Catastrophes and Conservation: Lessons from Sea Otters and the *Exxon Valdez*

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CATASTROPHES, SUDDEN AND WIDESPREAD DISASTERS, CAN either occur naturally or be caused by human beings. When human-caused, these events elicit feelings of shock and anger, often leading to costly litigation over personal loss and environmental damage. Perpetrators of catastrophes often spend vast sums of money ostensibly to prevent or undo the damage, and such expenditures are encouraged by law and public sentiment. It seems that people want to see the guilty party pay for environmental damage, the assumption implicitly being that funds expended result in harm prevented or undone. But is this assumption true? In the following commentary, I consider a recent and well-known case—the effort to save sea otters after the *Exxon Valdez* oil spill. Despite immense expenditures, the emerging facts lead to two conclusions: population losses were poorly documented, and few animals were saved. These findings cast doubt on our ability to protect sea otters from future spills and lead to troubling questions about how to recognize and document the effects of catastrophic events, and, ultimately, the utility of highly visible and expensive efforts to save wildlife from perceived environmental catastrophes.

The Exxon Valdez spill. On 24 March 1989, the *Exxon Valdez* ran aground on Bligh Reef in northeastern Prince William Sound, spilling more than 10 million gallons of crude oil (*1*). Catastrophic losses were expected and a monumental effort was made to save sea otters (*2*). The costs were high, but what were the benefits? Specifically, how many otters were killed, how many were saved, and how might a different course of action have improved these figures?

Effects of the Exxon Valdez spill on sea otters. The *Exxon Valdez* spill spread over a linear distance of more than 700 kilometers and soiled an estimated 5300 kilometers of shoreline (*3*). While cleaning up and capturing oiled wildlife for rehabilitation, 878 sea otter carcasses were recovered—a minimal estimate of loss. However, many animals killed by the spill undoubtedly were not found. Losses have been estimated from pre- and post-spill surveys, although in my view these surveys shed little light on the population-level effect, mainly because the size and distribution of the population just prior to the spill is poorly known. This is because a comprehensive survey of Prince William Sound and adjacent waters was not done immediately after the spill but before oil dispersed into southwestern Prince William Sound and the northern Gulf of Alaska. Thus, although the *Exxon Valdez* spill undoubtedly killed many sea otters and may have reduced populations substantially, available data lack the power to demonstrate population changes.

Rescue and rehabilitation of oiled sea otters. In total, 357 sea otters were captured and delivered to rehabilitation facilities (*2, 4*). Of these, 123 died in captivity. Thirty-seven of the 234 survivors were judged unsuitable for return to the wild and were transferred to aquaria and other permanent holding facilities; 25 of these animals were still alive 10 months later. The remaining 197 survivors were released by August 1989, 45 of them with surgically implanted radios. Twenty-two of the instrumented animals were dead (11) or missing (11) the following spring, thus indicating relatively low post-release survival of the captured and treated animals (*5*).

At best, 222 sea otters (the 197 released and 25 living in captivity) were captured and rehabilitated. This represents about 18% of the minimal number contaminated (878 found dead in the field and 357 brought to the rehabilitation facility). However, the percentage of contaminated otters that were successfully rehabilitated was lower than this. For one, many contaminated sea otters probably were never found. Available data suggest that only about one in five acute deaths were recovered (*4*). Second, some otters captured for rehabilitation were unoiled, and others were so lightly oiled that they may have fared better if left in nature to their own devices (*6*). About 70% of the animals brought to the rehabilitation facilities were determined to be uncontaminated (61), lightly oiled (123), or of unknown status (68) (*7*). Finally, rescue efforts probably caused some mortality in and of themselves because otherwise healthy captive sea otters suffer a 5 to 10% stress-induced mortality rate under the best of circumstances (*4, 8*).

Cost of capture and rehabilitation. Capture and rehabilitation costs for sea otters alone was $18.3 million (*9*). Assuming that 222 otters were saved (the maximum possible), costs exceeded $80,000 per animal.

The *Exxon Valdez* spill is broadly perceived as an environmental catastrophe. However, expected catastrophic declines in the region's sea otter population cannot be demonstrated, not because they did not occur but because the necessary information is lacking. Furthermore, efforts to rehabilitate oiled sea otters following the spill were extremely expensive and ineffective. Some improvements are possible with better planning. However, post-spill capture and rehabilitation probably cannot be used to substantially reduce sea otter losses from future spills, and the use of such measures to conserve populations is unrealistic.

How then should we prepare for and respond to environmental catastrophes of this kind? The *Exxon Valdez* experience suggests several points of possible general application. First, the effects must be properly documented, especially at the levels of populations, communities, and ecosystems. Such documentation is necessary if we are to know that a catastrophe was indeed a catastrophe. By no means is this clear for sea otters and the *Exxon Valdez*. Second, it is important to evaluate the need for and effectiveness of intervention on behalf of wildlife. If a species or population is not threatened with decimation or extinction by the event, and if methods are not available to protect or rehabilitate affected wildlife, should the time, money, and anguish be put forth to save a few individuals? Finally, in preparing for future catastrophes, post-event mitigation should be used only as a line of last resort. Planning of this kind tends to lull the public and policy-makers into a false sense of readiness. By far the more effective strategies are to reduce risks and to enhance threatened species or populations in anticipation of potential catastrophic loss.

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REFERENCES

1. K. Bayha and J. Kormendy, Eds., *U.S. Fish Wildl. Serv. Biol. Rep.* **90** (no. 12) (1990).
2. T. M. Williams and R. W. Davis, Eds., *Sea Otter Rehabilitation Program: 1989 Exxon Valdez Oil Spill* (International Wildlife Research, 1990).
3. C. R. Sullivan, *Fisheries* **15**, 1 (1990).
4. U.S. Fish and Wildlife Service, Anchorage, Alaska, unpublished data.
5. C. W. Monnett *et al.*, in (*1*).
6. J. Ames, in (*1*), and G. R. VanBlaricom, in (*1*), present further discussion and opposing views on this issue.
7. T. M. Williams *et al.*, in (*2*).
8. K. B. Schneider, personal communication.
9. R. W. Davis, in (*2*).