

Cetacean-based Food Products: Polluted and Popular

Productos Alimenticios basados en Cetáceos: Contaminados y Populares

Aliments à base de Cétacés: Pollués et Populaires

FIELDING, RUSSELL

HTC Honors College and Center for Interdisciplinary Studies, Coastal Carolina University, Conway, South Carolina, 29528, USA, rfielding@coastal.edu

EXTENDED ABSTRACT

In St. Vincent & the Grenadines (SVG), an average of 344 small cetaceans are taken annually to produce food for human consumption: meat, blubber, and oil. The most commonly caught species are spinner dolphins (*Stenella longirostris*), short-finned pilot whales (*Globicephala macrorhynchus*), Atlantic spotted dolphins (*Stenella frontalis*), and killer whales (*Orcinus orca*) (Fielding 2018).

Small cetacean-based food products are consumed by a majority of SVG residents, according to a recent survey (n=921; SVG adult population=72,962). Certain demographic and geographic trends to consumption rates exist, however. Males and people living near to Barrouallie, the main village where whaling occurs, are more likely to consume food products derived from small cetaceans. Age and socioeconomic level (proxied by occupation) are not significant predictors of consumption. Overall, 66% of survey respondents are regular consumers of food products derived from small cetaceans (Fielding et al., in preparation). After processing, food products generally do not retain any identifying link to the species of origin. Thus, consumers of cetacean-based food products are generally not aware of which species they are consuming.

Two more recent studies found that the muscle tissue of small cetaceans caught for food in SVG contains high concentrations of mercury. The World Health Organization, together with the Food and Agricultural Organization of the United Nations, recommends that seafood with concentrations of mercury greater than 1.0 parts per million ($\mu\text{g/g}$, wet-weight) not be consumed (FAO/WHO 2015). Mercury levels in the muscle tissue of six commonly caught species range from $0.68\mu\text{g/g}$ to $202\mu\text{g/g}$ (Fielding & Evans 2014; McCormack et al. 2020).

The mean of all mercury concentrations across the entire sample set in the most recent study is $19.4\mu\text{g/g}$ (McCormack et al. 2020). Of particular note is the inclusion of the highest muscle tissue mercury concentration ever reported in the scientific literature for killer whales. Mercury concentrations in killer whales are so high that removing samples of this species from the analysis would reduce the mean mercury concentration across all remaining samples to $11.9\mu\text{g/g}$ —still far above the FAO/WHO advisory level (2015), to be sure, but significantly lower than the present average concentration.

The situation described here, in which cetacean-based food products consumed in the Caribbean are both highly popular and heavily polluted is not sustainable. Public health research has identified multiple negative neurological, cardiovascular, immunological, and developmental effects of mercury exposure (Rice et al. 2014). Of particular concern are the effects of mercury exposure on infants and unborn children (UNEP 2013). Mercury concentrations in the muscle tissue of small cetaceans caught for food in SVG far exceed the FAO/WHO recommended maximum.

The immediate abandonment of these foods, however, would entail significant disruption to the Vincentian food system and economy, affecting both producers and consumers. In other locations where traditional foods have been abandoned in response to pollution, negative health outcomes have resulted from the shift to unhealthy alternative foods (Van Oostdam et al. 2005).

To promote better health outcomes for the Vincentian population, the following recommendations should be considered for future research and policy. First, in terms of research, the source(s) and movements of mercury into and within the southeastern Caribbean should be further studied and modeled. The second research recommendation is that populations of small cetaceans in the southeastern Caribbean should be studied to determine their sizes and structures. This will aid in determining their conservation status and quantifying the impact of whaling upon cetacean populations in the southeastern Caribbean. The third research recommendation is that movements of small cetaceans within the southeastern Caribbean region and to/from other regions should be studied through observation and satellite-aided tracking. The fourth and final research recommendation is that the role of killer whales in the marine ecosystem of the southeastern Caribbean should be further studied to determine the reason(s) for the remarkably high mercury concentrations in their muscle tissues.

In terms of policy, the first recommendation is, based upon the findings of the first research recommendation above, parties responsible for the presence of mercury in the Caribbean food system should be held accountable. The second policy recommendation is that killer whales should no longer be hunted for food by Caribbean whalers. If killer whales were excluded from the pool from which cetacean-based foods are produced, the average Hg concentration in the entire food system would be reduced significantly. The third policy recommendation is that dietary guidelines should be written and communicated among the Vincentian public to offer evidence-based advice regarding the maximum amounts of cetacean-based food products that can safely be consumed. These guidelines should be adjustable for the consumer's age, gender, body weight, and any underlying health conditions. Fourth, and finally, in terms of policy recommendations, global mercury emissions should be reduced in accordance with the United Nations Environmental Programme's Minamata Convention on

Mercury (UNEP 2013).

The fact that cetacean-based food products are both heavily polluted and highly popular in SVG is not merely a Vincentian problem. It is indicative of a problem that spans the entire Gulf/Caribbean region and reaches globally. Regional and global effort is required to adequately address this issue.

KEYWORDS: St. Vincent and the Grenadines, cetaceans, ecotoxicology, human health, small-scale fisheries

LITERATURE CITED

- FAO/WHO [Food & Agriculture Organization of the United Nations/ World Health Organization]. 2015. Codex Alimentarius: International Food Standards. Rome, Italy: FAO & Geneva, Switzerland: WHO.
- Fielding, R. 2018. *The Wake of the Whale: Hunter Societies in the Caribbean and North Atlantic*. Cambridge, Massachusetts, USA: Harvard University Press.
- Fielding, R., J. Kiszka, C. Macdonald, M.A. McCormack, J. Dutton, A. Ollivierre, J.A. Arnett, M. Elkins, N.A. Darby, H.-M. Garcia, S. Skinner, H. Tucker, and V. Reid. [In preparation] Demographic and Geographic Patterns of Cetacean-based Food Product Consumption and Potential Mercury Exposure within a Caribbean Whaling Community.
- Fielding, R., and D.W. Evans. 2014. Mercury in Caribbean Dolphins (*Stenella longirostris* and *Stenella frontalis*) Caught for Human Consumption off St. Vincent, West Indies. *Marine Pollution Bulletin* 89(1-2):30-34.
- McCormack, M.A., R. Fielding, J.J. Kiszka, V. Paz, B. P. Jackson, D.R. Bergfelt, and J. Dutton. 2020. Mercury and selenium concentrations, and selenium:mercury molar ratios in small cetaceans taken off St. Vincent, West Indies. *Environmental Research* 181:108908.
- Rice, K.M., E.M. Walker, Jr., M. Wu, C. Gillette, and E.R. Blough. 2014. Environmental mercury and its toxic effect effects. *Journal of Preventive Medicine & Public Health* 47:74–83.
- UNEP [United Nations Environmental Programme]. 2013. *Minamata Convention on Mercury*. Nairobi, Kenya: UNEP.
- Van Oostdam, J., S.G. Donaldson, M. Feeley, D. Arnold, P. Ayotte, G. Bondy, L. Chan, É. Dewailly, C.M. Furgal, H. Kuhnlein, E. Loring, G. Muckle, E. Myles, O. Receveur, B. Tracy, U. Gill, and S. Kalhok. 2005. Human health implications of environmental contaminants in Arctic Canada: a review. *Science of the Total Environment* 351: 165-246.