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THE EFFECT OF THE *EXXON VALDEZ* OIL SPILL ON SHORT-TAILED SHEARWATERS

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Each year millions of short-tailed shearwaters, *Puffinus tenuirostris* arrive along the Alaskan coastline during their annual 15,000 km migratory journey from Australia.

They join 85 other species of seabirds, which makes this region one of the richest seabird assemblies in the world. As is now ecological history the birds and other wildlife were greeted by the huge oil spill of 24 March 1989 from the oil tanker *Exxon Valdez* in Prince William Sound, Gulf of Alaska. The tanker was headed for Long Beach, California, carrying a full load of 126 million barrels. The total spillage was 11.2 million gallons which compares with the *Torrey Canyon* spill of nearly 42 million gallons off England in 1967 and the *Amoco Cadiz* spill of 68 million gallons off France in 1978.

The effects on the wildlife are now known to have been devastating and it is timely to speculate on how the short-tailed shearwater could be affected.

THE OIL SPILL

The *Exxon Valdez* ran aground under the clear skies, in calm seas and in a deep water sound (900-1600 feet)—all conditions considered safe for maritime travel. The morning after the spill the oil covered an area of 32 square miles. By Monday morning 27 March strong winds had shaped the oil into a rectangular slick about half a mile by 40 miles and the North Pacific Current was moving it in a southwesterly direction. Three weeks later the oil spill covered approximately 3,000 square miles; near the end of April the oil was heading towards Kodiak Island, 400 km from the site of the original spill.

The local coastline features of beaches, rocky islands and fiords are the worst

affected by the oil, which has been pushed in by choppy seas and strong winds. Coastal wildlife is most at risk, including resident fauna and those species which feed within the coastal zone.

Oil is not only a toxic substance if ingested, but can kill animals by interfering with functions such as thermoregulation, bouyancy and flight. For birds such as the short-tailed shearwater the threats posed by the oil are that it prevents the feathers forming an effective waterproof seal, causing the birds to lose bouyancy, and inducing hypothermia by keeping them wet and cold. It also cripples flight as well as causing poisoning, stomach inflammation, diarrhoea, intestinal blockage and starvation.

The migratory habits, feeding strategies and distribution of the short-tailed shearwater in the waters of the Gulf of Alaska are factors to be considered in assessing the risks of this species.

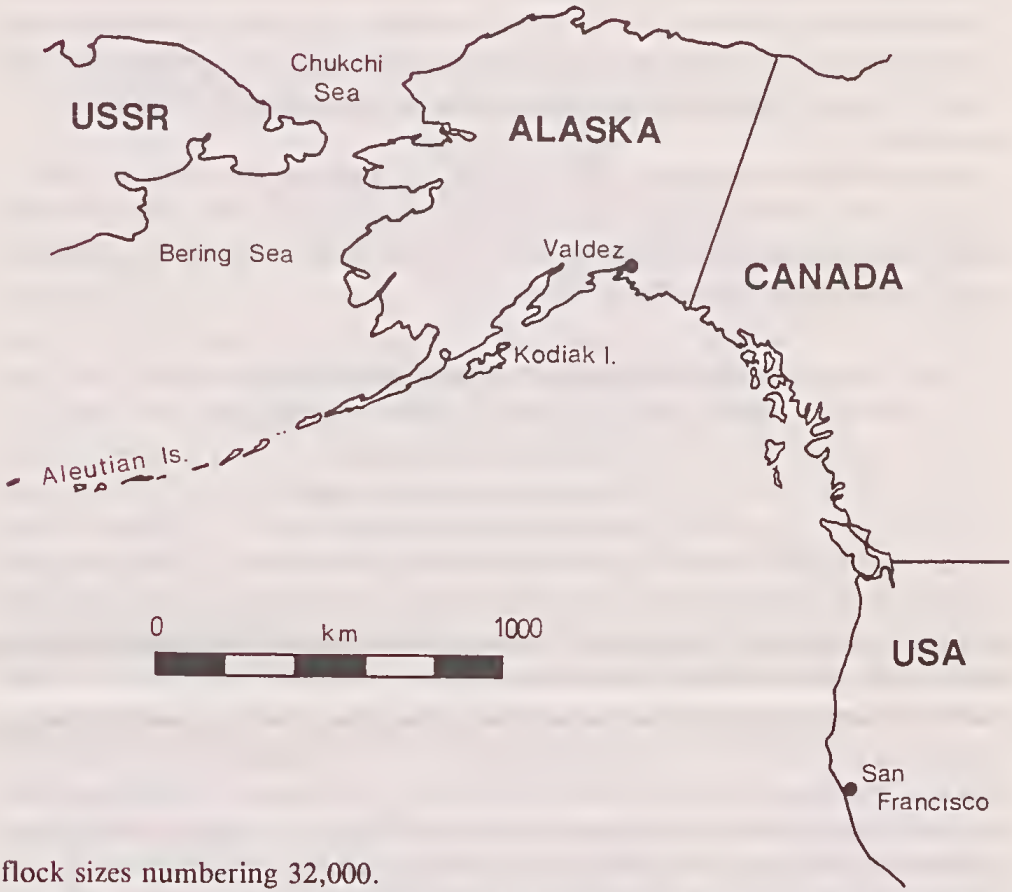
SHEARWATER MIGRATION

The short-tailed shearwater, commonly known as the Tasmanian muttonbird, is a circum-Pacific migrant spending the boreal summer in the Northern Pacific region. It breeds only in Southern Australia and is most abundant in Tasmania. The first to leave the breeding areas are sexually immature birds near the end of March, followed by the parents around mid-April then the fledged chicks at end of April to early May. The shearwaters migrate rapidly and arrive in the Northern Hemisphere on a broad front across the central Pacific Ocean. Occasionally many are washed up dead on Japanese beaches as easterly winds blow weak birds, particularly juveniles, off their normal route westward.

The majority reach the northern part of the Pacific Ocean between the end of April and the beginning of June. The largest assemblies can be observed in the Northern Hemisphere spring and the beginning of summer in the eastern part of the Bering Sea. In the second half of summer many pass into the Chukchi Sea and, while birds are still flocking into the Chukchi Sea, southwards migration begins.

The species' status on the North American west coast and the Gulf of Alaska is confusing because of the difficulty of distinguishing it from the similar sooty shearwater *P. griseus* which is common off California. However, very large flocks may occasionally occur off the west Canadian coast in May under certain wind conditions. This is because some birds migrate up the North American coast and some across the Pacific between the Hawaiian Islands and North America.

In the Gulf of Alaska short-tailed and sooty shearwaters are the dominant birds in spring and prefer the waters of the continental shelf, which is between 100 and 150 km wide. Numbers are greatest in May and by June their estimated density drops to half of that in May. In the north east of the Gulf, the Kodiak area, short-tailed shearwaters outnumber sooty shearwaters by about 1.2:1 with



flock sizes numbering 32,000.

Of an estimated world population of 23 million, the proportion of short-tailed shearwaters that frequent the Gulf area is not known. Indications are that the higher numbers flock to the Bering and Chukchi Seas. When the summer migration back to Australia commences at the beginning of September, short-tailed shearwaters fly mainly across the western half of the Pacific. Some flocks move through the Gulf of Alaska to California before heading southwards to Australia but the lack of sightings indicates that there is no regular migratory movement along the Canadian coast from August onwards.

FEEDING

Monitoring of the wildlife at Valdez show that diving seabirds which feed close to the coast have been the most badly affected species. Short-tailed shearwaters use several feeding methods, but mainly plunge-dive after food such as squid, krill and fish. They may feed close inshore so it is likely that some short-tailed shearwaters have been affected by the spill. Short-tailed shearwaters have also been observed to feed over an extensive area in the Gulf of Alaska, and this flexibility may be advantageous to the species in the current crisis.

The overall impact of the oil spill on wildlife has been particularly severe on coastal wildlife such as sea otters, eagles, ducks and cormorants. Although clean-up operations have been in progress all year, experience from previous oil spills around the world demonstrates that recovery of the volume of oil spilt is rarely over 10%.

American wildlife biologists will continue to monitor the situation and in Tasmania the Department of Parks, Wildlife and Heritage have been keeping a close watch on the 1989-90 breeding season, and will take management initiatives available to conserve the species.

AN UNUSUAL OBSERVATION OF A BLUE-TONGUED LIZARD

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On Thursday the 23rd of November 1989 at approximately 11.00 a.m., while working in a wetland on the east coast, I noticed an interesting and apparently original observation. The wetland, called the Big Punchbowl, is located on the eastern edge of Moulting Lagoon northeast of Swansea. It is a nearly circular shallow basin about 500m in diameter and was then holding water about one metre deep. The water surface was nearly covered around the edges by a dense stand of *Baumea rubiginosa* and *Lepidosperma longitudinale*. The *Baumea* thinned out towards the centre but the entire surface was broken by scattered individuals, often dead and fallen over, interspersed with *Triglochin procera*.

While standing in water 800mm deep about 40m out from shore, recording information from one of the vegetation plots I had marked out earlier in the year, I was standing quietly and kept hearing a "plopping", splashing sound repeated at intervals. My first thought was that it was made by one of the swamp hens *(Porphyrio porphyrio)* that are common there and were frequently calling that day. I kept turning around but couldn't see anything.

Finally the sound occurred quite close to me and I stopped what I was doing, determined to find out what it was. The culprit soon revealed itself and to my surprise it was a blue-tongue lizard *(Tiliqua nigrolutea)*. It was coming from the centre of the lagoon, heading toward shore and I was able to observe it closely as it passed within 2m of me. Although it paused every few metres to rest where the vegetation was dense enough to support it, it did actively swim across stretches of open water. This was accomplished by thrashing its tail and paddling with its legs. It floated low in the water and had to tilt its head back to keep its nostrils above the surface. It was apparently finding the going a bit hard because when it stopped to rest it was breathing heavily. While swimming though, it looked confident and certainly appeared to be out there by choice rather than by accident.

RARITY AND ENVIRONMENTAL DISTURBANCE AN EXAMPLE FROM THE RHAMNACEAE

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The phenomenon of rarity has fascinated people interested in natural science for a long time. The word 'rare' is loaded with preconceptions, that is we often assume that because something is rare it is attractive, unusual to look at, found in a remote location and probably delicate or vulnerable. But is this always true? We are aware that many plants have become rare due to the effects of disturbance to the environment over the two hundred years since European settlement. Activities such as clearing and ploughing, grazing and overburning have reduced former plant populations to protected pockets so that their distribution is now disjunct within the state, with populations often consisting of a few individuals. On the other hand, some species are likely to have always been rare, existing as small, isolated populations separated from each other geographically, or in small numbers widely distributed statewide, or combinations of both. How these populations maintain themselves has been the subject of ongoing debate between botanists for many years. The viability of populations or their ability to maintain sufficient genetic vigour is considered a prerequisite for the perpetuation of a species. The production of viable seed and appropriate conditions for germination is another. Growth and establishment of propagules amidst faster growing neighbours which may be competing for resources both above and below ground may also threaten the livelihood of rare plants.

Examples of rare species which appear to have special requirements for regeneration and dispersal occur in the family Rhamnaceae. Unlike the common dogwoods—*Pomaderris apetala, P. elliptica and P. pilifera*, other species in the family are not so ubiquitous. There is, therefore, a high degree of species rarity within other genera in the Rhamnaceae which is expressed as the localized occurrence of small populations which are highly site specific within particular vegetation types. Coincident with the distribution of almost all these populations is evidence of some form of past disturbance. This may be from high fire frequencies, mechanical disturbance such as bulldozers, river flooding, slope movement or the activities of animals. Commonly, all such phenomena create open bare ground, suitable for the establishment of seedlings, or encourage suckering from plants damaged during the course of the disturbance. Regeneration would appear restricted to these situations so far as most of the rare Rhamnaceae species are concerned, however the occurrence of rare plants with disturbed sites has been observed for other taxa. This raises the question of whether rare plants possess

specific ecophysiological or reproductive traits which may be unique to the species and are only expressed following a disturbance event. Conversely, it could also be argued that disturbance may be limiting, rather than enhancing the establishment of such species, given that they are restricted in their distribution, yet disturbance, both natural and imposed, is of frequent occurrence in the Tasmanian environment.

In an attempt to answer these questions, a study was initiated early in 1989 by the Department of Parks, Wildlife and Heritage, which will form the basis of postgraduate degree at the University of Tasmania, to be carried out over the next few years. The study will look at plant strategies and processes such as germination and seedling establishment, in an effort to examine and explain the links between rarity and disturbance as exemplified by the Rhamnaceae. The author would be interested to hear from anyone who has made similar observations on rare plants and who would be willing to disclose any locations they may have. In particular, *Stenanthemum pimeleoides, Spyridium microphyllum, S. parvifolium, Discaria pubescens, Pomaderris elachophylla* and *P. phylicifolia* are of special interest.

BOOK REVIEWS

Birds of Tasmania

by Robert H. Green

Published by Potoroo Publishing, Launceston

Reviewed by D.G. Hird

Described as an annotated checklist of Tasmanian birds, this Third Revised Edition, 1989, updates the 1977 Second Edition. A prominent additional feature is the inclusion of 16 pages of colour and plates, supplementing the black and white habitat photographs retained from the prior edition.

The continuing availability of this book should serve the more keen Tasmanian amateur ornithologist well. Tasmania, with its subset of the general Australian fauna, has fewer species to confuse the bird watcher, especially when sea birds are excluded. Check lists are vital supplements to field-guides and longer and more descriptive volumes. Although for many species the information provided may be unchanged between editions, many new references and interesting occasional records are added.

The colour photographs included in this volume are generally clear and well reproduced. Their inclusion in what is predominantly a check list is slightly incongruous, although they should not impede a reader's access to the latter.

Tasmanian Sea Shells Common to other Australian States

by Margaret H. Richmond

Published by Richmond Printers, Devonport

Reviewed by Ron C. Kershaw

This slim volume of A4 format provides illustrations of 170 gastropod and bivalve shells in full colour. Each species is readily recognisable on plates not cluttered by too many specimens. Facing each plate are distribution maps and names of each species and family dealt with. Some comment on each family adds useful data.

An introduction provides some basic information on the Mollusca. There is also a useful glossary and several helpful references. The title page for the gastropods section has vague outlines of two shells the smaller of which is clearly reversed, presumably accidently during printing. Some very pleasant views of Tasmanian beaches add further to the excellent photography by Miss Richmond.

The book provides a list of the beaches together with the number of visits made to each and a map reference. The maps which follow show the location of each beach very clearly. Each is numbered for easy reference to the list. A large proportion of the coast has been covered so that the book provides a very good indication of both distribution and frequency of occurence. There are very few errors of which most are insignificant but there are two in the index. The generic name *Phalium* is spelt incorrectly (p 79) and the "Pot" has disappeared from "Strange's Watering Pot" (p 80).

The book can be recommended to naturalists, schools and any shell lover as a source of accurate indentification data.