Among Yellowstone’s wild rose, sage and pines, other MSU researchers conduct studies on park wildlife, microbes, plants, fish, climate and land use.

Yellowstone wildlife

Scott Greel, ecology professor, monitors elk-wolf interactions and trends in the northwest part of the Yellowstone ecosystem. He tracks elk as they move in and out of the park, and has found that bull elk care more about food than the predator wolves during the winter as the elk struggle to replace up to 100 pounds lost during fall rut. The bull elk are paying for their lack of wariness with their lives.

Robert Garrott, ecology professor, also examines predator-prey dynamics in a wolf-ungulate (elk) relationship. Additionally, he is studying bison demography in relation to roads that are groomed for winter snowmobilers’ travel.

Marcel Huijser, Western Transportation Institute researcher, is testing an animal warning system for motorists who drive along Highway 191 in Yellowstone National Park. The animal detection system detects large animals as they approach the road on a one-mile stretch of U.S. 191, 50 miles south of Belgrade. When a large animal like an elk breaks the high-frequency radio beam, warning signs flash.

Carl Wambolt, animal and range sciences, studies shrub ecology and management and the role of shrubs in range ecosystems. He examines the shrub-ungulate relationship in the Northern Yellowstone winter range.

Yellowstone microbes

Keith Cooksey, microbiology professor, searches the hot springs of Yellowstone National Park for microbes that exist in extremely hot environments. The microbes could be used to help clean CO2 emissions from smokestacks since the organisms feed on CO2 from the hot springs.

Gill Geesey, microbiology, examines growth rates of bacteria in subsurface environments, specifically of bacteria in hydrothermal vents at the bottom of Mary Bey of Yellowstone Lake. He scuba dives to the site to place artificial surfaces for these bacteria to colonize at the orifice of vents that emit hydrogen sulfide, the primary energy source for this group of bacteria. He returns to the vents at intervals and retrieves the surfaces, preserves the bacteria that have attached, and examines them under the microscope at MSU. He hypothesizes that the growth rates are dependent upon the concentrations of hydrogen sulfide; he tests this at different vents.

Timothy McDermott, environmental microbiologist, examines microbial communities inhabiting thermal springs. These organisms derive their energy from inorganic nutrients such as iron, hydrogen, sulfide and arsenite.

Kathy Sheehan, microbiology, compiled a guide to the microbes of Yellowstone National Park, “Seen and Unseen: Discovering the Microbes of Yellowstone,” published by The Globe Pequot Press. The highly illustrated book explains some of the many microorganisms that inhabit the park and how they are important in Yellowstone’s ecology.

David Ward, land resources and environmental sciences, is researching microbial diversity, ecology and evolution. In Yellowstone, he studies molecular analysis of composition, structure and function of hot spring microbial mat communities used as natural models.

Mark Young, virologist/microbiologist and co-director of the Thermal Biology Institute at MSU, is researching viruses found in Yellowstone's acidic (pH <3.0) high-temperature (>80°C) environments to understand biochemical adaptations to life at high temperatures and to answer questions of the evolution of Earth's early life.

Yellowstone plants

Lisa Rawl, land resources and environmental sciences, is interested in the spatial distribution and dynamics of non-native plant populations and how to detect, map and model such populations. In the northern range of Yellowstone, she has developed a sampling methodology to survey for non-native plants within natural ecosystems. These data are used to make predictive maps of plant occurrence over the whole northern range.

Richard Stout, plant sciences, studies hot springs panic grass, common in geyser basins throughout Yellowstone. The main goal of the research is to uncover the biological processes behind the plant’s remarkable ability to tolerate hot, acidic soils in Yellowstone.

Yellowstone fish

Billie Kerans, ecology professor, explores the ecology of aquatic invasive species (New Zealand mud snail, Potamopyrgus antipodarum; salmonid whirling disease parasite, Myxobolus cerebralis) in aquatic ecosystems of the park.

Joseph Shaw, electrical computer engineering professor, has flown over Yellowstone Lake to count non-native lake trout using lidar, laser radar, to detect the numbers of fish and areas they are most prevalent.

Yellowstone climate and land use

Lisa Graumlich, Big Sky Institute director, seeks to understand the interaction between climate variability and ecosystem processes, especially fire. She uses tree-ring records to reconstruct the history of drought and fire over the last 300 to 1,000 yrs. The records reveal the importance of long-term (>10 year) dry and wet periods in shaping the forest landscape of the Greater Yellowstone Ecosystem.

Andy Hansen, ecology professor, is hoping to establish standards for assessing the current and long-term ecological condition of park resources. A goal is to develop protocols for monitoring of ecosystem components that function as indicators, or “vital signs,” of ecosystem health. Land use activities surrounding park borders can significantly influence the status of ecological condition and functioning within parks.