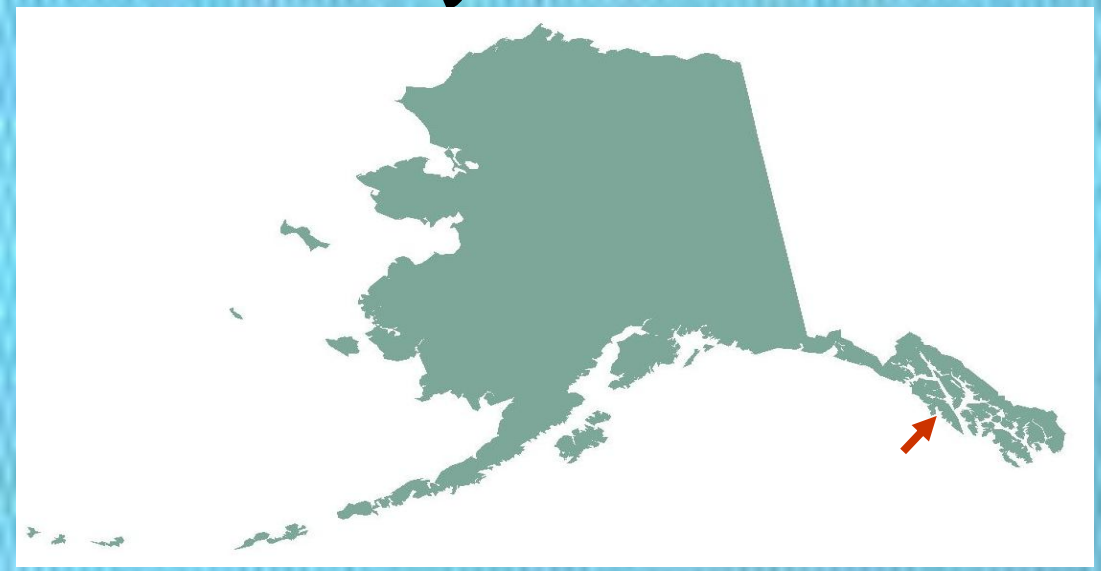


# ORGANIC CONTAMINANTS AND METHYLMERCURY IN STORM-PETRELS FROM ST. LAZARIA ISLAND,



## ALASKA MARITIME NATIONAL WILDLIFE REFUGE

Deborah D. Rudis<sup>1</sup> and B. Leslie Slater<sup>2</sup>



<sup>1</sup>U.S. Fish and Wildlife Service, Ecological Services, Juneau, AK; <sup>2</sup>U.S. Fish and Wildlife Service, Alaska Maritime National Wildlife Refuge, Homer, AK author contact: [deborah\\_rudis@fws.gov](mailto:deborah_rudis@fws.gov)

### Abstract

We collected 13 eggs and two chick carcasses from Fork-tailed, (*Oceanodroma furcata*), and Leach's Storm-petrels (LESP), (*O. leucorhoa*), from St. Lazaria Island in 2007 to determine a suite of persistent organic pollutants (POPs) and methylmercury (MeHg) in these seabirds. Previous analyses of storm-petrel eggs in 1992 and 1999 suggested that some birds may be accumulating POPs, including polychlorinated biphenyls (PCBs) that were found in one egg at concentrations which exceed avian toxicity thresholds.

This southeast Alaskan island is home to a large seabird colony and is part of the Alaska Maritime National Wildlife Refuge. Storm-petrels travel extensively between coastal breeding areas and their more pelagic wintering habitat. These small nocturnal seabirds are mesopelagic feeders, reflecting contaminant concentrations of that ecosystem.

Tissue samples were analyzed for lipid content; total and select congeners of PCBs; DDT and metabolites; chlordane-related compounds; hexachlorobenzene (HCB), dieldrin, mirex and other organochlorines (OCs); polybrominated diphenyl ethers (PBDEs) and methylmercury (MeHg).

PCBs, HCB, and total DDTs were detected at lower concentrations than we reported in our previous samples. However, PCBs were similar to concentrations reported three decades ago in 11 LESP eggs from Oregon (Henny et al. 1982). Dieldrin was reported in all 2007 samples and only 2 of the earlier years' samples; endrin was reported in all but one 2007 year samples and was not detected in the earlier samples; heptachlor epoxide was in all 2007 samples and was not reported in earlier samples. Other organochlorines were either low or below detection limits. MeHg residues were similar to those reported by Goodale et al. (2007, 2008) in LESP eggs from Maine. Our concentrations were greater than those reported in 1993 and 1997 from western Canada storm-petrels (Elliot and Noble 1993; Elliott et al. 1997). PBDEs were not detected at or above detection limits (DL range 0.00676 – 0.0201 ppm wet wt.). We had too few data to allow contaminant comparisons between the two storm-petrel species.

Storm-petrels can be considered indicator species for ocean surface contaminants. St. Lazaria birds are accumulating some contaminants and transferring these to their eggs, although generally at low concentrations.

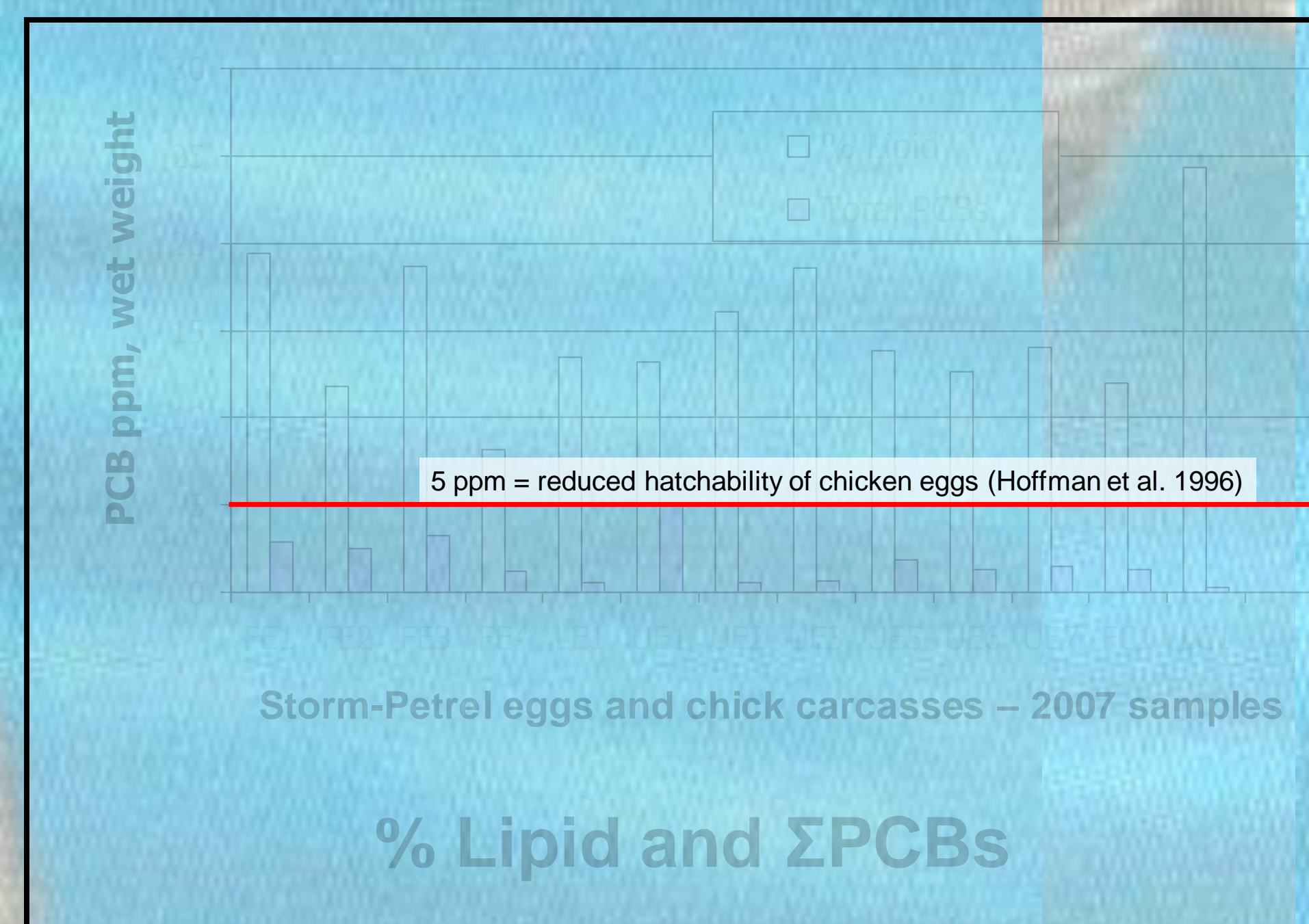
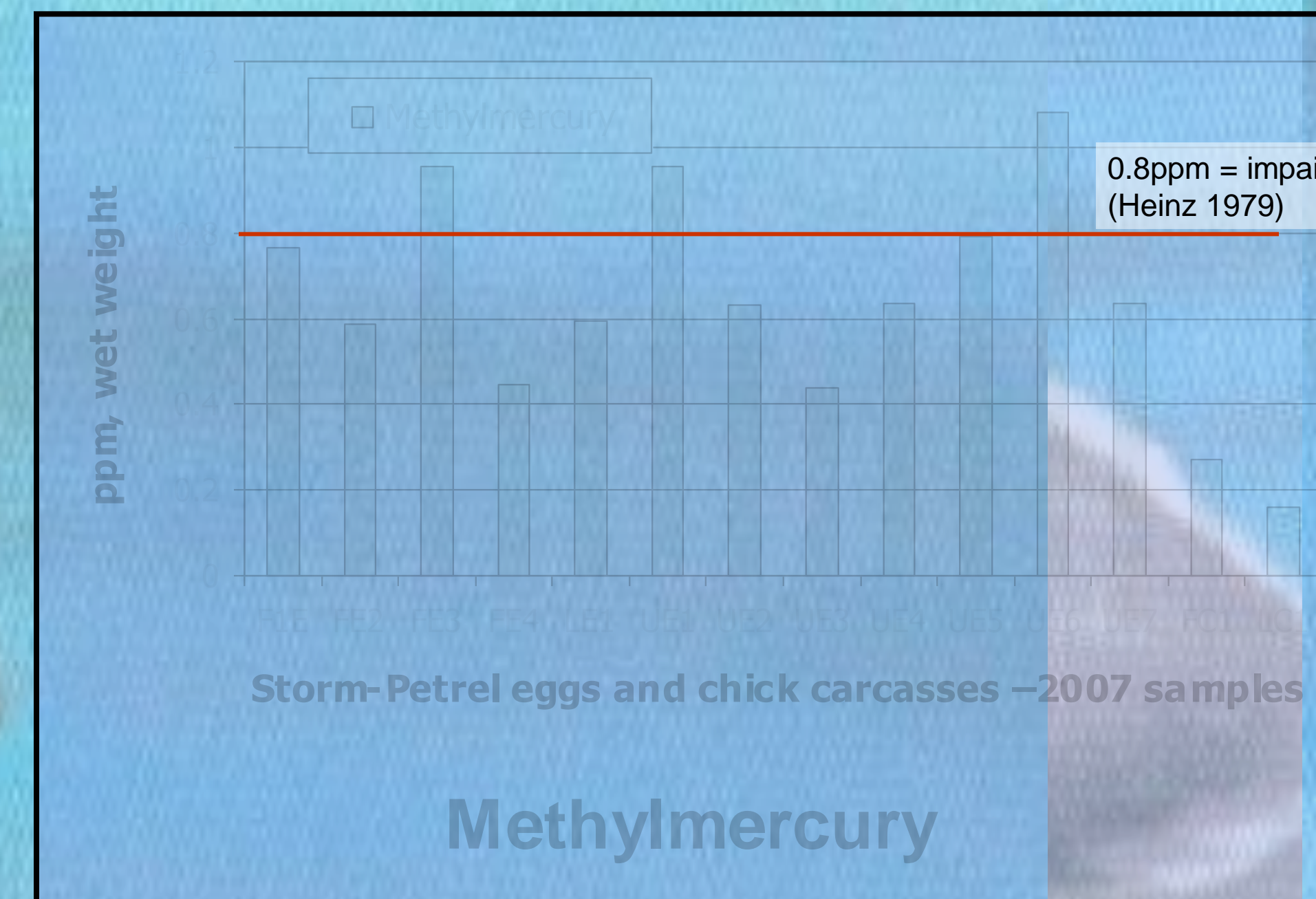
### Methods

- Added storm-petrel eggs and chick carcasses were collected from nest burrows on St. Lazaria Island in 2007.
- Egg contents and carcasses were individually homogenized and analyzed at TDI- Brooks International for % lipid, % moisture, OCs, PBDEs and PCBs. Methylmercury analyses were done at TERL.
- Organic analyses - quantified with a gas-liquid chromatograph.
- Methyl mercury analyses by GC equivalent following Uthe et al. 1972
- Acceptable accuracy for percent recovery of analytes in spiked samples was 80 percent (Moore 1990). Acceptable relative percent difference of duplicate samples was within 20 percent. Quantification criteria for all analytes were defined as results greater than twice the Detection Limit (DL). If results for a sample were less than twice the DL they were only considered qualitative.
- One sample was dropped before organic analyses could be done.

### Objectives

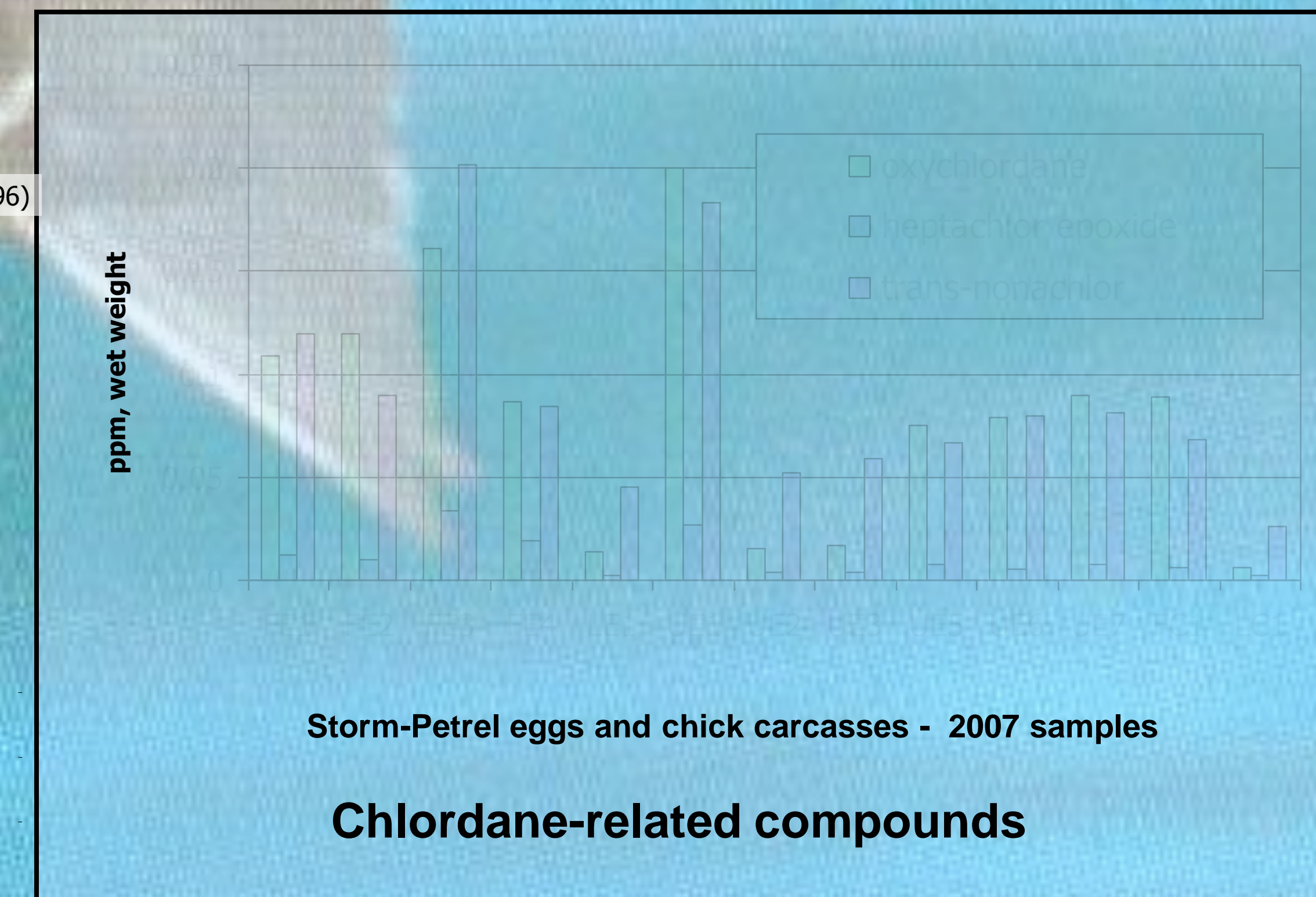
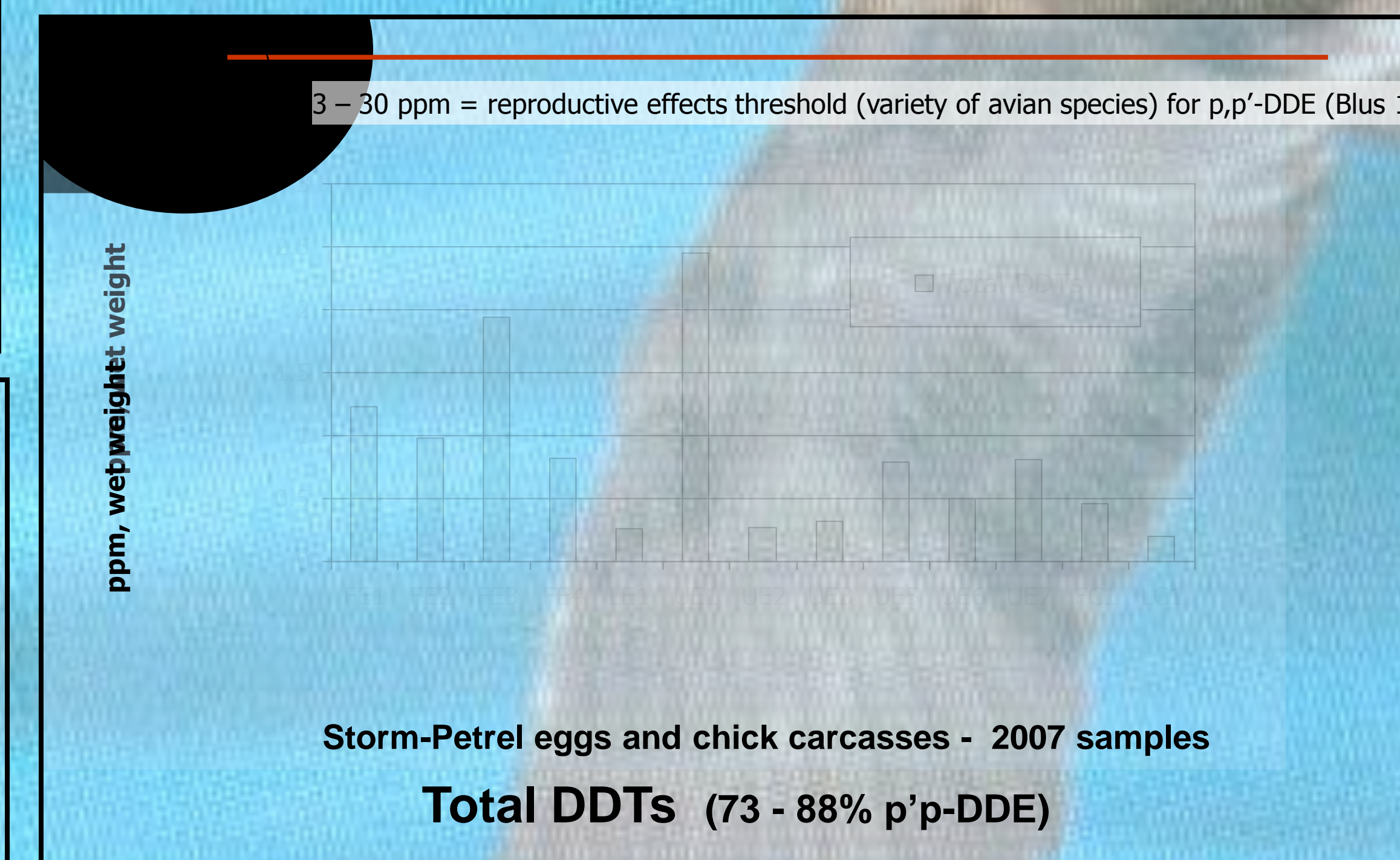
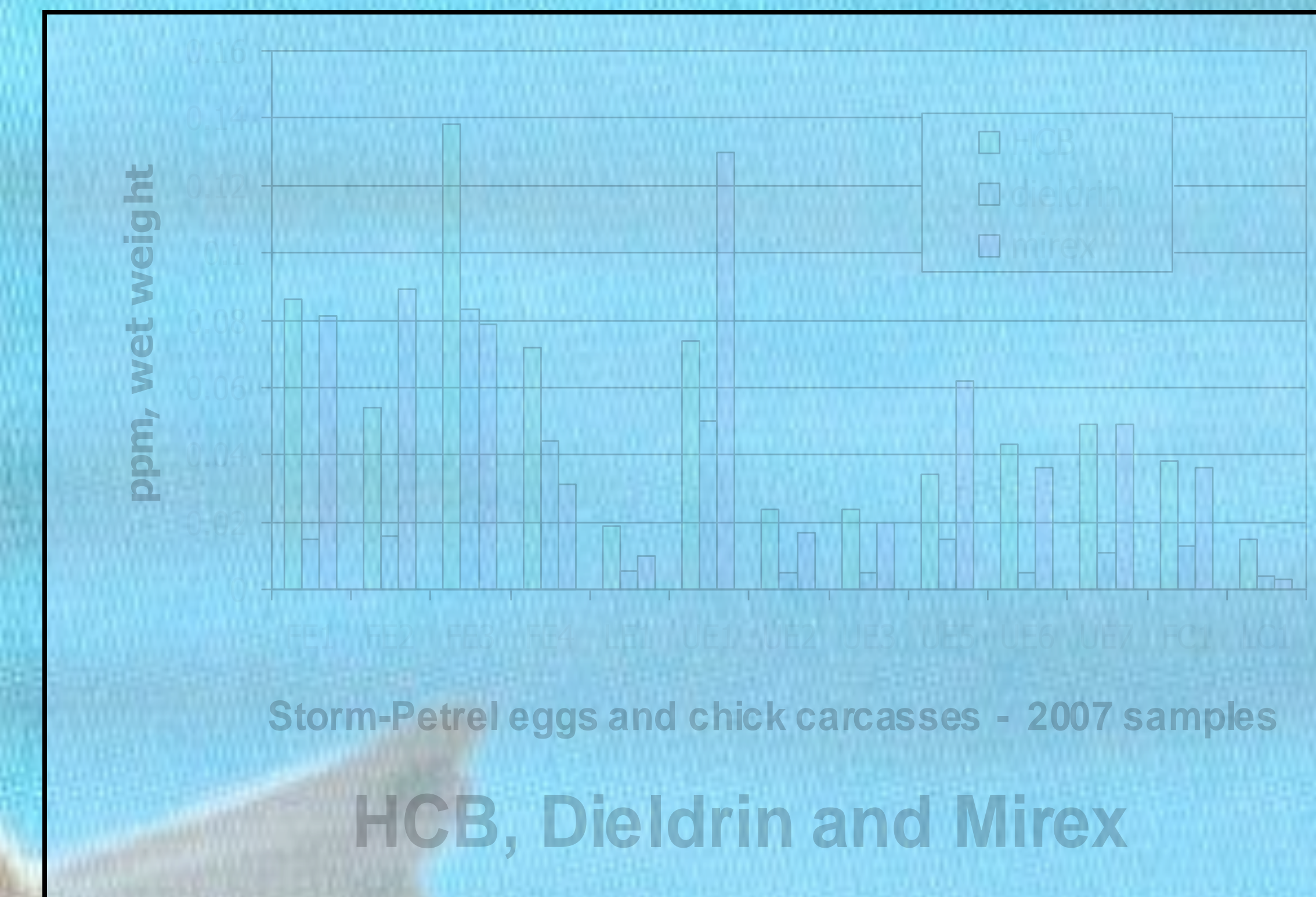
- Determine contaminant concentrations in storm-petrel eggs from St. Lazaria Island, AK Maritime NWR.
- Compare St. Lazaria egg contaminants data among years and with data from other locations.
- Determine if contaminants in storm-petrel eggs are at concentrations of concern compared to toxicity benchmarks.

F = Fork-tailed Storm-petrel, L = Leach's Storm-petrel, U = unknown species Storm-petrel, E = egg, C = carcass



### Literature Cited

- Blus, L.J. 1996 DDT, DDE, and DDE in Birds. In: Environmental Contaminants in Wildlife: Interpreting Tissue Concentrations. Lewis Publishers, Boca Raton. Pg 49 – 71.
- Elliott, J.A. and Noble, D.G. 1993. Chlorinated hydrocarbon contaminants in marine birds of the temperate North Pacific. Pgs 241-253 In, The status, ecology and conservation of marine birds of the North Pacific.
- Elliott, J.A., et al. 1997. Organochlorine contaminants in seabird eggs from the Queen Charlotte Islands. Can. Wildl. Serv. Occas. Pap. No. 93. p. 137 -147.
- Heinz, G.H. 1979. Methylmercury: reproductive and behavioral effects on three generations of mallard ducks. J. Wildl. Manage. 43:394-401.
- Henny, C.J., L.J. Blus, and R.M. Prouty. 1982. Organochlorine residues and shell thinning in Oregon seabird eggs. Murrelet 63:15-21.
- Hoffman, D.J., C.P. Rice, and T.J. Kubiak. 1996. PCBs and Dioxins in Birds. In: Environmental Contaminants in Wildlife: Interpreting Tissue Concentrations. Lewis Publishers, Boca Raton. Pg 165-207.
- Moore, J. 1990. Patuxent Analytical Control Facility Reference Manual. USFWS unpub.



### Conclusions

- Organic compounds in Storm-petrel eggs from St. Lazaria Island are at relatively low concentrations that do not represent a risk to these populations.
- Comparison with MeHg data from other seabird eggs indicates these Storm-petrel eggs have comparable MeHg concentrations, however, MeHg concentrations were greater than concentrations we reported from our previous study. Although concentrations in 3 samples exceeded a toxicity threshold for mallards, seabirds are thought to be able to tolerate higher Hg concentrations.
- Most organochlorines, including the chlordane-related compounds, endrin, toxaphene, and lindane compounds were present in eggs at low concentrations.
- Total PCBs were below toxicity thresholds reported for other avian species.
- PBDEs were not detected in samples at or above DLs of 0.02 ppm.
- Additional organic compound toxicity threshold data is needed to determine if any contaminant levels in Leach's and Fork-tailed storm-petrel eggs are of concern.



### ACKNOWLEDGEMENTS

Thanks to Leslie Slater's field crews for sample collection. Funding was provided through the USFWS Environmental Contaminants Program for refuge investigations.

Presented at the 30<sup>th</sup> SETAC Conference, New Orleans, LA, Nov. 2009