

RSPCA Australia Scholarship for Animal Welfare Annual Report 2007-08

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Project title: Investigation of PCB concentrations in coastal dolphins in South Australia: threats to species health and links with parasitic lung nematodes (in progress)

Progress report 2006-07

Organochlorines (OCs) are persistent, lipophilic pollutants that accumulate through the food chain, reaching high concentrations in the blubber of marine mammals. OCs have been quantified in the blubber of over 56 cetacean species (O'Shea, 1999) and have shown associations with immune, endocrine and nervous system dysfunction, including reproductive impairment, disruption of growth and development, and decreased resistance to disease (Beland et al., 1993; Reijnders, 1994; Reijnders and Ruiters-Dijkman, 1995; Ross et al., 1996; Skaare et al., 2000).

A recent epidemic of parasitic lung nematode infestations in South Australian dolphins (predominantly *Delphinus delphis*) has raised concerns that an OC immunosuppressive agent may be implicated. The incidence of parasitic nematode infestations has risen sharply from 2003 to 2006 (Tomo, et al., in prep). Carcasses infected with parasitic nematodes have stranded throughout South Australia, in Gulf St Vincent, Spencer Gulf and Investigator Strait. Infected species are predominantly *Delphinus delphis*, but *Tursiops aduncus* carcasses have also been observed to be infested with the parasitic nematodes.

Metals (Pb, Cd, Hg, Zn) and selenium (Se) have been measured previously in adult South Australian *Tursiops aduncus* and found to be moderate to high in comparison with other areas (Lavery et al., 2008). Metals are known to have immunosuppressive effects and cause health deficits. It is possible that PCBs and metals are interacting in an additive or synergistic manner to decrease immune system functioning and increase the susceptibility to health deficits such as parasite infestations.

Metals and PCBs may also interact to cause diseases of bone structure and organisation. Environmental contaminants cause demineralisation of the bone which can lead to osteoporosis. Polar bear and grey seal populations with high PCB loads have been shown to have significantly weakened bone (Lind et al., 2003; Sonne et al., 2004) and laboratory and wildlife studies have shown a relationship between high metal burdens and loss of bone structure (Bieglbock, et al., 2002; Suzuki et al., 2004).

We aim to undertake a preliminary examination of the association between parasitic lung nematodes, bone density and structure, and toxicant (PCBs and metals) loads in South Australian dolphins and 21 PCB congeners.

Progress of specific outcomes:

Outcome	Progress as of August 2007
Quantification of 21 PCB congeners in dolphin tissues	Completed
Quantification of metals in dolphin tissues	Completed

Quantification of extent of lung nematode infection	Completed
Determination of dolphin bone mineral density	Completed
Determination of dolphin bone histomorphometry	Completed

Expected date of completion of laboratory analyses and final report:

Preliminary results show a large range of contaminant (PCB and metal) concentrations in the liver and blubber of South Australia's dolphins. While there is no obvious connection between PCB load and lung nematode infestations, there does seem to be some indicator of a relationship between contaminants and bone structure. Using the results of this work, we have obtained additional funding to increase the sample size of this study and further investigate the relationship between contaminants and bone structure. This work will be carried out throughout this year, and will be completed in mid 2009.