ASL Environmental Sciences

Solutions Newsletter
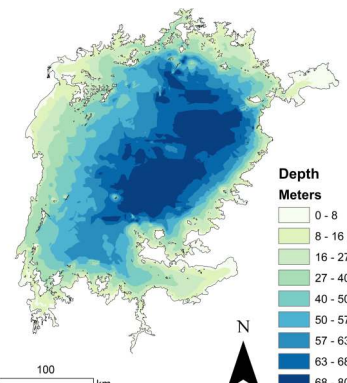**Fall 2019**

ASL Announces Dr. Laura Hobbs and Dr. Roland Proud as the 2019 Acoustic Zooplankton Fish Profiler (AZFP) Award Contest Winners

Dr. Hobbs is a marine ecologist who specializes in bioacoustics.

Bathymetric map of Lake Victoria. (map source: Hamilton, 2016)

ASL Environmental Sciences is pleased to announce Dr. Laura Hobbs and Dr. Roland Proud as winners of the fourth annual Acoustic Zooplankton Fish Profiler (AZFP) early career scientist award contest. They are both Scotland-based marine ecologists, specialising in bioacoustics. Dr. Hobbs is associated with the Scottish Association for Marine Science (SAMS) and the University of Strathclyde, and Dr. Proud is with the University of St Andrews. Together, they plan to deploy the AZFP in Lake Victoria, East Africa.

Their goal for this deployment will be to study the vertical distribution, dynamics, and ecology of important fish species (e.g. Nile perch, Dagaa and Haplochromines) and their prey (e.g. zooplankton). This will provide the first continuous dataset of this kind for Lake Victoria, describing both the diel and seasonal changes in species abundance and vertical distribution. This will complement the 20 years' worth of acoustic survey data (vessel-based echosounders operating at 70 and 120 kHz) which have mapped the spatial distribution of these species. It will be a major ecological step forwards—Lake Victoria as a closed system is in many ways an ideal "natural experiment"—and a major contribution to future fisheries management.

The use of the AZFP (38/125/200/455 kHz) in this context will address many socio-economic issues that face the East African Community, while also improving the knowledge of an ecosystem that is presently poorly understood. It is hoped that the project will improve sustainability by supporting the fishery that underpins regional food security and by providing new and advanced methods of data acquisition to improve stock assessment. This project will seek to link ecological modellers with fisheries management and will be used to generate a variety of collaborations and scientific publications.

Dr. Proud and Dr. Hobbs held a consultation with the Lake Victoria Fisheries Organization and the Lake Victoria hydro-acoustics working group in June 2019. During this consultation, the optimal placement of the AZFP within the lake was discussed. It was decided that a deep section in the lake basin was most suitable to allow for the acoustic sampling of the entire water column, while still allowing for four frequency analysis. In November 2019, Dr. Proud and colleagues from St Andrews will visit Lake Victoria to undertake a vessel-based hydroacoustic survey, and they will deploy the mooring at this time. The AZFP will be collected in February 2020.

Dr. Gary Borstad Receives Val Shaw Memorial Award from the Canadian Remote Sensing Society

Photo credit: Kevin Murnaghan

ASL's Dr. Gary Borstad recently received the Val Shaw Memorial Award in recognition of his career-long contributions and lifetime achievement in practical remote sensing applied to natural resource management. This award was presented at the 40th Canadian Symposium on Remote Sensing in Fredericton, New Brunswick on June 25th, 2019. The Val Shaw Award was established in 1990 in memory of Val Shaw, an executive with the Bercha Group and a strong proponent of remote sensing in Canada.

Gary was educated at the Universities of Alberta, Paris and McGill and has been active in remote sensing since 1975. With his partner, Lorraine, he founded Borstad Associates Ltd. in 1983 to provide remote sensing data acquisition and analysis internationally. In 2009, Borstad Associates merged with ASL Environmental Sciences Inc. to provide expanded capabilities. He is now retired (mostly).

In his 40-year career, Dr. Borstad worked with all types of remote sensing data, but has played an important national and international role in the development of hyperspectral sensors and applications. He began using an airborne spectrometer in 1978 to map solar-stimulated fluorescence from phytoplankton with Dr. Jim Gower at Fisheries and Oceans Canada. He and the Borstad team later helped design and develop the Compact Airborne Spectrographic Imager and have since worked with six generations of imaging spectrometers.

Dr. Borstad's work began with marine, fisheries and ecological applications but has also included vessel detection, ice, forestry, agriculture, mining, military and security applications with many advanced sensors. Under his leadership, Borstad Associates built its own high resolution imager for marine mammal surveys and rebuilt the CCRS SWIR Full-Spectrum Imager (SFSI) for operational mineral exploration campaigns. More recently, he has led many climate and change detection studies.

Gary served as adjunct professor and graduate student supervisor at several universities, and has taught many advanced international remote sensing training courses. He led more than 300 research projects in 40 countries, flew over 80,000 km in airborne remote sensing missions on five continents and wrote or co-authored nearly 50 refereed primary publications, more than 120 symposium papers and 250 technical reports.

In accepting the award, Gary began by thanking Lorraine, his parents, mentors and team members, going on to say that "no one ever achieves anything by oneself—it is about the people around us."

Rogue Wave Study at Tofino, BC

Rogue waves are individual waves that are large compared to the surrounding wave field. A common definition is the height of "rogue waves" is at least 2.2 times the significant wave height. They are not uncommon in BC waters and in moderate to high sea states they can threaten marine operations. Dr Johannes Gemmrich at the University of Victoria is conducting a study of rogue waves off Tofino, BC. The goal is to identify rogue waves and measure their progression towards shore. On October 4th, the University of Victoria deployed a surface wave buoy in about 30 m of water depth, a bottom pressure gauge nearshore, and a camera system to quantify wave runup. ASL assisted with the UVic mooring deployments and also contributed an acoustic Wave Profiler that was bottom moored between the two University of Victoria moorings. The instruments will be left in place over winter, and the data will be used to validate high-resolution wave models.

Another aspect of the study will involve the WERA HF real-time radar located onshore at Tofino. This system will measure both waves and currents over the project duration.

Dissolved Oxygen Loggers from ASL's Lease Pool Reveal Diurnal Dynamics of Eutrophic Lake

Swan Lake Victoria, BC.

Dissolved oxygen (DO) concentrations and their fluctuations are vital to the aquatic health of eutrophic lakes. As oxygen production through aquatic plant-based photosynthesis is largely dependent on the sun, DO concentrations, especially in the upper water column, vary significantly over a 24-hour period. Because of these variations, spot measurements, if taken on a daily or weekly interval, could be misleading depending on where the measurement occurs on the diurnal cycle.

Last year, Rob Bowen of Diversified Scientific Solutions deployed one of ASL Environmental Sciences' DO loggers to examine the finer details of the DO diurnal cycle at Swan Lake in Victoria, BC. This nine-hectare lake set in an urban landscape is subject to algal blooms and fish kill due to hypoxia (DO less than 2 mg/l). In the figure below, the DO logger, sampling every 10 minutes, illustrates the high amplitude swings related to photosynthesis (daylight) and respiration (night). Other factors that played a significant role in these swings were algal blooms and the depletion of available phosphorous. Draped over the logger data are periodic handheld spot measurements. The handheld data were collected between 10 am and 1 pm and appear on the rise of the sinusoidal curve. If these values were taken later in the day, a very different curve would result. This year, Rob is using two ASL environmental DO loggers from the ASL lease pool to examine DO levels in an area where a bubbler system was installed. One logger was installed adjacent to the bubbler and the other logger was placed outside of the influence of the bubbler.
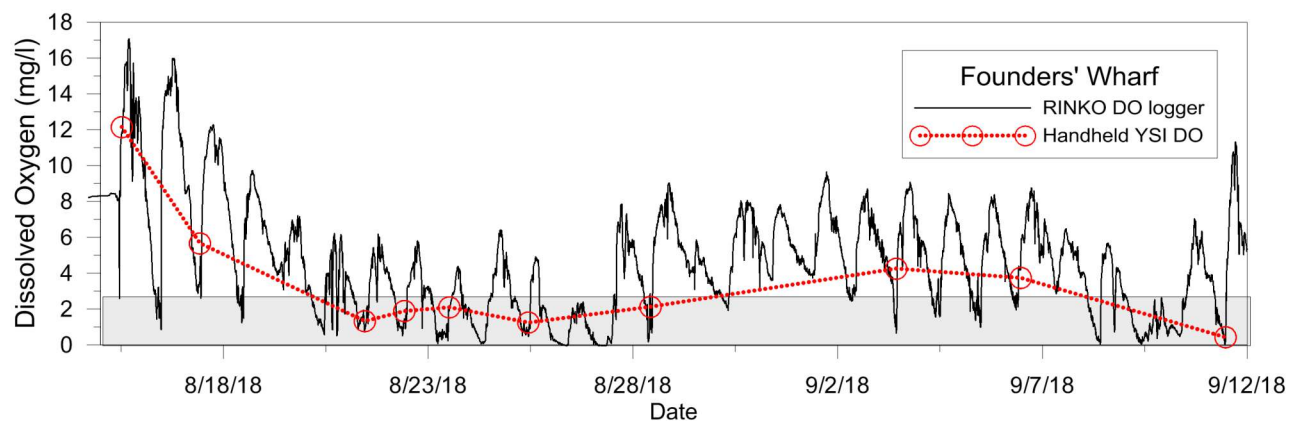
DO logger showing dynamic diurnal cycle with handheld DO data overlay.

ASL Hires Dr. Matthew Asplin for the Position of Metocean and Arctic Project Manager

ASL Environmental Sciences is pleased to announce the appointment of Dr. Matthew Asplin to the position of Metocean and Arctic Project Manager. Dr. Asplin brings a diverse set of multidisciplinary research skills in meteorology, sea ice, and oceanography, and has over 15 years of experience in these fields. He will be responsible for project management and client liaison tasks for projects across these disciplines, and will also be active in responding to business development opportunities and academic collaborations, as well as expanding new consulting services to ASL's present clients. Dr. Asplin will also be active in strategic planning, marketing and actively participate in scientific conferences and workshops.

Dr. Asplin had previously completed a NSERC Industrial Postdoctoral Research and Development Fellowship with ASL Environmental Sciences Inc. from 2013–2016. This research program was designed to continue the theme of study of his Ph.D. program as part of the ArcticNet–Industry Beaufort Sea Research collaboration between ArcticNet, BP, Imperial Oil, and ASL. He completed research within the following topics: 1) surface atmospheric circulation systems—changes and trends for the western Arctic, 2) momentum coupling of atmospheric forcing to ice and near-surface ocean regimes, and 3) wind-forced propagation of ocean waves into the periphery of the pack ice. Dr. Asplin followed this work with W. Garfield Weston Fellowship in Northern Research at the Department of Geography at the University of Victoria, where he investigated synoptic meteorological drivers of storm surge events in the western Canadian Arctic, including a traditional knowledge study through direct consultations with residents in three coastal communities in the Inuvialuit Settlement Region.

Dr. Asplin completed a Ph.D. at the University of Manitoba under Dr. David Barber investigating how Arctic storms influence dynamic and thermodynamic processes in Arctic sea ice and across the ocean–sea ice atmosphere interface, and how these processes might change with climate change. This project details an emerging ice-free Arctic ocean over the past decade that reveals a surface that absorbs and retains more solar radiation and thus is apt to be characterized by a delayed winter freeze-up, increased autumn storminess, and higher frequencies of large waves and swells. Waves can propagate into the pack ice, causing flexural swell and mechanical breaking of the sea ice cover, thereby changing ice floe size distributions towards smaller diameter floes. Dr. Asplin conducted field work for this project on board the Canadian Coast Guard Ship *Amundsen*, through the ArcticNet Network of Centres of Excellence, the 2007–2008 International Polar Year Circumpolar Flaw Lead System Study, and the ArcticNet–Industry Partnership Program (2009–2011).

Dr. Asplin is presently the Chair of the Vancouver Island Chapter of the Canadian Meteorological and Oceanographic Society (CMOS), the Vice Chair and Secretary of the Local Arrangements Committee for the CMOS Victoria 2021 National Congress, the Past-Chair of the University of Victoria Community Climate Science Seminar Series, and a past sessional instructor at the University of Victoria Department of Geography.

ASL's Lease Pool Expanded

ASL is looking at adding a GPS wave buoy to the metocean equipment lease pool. These units are small and easily deployable from a small boat, and transmit wave parameters real-time to your computer via Iridium satellite. They are ideal for coastal applications such as wave studies of harbours and are much less expensive than the standard metocean buoys. If anyone sees an upcoming need or has other interests, please contact Rick at rbirch@aslenv.com for updates.

James Bartlett New Point of Contact for ASL Sales and Third-Party Products

ASL is pleased to introduce James Bartlett as the company's primary point of contact for product enquiries and sales for ice/wave profiling sonar product lines. James may also be contacted for any of the third-party product lines represented by ASL. These include Teledyne RD Instruments, Deep Water Buoyancy, WERA Northern Radar and the ClearSignal antifoulant coating by Severn Marine Technologies.

As one of ASL's lead oceanographic service scientists, James has collaborated with governments, industry and academic institutions both locally and on projects around the globe and brings well-rounded experience to support and understand our customers' needs in this new role. As a regular user of a wide range of instrumentation designed to measure physical, chemical and biological water properties, James is well positioned to assist ASL's customers in finding the ideal solutions to their measurement challenges.

James can be contacted at jbartlett@aslenv.com or by phone at 250-656-0177 ext 153.

Announcing Teledyne RDI's newest product release, the long-range Pinnacle ADCP (see details here).

Meet James at the Teledyne Marine Trade Workshop in San Diego, October 6–9 2019.

Click on logos to visit ASL rep pages.

Acoustic Scintillation Flow Meter (ASFM)

ASFM Engineering Code Acceptance

The acoustic scintillation method for measuring flow through turbines in hydroelectric plants is moving closer to adoption by the engineering organizations that set standards for those measurements. Those organizations are the ASME (American Society of Mechanical Engineers), whose PTC-18 test code is used primarily in North America and the IEC (International Electrotechnical Commission) which publishes the IEC-41 code, used internationally. Committees drafting the next editions of both these measurement codes have included acoustic scintillation as an appendix to the main body of their code, describing how the method is to be used when parties to a turbine test have agreed to use it. New editions to both codes are expected to be published within the next one to two years. Inclusion in the appendices is a step towards full acceptance as a code-approved method.

ASL Provides Co-op Work Experience

This past summer, ASL had the pleasure of providing a co-op educational opportunity for UVic Physics, Ocean and Atmospheric Sciences student Cathryn Hale. While at ASL, Cathryn worked as an oceanographic data analyst. In a story published in the Victoria *Times Colonist*, Cathryn's supervisor, Dawn Sadowy, said that "The co-op program allows us to get extra help when we're busy, but it also gives students the opportunity to put their learning into practice." Cathryn had a rewarding experience stating, "Honestly, I could see myself doing this kind of work in the future." We are grateful for Cathryn's work and wish her well in her future endeavours.

ASL routinely provides co-op students with real-work experience in aid of career development.

Cathryn Hale (left) and Dawn Sadowy (right).

ASL Riders Cross Finish Line Along with Thousands to Raise Funds for Cancer Research

On August 25, ASL's Jan Buermans, Keath Borg, and Kaan Ersahin, along with thousands of other riders crossed the finish line after a two-day epic 200+ km route between Surrey and Hope, BC. This year, Ride to Conquer Cancer participants collectively raised $9.1 million for cancer research with our team raising over $7,000. Thank you for supporting our fundraising efforts benefiting the BC Cancer Foundation.
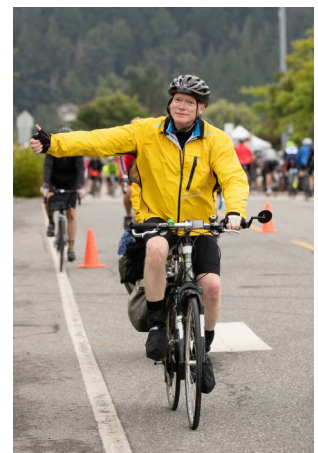
Link to Ride to Conquer Cancer website (https://ride.conquercancer.ca/vancouver19/).

At the finish line
(Kaan Ersahin, Jan Buermans and Keath Borg).

Keath Borg and Jan Buermans en route.

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Alexander Graham Joins ASL's Remote Sensing Team

We wish to welcome Mr. Alexander Graham to ASL Environmental Sciences for the position of Remote Sensing Analyst. Alex holds an MSc. Degree in Forestry from Lakehead University (2016) where his research focused on multispectral remote sensing and fungal disease detection in field crops with Unmanned Aerials Vehicles (UAVs). His work was among the first to utilize UAV-based remote sensing for the detection of fungal diseases in field crops, where the capabilities of high-resolution remote sensing data were demonstrated for crop health diagnosis.

Alex then worked for VineView in Halifax, NS as a Remote Sensing Data Scientist, where he contributed to the research and development activities for disease detection in grapevines using multispectral and hyperspectral data acquired from unmanned and manned airborne platforms. For a variety of research projects, in addition to algorithm development, he was involved in the development of new optical sensors, automating image processing workflows, and conducting fieldwork internationally. Alex holds certification for piloting UAVs and gained experience flying rotary platforms with hyperspectral payloads.

In his new role at ASL, Alex will be involved in the development of automated processing workflows using multispectral and hyperspectral sensors and data analysis for a variety of applications including forestry, agriculture and mineral mapping.

Alex is a valuable addition to ASL's remote sensing group that has an established international reputation as experts in hyperspectral remote sensing and its applications for environmental, mining, and defence sectors.

Conferences Attendance

Recent

- 42nd AMOP Technical Seminar on Environmental Contamination and Response,
  June 4–6, 2019 Halifax, NS
- GeoIgnite 2019,
  June 18–19, 2019 Ottawa, ON
- IUGG General Assembly,
  July 8–18, 2019 Montreal, QC
- International Glaciological Society Sea Ice Symposium
  August 18–23, 2019 Winnipeg, MB
- International Summer School on Radio Oceanography and Radio Oceanography Workshop 2019
  August 25–30, 2019 Victoria, BC
- Cold Harvest
  September 24–26, 2019 St. John's, Newfoundland
- ASAR 2019: A Workshop on Synthetic Aperture Radar
  October 1–3, 2019 Saint-Hubert, Quebec
- DEFSEC Atlantic Defence Tradeshow
  October 1–3, 2019 Halifax, Nova Scotia

Upcoming

- Teledyne Marine Technology Workshop
  October 6–9, 2019 San Diego, California
- Planet Explore 2019
  October 15–16, 2019 San Francisco, California
- PICES 2019 Annual Meeting
  Connecting Science and Communities in a Changing North Pacific
  October 16–27, 2019 Victoria, BC
- Oceans 2019
  October 27–31, 2019 Seattle, Washington
- Oceanology International 2020
  March 17–19, 2020 London, UK