



Friends of Merrymeeting Bay (FOMB) is a 501(c)(3) non-profit organization. Our mission is to preserve, protect, and improve the unique ecosystems of the Bay through:

## Education

## Conservation & Stewardship

## Research & Advocacy

## Member Events

Support comes from members' tax-deductible donations and gifts.

Merrymeeting News is published seasonally and is sent to FOMB members and other friends of the Bay. Article hyperlinks and color images are available in web edition at: [www.fomb.org](http://www.fomb.org)

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Chair  
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## STINKY SALMON & OTHER NATURAL FERTILIZERS

From dying salmon, mighty redwoods grow. Scientists have long studied how the expansive, lush forests of the Pacific Northwest are **nourished** by an annual **fertilizer boost** provided by migrating salmon. As salmon return from the ocean, where they can gain more than **98% of their body weight**, they import a wealth of nutrients from their **marine feeding grounds** to the freshwater habitats of their birth. Stream networks act as arteries of the landscape, allowing salmon – and the nutrients they carry – to disperse across large swaths of the Pacific Northwest.

A diverse array of animals feast on this seasonal salmon buffet, and through their digestion distribute “**fish fertilizer**” far beyond river channels. **Carcasses** that go uneaten slowly decay and provide nutrients for microbes and plants. In this way, the parental generation of salmon likely serves to enhance conditions for their offspring by boosting plant growth and food resources in the streams where they lay their eggs.

The same principle applies to Central Valley streams, where nitrogen from the ocean, transported in the form of Chinook salmon, can contribute up of a quarter of the nitrogen found in wine grapes cultivated near streams with appreciable salmon runs (**Merz and Moyle 2006**).

Salmon migrations are not the only pathway for marine nutrients to enter freshwater and terrestrial systems. Seabirds that forage over great expanses of the open ocean concentrate nutrients in the form of guano on islands where they roost and nest (**Anderson and Polis 1999**). There, the fertilizer they provide supports plant life in an otherwise nutrient-limited environment. Local plants and animals have adapted to and rely upon this nutrient input, and interruptions or changes to the mechanisms that transport nutrients from the ocean to freshwater and terrestrial environments can have far-reaching consequences.

Scientists suggest that currently, the Pacific Northwest receives a **mere 6-7 %** of the marine nutrients historically provided by returning salmon to fertilize the next generation's rearing habitat (**Gresh et al. 2011**). In the case of salmon, overfishing, habitat destruction, and poor management practices have all contributed to population declines, and now their low abundance – and the lower amounts of nutrients they transport – may **limit their ability to recover**. On the Aleutian Islands, the introduction of foxes to bolster the fur trade has **reduced the number of seabirds**, and the loss of their guano has in turn changed the soil fertility and transformed formerly rich grasslands into harsh tundra (**Croll et al. 2005**).

Fish don't just transport nutrients – they can also benefit from nutrients transported by other species. In a study published earlier this year in the scientific journal *Nature*, researchers describe how exotic introduced rats can disrupt the transfer of marine nutrients to tropical islands by decimating seabirds (**Graham et al. 2018**). On islands that have remained rat-free, birds deposit 200 times more nutrients than on those with rats. The reef systems that surround the islands also receive a nutrient boost from the guano runoff. As a consequence, reef fish grow faster and their biomass is greater near rat-less islands.



Photo: [Robert OToole](#)

## STINKY SALMON (CONTINUED)

This study illustrates the complex connectivity among different communities (*in Maine as well*) offshore, near shore, at sea, and on land, highlighting once more how human intervention can have unexpected and widespread consequences. Efforts have been made to correct these human-caused nutrient deficits and re-establish the natural conveyor belt of marine nutrients, such as eradicating introduced species or by adding salmon carcasses – or even artificial fertilizer – to streams. In the latter case, however, studies indicate that real salmon carcasses are far superior as a source of nutrients than fertilizer pellets (Wipfli et al. 2011). More often than not, nature knows best.

December 10, 2018 *Fish Report* from FishBio, a fisheries and environmental consulting company dedicated to advancing the research, monitoring, and conservation of fishes around the world. <https://fishbio.com/field-notes/the-fish-report/stinky-salmon-natural-fertilizers>

## FROM THE CHAIR - THE LITTLE THINGS COUNT!

Back in 1998 we launched a first-of-its-kind research project mixing historical aerial photography of the Bay (1956 and 1981) with current imagery in order to document and study changes over time. Photography was used for photointerpretation of aquatic and upland vegetation cover types as well as changes in development (buildings, roads, etc.). Cover types were plotted into the digital format of geographic information systems or GIS and mapped in this way. (See Abbagadasset marsh images below, comparing color infrared to GIS interpretation.) From GIS data, analyses of change can more easily be done. We hired James W. Sewall of Old Town to do this work. Our study area included the entire Bay and ½ mile upland buffer inclusive of the tributaries. The project area extends north on the Kennebec to the Richmond Bridge and south to below Thorne Head. We updated this work in 2009 and another update became a big piece of our 2018 research agenda.

As I write this, the final Sewall report is nearly complete. With the 2018 update, resulting maps will illustrate more than 60 years of change in this dynamic inland delta; including shifts in aquatic vegetation affecting habitat productivity for diadromous fish, waterfowl feed resources and possibly reflective of climate change and rising sea levels. Upland habitat changes indicate growth in shoreland development, conversion of farmland to forest or housing and more. FOMB will share the report and maps with our communities and incorporate the study into the elementary education programs we provide both in schools, and outdoors at our annual spring and fall Bay Days. The fruits of this project come from an aggregation of many little data points.

In 2018 we finally broke ground on the Dresden Falls archaeology and wildlife preserve to see whether ground penetrating radar (GPR) results from 2017 interpreted as showing a buried historical foundation and various prehistoric dwelling circles were in



fact accurate. Working with the Maine Historic Preservation Commission crew and a team of enthusiastic and experienced volunteers we spent two weeks in the upland historical and lower prehistoric areas. The “foundation” lines turned out to be plow scars and no circular dwelling areas were defined although various “features” were found in both areas and lots of small artifact fragments. Here again, the little things; lithic flakes, calcined fish and mammal bone, charcoal and pollen bits will be the ingredients for a bigger and more comprehensive story of the site.

This past year FOMB again got students out of their digitally infused classrooms and into the mud. Two successful Bay Days brought tactile, experiential and fun learning to about 350 4<sup>th</sup> graders. We also brought our taxidermy critters accompanied by hands-on bones, talons, feathers and hides to approximately 600 in-school kids around the Bay. With apologies to Mahatma Gandhi, if we are to teach real care for our environment and the holistic nature of our world, we must begin with the children, the little ones.

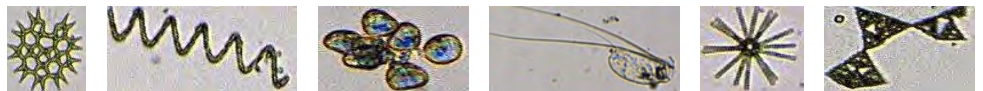
Much of our advocacy work in 2018 revolved around our partnership with Friends of Sebago Lake in our efforts to restore migratory fish to the Presumpscot River and the entire watershed. While all Presumpscot River dams had fish passage in the late 1800's, now only Cumberland Mills a non-hydro dam lowest on the river has it. And, just since 2013. Unfortunately, Sappi, owner of all dams on the river but one, in league with two NGO's (Friends of the Presumpscot River and Conservation Law Foundation) along with MDMR, DEP, USFWS and the city of Westbrook have conspired to prohibit any migratory fish passing the Gambo and Dundee dams for at least another 34 years. This in exchange for enhanced passage at Westbrook with removal of the Saccarappa dam.

Approximately 90% of the watershed's native range for migratory species lies above Gambo dam. At least on paper, most of the justifications for removing existing passage requirements at Gambo and Dundee revolved around the extraordinary time it might take migratory fish to reach Gambo in sufficient numbers to activate a biological trigger of 18,020 blueback herring, a type of river herring virtually indistinguishable from alewives. The trigger number activates fish passage requirements.

After all their permitting was in place, Sappi finally released the numbers of fish passing Cumberland Mills in 2018. 53,000 river herring!!! While Sappi, who runs the fishway and counts the fish ( but there's no conflict of interest) claims there were only 275 bluebacks amongst the 53,000 river herring, DMR has estimated blueback percentages during stocking efforts at 25% and bluebacks passing Benton Falls on the Sebasticook range from 24-35% of river herring in recent years. Twenty-five percent of 18,000 is an estimated 13,250 blueback herring, making the probability of reaching the necessary biological trigger of 18K for further fish passage very likely by 2021 when passage in Westbrook should be completed. Is there any possible good reason why we allow dam owners having the most to lose with increased fish presence, to run the fishways and count the fish? Here again, in the face of incredible odds, little fish, one step up on the food chain from plankton, are showing up to make their presence known.

And speaking of plankton, please read the longer than usual article in this issue about the effects of altered freshwater flows. They go far beyond the physical obstructions dams create for migratory fish, impacting the very food chain base, phytoplankton and zooplankton, the very little things we can not do without. With the current administration in Washington vehemently anti-environment, Maine and other states are facing the risks of offshore oil development. Maybe we can learn from our maritime neighbors?

### *Some Merrymeeting Bay Plankton:*



During seismic testing off Newfoundland and Labrador, a dramatic 50% drop in the number of plankton has [renewed calls to halt seismic testing](#) by the oil and gas industry. Remaining plankton appear to have shifted to those of smaller size. Seismic surveys produce the loudest human-made sounds in the ocean aside from explosions. The process involves towing air guns behind ships and shooting loud blasts of compressed air through the water and into the seabed to find oil and gas deposits that may be buried there. The guns release at high pressure and can go off every 10 seconds around the clock for months at a time.

Data collected by scientists with the federal Department of Fisheries and Oceans (DFO) have revealed a steady decline over the last five years in phytoplankton and zooplankton. The tiny organisms live near the ocean's surface and underpin the entire marine food web, feeding the smallest and largest of creatures that call the ocean home. Small but mighty, they are what make life on Earth possible.

Meanwhile, above the high water mark, our world is seeing a massive decline in insect populations. 2.5% per year for the last few decades says one recent study *Worldwide decline of the entomofauna: A review of its drivers* and a 75% decline in Germany says another. Likely reasons include habitat loss to agricultural land, climate change and pesticide use but ignored by most scientists is possibly an equal or far greater culprit, air pollution caused by low level radiation from wireless proliferation. "If insect species losses cannot be halted, this will have catastrophic consequences for both the planet's ecosystems and for the survival of mankind," said co-author of the entomofauna paper Francisco Sánchez-Bayo. The little things certainly matter.

FOMB has a membership of about 450 households, and an extraordinary volunteer rate of about 33%. We might be considered like plankton and river herring, small but mighty. It takes all of us to make FOMB work and I'm so thankful to all of our volunteers and all of our donors. Most volunteers get thanked along the way during the year so I'd like to shout out here to a few who don't; our board members: Tom, Simon, Becky, Vance, Nate and Phil for their dedication, envelope addressers extraordinaire: Terri Blen Parker and Linda Hornbeck and part-time staffer Brooke Hoerner for her great work in the office. Thank you all. It's the little things that count. *Respectfully Submitted, Ed Friedman*

## ALTERED FRESHWATER RIVER FLOWS

Each time I hear Hydro Quebec mentioned as synonymous with green energy I cringe all the way from my head to my toes. Not only did the damming of most large rivers in northern Quebec destroy the native Cree culture, drive wildlife populations that could escape rising waters into limited areas of high ground and destroy the free flowing rivers with their migratory fish populations; we've come to learn there are a myriad of other seriously adverse effects. There is extensive but generally older research on the effects of altered freshwater flows. Locally, our partners at Friends of Sebago Lake (FOSL) have become quite interested in the subject and hope to compile a central online repository for this research. A number of published papers on the subject, particularly dealing with vital nutrient transfers can be found on the [FOSL](#) website. What follows gives a better idea of true energy costs coming through the recent Central Maine Power's Maine Power Reliability Project high voltage transmission corridor and what is planned for the now fiercely contested proposed new CMP corridor through Maine to southern New England. And, an idea of what effects Maine's dammed rivers may be having in addition to physically blocking fish.

This first excerpt is from: *After a Long Boom, an Uncertain Future for Big Dam Projects*, written by Jacques Leslie and published November 27, 2018 in *YaleEnvironment360* from the Yale School of Forestry & Environmental Studies. "The environmental costs of dams have been well documented. They devastate fisheries by blocking fish migration and the downstream flow of nutrients to estuaries, and they upset river hydrological regimes that plants, animals — and humans — depend on. They are often touted as generators of clean energy, but even that assertion is being undermined by increasing evidence of substantial methane emissions from reservoirs."

"The International Hydropower Association touts dams as a clean technology, but that's not quite true: Many reservoirs emit substantial amounts of methane, a potent greenhouse gas released by decomposing vegetation and other organic matter that collect in oxygen-poor reservoirs. A 2016 [study](#) in *BioScience* found that methane emissions from reservoirs constitute 1.3 percent all of global human-caused greenhouse gas emissions, and the highest-emitting reservoirs rival coal-fired power plants. It is commonly assumed that methane emissions occur chiefly in shallow, tropical reservoirs, as if it's a problem for only a small number of dam projects. But according to John Harrison, a professor at Washington State University's School of the Environment and one of the study's authors, "There is strong and growing evidence that temperate reservoirs can produce methane at rates comparable to those reported from tropical reservoirs."

**And from Steve Kasprzak in a special to the Maine Sunday Telegram on December 23, 2018:**

### **Maine Voices: Hydroelectric dams produce green energy? Think again**

"Before advocating for [the 145-mile line](#) to carry hydroelectricity generated by Hydro-Quebec (Our View, [Dec. 9](#)), the Maine Sunday Telegram Editorial Board should first explain why hydroelectricity produced by reservoir dams should be called "green energy." The construction of these dams in Maine would be prohibited by [Section 401](#) of the Clean Water Act of 1972 and [Maine's Natural Resources Protection Act](#).

Every reservoir hydroelectric facility [represents an environmental catastrophe](#), not only to the dammed river, but also to the ocean regions where the rivers' currents convey nutrients. Commissioned in 1969, the Outardes-4 hydroelectric reservoir dam on the Outardes River discharges into the St. Lawrence River. Its surface area is 252 square miles – five times bigger than Sebago Lake.



Manicouagan Reservoir - NASA

Four other hydroelectric facilities, built from 1967 to 1989 on the nearby Manicouagan River, also discharge into the St. Lawrence. The Manicouagan Reservoir (*utilizing a 5km asteroid impact crater from 215.5 million years ago and now 100km across and a tourist attraction known as "The Eye of Quebec"-ed. note*) is a giant head pond created by the Daniel-Johnson Dam and has a surface area of 750 square miles – equivalent to 16 Sebago Lakes.

There are four other reservoirs on the Manicouagan River, and the Mavic-Outardes hydro project has an annual capacity of 5,579 megawatts. Maine's total annual hydroelectric capacity is 753 MW. The St. Lawrence, the largest-volume river (*inclusive of the Great Lakes which it drains-ed. note*) in North America, is the major supplier of dissolved silicate to the Gulf of Maine, as daily flows are 40 to 50 times greater than any of Maine's major rivers. The Churchill Falls Generating Station was built in the 1970s in Newfoundland-Labrador on the Churchill River, which discharges in the Labrador Current.

There are 11 generating units and a series of 88 dikes, which have a total length of 40 miles and created the Smallwood Reservoir with a surface area of 2,200 square miles – equal to 46 Sebago Lakes. The annual capacity is 5,428 MW.

The Robert-Bourassa hydroelectric project was completed in 1986 in Quebec on the LaGrande River, which discharges into James Bay. It has an annual capacity of 10,800 MW and five reservoirs with a surface area equal to 89 Sebago Lakes. A second phase of hydroelectric dams was built on the LaGrande River in the 1990s with an annual capacity of 5,200 MW. The surface area of these three additional reservoirs equals 13 Sebago Lakes. The surface areas of the above reservoirs, built on just four rivers, are equal to 169 Sebago Lakes or 982 transmission corridors 145 miles long by 300 feet wide.

Before these dams were built, the silica cycle was in a steady state with input balancing off the output. The major output loss is in the ocean waters, where it is estimated that the burial rate of biogenic silica is 2 to 3 percent per year. A cumulative loss of 3 percent per year would result in a 50 percent loss of silica in only 23 years.

This ocean loss was offset naturally each year by the input of dissolved silicate transported by the rivers. Rivers account for 80 to 85 percent of the annual input of dissolved silicate to the oceans. In temperate rivers with reservoir dams, scientists have calculated an annual silica removal as high as 50 percent.

The cumulative impact of less silica being transported each year to the ocean has resulted in fewer and smaller diatoms. (*Silica forms the cell walls of diatoms, key single organisms at the base of the marine food chain.-ed. note*) Depleted diatom populations fail to support a healthy food chain or ameliorate ocean acidity, and they'll release less oxygen into the atmosphere. This has led to the starvation of creatures and fishes that eat them and increased acidity. The silicate of the smaller diatoms dissolves before the carbon can be sequestered to the ocean floor.



Maine has large impoundments also. Gulf Island Pond, Androscoggin R. Photo: Point of View Helicopter Services

These reservoir dams have had other catastrophic impacts. For example, the temperature of the high-volume winter discharged waters flowing into the ocean has increased. These reservoir waters are now thermally stratified lakes, (*often with low levels of dissolved oxygen creating relatively lifeless anoxic environments-ed. note*). In northern temperate lakes, the bottommost waters are typically close to 4 degrees Celsius year-round, which is much warmer than the super cold river waters flowing under ice in the winter. It is not surprising the Gulf of Maine is warming so fast.

How long will the media and officials remain silent about all the key causes of the demise of the Gulf of Maine because of Canadian hydropower dams and unnatural freshwater flow regulation?"

## FOMB PRELIMINARY 2018 FINANCIALS

Still awaiting several 2018 statements, but I am pleased to present a preliminary summary of financial operations for FOMB during the most recent fiscal year. Cash income exceeded expenses by \$9,400, though there will be further bills around 2018 research initiatives.

On 12/31/18 the statement balance of FOMB's checking account with Bath Savings Institute (BSI) was \$34,500. FOMB also maintains a number of CD's and savings accounts with BSI, which totaled \$158,000 at year-end 2018: \$45,000 of this amount is restricted for protecting existing conservation easements. An additional \$102,000 of liquid assets is managed by Wells Fargo: \$13,400 in Money Market Funds; \$85,000 in Calvert Social Investment mutual funds (\$71,500 equity + \$13,500 in bonds), and; \$3,600 individual equities (from an in-kind donation). The grand total of liquid funds at year-end was \$294,500. FOMB continues to demonstrate an emphasis on focusing resources towards accomplishing its mission, with 89% of 2018 expense's committed to programs. *Vance Stephenson - Treasurer*

<b>Income \$90,300</b>	<b>Expenses \$80,900</b>
Grants 45%	Programs 89%
Membership 24%	Administration 8%
Annual Appeal 14%	Membership & Fundraising 3%
Other 17%	

## FRIENDS OF MERRYMEETING BAY 2018 ACCOMPLISHMENTS

### Media

Print: (Over 12), Archaeology, Presumpscot River CWA, BIW, Habitat Assessment Project, Education, Speaker Series, the Bay, Outings, etc.

### Volunteers

Approximately 4009 volunteer hours (501days)  
150 volunteers

### Membership

450 households  
Speaker Series – (282 people)  
Outside 2018 (Paddle Series, Walks, etc.) – 130 people.  
Newsletters – 4

### Grants

\$30,000- Dresden Falls Archaeology  
\$10,000-Vegetation Mapping & Habitat Assessment

### Outreach Presentations

Maine Maritime Museum Cruises & Paddles (80 participants)

### Education

Two Bay Days (357) students, 8 different schools)  
School Visits (600 students)  
Non-School Visits (450 people): library summer series and science night  
Web site updates

### Conservation and Stewardship

Additional easements in progress  
Continuous landowner outreach  
Ongoing stewardship activities  
Control two phragmites stands in Bowdoinham  
Monitor all easement & fee properties

### Research

Water Quality Monitoring – 17 sites  
Dresden Falls Archaeology  
10-year Vegetation and Land Use Update in Process

### Advocacy (postings, letters, testimony, etc.)

Submit Lower Androscoggin Upgrade Proposal  
Lawsuit-GMO Atlantic salmon  
Healthy Rivers/Healthy Gulf promoting safe fish passage  
Smart Meters  
Wifi from Space  
Climate Change-Green New Deal  
Posting Fish Consumption Advisories  
Presumpscot R. CWA-FERC & DEP Comments & Legal

### Primary Partners

The Archaeological Conservancy  
Kennebec Reborn  
Avian Haven  
Maine Coalition to Stop Smart Meters  
Bowdoin College Environmental Studies  
Department of Inland Fisheries and Wildlife  
Maine Maritime Museum  
Department of Marine Resources  
Bowdoinham Public Library  
Maine Land Trust Network  
Friends of Sebago Lake  
Department of Environmental Protection  
Patagonia Outlet, Freeport  
Chop Point School  
Curtis Memorial Library  
Green Justice Legal  
Earthjustice  
Center for Food Safety

# WE NEED YOU! PLEASE SUPPORT OUR IMPORTANT WORK

## FOMB Leadership

Our accomplishments are due to the hard work of dedicated volunteers, especially those who serve on our committees. If you want to get involved and serve, please contact the committee chair or Ed Friedman. We always welcome member input and we'd love for you to join us!

### Steering Committee

Ed Friedman, Chair (Bowdoinham)  
 Vance Stephenson, Treasurer (Kettering, OH)  
 Tom Walling, Secretary (Bowdoinham)  
 Simon Beirne (Bowdoinham)  
 Becky Bowes (Brunswick)  
 Phil Brzozowski (Pittston)  
 Nate Gray (Vassalboro)

### Education Committee

Betsy Steen, Co-Chair, 666-3468  
 Tom Walling, Co-Chair, 666-5837

### Conservation and Stewardship Committee

Chair Vacancy

### Membership and Fundraising Committee

Nate Gray, Chair, 446-8870

### Research and Advocacy Committee

Ed Friedman, Chair, 666-3372

Friends of Merrymeeting Bay • PO Box 233 • Richmond, Maine 04357

### Membership Levels

- |   |   |                                     |
|---|---|-------------------------------------|
| <input type="checkbox"/> \$1,000+ Sturgeon  | <input type="checkbox"/> \$250 Striped Bass | <input type="checkbox"/> \$20 Smelt |
| <input type="checkbox"/> \$750 American Eel | <input type="checkbox"/> \$100 Shad         | <input type="checkbox"/> Other      |
| <input type="checkbox"/> \$500 Wild Salmon  | <input type="checkbox"/> \$50 Alewife       |                                     |

Name \_\_\_\_\_

Address \_\_\_\_\_

Town/State/Zip \_\_\_\_\_

Phone \_\_\_\_\_

Email \_\_\_\_\_

- |                                     |   |
|-------------------------------------|---|
| <input type="checkbox"/> Renewal    | <input type="checkbox"/> Send information about volunteer opportunities |
| <input type="checkbox"/> New Member | <input type="checkbox"/> I would like a sticker                         |

\$7 Enclosed (optional) for a copy of *Conservation Options: A Guide for Maine Land Owners* [\$5 for book, \$2 for postage].



Thanks to Will Zell and Zellous.org for newsletter layout.

## SHIFTING BASELINES

Shifting baselines reflect the chronic, usually slow and hard-to-notice changes in things, from the disappearance of buffalo on the plains, large and abundant fish in the sea or birds and frogs in the countryside to the increased drive time from Portland to Brunswick. If your ideal weight used to be 150 pounds and now it's 160, your baseline -- as well as your waistline -- has shifted. One's baseline of reference can vary and while scientists often used to consider present conditions as their baseline when considering restoration projects, this is changing.

With greater awareness of this concept, most practitioners now think of baseline conditions as some past time when the resource was more abundant, and perhaps use this population as a goal (sometimes realistic, sometimes not) in restoration efforts. Unfortunately, with each succeeding generation, knowledge and memories of past abundance (i.e. salmon so thick you could walk across the Kennebec, Androscoggin or the Presumpscot on them) fade until for example, most of today's generation consider normal, a river not only devoid of any salmon, but absent any type of substantive migratory fish run.

Brooke Jarvis further describes this in his excellent article: [The Insect Apocalypse is Here](#), published November 27<sup>th</sup>, 2018 in the NY Times Magazine. Jarvis refers to J.B. MacKinnon's superb book (recommended reading!), dealing largely with the shifting baseline concept: "But extinction is not the only tragedy through which we're living."

"What about the species that still exist, but as a shadow of what they once were? In *"The Once and Future World,"* the journalist J.B. MacKinnon cites records from recent centuries that hint at what has only just been lost: "In the North Atlantic, a school



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of cod stalls a tall ship in midocean; off Sydney, Australia, a ship's captain sails from noon until sunset through pods of sperm whales as far as the eye can see. ... Pacific pioneers complain to the authorities that splashing salmon threaten to swamp their canoes." There were reports of lions in the south of France, walrus at the mouth of the Thames, flocks of birds that took three days to fly overhead, as many as 100 blue whales in the Southern Ocean for every one that's there now. "These are not sights from some ancient age of fire and ice," MacKinnon writes. "We are talking about things seen by human eyes, recalled in human memory."

*"Denial is the last defense against memory. It helps us to forget what we'd rather not remember, and then to forget that we've forgotten it, and then to resist the temptation to remember."*

As MacKinnon also writes: "Which is the greater loss, the extinction of the Pashford pot beetle from its few swamps, or the extirpation of the tiger from an area sixty-five times the size of the entire United Kingdom? That is a question to be weighed on the cosmic scales. Extinction wipes out, point by point, the clues to the code of existence; extirpation is the great, sucking retreat of the tide of life." ... "Denial is the last defense against memory. It helps us to forget what we'd rather not remember, and then to forget that we've forgotten it, and then to resist the temptation to remember."

## *Winter Speaker Series 2018-2019*

All talks 7:00pm at Curtis Memorial Library, Brunswick, unless noted. Details at [www.fomb.org](http://www.fomb.org)

**MARCH 13 The Fascinating Life Cycle of Native Plants,**  
*Heather McCargo, Exec. Director, Wild Seed Project*

**APRIL 10 Dresden Falls-Kennebec Life 1776-9,000 Years**  
**B.P.,** *Art Spiess & Leith Smith, Prehistoric & Historic Archaeologists, Maine Historic Preservation Commission*

**MAY 08 Wireless, Wildlife & You**  
*Blake Levitt, Science & Medical Journalist/Author*

**MAY 30 Killing Games: Wildlife in the Crosshairs,**  
*Camilla Fox, Exec. Director, Project Coyote*