

SEA STAR

**WASHINGTON
SEA GRANT**

Autumn 2019

**FRIDAY HARBOR
LABS**

A marine biology
student's dream **Page 3**

ED MELVIN

A career saving
seabirds **Page 4**

**WSG FIELD
NOTES**

New staff and new
fellows **Page 6**

A MOBILE SEWER

Free mobile pumpout
services to local
boaters **Page 7**

KING TIDES PROVIDE A WINDOW INTO THE FUTURE OF WASHINGTON SHORELINES

By Andrew Chin, WSG Science Communications Fellow

On a quiet day in Oak Harbor last January, the surface of Puget Sound was as smooth as glass. The water gently reflected the winter sun as 45 pairs of eyes watched the tide slowly overtake the shoreline, reaching the line of driftwood that had been thrown ashore in storms past and the grass lawn of Flinstone Park. This encroachment was a king tide: the edge of the sea was at about the highest point it would reach all year. It was a natural, innocuous event—but as the group watched the water, they grappled with the fact that, as the seas rise, these high-water levels will become more and more common, raising the risk of floods that could damage nearby property.

The gathering was organized by Bridget Trosin, coastal policy specialist at Washington Sea Grant. Trosin heads the Washington King Tides Project,

which monitors the extent of king tide flooding around coastal Washington. She also leads king tide viewing parties like the one in Oak Harbor to help people get a first-hand look at what sea-level rise might mean for their coastal Washington communities. “We invite the public down to the waterfront to talk about king tides and sea-level projections,” Trosin says. The projections come from the Washington Coastal Resilience Project (WCRP)’s sea-level rise report, the result of a collaboration between several groups, including Washington Sea Grant and the UW Climate Impacts Group. The projection for Oak Harbor is a 50 percent chance that seas will rise by nearly a foot by 2050. This means that today’s king tides could one day become the everyday tides across our region.

The ebb and flow of the ocean are a familiar phenomenon to those living in coastal communities, but the extent of both high and low tides varies throughout the year. The term king tide, Trosin explains, describes the most extreme high tides in

King Tides • continued on page 2

Washington Sea Grant’s upcoming king tides viewing parties will help local residents and planners understand the effects of sea-level rise



Bridget Trosin, coastal policy specialist



DIRECTOR'S NOTE

The entire Washington Sea Grant team assembled in June for an all-hands staff retreat. This retreat provided an opportunity for the organization to take a collective breath and for the team to catch up with one another in a low-pressure, informal setting. I am super excited about the event's success, especially because this was the first of its type that any current staff can recall!

We focused on program updates from leadership, informal problem-solving, team-building activities and celebrating our recent successes in leveraging funding. We highlighted the successful Diversity, Equity and Inclusion Workgroup's efforts over the last year to profoundly change WSG's culture internally and externally in everything that we do.

Day two featured a tribal relations training. The training was incredibly powerful for me, and I think it improved our collective understanding of how we can enhance relationships and build trust. 



King Tides • continued from page 1

any given year. Caused by the alignment of the sun, moon and Earth (called syzygy) or when the sun is closest to the Earth (a point called perihelion), these series of unusual tides occur regularly four to five times a year, usually in the winter.

While king tides are a natural phenomenon, the unusually high water levels they bring help scientists, planners and decision-makers visualize how sea-level rise will affect communities. The WCRP sea-level rise projections account for local variability within coastal Washington's complex landscape. This variability can be due to tectonic plate movement, the shape of the seafloor, tides, weather, and human modifications to the shoreline. However, these projections can be challenging to translate to the local infrastructure and ecosystems.

Meredith Penny, a long-range county planner with Island County, is one of the people using these projections in local communities. She explained that Island County is especially vulnerable because of the high proportion of shoreline property across its two major islands, Camano and Whidbey. "We have a lot of private owners, historic beach communities, canal communities and a lot of coastal bluffs," she explained. "Many of these properties are already being flooded by regular king tides. So, people are coming to the county and asking, 'What can the county do? What can we do?'"

Island County hopes to use WCRP sea-level rise projections to inform future development. "We expect to use these projections as guidance and information for property owners during the shoreline permitting process by combining the projections with the expected lifetimes on other property investments, such as septic tanks or shoreline armoring," says Penny. "This allows property owners to make their own decisions about risk tolerance."

The long-term vision for sea-level rise adaptation for Island County includes developing best management practices, assessing risk and reaching out to the most vulnerable communities. It also includes monitoring sea-level rise thresholds in order to initiate discussions about further actions. "Some projects work better on a community-wide scale versus property-by-property, so we're also hoping to develop a framework for community hazard planning—each community can outline flooding tolerance thresholds for themselves, and the county can help provide guidance for different projects, such as community septic systems, dyke repair, beach nourishment or restoration," says Penny.

Trosin is looking forward to more viewing parties around coastal Washington in the winter. Tracking the impacts on every shoreline in Washington during a king tide is a tall order. To assist with this goal, Trosin and collaborators from the Washington Department of Natural Resources, U.S. Geologic Survey, Snohomish County and others have developed a tool for the public: The MyCoast app, which enables people to upload and share photos of king tides that they witness. The images help scientists identify the effects of sea-level rise around coastal Washington. Within only a few months of the new tool's launch in November 2018, there were 56 reports with over 110 photos uploaded from all regions of Washington.

This year's king tides will be the perfect opportunity to snap photos that contribute to the MyCoast database.

To get more information about this season's king tide viewing parties, subscribe to our WSG News email list: bit.ly/sea-star-news

Share your king tide photos by downloading the iPhone/Android MyCoast app: <https://mycoast.org/wa> 

FRIDAY HARBOR LABS: A MARINE BIOLOGY STUDENT'S DREAM

By Helen Kesting, guest student writer

Just 50 miles away from Seattle as the crow flies, the University of Washington runs a marine field station on San Juan Island called Friday Harbor Laboratories (FHL). Wooden buildings, grass fields and grazing deer cover the campus, which is surrounded by nearly 400 acres of mixed coniferous forest. During the weekends, students entertain themselves by hiking or by taking a rowboat to a nearby cove. At night, you might find a dozen or so people huddled out on the docks watching fish swim around a bright dive light: an activity known as “FHL TV.”

Last spring quarter, I lived and studied at FHL as a student in the Zoology-Botany (or “Zoo-Bot”) program. My 16 classmates and I packed our schedule from 8:30 a.m. to 5:00 p.m. with lectures, labs and field trips led by inspirational professors who shared an infectious passion for their respective fields. Our professors were also esteemed research scientists. Washington Sea Grant (WSG) is proud to have supported some of their work.

One of our professors was Megan Dethier, who is currently serving as FHL's Interim Director. In recent years, Dethier received funding from WSG for her research on the factors affecting juvenile clam mortality as well as the ecological impacts of shoreline armoring. She helped me understand the diverse ecological roles occupied by invertebrates in 13 different phyla. Dethier is clearly passionate about her work: “It is gratifying to find that even in this modern era with its different demands on students' time, there is still appeal in courses that get students connected to live plants and animals and their habitats, and doing research about those organisms,” she said.

Once or twice a week, my Zoo-Bot classmates and I would pile into vans and travel to a different location on the island to collect specimens to study. We found sponges and flatworms in Argyle Creek, which runs between the ocean and a lagoon, the direction of its flow changing with the tide. We dug around in the mud for polychaete worms at False Bay, a 300-acre sand flat that fills with water at high tide. Twice, we took out the research vessel, the Centennial, to dredge the ocean floor and found tunicates, sea stars, decorator crabs and an incredible diversity of red algae.

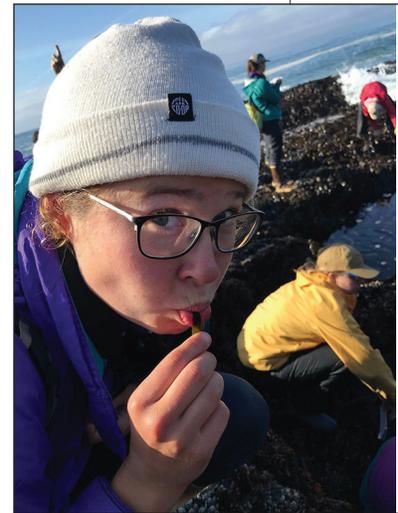
Right: Professor Megan Dethier crawls under a rock formation to get a closer look at the invertebrate diversity at Botanical Beach on Vancouver Island, B.C. Photo: Ryu Kawada

Thanks to a system of pumps and pipes that circulate water from the Puget Sound, we could bring our field trip collections back to the labs and keep them in conditions that mimic the environment. Our seawater tanks were always full of crabs, anemones, nudibranchs, sea stars and other marine creatures, which we could observe at any time. One tank even had a bright magenta scale worm, which was nearly a foot long and only left its glass bottle home at night.

Though the diversity of biota on San Juan Island was stunning, it paled in comparison to what we saw on our final field trip. During the last week of classes, we packed our camping gear and traveled to Vancouver Island, B.C., to spend three nights at Port Renfrew, just south of the famous West Coast Trail. We spent two days at Botanical Beach Provincial Park, where unique geologic features and unparalleled biological diversity create a place of otherworldly appearance.

One of the requirements of the Zoo-Bot program is completing an independent research project. Each one of us formulated a question, designed an experiment, and carried out the experiment in under two weeks. We presented our findings via an oral presentation, as well as a scientific paper. My classmates studied development and behavior in larvae of diverse marine organisms, such as bull kelp (*Nereocystis leutkeana*), sand dollars (*Dendraster excentricus*) and kelp crabs (*Pugettia producta*).

For several of my classmates, this was the first research project of many more to come — perhaps one of them may even receive funding from WSG someday. The experiences my fellow students and I gained at FHL will benefit us throughout our careers as we work to understand our oceans and protect them into the future. 🌱

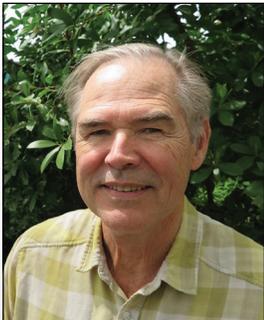


The author tasting a piece of seaweed. It was surprisingly spicy! Photo: Sanna Titus



A CAREER SAVING

Looking back on the work of marine fisheries scientist Ed Melvin upon his retirement.



Ed Melvin

“I’ve never had an ornithology class in my life,” Ed Melvin confides on a sunny afternoon sitting by Seattle’s Portage Bay. For anyone familiar with Melvin’s work, this may come as a surprise. Melvin spent the bulk of his career saving seabirds.

Each year, hundreds of thousands of seabirds, including many endangered albatrosses and petrels, are trapped and drowned in commercial fishing gear. As a marine fisheries scientist at Washington Sea Grant (WSG), Melvin focused on researching and implementing methods that would help prevent seabird bycatch. This work took Melvin around the world and out to the high seas. It gave him the opportunity to work with other scientists, fishermen and policy-makers. It also earned him top honors from UW, the Pacific Seabird Group and NOAA, and a project he led was awarded the prestigious Presidential Migratory Bird Federal Stewardship Award in 2015.

After nearly 30 years on the WSG team, Melvin is now moving onto his next chapter: retirement. We recently talked with him about his career, including how he got started, some of the places it has taken him and how he plans to stay involved. Here’s what he had to say.

California roots

I got my master’s degree in fisheries biology at Humboldt State University. I worked in the stock room, where I handed out research equipment. This gave me the opportunity to interact with a lot of people at the university. A researcher on the California Sea Grant advisory committee suggested that I apply for a job there. I did, and so began my Sea Grant career with a fishery extension position in the counties of Monterey Bay.

I never thought I would be working on bird conservation. The first time I ran into the seabird bycatch issue was when two graduate students and I went out on a Boston Whaler in Monterey Bay, where newly immigrated fishermen were setting gillnets really close to shore—and killing tons of birds and some sea otters. I’ll never forget it. We filled the whole front of the boat with bird carcasses after watching about 20 minutes of a gillnet haul. It was a mess. (The issue was resolved when net fishing was moved further offshore.)

The Earthquake that led to Washington

I was at Candlestick Park for the World Series when the 1989 Loma Prieta earthquake hit. We had great seats—I was sitting right by Hank Aaron (a legendary baseball player). I went to get



G SEABIRDS

something to eat when things started to shake a bit. Eventually, the cops drove out to the field and told people that the Oakland Bridge had collapsed. Moss Landing Labs, where I worked, was also destroyed by the earthquake. So, eventually, I ended up applying for a job at WSG.

My work at WSG started with five years in Bellingham as a fisheries extension agent. When seabird bycatch in the Salish Sea threatened to close the non-treaty sockeye fishery, I was asked to help. This led to three years of testing bycatch solutions proposed by fishermen. In the end, we demonstrated that one of the ideas gleaned from fishermen worked—and bird nets have been required in the Salish Sea gillnet fishery ever since. This was the beginning of a collaborative research model that I have since applied in multiple fisheries.

Alaska

Starting in the 1990s, the bycatch of one or two endangered albatrosses a year threatened shutting down the multimillion-dollar Alaska longline fisheries for groundfish and halibut. As the problem developed, I was asked by NOAA and the industry to lead a research program to resolve the albatross bycatch issue within these fisheries. My approach was the same as with the Salish Sea gillnet fishery:

collaborate with motivated fishermen to test their ideas while they were fishing.

We started the fieldwork in 1999. Eventually, we found that bird scaring lines, also called “streamer lines,” could dramatically reduce seabird mortality in Alaska’s fisheries if deployed to specifications that we developed.

Because we had worked closely with the fleet testing their ideas, streamer lines were readily adopted by the Alaska longline fleet in 2002. What’s really cool is that fishermen adopted streamer lines two years before streamer lines were required through Fishery Management Council action. They didn’t need to read a paper, didn’t need to hear it from the management council; they knew streamer lines worked because that’s what they witnessed. It was experience born out.

Recently, I worked with collaborators to sift through 23 years’ worth of NOAA Fisheries observer data and found that streamer lines have reduced seabird bycatch rates in Alaska’s longline fisheries by 77 to 90 percent. From the time streamer lines were adopted through 2015, we estimated that well over 100,000 birds were saved, including almost 10,000 albatrosses (this study was published in *Conservation Biology* in January 2019).

Ed Melvin • continued on back page

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FIELD NOTES



Education specialist **Maile Sullivan** coordinated another fun and educational NOAA Science Camp, WSG's summer program for middle and high school students. This year, Science Camp hosted Indiana University Bloomington undergraduate **Mag Maurice** as a Doris Duke Conservation Scholar. The Doris Duke Conservation Scholars Program supports budding environmental leaders, encouraging them to develop unique perspectives and skill sets by drawing connections between conservation, individual and community identities, biodiversity and environmental justice. While at Science Camp, Maurice explored opportunities to acknowledge and infuse traditional ecological knowledge, also known as indigenous knowledge, into Camp activities. Currently a senior, she plans to begin working on her master's degree next year, also at Indiana University Bloomington.



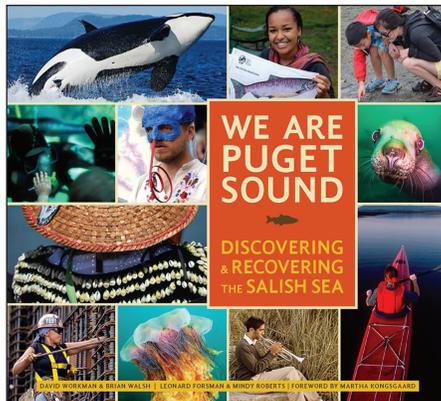
Melissa Watkinson, social scientist at WSG, is co-organizing the first Salish Sea Equity and Justice Symposium, to be held November 14–15, 2019 in Seattle. The event aims to move conversations related to diversity, equity and inclusion within environmental fields forward by elevating historically under-represented and marginalized voices within the Salish Sea and Pacific Northwest Coast Region and creating space for ongoing dialogues. Learn more: <https://ssequityandjustice.weebly.com>



The Quaternary Research Center (QRC) appointed WSG tsunami and coastal resilience specialist **Carrie Garrison-Laney** as a new member. Founded in 1969, the QRC is a hub of interdisciplinary research that attracts UW faculty, students, associates and visiting scientists who study a range of topics—including tectonics, climate, ecosystems and human adaptations to environmental impacts over the Quaternary (the geologic period that spans the past 2.6 million years). QRC is the oldest interdisciplinary center at UW and one of the oldest Quaternary centers in the country.



WSG is proud to introduce its new class of policy and research fellows. **Tressa Arbow, Rachel Assink, Ashley Bagley, Angela Cruz, Alex Sweetser** and **Sonni Tadlock** were named as the Washington Sea Grant Hershman Fellows. Their respective host offices are: Department of Ecology's Shorelands and Environmental Assistance Program, Department of Ecology's Spills Program, Long Live the Kings, Pacific Northwest Crab Research Group, Northwest Indian Fisheries Commission, and Department of Ecology's Coastal Hazards Project. **Katie Chicojay, Kelly Martin, Jasmine Prat** and **Spencer Showalter** have been selected as Knauss Marine Policy Fellowship finalists. In early 2020, each finalist will be placed in a legislative or executive office in Washington, D.C., for a year-long immersive policy experience. UW doctoral students John Best, Megan Federn and Maia Sosa Kapur have been awarded Sea Grant/NOAA Fisheries Graduate Fellowships to support their research on population and ecosystem dynamics or marine resources economics.



We Are Puget Sound: Discovering & Recovering the Salish Sea, a new title from Mountaineers Books by David L. Workman, Leonard Forsman, Mindy Roberts and Brian J. Cantwell, hits shelves this fall. WSG is a proud sponsor. Look for selected excerpts from the book on our blog: wsg.uw.edu/wsg-news/

Want to read these stories online or get more regular updates from WSG? Sign up for our email newsletter! Select WSG News here: bit.ly/sea-star-news



WSG welcomes research analyst **Nancy Nguyen**, shellfish aquaculture specialist **Alex Stote** and program specialist **Fiona Lee**. Based at the Northwest Fisheries Science Center, Nguyen is the newest member of the SoundToxins team. She works with volunteers to provide weekly harmful algal bloom monitoring of Puget Sound sites, prepares and analyzes data, and communicates SoundToxins information to managers, participants and the public. Stote's research focuses on ecological interactions between shellfish aquaculture and intertidal communities on the Washington coast. Findings from her work will be used to inform an ecosystem-based management plan with a focus on sustaining shellfish aquaculture in Washington under current and future environmental pressures. Before joining us at WSG, Lee spent 2.5 years working at the UW College of the Environment Dean's Office as the assistant to the associate deans for administration and research. She provides support on administration, research administration, health and safety, policy and other special projects.

A SUMMER BOAT RIDE ON A MOBILE SEWER

Washington State's Clean Vessel Act program provides free mobile pumpout services to local boaters

By Brittany Hoedemaker, WSG Science Communications Fellow

Ever dream of slipping out of your dark, air-conditioned office for an afternoon boat ride under the warm mid-summer sun? We did, and our summer daydreams became a reality when Washington Sea Grant (WSG) Communications Director MaryAnn Wagner and I got a ride on Seattle's Portage Bay with Katie Wixom and her four-legged co-captain, Roger, one sunny July day.

But this wasn't just any boat—and certainly not one that I ever expected to find myself on. It was a Terry and Sons mobile pumpout boat, which provides free sewage pumpout services for recreational boaters courtesy of the Washington State Parks Department Clean Vessel Program. In partnership with State Parks, WSG leads the Pumpout Washington outreach and education campaign.

Steering clear of sailboats capsized by summer campers, pairs of kayakers and the occasional hungry seabird, Wixom navigated the bay to our first stop at the Seattle Yacht Club. Pulling up to a docked boat that had scheduled a pumpout, it was clear that Wixom is a pro: she knows exactly where the holding tank is and immediately kicks into gear pumping it out. A flash of yellow hose, a trained eye on the nozzle, a swift clean up, and she's done. The whole process only takes a few minutes, and before we know it, we're off to the next dock.

Minutes later, we are greeted by a boater inquiring about an unscheduled pumpout. Wixom recognizes him and happily replies, "You have an account already! I'll get you all set, no problem." She then turns to us and motions to the customer's boat, "He has two holding tanks. One there, and one up front. So I'll pull around to the other side of the dock and we'll be able to reach both." Knowing her customers and their boats so well makes Wixom's service a hot commodity. Not to mention it costs the boaters nothing, thanks to funding from the Washington State Parks Clean Vessel Program, which is funded through the U.S. Fish & Wildlife Service via the Sport Fish Restoration and Boating Trust Fund. Additional funds come through donations from local marinas and the boating community.

Sewage in the Environment

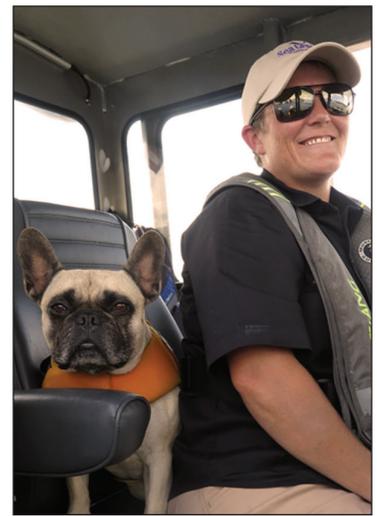
With pumpout services like those provided by Terry and Sons, keeping sewage out of the water has never been easier for Washington boaters. In 2018 alone, boaters diverted nearly 11 million gallons of sewage from Washington waters by using public pumpout and dump stations around the state. Most of these facilities are free to use, although a few have five-dollar service fees. If going it alone, Washington Sea Grant's free adapter kits help boaters minimize the chance of sewage spills and splatters by creating a secure attachment between the pumpout hose and a boat's waste deck fitting.

Boaters' commitment to clean water is definitely to be praised. Raw or untreated sewage discharged into the water has serious ramifications for human and environmental health. Bacterial and viral diseases, like the Norovirus, can spread through the water and become concentrated in shellfish. This can lead to closure of beaches and shellfish beds that Washingtonians depend on for recreation, food and jobs. It can also contribute to anoxia or dead zones as decomposing sewage depletes oxygen resources in the water.

What's Next?

In areas where mobile pumpout services aren't available, boaters can head to one of over 140 public pumpout and dump stations around the state. Since it's so important to keep sewage out of the water, it is essential that these stations are fully operational and accessible. That's why this year, our boating and coastal policy specialists, Aaron Barnett and Bridget Trosin, in partnership with Washington State Parks, have been out in the field conducting a state-wide inventory of public pumpout and dump stations.

"I think one of the coolest things we're doing is meeting and talking with marina operators during our inventories," said Trosin. Just like Wixom, the marina operators know their customers well and can anticipate their needs. Insight from them will help improve pumpout services and make pumping out a breeze for boaters. Thanks to these efforts, next year all facilities around the state will be serviced and operational, offering boaters a critical public service that keeps our waters clean. 🌿



How to Pumpout

Thanks for being such great stewards of Washington waters!

Visit pumpoutwashington.org for more resources, including a map where you can find a pumpout or dump location near you.

Schedule a boatside pumpout at PumpOut.Me.

Or contact Aaron Barnett at aaronb5@uw.edu or Bridget Trosin at bemmett@uw.edu





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Editor, Samantha Larson; Designer, Robyn Ricks; Assistant Director for Communications, MaryAnn Wagner; Technical Advisor, Karen Morrill-McClure. © Washington Sea Grant; all photos WSG except as noted.
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Ed Melvin • continued from page 5

World-wide impact

Most endangered seabird bycatch occurs where the majority of albatross species live: in the southern hemisphere. In 2003, I took a sabbatical in Australia and continued seabird bycatch work. While there, I began meeting with the leading group working on seabird bycatch mitigation at the time: the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), headquartered in Australia.

Later, at the Packard Foundation's invitation I submitted a proposal to push the model we used in Alaska across cultures and hemispheres. That's how I, and eventually my team, wound up on a couple of vessels fishing tuna on the high seas of the Southern Ocean. Most of the crew was Japanese or Indonesian and didn't speak English, and I didn't speak Japanese or Indonesian, so I did a lot of handwaving, drawing on pads and gesturing. Amazingly, we could communicate effectively, but it was exhausting for all involved.

These fisheries were different from the ones we worked on in Alaska. In this case, we found that you had to weight the fishing lines for the streamer lines to work. We also tested seabird bycatch during the day versus at night. Ultimately, we showed that the combination of streamer lines, weighted branchlines and night fishing could essentially get seabird bycatch down to zero. That was pretty cool because no one had done this kind of large-scale collaborative research in the high seas Asian fleets before. Many colleagues thought that it wasn't possible.

Agreement on the Conservation of Albatrosses and Petrels

The CCAMLR meetings morphed into the Agreement on the Conservation of Albatrosses and Petrels (ACAP). Our recommendations for the Southern Hemisphere high seas fleet became ACAP's best practice recommendation for pelagic fleets world-wide.

ACAP is an agreement between the countries that are willing to sign it, like the Paris Accords or the Law of the Sea. The U.S. is not a member, and that has always frustrated me. There are representatives from the U.S.—from the national and international offices at the National Marine Fisheries Service, the State Department, Fish and Wildlife Service, and me. But because the U.S. has not signed the agreement, it means we don't have the impact we could have.

In March 2019, I testified before a subcommittee of the U.S. Congress during a legislative hearing on a bill sponsored by the Audubon Society proposing that the U.S. join ACAP. The bill cleared the subcommittee and now it goes to the House. Next, there will be a Senate bill, which Cory Booker is poised to introduce.

Although retired, I'm interested in staying involved in international work. I'm keeping my role as Affiliate Professor in the UW School of Aquatic and Fishery Sciences and will keep an office here, so you haven't heard the last from me. 🌱

This interview has been edited and condensed for clarity and flow.