Appendix F

An Informal Public–Private Partnership in Service to Yellowstone Natural Resources

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The collaborative relationship between Diversa Corporation and Yellowstone National Park was developed under a Cooperative Research and Development Agreement (CRADA). An informal relationship survived the suspension of that CRADA. Diversa scientists provided two services to Yellowstone through this informal relationship—genetic analyses of the Yellowstone wolf population and of the microbes associated with a hydrothermal geologic feature.

In the late 1990s, Yellowstone National Park entered into a benefits-sharing agreement with Diversa Corporation (see Chapter One, 1.8). Despite the suspension of the Yellowstone–Diversa CRADA by a federal court in 2000, the collaborative research relationship developed by Yellowstone and Diversa during CRADA negotiations has remained somewhat intact.

When Yellowstone recognized a need for genomic (DNA) expertise to solve two separate resource management problems, it turned first to its former CRADA partner, Diversa. Diversa was well positioned to assist Yellowstone with two projects that would have been impossible for park employees to accomplish and prohibitively expensive to outsource. For Diversa, these problems were neither difficult nor expensive. The collaborative relationship between this private corporation and a national park encouraged the corporation to materially assist the park at little burden to itself.

The natural resource studies undertaken by Diversa for Yellowstone concerned wolves and hydrothermal geology, two seemingly unrelated disciplines. Starting in 1995, wolves were restored to Yellowstone National Park after more than half a century of absence. Thirty-two wolves were relocated to Yellowstone from Canada. Growing a much larger population from so few founders had the potential to result in genetic problems, and resource managers worried over this disturbing future possibility. Yellowstone needed the DNA "fingerprints" of the park's wolves to prepare to assess the health of the park's wolf population.

Park managers had saved blood samples from all wolves captured in the course of research, and Diversa offered to extract DNA and do the genetic fingerprinting tasks. The discoveries that were confirmed by this analysis were unprecedented. For instance, managers could immediately determine the origin of wolves killed on nearby roads or by illegal means, because DNA tests identified whether each wolf was part of the Yellowstone reintroduced population. Biologists were most pleased, however, because for the first time they were able to confirm the parentage of each wolf. A century from now, they will be able to track inbreeding depression or other genetic maladies, if they occur.

Yellowstone is also a fertile area for the study of geology, because it sits atop one of the world's largest active volcanoes. In 1996, a research team exploring the depths of Yellowstone Lake discovered a large rock formation built by mineral-rich hot water entering the lake from below. When the park allowed part of this novel and rare geological specimen to be retrieved for scientific study, it required that all possible data be extracted, including a description of the microbes living in it. After two years, research on the physical and chemical nature of the specimen was progressing, but study of the biological element was not. When the park discovered this problem, managers hoped that there might still be enough microorganismal DNA on the specimen to describe the microbes that lived on and helped form the rock specimen.

Using its database on world biodiversity, Diversa was able to characterize many species of microorganisms living in the specimen, including six new species of Archaea and four new species of Bacteria. The gasses bubbling up into the lake from hot springs underneath were expected to nourish a thriving community of microbes, but the identification of 10 species new to science was remarkable.

These two examples could only have occurred because of the working collaboration between park scientists and private scientists. This level of collaboration was not routine; it had been fostered and required by the Yellowstone–Diversa CRADA. The examples also demonstrate that tasks that are hard for the National Park Service to accomplish on its own, because of either the expense or the expertise they require, are sometimes relatively easy for a biotechnology company to achieve.