

Sept. 29, 2000

## Divers get lessons in mastering the deep

By Andy Fell

When California Department of Fish and Game officials decided its divers needed extra training in high altitude diving, they called Henry Fastenau.

Fastenau, the UC Davis diving officer based at the [Bodega Marine Laboratory](#), teaches qualified divers how to work in difficult and extreme conditions.

"He's great at walking the line between safety and what scientists need to do for their research," says Susan Anderson, a faculty member at the Bodega laboratory.

Fastenau walks the line at Bodega Bay and at Lake Tahoe, where he conducts classes in a setting made for diving. Last month, he spent two days there teaching divers about high-altitude diving.

"Studying steelhead and salmon, we sometimes need to dive in deep pools in rivers, mountain lakes," says fisheries biologist Doug Albin. Because of the lower air pressure at the surface, high-altitude dives pose a greater risk of decompression sickness. "At high altitude, three or four hours in even 10 or 12 feet of water can be a problem," says Joe Johnson of [Fish and Game](#).

Fastenau has been diving officer at the Bodega laboratory since 1993, and all divers working at UC Davis require his certification before officially pulling on a wetsuit. There are 54 certified divers at UC Davis, about half of whom are active.

Fastenau began diving in the San Diego area in the early 1960s. He was hired as a diver by the California Institute of Technology in 1972, and has been a scientific diver ever since, with spells as a commercial diver and fisherman. In 1983, he moved to Bodega Bay, and six years later he became a scuba instructor.



*Ryan O'Donnell, environmental biology major, walks the beach at Lake Tahoe following his diving lesson.*

Photo by Jim Grant

UC Davis offers courses in basic scuba diving, as well as diver rescue and scientific-diving techniques; all but the basic course is taught by Fastenau. The scientific-diving course teaches techniques, such as low-visibility diving, night diving and deep diving. Students also learn how to carry out research tasks in the water, like data collection, species identification and counting plants and animals.

In addition, Fastenau organizes workshops on topics such as high-altitude diving, blue-water diving or working in coastal surge zones. These provide extra training for divers from UC Davis, other UC campuses and agencies like the Department of Fish and Game.

The UC Davis training is recognized by the National Association of Underwater Instructors, and accredited by the American Association of Underwater Scientists, an association of 85 universities, institutes and other organizations.

Diving in mountain lakes and rivers poses special problems, Fastenau says. Because of lower atmospheric pressure, dives at high altitudes are equivalent to deeper dives at sea level. In Lake Tahoe, "I went today to 60 feet; that would be the equivalent of 80 feet in the ocean," he says.

As a diver breathes air under pressure, nitrogen gas dissolves into the bloodstream. The deeper the dive, the more nitrogen dissolves. Divers call this "nitrogen loading." When the diver returns to the surface, this gas comes out again; divers call it "off gassing."

For safety, divers need to balance nitrogen loading and off-gassing, Fastenau says. Divers rely on tables that tell them how deep they can dive, how long they can stay at that depth and how slowly they should come up. After returning to the surface, divers need to wait for the excess gas to leave their bodies. The amount of time spent off-gassing at the surface determines how deep and how long their next dive can be.

The tables now most commonly used for mountain diving were developed and tested at Lake Tahoe by UC Davis scientists Dick Bell and Reid Borgwardt in 1977.

Another technique for altitude diving is to use a special gas mixture, called nitrox. Nitrox contains more oxygen and less nitrogen than air, so less nitrogen dissolves in the blood during a dive. For calculating decompression, this reduces the effective depth.

This increases the time available for a diver to work, from 40 minutes to 60 minutes, he said. The Bodega laboratory was the first research facility on the West Coast equipped to use nitrox, and Fastenau was one of the first instructors in California licensed to train divers in its use.

---

[TOP OF PAGE](#)

[PREV PAGE](#)

[NEXT PAGE](#)

[CONTENTS](#)

---

*Dateline UC Davis is the faculty and staff newspaper for the University of California, Davis.*