. The cattle operation consists of Hereford cows and calves and some pasture yearlings. They are on a strict herd health program with their veterinarian as to pregnancy testing and inoculations. All calves are weighed individually and records kept on calves, cows, and bulls. Any cow or bull that does not produce the quality of animal expected goes to slaughter. The bulls are all top of the line registered Herefords and are health and semen evaluated each spring before going to their specific bunch of cows. Artificial insemination and synchronization has been used with qualified success. The goal in the cattle operation is to wean calves in October that will average over 600 pounds. Bulls are turned in with the cows April 15th and come out June 15th. Ruby and Gretchen are sold on the Savory Grazing Method but have not yet solved all the problems in implementing it on the Chase Ranch. The other operations included in the management picture are improving the irrigation systems, putting in more alfalfa, oats, and trying hay grazer (new forage variety). Last summer they raised enough hay to keep them all year. That was the first time in many years they had not purchased hay.

Being cattle ranchers in New Mexico or anywhere else takes some book-learning, a lot of hard work and a desire for excellence. Gretchen and Ruby have combined these factors with their commitment to the history of the area and their love for the land to have a ranch worthy of its heritage. They have proven themselves to be intelligent, independent women who strive for that intricate balance between man and nature.

Solar Power Used to Deliver Water

David P. Stevens

Some range areas produce good forage but are waterless. This is especially true of the pinyon-juniper type around Grand Junction, Colo.

Many P-J ridges and mesas on the Gibbler Allotment were chained and reseeded during the early 1970's. Lush stands of crested wheatgrass, needle grass, Indian ricegrass, western wheatgrass, and Junegrass now occupy areas that were once covered with pinyon and juniper and had little or no understory vegetation.

The Gibbler Allotment contains 45,500 acres, of which 10 to 12% had been chained, and in order to use the reseeded areas water had to be developed. This water was developed by constructing stock ponds, usually a dam across a drainage to catch the intermittent rainfall or spring snowmelt. In an area of 14- to 16-inch precipitation, rainfall is very intermittent; and so these ponds are not that reliable.

A more reliable source of permanent water was needed in order to use the forage available. Gibbler Spring, located on the edge of the chained area, was the best source of water.

Author is range conservationist with the Bureau of Land Management Grand Junction Resource Area, Grand Junction, Colorado.

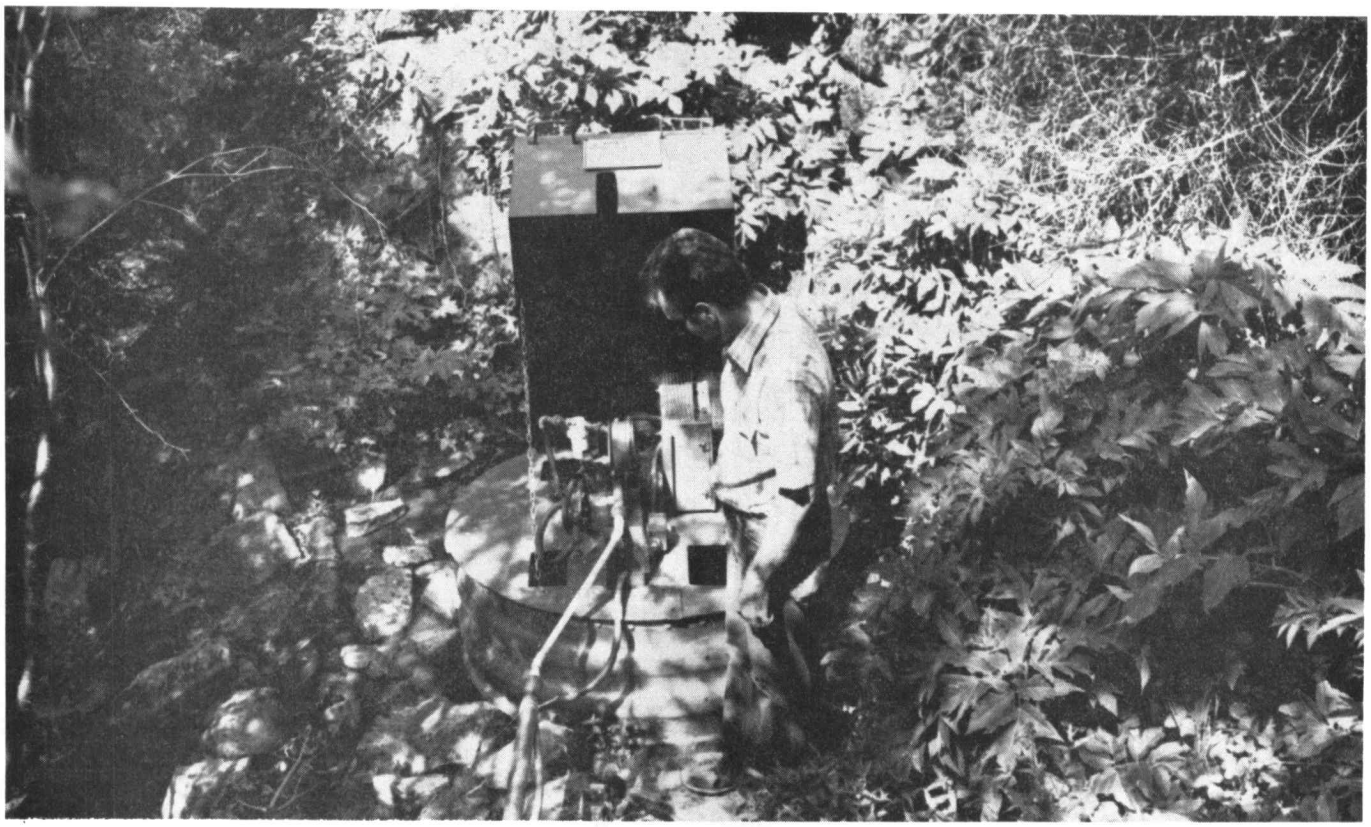
Problems encountered with the use of Gibbler Spring were:

1. The spring is located 10 miles from the nearest electrical source.
2. The spring is 240 feet down a steep canyon face.
3. The spring is next to a wilderness study area which would pose a problem if a gas generator were used, because of noise pollution.
4. Noise from a generator would lead to discovery and possible theft or vandalism.

A solar-powered pump was designed to handle the above-mentioned problems and deliver water from the spring to the top of the canyon. The whole system consists of a sump, solar panels, pump, pipeline, and catchment.

Water Source (Sump)

The seep was dug out to a 5′ × 10′ × 2′ dimension. The hole was lined with Hypalon rubber. A 2-foot section of a 4-foot culvert was used to hold the water. Gravel was packed around the culvert to allow water to filter into the punctured culvert. A 1/2-inch steel plate was fabricated to be used as a cover for the culvert and as a platform for the pump and transformer.



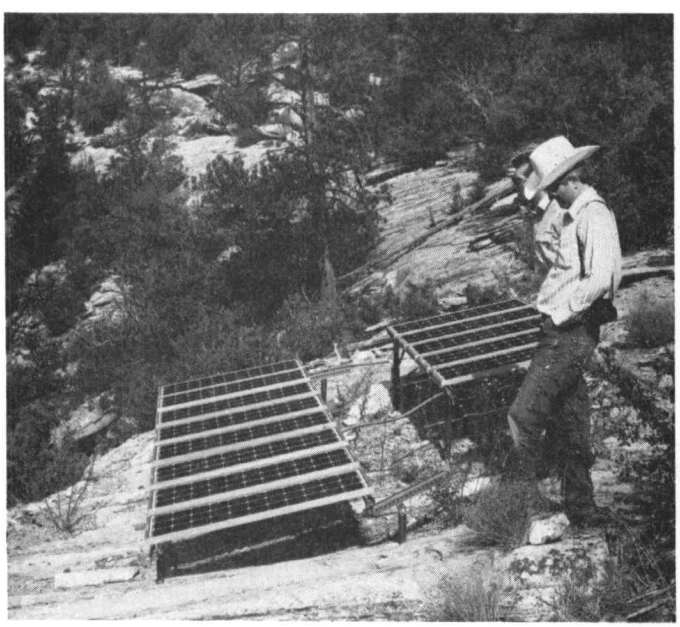
Dave Stevens observing the spring box, transformer and pump at Gibbler Spring.

The Photovoltaic Panels

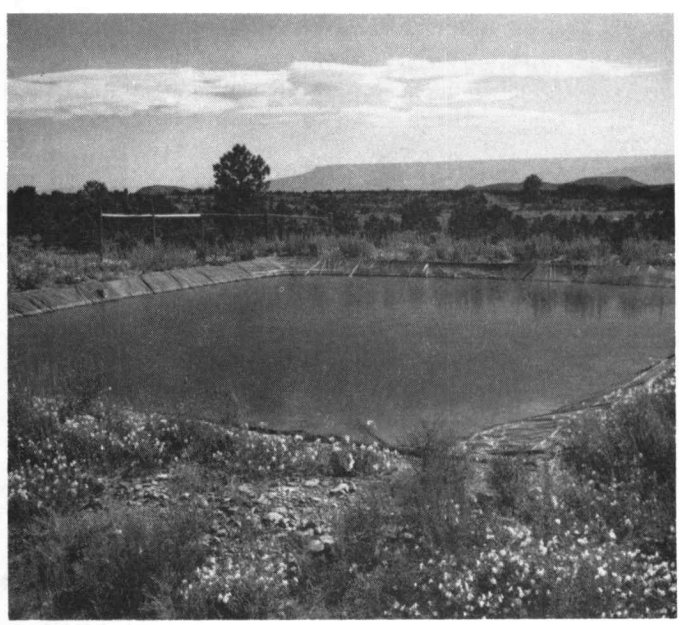
An array of 13 panels was arranged on a metal support structure that was bolted to an exposed sandstone bench, 100 feet below the rim of the canyon and 100 feet above the spring. The panels in place can withstand a 50-psf (pounds per square foot) wind load and 100-mph winds.

Two hundred and forty volts DC current can be produced by the panels. Amperage varies between 0.5 and 4.0 AMPs depending on the cloud cover.

Conduit, carrying the wiring, was laid and fastened along the canyon face down to the pump. The transformer and



George Innis, not shown, CSU Range Science Dept. and Dave Steven, BLM, admiring the solar panel array.



60,000 gallon holding catchment with deer-proof exclosure fence.

power tracker are used to convert solar power into power to run the pump.

Pumping System

Water had to be pumped uphill with a 240-foot vertical head of pressure. A piston pump with approximately 0.55 hp was used. Water was pumped to the top of the rim through 1 1/2-inch galvanized pipe. From the rim to the catchment, 1 1/2-inch plastic pipe was used. The pumping rate was 4 gpm.

Water Storage

A Hypalon, rubber-lined dugout catchment was used to store the water once it was pumped uphill from the spring. The capacity of the catchment is 60,000 gallons. The inlet to the catchment is equipped with a float valve which activates a pressure switch on the pump. When the catchment becomes full, the pressure switch turns the pump off.

At present, five troughs are filled with the catchment. These troughs are scattered along three and one-half miles of pipeline. In the future another three and one-half miles of pipeline will be laid in order to cover the whole chained area. The whole pipeline system will be served from the Gibbler Spring solar pump.

The solar system was chosen for this project and locality because of its dependability, low maintenance costs, and low initial costs. All other types of pumping systems were deemed more expensive due to the inaccessibility of the spring. Vandalism to the solar panels is the biggest concern at present, but so far they have withstood one season of hunting and firewood gathering.

Ranchers Control Leafy Spurge

C.A. Lacey, R.W. Kott, and P.K. Fay

HOW DO YOU STOP a weed that has a 15-foot deep root system and reproduces both by seeds and vegetative buds? These questions are being asked by many Montana ranchers in their battle against leafy spurge (*Euphorbia esula* L.).

Leafy spurge is a deep-rooted perennial that was introduced to North America from Russia about 1827 and has rapidly become a troublesome weed in the north central United States and southern Canada. It is estimated that the weed currently infests 2.4 million acres in North America, with severe infestations in Montana, North Dakota, Nebraska, South Dakota, and Wyoming.

Leafy spurge has invaded about 545,000 acres of range and pastureland in Montana and millions of additional acres of range are threatened. Once the weed is established, it competes with desirable vegetation and reduces grass production by as much as 50%. Since cattle generally avoid grazing in infested areas, carrying capacity can be reduced up to 75% by leafy spurge. This converts to an annual loss of about $4 million dollars to Montana's cattle industry.

Biological Control

Researchers in Canada and the United States are studying the use of insects and pathogens for controlling leafy spurge. Three insects have been released in Montana. The spurge hawkmoth *(Hyles euphorbiae)* was released in 1978 and scientists are now trying to increase the population of this insect. A clear-winged moth, *(Chamaesphecia tenthrediniformis)* was released in 1977, but was unable to become established. A root-boring beetle, *(Oberea erythrocephala)* was released in 1982 and is considered another potential candidate for control of leafy spurge.

Plant pathogens, organisms which produce diseases in plants, also have potential as biological control agents. Research is being conducted to identify and screen pathogens which would help control leafy spurge.

Biological control methods have a long-range potential; however, there are problems. First, selecting, screening, and releasing an agent is slow and costly. It is estimated that control of leafy spurge will involve at least 20 scientist years at a cost of $2 million dollars. Second, even if some agents are effective on leafy spurge, the level of control on the weed may not be adequate.

Chemical Control

Researchers are recommending the use of selected herbicides for leafy spurge control. Tordon is the most effective herbicide currently available. However, in most cases it must be reapplied after 3 years. Banvel and 2,4-D will provide control of the topgrowth, but must be applied annually. Cost of the herbicide and application for three years ranges from $15 to $120 per acre depending on the chemical and rate that is used. Although these herbicides can provide control of leafy spurge, in most cases, complete eradication of the plant is not possible.

Ranchers' Opinions

Many Montana ranchers have been using herbicides for leafy spurge control. However, according to Wilbur Holmes, a retired rancher in Absarokee, there are some problems. "We didn't have Tordon back in 1940, so we used 2,4-D. The problem with leafy spurge is that it will grow right in rocky ground or down along a stream bank. That makes controlling the weed with herbicides very difficult. Even where we could spray spurge, it always came back and we seemed to miss patches when we were spraying. Leo Lesnick, a neighboring rancher, agrees with Wilbur. "I sprayed leafy spurge for over 20 years with 2,4-D and each year the spurge was back," said Leo.

Authors are research assistant, Plant & Soil Science Department; extension sheep specialist, Montana Cooperative Extension specialist; associate professor, Plant & Soil Science Department, Montana State University, Bozeman, respectively.

About the senior author: Celestine Lacey was born and raised on a farm in southern New Mexico and received a B.S. degree from New Mexico State University. She worked for 5 years for the Soil Conservation Service correlating soil survey information with range site data in New Mexico and Utah. Currently she's working on a M.S. degree in agronomy specializing in weed science with a minor in range management at Montana State University.

Goals: Several weed species are becoming a major threat to the productivity of range and pastureland in Montana. These weeds are highly competitive and can reduce desirable forage production and impair the quality of wildlife habitat. Lacey says, "Our goal should be to develop ecological and and economical techniques for controlling weeds on rangelands."—D. Freeman