gosa news GOSA

Groton Open Space Association News, Spring 2014, Volume 3, No. 1

Our Neighbors at Risk and What We Can Do About It



Monarch Butterfly So named because of its large size and the vast domain over which it rules. Is its spectacular reign and 2500-mile migration from Mexico to Canada coming to an end? Page 11. Photo by Sue Sutherland



Take a Tour of Avery Farm! More on Page 2

Avery Farm Fund-raising Update See what GOSA's

Sidney's Corner What GOSA's intrepid volunteers are



Juvenile American eels They may look like snakes, but they are 100% fish; in fact, one was spotted in a stream at GOSA's Sheep Farm. Read all about this fascinating creature and its migration from the salty Sargasso Sea to a freshwater stream in Groton, Connecticut. Page 9. Photo: Uwe Kils, Wikimedia Commons



Oysters and shellfisheries Opening an oyster may be next to impossible, but a lively interview with Jim Markow makes opening an oyster sound far easier than farming one... because "with oystering, there is always something trying to do you in." Page 7. Photo: http://noankcooperative.com/

A Letter from the President, Joan Smith

Dear GOSA members and friends,

If you have not yet set aside a Sunday afternoon for a guided tour of Avery Farm in north Groton and Ledyard, you are missing a very special outdoor experience. A walk on the 300-acre Avery Farm, GOSA's newest planned acquisition, will take you past a 38-acre pond, huge marshes full of water birds, through lovely mature forests dotted with vernal pools, past archaeological sites and up along craggy rock ridges. This spectacular land is home to dozens of species of amphibians, turtles, and mammals as well as 169 bird species. Please join us on a tour held every Sunday at 2 p.m. (meeting at the southern gate of Lambtown Road Extension) and see for yourself!

The articles in this issue underline the importance of the work GOSA does every day to protect and preserve our natural resources. Syma Ebbin explores the mystery of encountering an American eel at the Sheep Farm and relates the amazing story of this creature's migration out to the Sargasso Sea and back. Jim Markow, a Noank oysterman, talks frankly with Liz Raisbeck about pioneering an oyster fishery in our waters. Jim testified years ago for GOSA about the risk of sedimentation to Palmer Cove and Long Island Sound from upstream development impacts. Eugenia Villagra

reminds us of the real danger of losing those beautiful and amazing creatures, the monarch butterflies. GOSA is doing its part by planting milkweed and other native plants and shrubs on our properties.

Sidney Van Zandt, one of GOSA's founding members, received <u>two lifetime achievement awards</u> for conservation in March: one from The Connecticut Land Conservation Council which awarded her the 2014 Katchen Coley Award for Excellence in Land Conservation for her decades of service advancing conservation in Groton and throughout Connecticut, and the other from the Connecticut General Assembly presented by Representative Elissa Wright and Senator Andy Maynard. In addition, U.S. Senator Richard Blumenthal, who spoke at the Connecticut Land Conservation Conference the day Sidney received her award, also formally recognized Sidney. These accolades are well deserved for decades of environmental work. Thank you and congratulations, Sidney!



Left to right: CLCC Vice-Chair Alicia Sullivan, Sidney Van Zandt, CLCC Executive Director Amy Paterson, and Steering Committee Chairman Tim Abbott. Photo by Gordon Paterson



GOSA News supports the mission and purpose of the Groton Open Space Association by publishing electronic newsletters that inform the public of past, present and future GOSA activities and threats to the health of open space. *GOSA News* also serves as a <u>link to the GOSA website</u> for additional information and as a link to other key sites. Our mission is to inform and inspire the public to become actively involved. We welcome letters to the editor. Letters should be sent with the writer's name, address and daytime phone number via email to: gosamail@gmail.com.



GOSA Mission and Purpose To work to promote conservation, environmental preservation, open space and recreational areas in Southeastern Connecticut. To educate the public about the value of open space, conservation and environmental preservation. To enlist public support and funding to promote, acquire or maintain open space for public use, alone or in cooperation with local, state or federal agencies, or with other nonprofit organizations. GOSA is a nonprofit tax exempt organization under IRS Section 501(c)(3).

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Membership

To join, send a check to GOSA and include your name, address and e-mail. Annual dues are \$10 per year.

Groton Open Space Association, Inc. P.O. Box 9187 Groton, CT 06340-9187

Avery Farm Fund-raising Update

We're off to a great start! To begin, Judy Weber generously donated the 146-acre Groton portion of Avery Farm, which is valued at \$320,000. Since launching the fund-raising campaign last December, GOSA has raised \$100,000. We have \$1,066,000 left to raise. Two generous donors will match 100% of donations in 2014 up to a total of \$100,000 – so you can double your contribution, even triple it with matching funds from your employer. On March 31, GOSA will apply to the Connecticut Department of Energy and Environmental Protection for an open space grant. With your continued help, we hope to close on this unique property with its outstanding habitat soon. For information on donating go to: http://gosaonline.org/donate/ or click here. Click here for Avery Farm tour information.

Most photos below by Sue Sutherland and Joan Smith: from top left clockwise, Avery Farm bog and marsh, rocky outcrops, barn and horse enclosures, lilypads in marsh water, American kestrel (a small falcon), farm path, pileated woodpecker, and the American box turtle.





Sidney's Corner By Sidney Van Zandt

Stewardship Activities Fall-Winter 2013-14

During this past super-cold and snowy winter, an intrepid band of GOSA volunteers has been out and about on GOSA properties providing much needed management stewardship for our open spaces. This hearty crew has been chopping and pulling invasive plants, building brushy frameworks for small critter

has been chopping and pulling invasive plants, building brushy frameworks for small critter habitat, clearing giant tree stumps for future habitat, marking the boundaries of Avery Farm, and opening trails on Candlewood Ridge.

GOSA volunteers took their tools to Candlewood Ridge to begin fulfillment of a \$125,000 federal grant to restore habitat for the rare New England cottontail. They have begun planting native plants in a cleared area. Rick Whittle of Whittles Farm donated his front-end loader and his time and labor to moving huge tree stumps — left by the former owner of Candlewood Ridge — out of the way of an area designated for restored rabbitat. Rick also brought a layer of crushed rock to cover Candlewood's muddy driveway.

The powerline corridor across these properties is particularly suitable for rabbitat restoration, and GOSA is working with the landowner of Avery Farm to remove trees to create a wildlife corridor connection between the Candlewood field and the powerline corridor. This area will be planted with blueberry, laurel, and other native shrubs which provide shelter and berries that benefit 50 species of birds and small mammals.



Top right clockwise: Si Borys posting a boundary sign; rabbitat: a framework of logs covered by a brush pile; left to right, Jim Anderson, Marie Olson, Joan Smith, Lon Thompson, and Rick's dog pose by the tractor; abandoned log pile; Rick's front-end loader. Photos by Joan Smith



Come to GOSA's 19th Annual Haley Farm Clean-up, Green-up Day!

Bring loppers and liberate a tree!

Haley Farm State Park

Saturday, April 26, 2014 (Rain date, April 27)

10 a.m. – 2 p.m.

We supply lunch, gloves, and some hand tools.

Supported in part by The Last Green Valley





National Trails Day June 7 & 8, 2014 Walk the Emerald Path!

June brings the first sweet pleasures of summer to Groton, including National Trails Day, celebrated here for the entire weekend of June 7-8! Trails Day will include three wonderful walks in Groton featuring coastal views, forests, meadows, streams and wildlife that will delight your eye. Please join us!

X-Town Hike Saturday, June 7, 9:30 a.m. to 1:00 p.m.



We will meet at 9:30 a.m. at the Bluff Point State Park parking lot for registration. Please get there a little early.

This five-to-six-mile walk on public trails will begin at the Poquonnock River and continue through the Haley Farm and across Rte. 215 to the town-owned Mortimer Wright Preserve. From there, the walk will pass through the Groton Open Space Association's Merritt Family Forest and on to the town-owned Beebe Pond Park, Avalonia Land Conservancy's Moore Woodlands, and "Town's End" at Beebe Cove. Click <u>here</u> for X-town map.

At 1 to 1:30 p.m. a bus will meet us for our return to Bluff Point. The hike is of medium difficulty and moderately paced. Bring your own snacks and drinks. In the event of heavy rain, the hike will be canceled. Solar toilets are available at Bluff Point and Haley Farm. *Please, no dogs.* For questions or registration information, contact Sidney Van Zandt, 860-572-5715, or <u>svanzandt3@aol.com</u>.

Sponsored by Connecticut Forest & Park Association, GOSA, Avalonia Land Conservancy, and the Town of Groton Parks and Recreation Department.





Historic Sheep Farm and Fort Hill Brook Sunday, June 8, 10:00 a.m. - 12:00 p.m.

Take a two-mile hike through meadows, forests, and mountain laurel glens to Fort Hill Brook. A gristmill dam from the early 1700s and a 10-foot waterfall over one of the many ledges found on the property will be some of the highlights. Colonial



era stone walls and roads as well as many natural features will also be noted. Moderate effort (gently rising terrain with occasional obstacles). Family friendly. *Please, no dogs.* Click here for Sheep Farm map.

Meet leader Joan Smith at 10:00 am at 245/255 Hazelnut Hill Road (on the right up the hill from the Pequot Health Center entrance). Rain or shine. **Pre-registration is recommended.** Questions and to register: contact Sue Sutherland (860) 574-5111 or e-mail: <u>suesuther-</u> land@snet.net

Sponsored by the Groton Open Space Association.

Avery Farm Deep Woods and Rocky Outcrops Sunday, June 8, 2:00 to 3:30 p.m.

Avery Farm is a 300-acre historic farm in Ledyard and Groton and one of the most biologically diverse sites in eastern Connecticut. Approximately one third of the farm is wetlands. We are planning two hikes, and will divide the groups according to interests: the **east hike** goes through farmlands past marsh and bog, across Haley Brook and into old forests; the **west hike** is more challenging and goes through mountain laurel up to the ridgeline and by old foundations and stone outcrops.



We will meet at 2 p.m. at 56 Lambtown Road Extension in Ledyard (you must drive up from Route 184) to register. Leader, Sue Sutherland: <u>suesutherland@snet.net</u> or 860-574-5111, Co-leaders, Karen Lamb and Joan Smith. Sponsored by the Groton Open Space Association.



Many thanks to Eagle Scout Jake Newsome, Boy Scout Troop 76, GOSA's Jim Anderson, Joan Smith, and the many friends and family who helped construct three bridge spans, trim trails, and pick up junk such as car fenders and bike ramps in the course of one day. Jake put in a lot of time planning, fund-raising, arranging donations from local businesses and securing Inland Wetland Agency approval for this Eagle Scout project. Puppies even showed up. The following letter from Jake Newsome was sent to GOSA:

Thank you all so much for the wonderful opportunity to help the community and your organization. The project went without any issues especially due to Mr. Anderson and Mrs. Smith stepping in and taking so much of their time to be there. I really appreciate how easy GOSA is to work with







along with the amount of communication that went with it. Many of my friends who do their projects talk to the beneficiaries only before and after the project is done, so all of the time everyone [GOSA] put in to help with any questions or give specific directions really helped.

> Thank you again for all your help. There's no way the project could have gotten done without it. Yours in scouting,

Jacob Newsome

Celebrate the Glory of Southeastern Connecticut! Join us at our annual **GOSA GALA** featuring views of the Mystic River and the tall ships, live piano music with Kent Hewitt and Steve DeConti, a cash bar, seated dinner, dessert, and a silent auction.

Date: Thursday, April 24, 2014 Time: 6-9 p.m. Place: Latitude 41° at Mystic Seaport Cost: \$60/person (\$30 tax deductible) RSVP: Call 860-572-5715 by April 14

Proceeds from this event help us protect natural resources in southeastern Connecticut and Long Island Sound Our entire community benefits from the quiet beauty of our natural surroundings and from clean water in our streams, rivers, estuaries, and reservoirs.

An Interview with Jim Markow, Oyster Farmer By Liz Raisbeck

In 2002, Jim Markow opened an oyster hatchery in the former marine research lab at the end of Main St., Noank. The Noank Aquaculture Cooperative consists of eight oystermen, including Jim, working the Long Island Sound waters and providing seed oysters to other oystermen up and down the Northeast coast. The pleasure of eating local oysters depends on the health of the Sound and the rivers and streams feeding it. GOSA and the local oystermen have a long relationship of collaboration to protect the waters in our area.

How did you happen to get into the business of oystering?

I grew up on Long Island next door to the Blue Point Oyster Company in West Saville, and in high school I started working as a deckhand on an oyster boat. Then I went to college for a while, but I got interested in welding, went to welding school, and learned how to fabricate. I built my own boat and worked for Blue Point for a while and then as a contractor to them. They had 29,000 acres of oyster beds and I contracted for several years.

What made you decide to strike out and start your own oyster business?

In the late '70s and early '80s the water started to change. The sewer district had built a new sewer system, and they changed a lot of the storm drains, which changed the salinity of the bay. The clams and oysters declined, probably because there was not enough dilution any more. The nutrient load changed too, with too much nitrogen coming into the Sound. Blue Point went through quite a few years of really struggling, even though they were the biggest oyster company in the country. They operated a hatchery and started looking for other areas to grow clams and oysters. They had areas in Connecticut. So I came over here, started looking for different areas that might be healthier for oysters. At first, I was involved with the Talmadge Brothers, a big grower over here. We experimented for several years.

I had a house on Moriches Bay on the south shore of L.I. and jacked up the house and put a hatchery under it. It became clear that Blue Point was going out of business, so with my partner Karen Rivara I started growing seed and planting them at different places. We didn't have access to a hatchery so we just grew our own seed. This was around 1991. Then, in 1993 a big storm blew a hole through Fire Island and everything came back terrifically in Long Island waters. It just changed everything. Oystering on the Island came booming back, but only for a little while. They built a one-mile-long wall to close the hole to protect the big houses down there, and within a year it all went to hell again.



How did you decide where to take your business on the Connecticut side of the Sound?

With the decline in Long Island, we came over here and planted oysters around the area at great expense to our-We got inselves. volved with the Dole family in Guilford, but when we planted oysters down there and they grew, when we came back somebody had already taken them. So after a while we had to give up down there.

We got to know the Groton Shellfish Commissioner and leased a piece of ground right off Avery Point at Pine Island. We had some success there. But with oystering, there is always something trying to do you in. We had a big crop but a huge green crab problem — probably lost a million oysters a year to green crabs until we figured out how to deal with it.

We also have some beds down behind the breakwalls in New Haven harbor, and those are natural set beds, where the larvae just set on clean shell. We started going down there and then in 1999 we had the DRMO MSX problem that wiped out the entire crop. It's a parasite, not a problem for humans, but devastating to oysters. It's also a cyclical thing. In 1999 we lost 98% of the crop, and we were just two years into it. We were at a pretty low point. But we did have oysters that survived that episode. We began working with John Volk, Director of Aquaculture in the state Department of Agriculture, a great guy, who hired a pathologist to help us solve the problem. His personal commitment to helping us really saved the fishery at that time.

We took oysters that survived that episode and have a natural resistance to the parasite and have built up a strain of oyster that seems to be resistant. In the meantime, we survived by clamming. I was contracting with Talmadge Brothers. We put money from clamming back into the oyster seed hatchery again, and that way we clawed our way back. Didn't get on our feet until we got some of the grounds around Noank; here we were having a much better survival rate, primarily because the water was so clean.¹ We have beds in the Mystic River, which have a perfect combination of salinity, water temperature, bottom composition, and we're able to get significant growth on our oysters here. Although we hadn't seen any natural oysters here, seeding was very successful. Today, some of our beds are leased from the town, some from the state, and some I own myself.

How do you grow an oyster?

In January we start the seed in the hatchery and grow seed 'til the end of April, and then the seed goes into nurseries. We contain the seed in upwellers, which are barrels, out-

> fertilized eog

side in the coves where they grow to 25 millimeters (one inch) during the summer, and in the fall we then plant them on the bottom on beds of oyster shell. In the course of a year, we plant about five million oysters, of which about 30% grow to harvesting size.

You can see the young oysters on the bottom in about three to six feet of water in the nurseries. Later we

move them to deeper water. They are amazing filters. We dump a lot of algae into the seed tanks for food, turning the water really dark, and the next morning the tanks are crystal clear. While runoff from a big storm like Sandy can shut down the beds for a while, the oysters will just clean themselves out. There will be regular water sampling after heavy rains, making sure there is no harvesting if the water isn't clean enough.

So, what does it take to make it in oystering?

I'd say two main things, besides a lot of luck. First, you've got to put your heart and soul into it, and you've got to expect to make no money and spend a lot of money for at least three to four years before you see any sign of a return. Whenever I see anyone who wants to get into this business, I say, don't quit your day job. Start small. Second, you have to have the right environment. Oysters are very particular, and they need just the right amount of salinity, the right temperatures, as well as very clean water if we are going to harvest them. So many things can go wrong, things that I can't control.

And a third important thing is friendly government. We partner with the towns and the state in this business and need their cooperation. The local Groton Shellfish Commission is particularly vital to our success. When we were starting out the Commission helped us gain access to some beds off Avery Point. They've done a great job of promoting stormwater run-off control, which is critical for

¹In the mid-70s, the newly established Connecticut Department of Environmental Protection decided that when public sewers came into Groton and Stonington, all treatment water would be piped over to the Thames River rather than the Mystic River or the coves between Noank and the Thames. This was the critical decision that made possible the return of oyster beds to our area, and GOSA was a strong supporter of it. the fishery. They are kind of a unique entity in this part of Connecticut. Because they are responsible for the health and safety of recreational shellfish beds, which have very strict rules, the commissioners themselves go out and test the water every month, send samples to the state lab, and report to us on water quality. In addition, they sample after one-inch rains and higher and automatically close the beds if there is a three-inch rain until the water tests clean.

Our relationship to the state has changed over the years. In the early days, the Department of Agriculture was very supportive of getting oystering going over here and helped us a lot. Today, it sees its role as strictly regulatory, not necessarily supportive.

How can an organization like GOSA help protect the oysters' habitat?

Southeastern Connecticut is unique in that we have a healthy recreational oyster fishery, the envy of the rest of the state. I see oystering as part of the unique quality of life we have here in Southeast Connecticut, and GOSA too is concerned about sustaining a healthy quality of life here. It can really help by encouraging the protection of wetland areas. We should eliminate development in any area that acts as nature's filter, like marsh areas where water can saturate instead of running off carrying a lot of pollutants with it. Marshland is an organ of nature, a kind of natural kidney filter. We have beds where the oysters have really

good growth in marsh areas. Once we tried growing oysters in the Thames River off the pier, but it just wasn't clean enough and didn't work.¹

spat attached

If the communities around here really want to have a healthy oyster fishery over the long term, they need to really protect the marshes and the streams that feed the coves and bays. We don't want parking lots next to the shore. GOSA can help with that. All of the properties that GOSA has purchased or



helped the state acquire protect our local streams flowing into the Sound, and our marshlands or coastal areas from runoff pollution. Our water quality is excellent; it's been getting better over the years as bad readings of fecal coliform have declined. The main reason for the improvement is that more development is now on public sewer and you don't get pollution running straight into the rivers and bays. Another promising development is that Stonington is going to switch its sewage treatment plant from chlorine-based to ultraviolet -light-based. Chlorine is terribly toxic to marine organisms, and we are hoping that other towns will follow their lead. That would be a good thing for GOSA to promote.

approximately 2 weeks

Oyster Life Cycle

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The Eel Deal: Recounting the Saga of the Sheep Farm Eel While Exploring the Mystery of the Eel's Life History

By Syma A. Ebbin

Have you been to the Sheep Farm? It is one of GOSA's recent open space acquisitions. It boasts the highest set of waterfalls in the town of Groton along with remnants of an historic grist mill dating back to the 1700s. It is a lovely place to hike any time of year.

On a warm Sunday over three years ago, June 6, 2010 to be precise, I hiked the Sheep Farm with my family. We enjoyed a picnic on a rocky outcrop in the middle of one of the fields and then hiked down along Fort Hill Brook until we reached the falls. My husband and children clambered up and over the rocks while I explored the pools at the bottom of the falls. My husband yelled down to me that he had found a fish in one of the pools atop the falls. I climbed up the rocks and, although I had never seen one before in fresh water, I easily identified it as an American Eel (*Anguilla rostrata*). The eel was dead, about 14 inches in length and in fairly good condition. I thought that a raptor might have dropped it into the pool, which is about 10 feet above the stream, but there were no talon marks or tears. No, this fish had probably migrated

up this stream several years before as a tiny elver, working its way up the moist and fairly vertical walls of the falls, living its life in the fresh waters of Fort Hill Brook. Or perhaps, our eel took a detour on land, relying on the ability of its skin to absorb oxygen, and slithered over the damp ground to make its way around the obstacles in its path.

If all had gone well, our little eel would have matured into a silver eel with a blackish back, silver underside, large eyes and a host of other physiological changes, and eventually migrated back downstream to Mumford Cove, out through Fishers Island Sound and headed south, swimming in deep

waters to the Sargasso Sea. Here, in the North Atlantic Subtropical Gyre, a shifting area of two million square miles delineated by the clockwise movement of ocean currents, our eel would join with other members of its species in a mass spawning event along with European eels (*Anguilla anguilla*), which spawn in the same area. After spawning, our eel would have died. This spatially unified approach to reproduction with spawning occurring in the same location results in what is termed a panmictic species – that is one that shares a common gene pool, with no genetically distinguishable populations or stock structure. All North American eels basically belong to the same and only population within the species *A. rostrata*.

If our eel spawned successfully, the fertilized eggs would have hatched in the salty waters of the Sargasso as transparent, somewhat flattened eel larvae called leptocephali. These would have transformed into glass eels and migrated to estuarine or freshwater environments in North America over the course of a year or so. They would migrate upstream, becoming elvers, rounder in shape and darker in color, ranging from three to six inches in length. Not all eels ascend freshwater tributaries; some remain in brackish coastal waters. Elvers are nocturnal and live in and around bottom sediments, growing over the course of several years into yellow eels, which is the stage of eel that we found at the Sheep Farm. During this period of their life, which may extend from three to 40 years, they are green or yellow in color, attain lengths of one to several feet; females usually growing larger than males. In Connecticut, the largest eel on record weighed in at 10.2 pounds and measured 52 inches in length, but in other areas



larger eels have been reported to reach five feet in length. After they mature sexually, they head downstream. Once they return to the ocean, they stop eating and undergo a series of physiological changes to allow them to navigate deep marine waters on their way to the Sargasso.

This life history strategy is called catadromy, similar but opposite to the approach taken by anadromous fish species such as salmon, which spawn in freshwater, mature in marine waters, and then return to fresh waters to complete their life cycle. Over 700 species of eel within the order Anguilliformes have been identified, most are marine, and only one

family, Anguillidae, contains freshwater species.

The mysteries of the eel's life history are numerous, our understanding is full of "data gaps," and our assessments are considered "data-poor." No one has ever found or captured an adult eel in the Sargasso Sea or open ocean, eels have never been observed mating, nor have the carcasses of eel been retrieved after spawning. What have been found are the newly hatched planktonic eel larvae, leading scientists to believe that adults have spawned nearby. It's not certain that eels die after mating, but there is no evidence that eels are repeat spawners or that they ascend freshwater tributaries after spawning. No one knows how the newly hatched eels distribute themselves among the thousands of different freshwater tributaries along the Gulf and Atlantic coast of North America nor how they navigate to places to which they have never been. The list of unknowns is long, as is the list of research priorities as evidenced by the Atlantic States Marine Fisheries Commission's 2013 Review of the American Eel which lists 21 multifaceted eel-related research questions in need of answers.

Unfortunately, despite the lack of data, one thing is becoming clear: the depleted status of American eels throughout their range, including localized extirpations. In the last decade, the U.S. Fish and Wildlife Service (USFWS) has been petitioned twice to list the American eel under the Endangered Species Act (ESA). In response to the first petition, the USFWS concluded in 2007 that a listing was not warranted. The second petition, however, made in 2010 by the Center for Environmental Science, Accuracy, and Reliability (CESAR) was found to contain substantive evidence that

might warrant a listing as threatened. USFWS decided the petition required more review; however, CE-SAR filed suit against USFWS in 2012 for failing to complete its review within the one year stipulated under the ESA. A Settlement Agreement was issued last April by the Court, which extended the USFWS's deadline for issuing a finding to September 30, 2015. So we'll have to stay tuned to see how the eel fares in its migration through that regulatory thicket.

Astutely, you might ask why are eels faring so poorly? As an animal which migrates both up and down rivers and streams, eels are subject to the same threats that have led to the depletion and extinction of salmon, namely dams. Dams not only block the passage of eels in both migratory directions, but the turbines associated with hydropower production puree the eels as they head out to the ocean on their way to spawn. Add to this threat the many other ways that humans have obstructed, impaired,

and even destroyed fresh water habitats, the pollutants which find their way into these waters, and the existence of a recently introduced swim bladder nematode, *Anguillacolla crassus*, a non-native Asian parasite likely brought in through aquacultural operations that is now infecting American eels and impacting their growth and reproduction. Overarching these threats is the growing impact of climate change which is causing waters to warm, flows to diminish, and droughts to persist, leading ultimately to the reconfiguration of the eel's essential fresh and marine habitats to the detriment of its survival.

In addition, American eel fisheries feed into a multibilliondollar international eel industry fueled primarily by Asian consumption patterns. As a child I caught eels as bycatch while targeting winter flounder in Baker Cove, Groton. They put up a great fight, but once caught, they were so difficult to free from the gear due to their notorious slime production that there was high release mortality. The only eels that are legal to harvest in Connecticut are yellow eel, which are primarily used for bait or sold and consumed in some ethnic markets. According to the Connecticut Department of Energy and Environmental Protection, which is responsible for managing the eel in Connecticut waters, there are two commercial eel fishermen in Connecticut, who in 2012 harvested a total of 3,560 pounds of eel at or over six inches in length, as well as a small targeted recreational fishery. With the depletion of Asian stocks of Anguilla japonica, Asian producers have turned to hatchery production; however, eels have proven to be difficult to breed and grow in captivity, and Asian hatchery production relies on wild-caught juveniles, now imported from the U.S. and Europe. This demand has



Main photo: Sheep Farm pool where eel was found, sits atop the falls. Inset: waterfall the eel navigated to reach the pool. Photos by Syma Ebbin

spiked the market price for glass eels and elvers to rise to over \$2000 a pound. Maine and South Carolina are the only Atlantic states that permit a commercial glass eel or elver fishery. Although they are not legally harvested in Connecticut at this time, a bill proposing the legalization of a glass eel fishery was introduced to the Connecticut legislature earlier this year. Illegal harvests are common in all states along the Atlantic coast given the lucrative nature of the fishery and difficulty in monitoring and enforcing regulations. There is a company in Connecticut that buys glass eels and elvers from fishermen in other states and sells them to Japan for grow-out in hatchery facilities.

Taken together, this is a recipe for extinction. Let's hope that eel researchers are able to uncover some of the mysteries of the eel's life history soon and that fishery regulators get their act together and can devise a rational plan to ensure the American eel's continued existence as a species. Let's hope that my children's children will be able to scramble over the rocks

by Fort Hill Brook and discover their own yellow eel hiding in a gravelly nook at the bottom of the brook. Steps in this process certainly involve the continued preservation of both our freshwater tributaries and the lands which surround these arteries, like the Sheep Farm and The Merritt Family Forest, along with continued efforts to ensure that our rivers and streams are unblocked and waters run pure. That's the eel's deal after all and not so bad for us either.

About the Author: Syma A. Ebbin, Ph.D. is research coordinator for Connecticut Sea Grant, faculty member of the UConn Department of Agricultural and Resource Economics, and a member of the GOSA Board of Directors. The Brave New World of the Monarch Butterfly By Eugenia Villagra



Take a moment to imagine. As you are reading this article one of the world's most awe-inspiring spectacles of nature has already begun. On March 20, millions of monarch butterflies that had wintered in the mountainous fir forests of central Mexico — a habitat found on only 12 mountaintops on the planet — took flight and are migrating north. It will take several months and three to four generations of monarchs, breeding and dying along the way, to travel the 2500 miles needed to reach their summer destinations in the United States and Canada. As they flutter in to their destination, to us seemingly aimlessly, the females will seek out and lay their eggs only on the milkweed plant — a plant that is vitally important to the completion of the four stages (egg, caterpillar, chrysalis, adult butterfly) of the monarch's life cycle.

Another amazing aspect of the monarch's migration story, which we have come to understand in the last few decades, is that the normal breeding monarch's life span is at most two months with one exception: the last generation of the summer monarch population enters into a non-breeding phase which lasts seven months or longer. It is this one "super" but lovelorn generation of butterfly that at summer's end flies the full 2500 miles back to Mexico to complete their wondrous migratory cycle. Even more miraculous is how the butterflies find their way back to the same overwintering spots over a gap of several generations. The timing and patterns of their flight, a topic of serious research and intense scientific speculation, are now thought to be prompted by the position of the sun in the sky and an ability, located in the monarch's antennae, to use the earth's magnetic field for orientation.



For as long as history has been recorded in the Americas, the first monarchs have arrived in Mexico each fall by the first of November with clockwork precision. Two important seasonal and cultural events coincide with their appearance: the corn harvest and the Day of the Dead when ancestral souls are believed to be returning to Earth as butterflies. But this past November, for the first time in memory, the monarchs didn't show up on November 1; they finally arrived, in shockingly-low numbers, a week later than usual.

Migration Near Collapse? The monarch population is in a steep and steady decline. The March, 2014, population is estimated at 33 million compared to a peak of one billion as recently as 1996. Along with thousands of other lesser known but equally important insect species, the monarch is in serious trouble leading some experts to fear that the migration could be near collapse. What factors have caused their migration schedule to change and their population to decline so dramatically during the past two years?

Challenges of Weather Extremes Monarch butterflies need proper humidity, light, shade, temperature, and protection from wind. Historically, the U.S. corn belt has produced half of the monarchs that migrate to Mexico. Drought and excessive heat in the mid-continent during the summer of 2012 resulted in low monarch reproduction and have been cited as major factors that contributed to the population decline. Again in the spring of 2013, due to unusually cold temperatures across the midcontinent, the new generation of monarchs was slow to



develop and late to migrate northward. Few monarchs even entered the northern breeding grounds in June; they remained scarce all summer, and there was little evidence of reproduction. Population recovery de-



http://www.traveltogether.us/corn-beltusa.html

pended on a productive breeding season.

Challenges on Breeding Grounds in the U.S. Monarch caterpillars feed exclusively on the milkweed which used to grow between the rows of food crops. Milkweed habitat has been greatly reduced due to new agricultural practices introduced in 1996 in the United States involving the expanding use of <u>herbicides</u> (Roundup®: glyphosate)

on plants such as corn and soybeans that are genetically modified (GMOs) to survive it. In addition, more acreage is being planted in herbicide-tolerant corn to meet increased demands for biofuels. Meanwhile, high corn prices push more land into corn production.

Challenges on Wintering Grounds When monarchs migrate to central Mexico they depend on the forest microclimate to survive the winter. The entire population overwinters together in a very small region. Illegal logging, though much reduced in recent years, continues to deplete

the monarch's forest and disrupt its delicate microclimate. The fact that the monarchs concentrate in one place for the winter makes the entire population vulnerable to a single storm, drought, fire, or disease. High-volume, unregulated ecotourism threatens the integrity of the monarch's winter refuge. Last but not least, humans and monarchs have competing needs for food, water, shelter, and space.

Challenges of Migration Migration is inherently risky and monarchs must find habitat to meet their needs every day of the journey. Around the world diverse natural habitats have been replaced with biological "deserts" including roads, parking lots, bluegrass lawns, and yards landscaped with aesthetics, not ecosystems, in mind. As milkweed plants disappear, monarchs have to travel longer distances to find suitable conditions, and this wears them out.

What can we do to <u>help the monarchs</u>, now classified as "near threatened," and other threatened insects?

GOSA in Action Connecticut, located along one of many monarch flyways, has a wonderful variety of native milkweed plants — the familiar vigorous broad-leaved

plant as well as the narrow-leaved varieties with pink, orange or yellow flowers. As part of the GOSA stewardship plan for each property, native plants, including milkweed, are identified, mapped, and protected. Areas with fewer desirable native plants are noted for future planting. GOSA recently received four grants which include funds to reestablish native perennials and shrubs.

In addition, over five years ago GOSA volunteers started growing milkweed and other native plants favored by monarchs from seed. In early winter, we mix native seed with soil and a little water, put the seeds in a plastic bag, seal and label it, and place in a secure container outside. In early spring the bags are removed and the contents spread on potting soil in outside trays. In a few weeks the seedlings emerge and when large enough are planted in a home garden until they become small plants. Then

> they are transplanted into GOSA open space properties to enhance wildlife habitat and provide enjoyment for all. Besides milkweed, we have grown rare varieties of mint, goldenrod, and aster. While monarchs require milkweed for breeding, it is important to have late blooming flowers like aster to provide food for the long migration south to Mexico.

> The **Connecticut Audubon Society** is taking action as well. They are working for stronger pesticide regulation and an overall reduction in pesticide use. According to Tom

Andersen, Director of Communications and Community Outreach, "<u>Pesticides</u> have always been a concern....We are concentrating on the issue now because of the findings of our 2013 Connecticut State of the Birds report, which documented the long-term population decline of 17 species of native birds that eat only insects they catch on the wing — so-called aerial insectivores. It will surprise no one that a key suspect is pesticides."

Individuals can help the monarchs too. There are numerous organizations and individuals across the country and in Connecticut dedicated to rebuilding native plant communities one sterile lawn and farm field at a time. University of Kansas insect ecologist Orley R. "Chip" Taylor, who is also founder and director of Monarch Watch, a conservation and outreach program, has been observing the populations of monarch butterflies for decades. Though he has never been more concerned about their future, he remains optimistic. "I have to believe that we can have an impact if we get the gardeners in this country to help us out by planting milkweed and putting in native plants to stabilize native pollinator communities. So people now have another purpose for creating a garden. The purpose is conservation."¹

¹Click <u>here</u> for more information.

Common milkweed plant