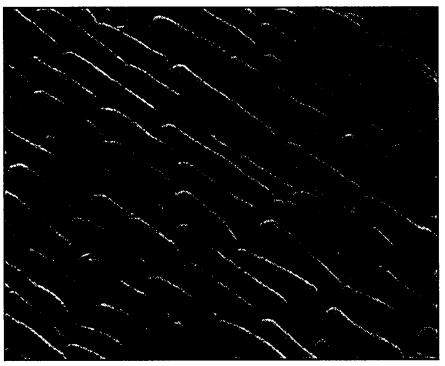

Deadly object. Anthrax spores, shielded by a tough shell, can survive for years in soil before germinating.

"We encountered challenges substantially beyond what we anticipated." El-Hibri said it was a shock, for example, when DOD denied a cost-plus-profit contract and demanded a fixed-price agreement.

Pentagon negotiators won a short-term bargain when BioPort agreed to sell each dose for $2.26 to $4.36. But that price left the company with no income to pay for the necessary renovations, a Defense auditor said. In response to emergency pleadings from BioPort, DOD raised the contract price to more than $10 per dose last year and gave BioPort an advance of $18.7 million, new equipment, and regulatory consulting help. Even so, federal auditors testified last week, BioPort still can't afford new capital investments.

No stock answers

Two problems stand in the way of getting BioPort's vaccine to the troops: FDA has not approved BioPort's supplemental license to operate the renovated production line, and the company can no longer produce valid test results for preexisting vaccine stocks. El-Hibri testified last week that about 800,000 doses of anthrax vaccine remain in the stockpile. Some of these quarantined reserves have passed sterility and purity tests, but not a test for potency. BioPort's chief scientific officer, Robert Myers, says the problem came to his attention in June, when he learned that graduated dilutions of vaccine given to guinea pigs were not yielding corresponding levels of protection against anthrax as they should. The company has assembled an expert panel to figure out what went wrong. No one can say when, or whether, the stocks will be released.

Nor can anyone predict when, or if, the production line will begin running. U.S. military officials had counted on getting it going before the end of the year, a schedule that FDA official Kathryn Zoon called "optimistic." She estimated it could take "6 to 12 months" to clear outstanding issues.

Members of Congress asked whether people with fewer than six shots would need to start over again. Zoon said FDA has no data on how delays might affect the vaccine's efficacy, but that FDA "would have no objection" if DOD decides to postpone some shots. Zoon added that FDA has seen no significant side effects of the anthrax vaccine. FDA's voluntary reporting system has registered only 1404 adverse reactions so far for nearly 2 million shots. This ratio is "toward the low end" of the spectrum, according to Zoon.

The Pentagon hopes to ease the production problem by finding a second vaccine supplier that would share BioPort's exclusive license as well as create a dedicated government-owned vaccine production facility, an idea the department rejected several years ago. DOD is also gearing up efforts to develop a new-generation vaccine based on a genetically engineered recombinant anthrax protein.

None of these initiatives will ease the anthrax vaccine supply crunch this fall, however. "These are not immediate fixes," de Leon confessed. Still, the changes prompted by this fiasco could give vaccinemakers the tools they need the next time the Pentagon attempts to protect troops against a potential bioweapon.

–ELIOT MARSHALL

CONSERVATION BIOLOGY

When Protecting One Species Hurts Another

Plans to protect the grizzly bear in Montana are not helping endangered fish there. Biologists are grappling with how best to save both

SWAN VALLEY, MONTANA—If grizzly bears dream, they might dream of Swan Valley. Streams brocade the valley floor, rich with fish and surrounded by greenery: horsetail, cow parsnip, and berry-bearing shrubs. Together, they provide a cornucopia of foods that bears crave when they descend the mountains in the spring. As if to prove the bounty of the valley, Dave Mattson digs a slender green shoot of sweet cicely from the earth, peels back the outer layer of its root, and chews the exposed inner root. "Bear food," he says.

The valley is also home to at least a dozen species of native fish, including the threatened bull trout and the declining westslope cutthroat trout. But rarely, if ever, have the conservation needs of both grizzly and fish been considered together.

Mattson, a grizzly biologist with the U.S. Geological Survey, and Chris Frissell, a fish biologist with the University of Montana's Flathead Lake Biological Station, have set out to change that. The two biologists recently completed a singular study of western Montana, including the Swan Valley, in which they compared the habitat needed to conserve both grizzly bears and fish. In particular, they wanted to see whether providing habitat for one wide-ranging species would protect the other—the so-called umbrella effect. This study, reported at last month's meeting of the Society for Conservation Biology,* came up with a sobering conclusion: There is limited overlap between prime grizzly habitat and that of threatened fish in the region, and grizzly conservation programs in Swan Valley may even be hurting the fish.

Mattson and Frissell's work—the first to look specifically at the combined needs of a large terrestrial species and several aquatic species—reflects an emerging approach to large-scale conservation that spurns a rigid focus on a single species. It "is a huge step forward," says J. Michael Scott, a conservation biologist at the University of Idaho, Moscow. "It's an extremely useful tool for ranking areas for conservation."

To calculate the overlap between ideal areas for both bear and fish, Mattson and Frissell independently ranked habitat quality for both species using preexisting information on species distributions, introduced species (especially fish), habitat productivity, human population density, and road den-

Two for one? Frissell (left) and Mattson compared ideal habitat for grizzlies and fish in Montana and found limited overlap.

* 9 to 11 June, Missoula, Montana.

CREDITS: (TOP TO BOTTOM) PHOTO RESEARCHERS; B. WUETHRICH

Feds Team Up With a Company to Protect 17 Threatened Fish Species

Although threatened fish may not be well served by the grizzly conservation efforts in Swan Valley (see main text), other plans are afoot to protect native species, especially in Elk Creek, known as the best bull trout spawning stream in the West. For several years now, road runoff and erosion have choked the creek with sediment, raising fears of even further decline in this endangered species. The problem stems in part from the operations of Plum Creek Timber Co., which owns much of Swan Valley and surrounding land.

Now, in an effort to mitigate its harmful effects and avert regulatory action, Plum Creek has designed a Native Fish Habitat Conservation Plan that would cover not only the Swan Valley but also 690,000 hectares in Montana, Idaho, and Washington. The company is the only large private landowner in the Northern Rockies working with the federal government to conserve native fish, says Ted Koch, a wildlife biologist with the U.S. Fish and Wildlife Service (FWS).

The proposal is one of the biggest multispecies Habitat Conservation Plans yet considered by the FWS. It covers 17 fish species, eight of which, including the recently listed bull trout, are on the Endangered Species List. The 30-year plan would allow Plum Creek to "take" some endangered species in the course of its timber harvest, while also committing the company to habitat conservation. The plan's biological goals include reducing the impacts of roads on fish by 50% across the project area, lowering the water temperature by 1°C to make it more fish friendly, and preventing roads from blocking the movement of fish.

The FWS is now weighing whether the plan is likely to be effective enough to warrant the regulatory protection that Plum Creek would receive in exchange. That issue remains controversial. Some biologists, including Chris Frissell of the University of Montana, Polson, argue that at best the plan will maintain the status quo but fail to aid species recovery. Others say the plan is too general to evaluate its impacts on a watershed basis, where they really count. "Based on the plan, we can't say what they're going to do where, so we can't predict what benefit it will be to fish," explains Mary Scurlock, senior policy analyst for the Pacific Rivers Council, a nonprofit conservation organization. The council, which conducted a scientific review of the plan, also calls the plan's assumption that many of the other 17 fish species will benefit if bull trout habitat is protected a scientifically unjustifiable "leap of faith."

Koch, the FWS's project director for the plan, says the service will issue a final decision in October.

–B.W.

sity. Roads are the single most important threat to both grizzly bear and fish habitat: They cause erosion, alter surface and groundwater flows, funnel sediment and chemical pollutants into rivers, and bring people into bear habitat. Mattson and Frissell then overlaid the results on maps to determine how much territory the furry and finned creatures shared.

The two biologists found that across their 67,000-km^2 study area, the very best grizzly bear habitat, which mostly falls within designated wilderness areas or national parks, encompasses only 12% of high-quality fish habitat—an amount insufficient to sustain viable populations of many fish. "It would only maintain a handful of isolated and relic fish populations" in a vulnerable state, Frissell says. Conversely, conserving broad areas of fish habitat would fail to provide an umbrella for the grizzly.

After modeling western Montana as a whole, Frissell focused on Swan Valley, the site of intensive grizzly bear conservation efforts, to see whether these real-world efforts are also protecting fish under their umbrella. To do so, he checked to see if prime aquatic habitat is encompassed in grizzly "linkage zones"—conservation areas that connect the Swan Mountains on the east to the Mission Mountains to the west. Bears live in both ranges and rely on the valley for food and for passage during male mating forays between the two populations. The valley's waters also provide one of the last strongholds for the threatened bull trout, a fish that can migrate hundreds of kilometers upstream to spawn.

The linkage zones were set up 5 years ago by private and government landowners. In the zones, landowners are required to maintain at least 40% of tree cover and to restrict human activity. In particular, owners manage road use in the linkage zones, especially during the spring, when the bears lumber down from the mountains to feast on truffles and fish.

Lunch. The "linkage zones" set up in Swan Valley to protect grizzlies don't encompass the best streams for bull trout and other fish, which may make it hard for the bears to find a good meal.

CREDIT: J. MCDONALD/CORBIS

To Frissell's dismay, he found that five of the six key bull trout spawning streams fall outside the zones. In fact, Frissell believes that the linkage zones may even be directing human activity into sensitive fish habitat, hastening the demise of many fish populations. "The grizzly bear agreement was for grizzly bears," concedes Lorin Hicks, lead biologist for the Plum Creek Timber Co., a key party to the Swan Valley conservation plan.

Mattson and Frissell's study comes at a good time, because the linkage zones are due for review this year. "If we can provide strong protection to bull trout by moving some of these linkage zones around and still protect the bears, we may do that," says Anne Vandehey, a biologist with the U.S. Fish and Wildlife Service who has been involved with the Swan Valley conservation plan. Meanwhile, a separate fish conservation plan is in the works (see sidebar).

Although he's in favor of protecting the bull trout, Frissell is concerned about an ever-moving strategy, in which new species are added as knowledge accumulates. "It's unlikely that society is going to tolerate too many trips to the well for allocating land to conservation needs," says Frissell, "so we need to approach conservation in an integrated way up front."

–BERNICE WUETHRICH

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