

ORCA TALK

A UVic computer scientist helps researchers access 36 years worth of whale conversation

by Jennifer Cador

Imagine trying to learn a foreign language without the guidance of a dictionary or anyone who speaks the language.

That's the challenge faced by researchers studying the complex clicks, whistles and squeals made by BC's killer whales, or orcas. As it turns out, there are hundreds of tapes sitting in boxes, full of orca calls recorded since 1970 in Johnstone Strait off northeastern Vancouver Island.

The tapes are a treasure trove for researchers, but they're on cassette and can only be accessed by a few. The sheer volume of information makes research tasks, like trying to find specific calls, a lot like looking for a needle in a haystack—real barriers for researchers studying the mysteries of orca communication.

Enter University of Victoria professor George Tzanetakis, a computer scientist with a special interest in extracting information from complex audio signals, such as music. He's using his expertise to create a giant database of BC orca calls that will be made available globally.

OrcaLab, a BC-based, non-profit research organization dedicated to the study of killer whales, asked Tzanetakis for help in creating a user-friendly database from 36 years worth of orca calls collected by its underwater hydrophone network. It works out to about 20,000 hours of tape which, by any measure, is a lot of whale conversation.

"Just to give you an idea," says Tzanetakis, "if all you did was listen to the tapes and never slept, it would take you two-and-a-half years to listen to all of them."

Beyond digitizing and creating a research database, Tzanetakis is inventing new software tools for researchers to quickly find data. He's also developing new technology to filter out background noise made by waves, wind and boats so that orca calls can be heard more clearly.

With such immense amounts of audio, Tzanetakis has his work cut out for him. But getting volunteers is never a problem. "Just mentioning these

projects, you immediately get undergraduate and graduate students wanting to be involved."

Perhaps it has something to do with the ongoing love affair British Columbians have with orcas, which are, after all, one of the most cherished symbols of the West Coast. Or maybe it's because BC orcas are in trouble—the population off northern Vancouver Island is listed as threatened, while the southern Vancouver Island population is classified as endangered.

Orcas use sound to communicate and navigate through the water. Researchers study the sounds they make to learn more about their social structure and monitor their movements along the BC coast.

Ultimately, Tzanetakis hopes to develop a monitoring system that would automatically recognize, record and archive killer whale calls in real time. OrcaLab currently relies on human ears to hear approaching whales.

"Long-term studies employing acoustic techniques are essential for fully understanding orca communities worldwide where access is remote," says Dr. Paul Spong, OrcaLab's director. "With knowledge comes understanding, and with understanding comes conservation."

Tzanetakis, with visual displays of whale calls.

DIANA NETHERCOTT

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Among BC's resident (fish-eating) orcas, each whale has the same set of calls, or dialect, as other members of its pod. The only other mammals known to have true dialects are humans, some monkeys, and the sperm whale.

Dialects of most resident pods can be distinguished either by ear or with a sound analyser. Test your ability to distinguish orca calls at www.killerwhale.org (click on acoustics).

Whale sounds are recorded using an underwater microphone called a hydrophone. Hydrophones have been placed at strategic locations along the BC coast to monitor for whale vocalizations. A hydrophone array is also part of the UVic-led VENUS seafloor observatory in Saanich Inlet. Visit VENUS online at www.venus.uvic.ca.

George Tzanetakis's main research interests are signal processing, machine learning, and the analysis of audio signals in human-computer interactions.

UVic researchers were awarded more than \$82 million in external research grants and contracts in 2005-06, up nearly 150 per cent since 2001-02.

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