Handcrafting the World's Freshwater Laboratory

IISD
EXPERIMENTAL
LAKES AREA

2021-2022
ANNUAL REPORT

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Get through those long winter nights by taking on an IISD-ELA inspired cross-stitch pattern.

I ♥ IISD-ELA

Download the I ♥ IISD-ELA cross-stitch pattern here

bit.ly/ela-heart

MESSAGE FROM THE CHAIR OF THE BOARD AND EXECUTIVE DIRECTOR

Every year when summer is in full force, we mull, we ponder—and, yes, we even muse on—the topic of the upcoming annual report.

What captures the essence of the work of the world's freshwater laboratory over the past year?

What story do we want to tell the rest of the world—from the towns of northwestern Ontario to the grand cities that border the African Great Lakes?

This year's decision was relatively straightforward, as we felt that it was high time to pay tribute to the handcrafted, do-it-yourself attitude that has made IISD Experimental Lakes Area the world's freshwater laboratory.

It was, indeed, that pioneering, pragmatic spirit on which the site was founded. As the world grappled with algal blooms back in the late 1960s, a bunch

of plucky Canadian scientists decided to take the issues into their own hands and "do it themselves." In the process, they created a completely new approach to freshwater research—whole-lake experimentation.

And it didn't stop there.

People are often surprised to discover that, even in 2022, we dedicate a great deal of time to creating our own bespoke sets of equipment for the field, sewing our own unique wardrobe of clothes, and conceiving mini experiments complementary to our work that kids (and even adults) can do themselves in the comfort of their own homes [page 16].

And, of course, from bonfire singalongs and talent shows to visits from artists across Canada, we are always creating our own fun in the middle of the boreal forest, too.

This year, as we have attempted to (vigilantly) ramp up our research activities to pre-pandemic levels, we want to recognize our indefatigable team of researchers who have spent the last 2 years demonstrating that creativity for which we are famed—rejigging their schedules and overhauling their research plans to keep everyone at the site safe.

It has paid off. This year, our work on immediate threats to fresh water, such as microplastics and anti-depressants, is fully underway, with a list of nascent projects—such as one exploring what happens when tires break down and leach into our waterways—ready to go for next year [page 15].

As always, our work is not restricted by borders and continues to impact research and knowledge across the planet. Just ask the African Women in Science who participated in a program that brought them across the pond twice this year to share knowledge, experience, and reflections.

But none of this work would be possible without our incredibly generous group of supporters—which, this year, includes important commitments from government, as well as new funding from The Canada Foundation for Innovation. Together, these agreements represent over CAD 46 million in funding over the next 5 years.

It is to all those supporters, across the country and the planet, to whom we dedicate these next few pages.

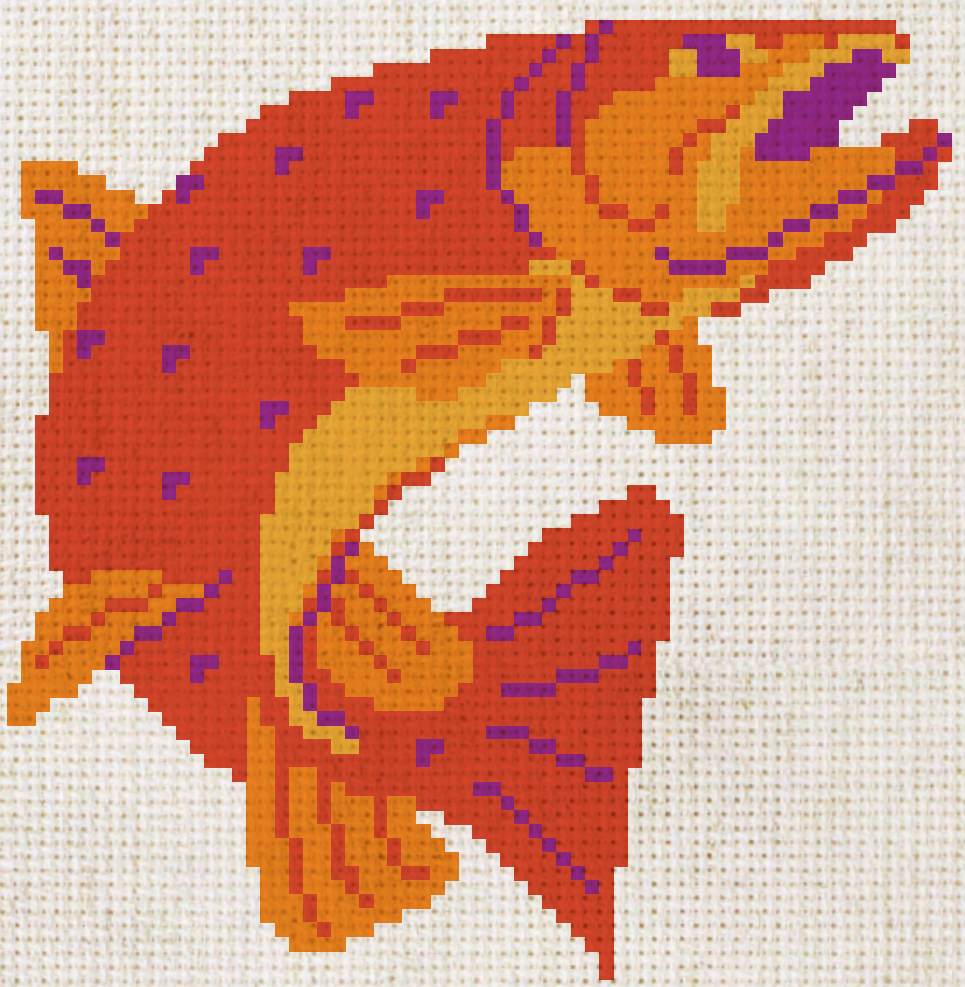
We never tire of saying it—we simply couldn't "do it ourselves" without you.

MATTHEW MCCANDLESS

IISD-ELA Executive Director
IISD Senior Director, Fresh Water

MARTHA CASEY

IISD-ELA Chair of the Board
IISD Vice-President, Operations and Business Transformation



Download the lake trout cross-stitch pattern here

bit.ly/ela-lake-trout

Dr.Zooplankton

Download the Dr. Zooplankton cross-stitch pattern here

bit.ly/ela-zooplankton

AWIS: A WIN

for African Women in Science

It's no secret that, traditionally, women have been denied access to positions in many areas of scientific endeavour, including limnology (or freshwater science).

Sadly, this means their unique perspectives are missing from critical solutions to environmental problems across the globe.

Our African Women in Science (AWIS) program, in partnership with the African Center for Aquatic Research and Education, is seeking to change that.

AWIS is a 10-month program designed by women, for women, to support the interests, needs, and goals of early-career scientists working on Africa's

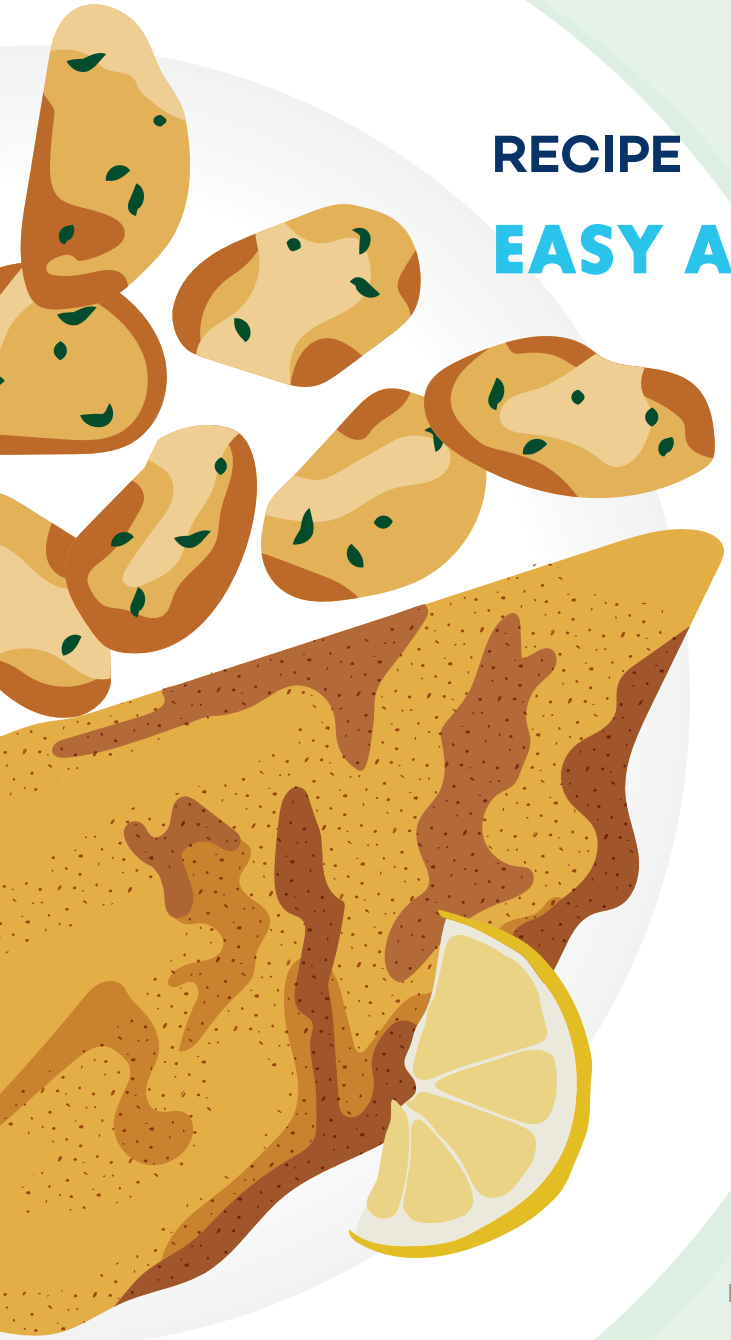
Historically, women are denied positions in sciences. That means that their perspectives are missing from the critical research that needs to be done. We can't solve the world's problems if we are only hearing from half the population.

ESTHER KAGOYA
a participant in this year's AWIS program

freshwater issues. AWIS aims to ensure that more researchers are best equipped to protect North America's and Africa's Great Lakes—critical sources of food, clean water, and secure employment for tens of millions of people.

And this year, we were thrilled to host our very first in-person session—inviting 11 women working on freshwater issues around the African Great Lakes to the United States and Canada to share experience, knowledge, and plans with their peers.

This involved attending—and even presenting at—the Joint Aquatic Sciences Meeting in Michigan and visiting yours truly—the world's freshwater laboratory—to discover how researchers are working on the Laurentian Great Lakes and sharing their expertise.



RECIPE

EASY AIR FRYER WALLEYE

INGREDIENTS

2	fresh walleye fillets*
1	egg
1 cup	panko crumbs
1 tbsp	garlic powder
1 tsp	smoked paprika
	Salt and pepper to taste
	Non-stick cooking spray

Optional: lemon for garnish

* Walleye may be labelled as pickerel in the store, depending on your location.

Recipes courtesy of the Marine Stewardship Council

Serves 4

Prep time 20 min

Cook time 15 min

This recipe is a great alternative to deep-fried fish fillets. It can also be adapted as a low-sodium option by skipping the salt or gluten free by using gluten-free breadcrumbs instead of panko crumbs. Serve with oven-baked potato wedges and a green vegetable, and you've got a healthy replacement for fish and chips!

INSTRUCTIONS

1. Prepare the walleye fillets by removing any skin and gently patting with a clean tea towel to remove any moisture.
2. Crack the egg into a bowl and whisk.
3. To prepare the breadcrumb mixture, pour the panko crumbs into a bowl and add garlic powder, smoked paprika, salt, and pepper. Mix until the spices are evenly spread throughout the mixture.
4. Coat the fish by first dipping it in the egg and then coating it in the breadcrumb mixture. Make sure the fillets are fully coated with breadcrumbs on both sides.
5. Spray the air fryer basket with non-stick cooking spray and place fillets inside.
6. Cook the fish at 190°C for 12–15 minutes (cook times may differ slightly depending on the air fryer model). Serve with lemon garnish if desired.

NOTES

Walleye sometimes have very small bones that can be hard to see—check carefully for bones before eating.

If you don't have an air fryer, you can make this recipe in a conventional oven as well, but cook times may be longer.

★ Please post your process and results on social media and tag us, so that we can share your DIY efforts with the world!

RECIPE

SAYADIEH (Lebanese rice and fish)

INGREDIENTS

2 tbsp	olive oil
3	yellow or white onions
2 cups	long-grain rice
1 ½ tsp	salt + a little extra for fish
1 tsp	pepper
1 tsp	turmeric
1 tsp	cumin
½ tsp	cinnamon
½ tsp	ground ginger
1 ½ lbs	local, certified fish (any type, but preferably white fish)

Optional: chopped almonds and parsley for garnish

Recipes courtesy of the Marine Stewardship Council

Serves 8

Prep time 10 min

Cook time 30 min

Sayadieh is the perfect dish for those cold Manitoba nights that make you wish you were on vacation in the Mediterranean. Popular in Lebanon, Sayadieh can be made with almost any type of fish (although white fish are preferable) and just a few other easy-to-find ingredients.

INSTRUCTIONS

1. Roughly dice the onions.
2. Heat 1 tbsp of oil over medium heat and sauté the onions until they begin to brown.
3. Add the rice and all spices to the pan and stir to coat.
4. Add 4 cups of water to the pan and cover to cook the rice. Leave cooking until the rice has absorbed all the liquid then remove from heat.
5. Season the fish with some salt on both sides of the fillet and fry in a separate pan using the remaining 1 tbsp of olive oil.
6. When the fish is cooked through, break it up into small pieces and sprinkle it over the rice.
7. If desired, top the dish with chopped almonds and parsley as a garnish.

NOTES

For a more authentic Mediterranean experience, serve this dish with tahini. It can be found in the international aisle of most major grocery stores.

★ Please post your process and results on social media and tag us, so that we can share your DIY efforts with the world!


ROCHMAN
LAB

PLASTIC. FANTASTIC?

You've seen the headlines. In fact, it seems like every day we are exposed to articles about how plastic pollution—from microplastics in particular—is affecting our environment and water supplies.

Microplastics (plastic particles that are smaller than 5 mm) are used in all aspects of contemporary life, but little is known about what happens when they break down and reach our precious water supplies—especially not our freshwater supplies.

That's where we come in.

After a few years of testing the current state of the lake we planned to do research on (called baseline monitoring), we launched small plastic enclosures called mesocosms into that lake. We carefully added microplastics in order to see what the impact on the overall water column would be—from the chemistry of the water to the health of the fish.

The ultimate goal? To manipulate a whole lake in a few years to discover how the lake and its inhabitants—from zooplankton to fish populations—respond to microplastics.

Then, as always, we need to convert what we discover directly into policy to make sure that the best decisions are made to protect our fresh water for us and for generations to come.

DIY ACTIVITY

STRAWBERRY DNA EXTRACTION

Did you know that there is a way to monitor species in an ecosystem without actually seeing it? That is because species leave a trail behind them—environmental DNA (eDNA)—after it has left their bodies.

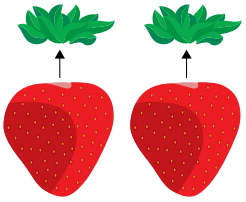
At IISD-ELA, we have been exploring the potential of eDNA to help us track the species in our lakes in a less invasive way. We have also partnered with the University of Manitoba and FortWhyte Alive on a whole high-school class focused on the potential of eDNA for freshwater research, and ecology more broadly!

Try out this fun activity that allows you to see the DNA of a strawberry!

★ Please post your process and results on social media and tag us, so that we can share your DIY efforts with the world!

Adapted from: https://www.genome.gov/Pages/Education/Modules/StrawberryExtractionInstructions.pdf

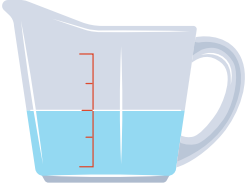
1 resealable plastic bag



2 strawberries (fresh or frozen)

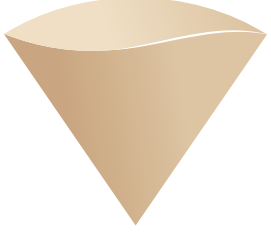
2 tsp dishwashing liquid

1 tsp salt



½ cup water

2 plastic cups



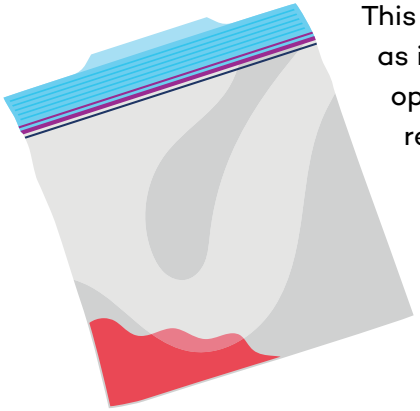
1 coffee filter

½ cup cold rubbing alcohol

1 coffee stirrer

1

Put strawberries in the plastic bag and smash them for about 2 minutes. The strawberries need to be crushed! This is important as it breaks open cells and releases the DNA.



2

In a plastic cup, mix:

2 tsp dishwashing liquid
1 tsp salt
½ cup of water

3

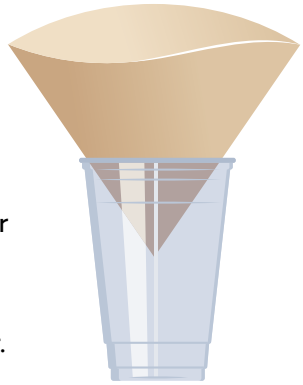
Add 2 tsp of the DNA extraction liquid to the bag of mashed strawberries. This will further open the cells.

4

Seal the bag and mix the strawberries and liquid for 1 minute. Try not to make too many soap bubbles.

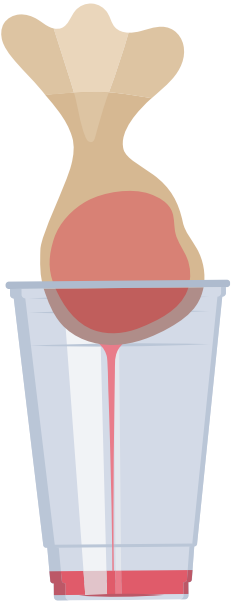
5

Place a coffee filter in a plastic cup. Pour strawberry liquid into the filter.



6

Twist the filter just above the liquid and gently squeeze all the liquid into the cup.

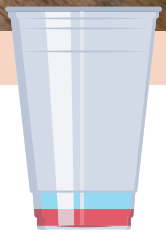


7

Pour an equal amount of cold rubbing alcohol down the side of the cup. Do not mix or stir. The DNA from the strawberry is now isolated!.

8

You should see a white substance (DNA) atop the strawberry liquid. Tilt the cup and pick out the DNA using the coffee stick



PHILANTHROPY

TOMORROW NEEDS YOU TODAY!

As you know, IISD Experimental Lakes Area's work has driven key findings on acid rain, the connection between phosphates and algae blooms, and how mercury in the air affects fish in the water.

The knowledge we've generated and shared has influenced policy decisions in government and industry for more than 50 years. And, since we took over operation of the world's freshwater laboratory in 2014, IISD Experimental Lakes Area has continued its tradition of cooperative whole-ecosystem science while increasing access to freshwater knowledge by developing an education and outreach program.

We've achieved a great deal with limited resources through determination and meaningful collaboration. In fact, the current demand for IISD-ELA programming well exceeds the capacity of the site's existing infrastructure.

Thanks to the tireless efforts of many, we are pleased to share that IISD-ELA has secured significant commitments from governments as well as new funding from the Canada Foundation for Innovation. Together, these agreements represent over CAD 46 million in funding over the next 5 years and are a testament to the vital role IISD-ELA plays in Canada and around the world.

We are now positioned to launch *Tomorrow Needs You Today*—a public campaign to equip the world's freshwater laboratory with functional facilities and a healthy endowment fund to ensure that infrastructure will be maintained and science will be sustained—come what may.

TOMORROW NEEDS YOU TODAY encompasses two priorities:

1

The CAD 11 million Campus Renewal Initiative is anchored by the 10,000-square-foot Centre for Climate and Lake Learning, which also includes expanded lodging facilities, and the decarbonization of our power grid. At the time of publication, CAD 2.1 million has been secured thanks to donors and funders.

2

The robust CAD 10 million endowment fund balance will provide a sustainable lifeline and a steady heartbeat for our one-of-a-kind natural laboratory. At the time of publication, IISD Experimental Lakes Area's endowment fund, managed in perpetuity by The Winnipeg Foundation, has a principal of CAD 3.4 million thanks to generous donor support.

X X X X X

For a limited time, every dollar donated will become $2, thanks to generous gifts from Michael Paterson and the Gail Asper Family Foundation, as well as the John and Pat McCutcheon Family Foundation.

To see the full list of our 2021–2022 donors visit our website iisd.org/ela/support

IISD Experimental Lakes Area is proud to honour a family whose philanthropy has been truly transformational as our first Steward of a Living Lab.

Stewarding a Living Lab, Starting With McCutcheon Lake (a.k.a. Lake 226)

Best known for what is described as "the most famous picture in limnology," Lake 226 is an hourglass-shaped lake that changed the world's understanding of nutrients and algae.

And going forth, Lake 226, will also be known as McCutcheon Lake. IISD Experimental Lakes Area is proud to honour a family whose philanthropy has been truly transformational as our first *Steward of a Living Lab*. To date, the John and Pat McCutcheon Charitable Foundation has invested more than CAD 3 million in the world's freshwater laboratory; the impact of this generosity will ripple for decades to come.

You can join the McCutcheons and help ensure that IISD-ELA continues to play its vital role in contributing crucial data to the global conversation about fresh water by donating to become a *Steward of a Living Lab.*

Your gift of CAD 1 million to IISD-ELA will attach your name to one of the 58 living labs in the protected northern Ontario lake system.

In partnership with global agencies, governments, and our neighbours on Grand Council Treaty 3 territory, we have been protecting fresh water for more than five decades and continue to be at the forefront of critical research—**now, you can join us.** By supporting a living lab at IISD-ELA, you'll help ensure it remains a vital scientific resource and thriving natural ecosystem for generations to come.

MAKING A ZOOPLANKTON NET

So much of the research we do at IISD Experimental Lakes Area is unique and specific to us. It often, therefore, requires equipment that is specialized in terms of function, and size.

There is a strong tradition of our researchers developing and making their own equipment tailored for a specific purpose. In fact, two key researchers in the 50-year history of IISD-ELA got their hands dirty and made the trap nets that we still use to this day!

And we are not alone. You might assume that all researchers simply buy their equipment online, but making equipment specific to your research is a practice common to many scientific research institutions.

Lee Hrenchuk, for example, is already an accomplished sewist and has just taken over the task of creating zooplankton nets to track the abundance and species of zooplankton found in our lakes from Doug Allan, who had done it for many years. They are made with material suited specifically for the size of zooplankton we want to track and for the size of our equipment and lakes.

Tracking zooplankton is a crucial part of our Long-Term Ecological Research datasets and is also often tracked before and after major experiments to see what impact our manipulation has had on the zooplankton populations.

Allow Lee to guide you through the process…

1

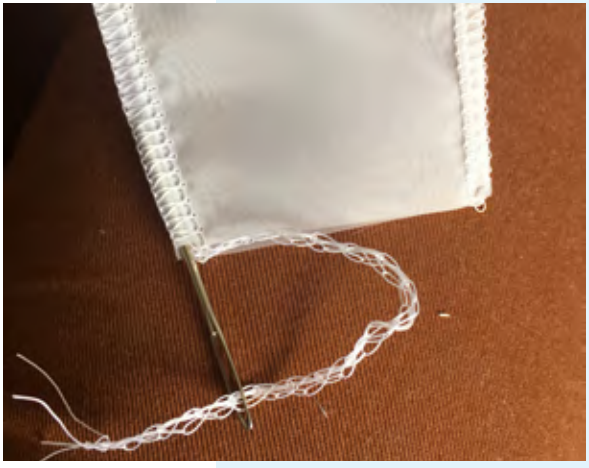
First I use a hard plastic template to make sure all of the nets are the same size. We use a type of fabric called Nitex, which has the specific mesh size we need to capture the zooplankton we want to track. Nitex is quite pricey, so I am sure to waste as little as possible when measuring it out.

2

Next I use a rotary cutter to cut the Nitex that will make up the body of the net.

See the video of this step

youtu.be/lX_TJQwt1tc



3

I then use a serger to stitch the two sides of the net together. We have to use some pretty tough thread to make sure the edges seal and stay together. The serger creates an overlock stitch that prevents the edge of the material from fraying. I finish the bottom by weaving the thread tail into the seam.

4

It's then back to a regular old sewing machine to sew the collar on. The collar is made of canvas and is what attaches to the apparatus we use to collect the samples.

See the video of this step

youtu.be/OjMPqcRIsUM

5

I just need to add a spigot to the small opening and here it is—the finished zooplankton net. It will be used for 1 year in one lake!

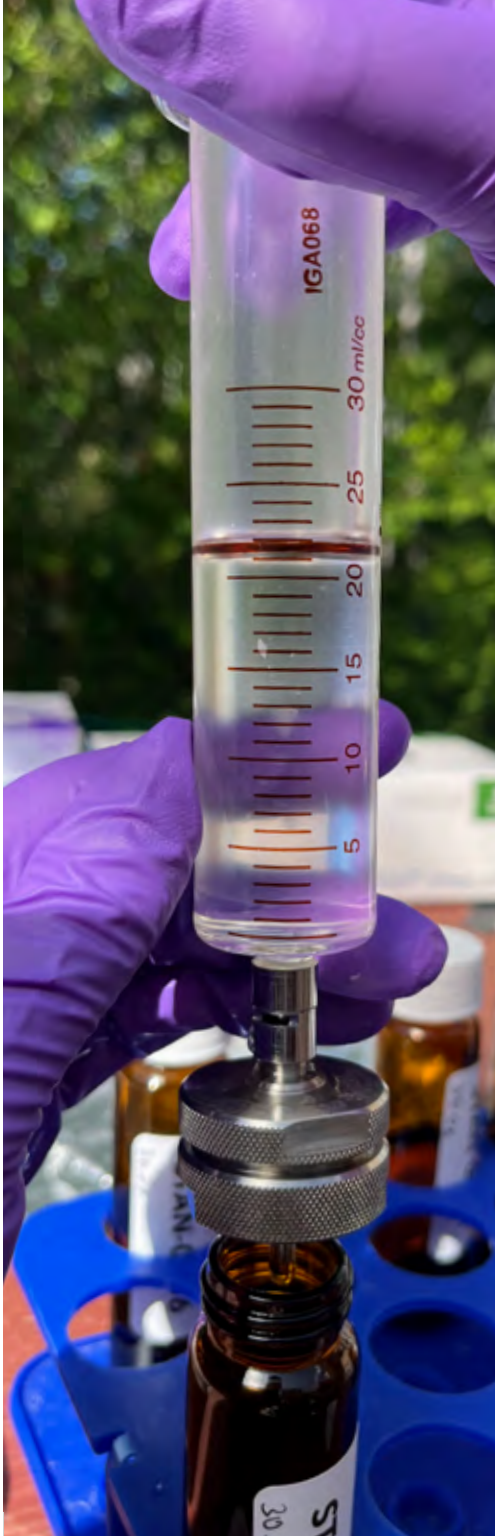
Now we get to see the nets in action. The net is lowered down to take a sample of the water column (not including the sediment) and then raised and drained to concentrate the zooplankton. Remember we are using Nitex, which has just the right-sized mesh to capture what we want. We then determine the species and number of zooplankton in that sample, and then use a formula to extrapolate and determine the abundance of zooplankton in the whole lake.

FINANCIALS

STATEMENT OF FINANCIAL POSITION	2022 $	2021 $
Assets		
Current		
Cash and cash equivalents	2,586,089	1,699,938
Restricted cash	532,124	528,413
Current portion of grants receivable	1,816,289	1,032,937
Accounts receivable	68,437	80,844
Prepaid expenses	26,116	75,127
Total current assets	**5,029,055**	**3,417,259**
Grants receivable	505,282	263,300
Investments	1,382,242	1,245,568
Capital assets, net	1,410,794	1,200,325
Intangible assets	28,584	28,584
	8,355,957	**6,155,036**

To see the full IISD-ELA financial statements, visit our website at iisd.org/ela/about/annual-report

STATEMENT OF FINANCIAL POSITION	2022 $	2021 $
Liabilities and net assets		
Current		
Accounts payable and accrued liabilities	574,926	640,526
Due to International Institute for Sustainable Development	104,429	74,193
Current portion of deferred contributions	1,450,830	1,460,672
Total current liabilities	**2,130,185**	**2,175,391**
Deferred contributions	518,815	165,032
Deferred capital contributions	2,867,164	1,039,189
Total liabilities	**5,516,164**	**3,379,612**
Net assets		
Net assets invested in capital assets	367,697	317,524
Sustainable Future Fund	800,000	800,000
Remediation fund	532,124	528,413
Unrestricted net operating surplus	1,139,972	1,129,487
Total net assets	**2,839,793**	**2,775,424**
	8,355,957	**6,155,036**



STATEMENT OF OPERATIONS AND CHANGES IN UNRESTRICTED NET OPERATING SURPLUS	2022 $	2021 $
Revenue		
Designated grants	3,985,539	3,735,829
Sustainable Future Fund	70,759	—
Donations – unrestricted	75,411	74,662
Amortization of deferred capital contributions	124,094	143,395
Other	303,760	456,534
Investment income	18,112	18,041
	4,577,675	**4,428,461**
Expenses		
Field station operations	972,870	746,766
Field research	1,987,238	1,708,599
Administration	860,888	734,940
Marketing and fundraising	99,976	139,963
Outreach and education	342,723	311,534
Laboratory research	40,590	63,982
Offsite research and technical review	209,021	201,749
	4,513,306	**3,907,533**
Excess of revenue over expenses for the year	**64,369**	**520,928**
Appropriation from and to unrestricted net operating surplus		
Change in net assets invested in remediation fund	(3,711)	(4,036)
Change in net assets invested in capital assets	(50,173)	(166,554)
Increase in unrestricted net operating surplus	**10,485**	**350,338**
Unrestricted net operating surplus, beginning of year	1,129,487	779,149
Unrestricted net operating surplus, end of year	**1,139,972**	**1,129,487**

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