

# Aerial Photo Exploration for Open Range Water Supplies

Paul J. Krupin

Water—Lifeblood of the West—is commonly referred to as being the most important limiting factor affecting ranching in almost all of the western states. Water development plays a decisive role in attaining optimum utilization of arid and semiarid rangelands. During the development of allotment management plans and grazing schemes, small upland water sources may escape the consideration of ranchers and range managers and water development proceeds in a partially effective and cost inefficient manner. Indeed it is quite difficult to identify and locate small springs and seeps worthy of development in rangelands that are rugged, isolated and sometimes so vast as to make a comprehensive inventory of surface water unattainable on the ground or in the air in a reasonable amount of time and money.

Fortunately, aerial photographs provide one with the opportunity to study relatively large areas of land from a static, elevated perspective. By using an easily applied air photo interpretation procedure, ranchers and range managers can quickly identify and locate potential livestock water supplies that are as yet undeveloped.

The first step is to review the available resource information and make a map showing all known available water sources, constructed developments and areas in need of water. Aerial photos of the selected water scarce areas are then interpreted for streams, springs, seeps, wetlands and riparian zones of any type and size. The locations of all photo-identified potential water sources are transferred directly onto the base map for followup field investigation. High priority sites are then field checked to determine the development potential of the source. The final decision to develop any given water source depends on the quantity of water found, amount of available forage, terrain characteristics, the number of livestock to be watered, type of grazing system and the availability of funds for development of the water system (pipeline and troughs for example).

The actual exploration for surface water with aerial photos is accomplished by simply mapping the location of the deciduous and herbaceous riparian vegetation. In the Rockies these are the "hydrophilic" (water loving) species that grow on nearly every inch of the scarce, wet soil. In the sage grass rangelands one can become quickly proficient at identifying the major vegetation types by taking some aerial photos into the field and practicing for a short time. Natural color and false color infrared imagery of scales between 1:24000 (about 2½ inches to a mile) and 1:12000 (about 5¼ inch to a mile) are ideal for use and are usually available

through local land management agencies.

Deciduous riparian vegetation on natural color imagery is usually lush and bright green in color, occupying the bottoms of small upland valleys and draws. False color infrared imagery is far easier to interpret for water sources because the deciduous riparian vegetation is colored a bright pink or red against the white, tan, brown, or blue of the surrounding bare ground and xeric vegetation. Particularly viable sources of water usually show a distinct linear character, indicating flowing surface water or an abundant source of shallow ground water within the rooting depth of the plants.

Several major benefits can be derived from comprehensively evaluating the aerial distribution of water sources on the range. The water source information can be used to develop water supplies to open up areas that are unsuitable for grazing because of a lack of water. In areas with limited livestock water supplies, water developments can be constructed to improve cattle distribution and forage utilization on the useable rangelands. The hydrogeographic knowledge of available water sources enables land managers to more effectively prioritize water development activities and expenditures for range improvement.

The maps of surface water sources and riparian vegetation also provide the biologist with a way to evaluate and interpret riparian wildlife and habitat conditions. Selected water sources can be developed in a manner that improves the quality of the sources for wildlife, while providing livestock with a supply of drinking water. In some cases, the improved cattle distribution on rangeland may help increase water quality by reducing the damaging overutilization of valley bottoms and stream corridors with valuable aquatic and fisheries resources.

In especially water scarce areas, photo mapped riparian zones may point out where vegetative manipulation, either manual, chemical or mechanical, could be used to reduce evapotranspiration losses and increase available water yields. At the driest sites, the photo interpretation may yield information that can be used to determine the necessity for and type of ground water development (i.e. horizontal drilling into a seep) that must be performed to acquire a producing source of water.

Aerial photo exploration for water can have very significant benefits for rangeland users all over the West. While the procedure is best applied to arid and semiarid regions, upper montane, subalpine and alpine areas in semihumid regimes can also be interpreted quite effectively. This is a simple technique that ranchers and range managers can utilize to improve the rangeland. With a concentrated effort, large areas of land can be covered in a matter of days. The short and long term benefits to be derived from discovering and developing additional livestock water supplies make this a very worthwhile effort.

The author is District Hydrologist, Bureau of Land Management, Salmon, Idaho 83467.

*Editor's Note:* Range users and managers should be aware of the technique and the availability of suitable imagery in their own area. This short article will provide them with the idea and a means to alleviate the problem of water scarcity in the arid West.