

## Scientific Diving Injuries in Southeast Alaska

### Marc Pritchett

*Commercial Fisheries, Alaska Department of Fish and Game,  
P.O. Box 240020, Douglas, AK 99821, 907-465-4244 (tel.),  
907-465-4944 (fax), marc\_pritchett@fishgame.state.ak.us*

Scientific diving records for the Alaska Department of Fish and Game Division of Commercial Fisheries in southeast Alaska were reviewed and compared to the number of documented diving-related injuries. For the 1990 through 2000 dive survey seasons, over 10,933<sup>1</sup> scientific dives were performed, ranging from 266 dives in 1990 to over 1,943 dives in 2000 (Figure 1).

As many as 18 divers have participated during a single survey season, though typically only six divers participate per specific project survey trip. The average number of dives per diver per season has steadily increased each year (Table 1).

Air was used as the breathing gas for 6,041 (55%) dives and 32% nitrox for 4,892 (45%) dives. Maximum depth for all dives was no greater than 22.5 m (70 fsw [feet seawater]) with an average dive time of approximately 20 minutes per dive. Typical survey schedules and protocols require multiple reverse-profile (shallow to deep) dives per day for periods often lasting two or more weeks. During the early 1990s, divers averaged three dives per day but by 1997 through 2000 were averaging six dives per day.

Although most training agencies discourage the type of repetitive dive profile described above, relatively few dive-related incidents have been encountered. A physician was required for four diving-related injuries, including one case of DCS (decompression sickness), from 1990 through 2000 (Table 2).

The DCS injury was considered an "undeserved hit" following an "innocuous" (hyperbaric physician's terminology) dive profile and was completely resolved following recompression treatment. The remaining three injuries are considered diver error and could have been prevented by the diver. No permanent damage remains from any of the injuries. The one

<sup>1</sup> Total does not include geoduck show plots, red urchin tagging, cucumber sampling, cucumber/urchin/abalone genetics, herring calibration samples, or temperature recorder placement.

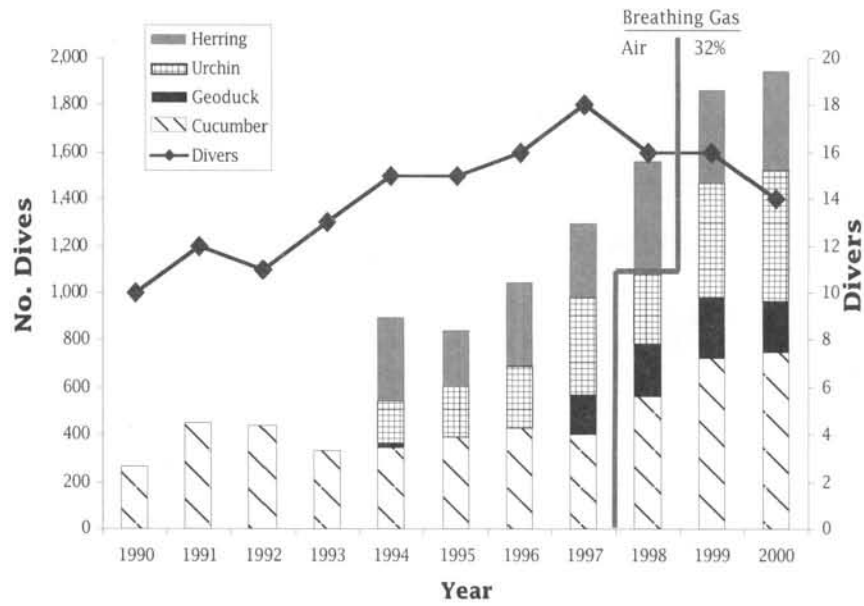


Figure 1. Number of scientific dives performed from 1990 through 2000 in Southeast Alaska, by project, by dive season, by number of divers available per season, and by breathing gas used.

Table 1. Number of scientific divers available per survey season and the number of dives performed per diver.

Year	Divers	Dives per diver per season	
		Avg.	Min / Max
1990	10	27	2 / 54
1991	12	38	9 / 94
1992	11	40	13 / 99
1993	13	26	6 / 58
1994	15	60	9 / 162
1995	15	56	10 / 159
1996	16	65	18 / 129
1997	18	72	6 / 187
1998	16	98	16 / 252
1999	16	117	3 / 294
2000	14	139	6 / 358

**Table 2. Dive-related injuries requiring treatment from 1990 through 2000.**

Year	Injury
1992	"Raccoon eyes" (mask too tight)
1994	Ruptured ear drum
1999	DCS (Type I, pain wrist/elbow)
2000	Reverse squeeze (diving congested)

DCS injury computes to a 0.0091% accident rate for recorded dives between 1990 and 2000, and 0.020% for 32% nitrox.

Concern for the type of dive profile and number of dives scheduled prompted the project leaders to begin using nitrox (32%) exclusively in the spring of 1998. Currently it is not expected that the number of dives completed each season will significantly increase nor will the season's dive schedule decrease in the foreseeable future. The one case of DCS cannot be explained from the individual's dive profile (all dives and ascent rates were well within accepted decompression limits). The seasonal increase in the number of dives per day and the increase in survey trip length may have contributed. The recommendation to increase department divers' margin of safety will be to begin using a 36% oxygen mixture. The project's standard dive profile methodologies allow the use of 36% nitrox and remain within the department's 1.4 partial pressure O<sub>2</sub> limit.