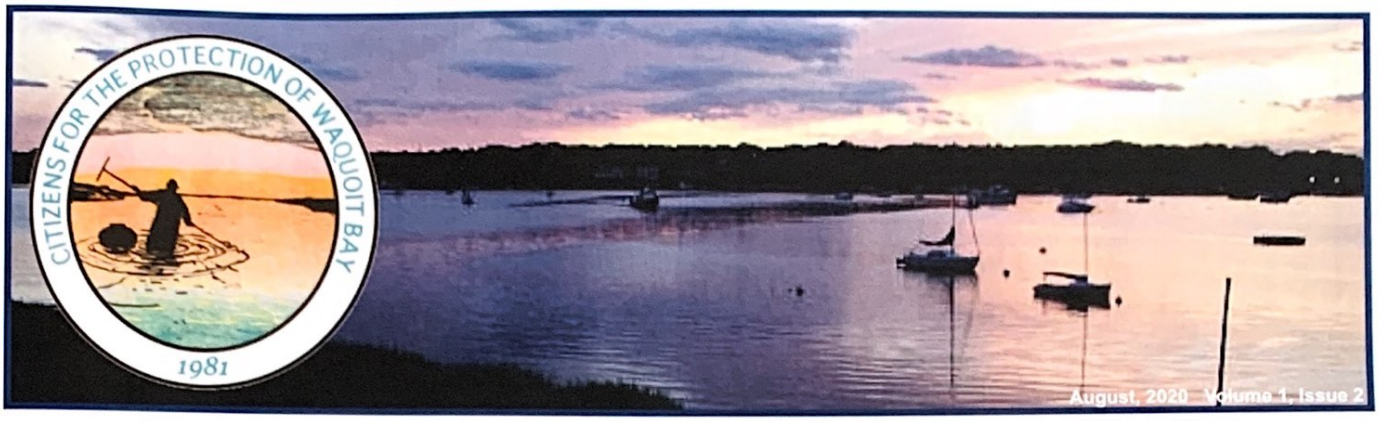
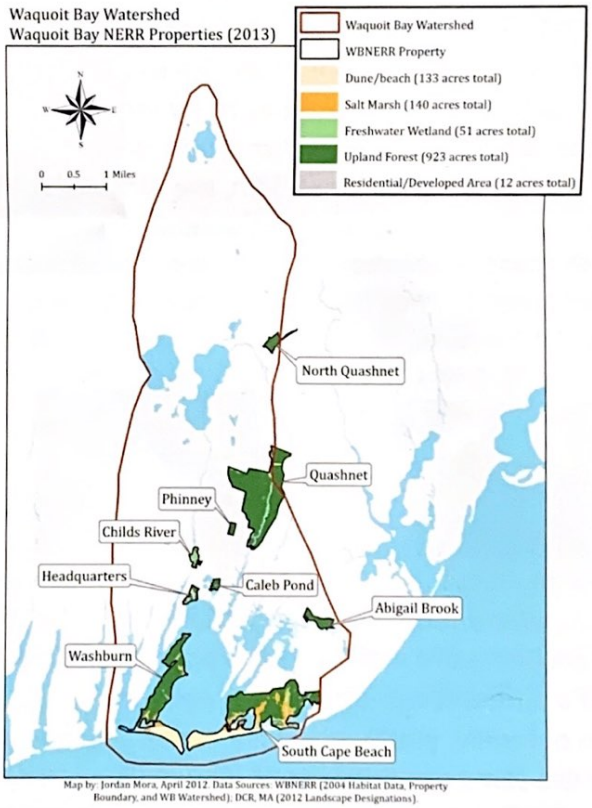


From the Board

The CPWB Board is pleased to announce its Guest Speaker for this year's Annual Meeting. **Scott Horsley,** Water Resources Consultant and Lecturer, will be joining us via Zoom on **Wednesday, August 19th at 6:30PM**. Scott Horsley has over 30 years of professional experience as a consultant to federal, state, and local jurisdictions, and private industry throughout the United States, Bulgaria, Nicaragua, the Caribbean, the Pacific Islands, and China. Scott has been an innovator in the environmental profession and thrives on bringing innovative and interdisciplinary approaches to challenging projects. Scott has a strong understanding of the full range of technical, planning, and policy issues associated with water resources and land use. Scott has served as an expert witness in the field of hydrology in numerous state and federal court cases. He has served as an instructor for a nationwide series of U.S. Environmental Protection Agency (EPA) workshops on water resource management. He has also served on numerous advisory boards and committees to the EPA, the National Academy of Public Administration, Massachusetts Department of Environmental Protection (MADEP), Massachusetts Executive Office of Energy and Environmental Affairs (EEA), National Groundwater Association, and Massachusetts Audubon Society. Scott has received national (EPA) and local awards (Mashpee Conservation Commission) for his work in the wetlands and stormwater management fields. Scott Horsley serves as Adjunct Faculty at Tufts University in the Graduate Department of Urban & Environmental Policy & Planning and at the Harvard Extension School.



You are not going to want to miss this presentation! ALL are WELCOME to attend—but because this is a virtual meeting using ZOOM, you must reach out to us by phone (508-540-0981) or by email (CPWB1981@gmail.com) in order to receive the Meeting ID and Password. We look forward to seeing you on the 19th at 6:30PM.

CITIZENS FOR THE PROTECTION OF WAQUOIT BAY

Matt Patrick, President
Bobye Anderson, Secretary
Mike Bingham, Treasurer
Winthrop Munro

DID YOU KNOW???

Leaving dog waste on the ground is a significant contaminant to our waterways and groundwater. The simple act of picking up after your dog and putting the waste in your household trash is a small step that can make a big difference. CPWB has been installing dog waste bag dispensers in areas around Waquoit. We are seeking more locations and want to get the word out that using the bags provided is a good thing to do for our waterways and our environment! CPWB is funding the purchase and installation of the dispensers and the refill bags.

Right now we have 3 bag dispensers installed: Quashnet River parking lot off Rte 28, Redbrook Rd near the walking trail to Great Neck Road, and Seacoast Shores. Coming soon will be a second bag dispenser for Seacoast Shores and a dispenser for Seconsett Island. If you know of other locations that would likely get good use or if you would like to help us monitor the dispensers to keep them supplied with bags please email us at CPWB1981@gmail.com

LET'S PREPARE FOR THE INEVITABLE

Matt Patrick, President, 7/28/20

A potential disaster is only a rainy day away for our bays and estuaries. Fully implementing comprehensive waste water treatment is absolutely essential to the long-term health of our estuaries. We stand by that goal and will always fight for it. However, fifteen years will pass before a final plan is implemented for Waquoit Bay.

Road runoff always has the potential to be a toxic killer with an ever-increasing chance of it occurring. It carries heavy metals (from tire rubber), hydrocarbons (exhaust residue, oils, and other automotive fluids) and pathogens that are toxic to fish and can close our swimming beaches and shellfish beds. **Although storm water runoff is a small contributor to the nitrogen load, it carries an inordinate capacity to poison the ecosystem. Global warming magnifies the impact of road run-off making it a more imminent danger to our bays.**

Global warming has created more intense rainfall events that deliver more rain over very short time periods after extended dry spells. Rainfall events that once were expected to happen infrequently are now happening on a regular basis especially in **New England which has seen a 71% increase in "very heavy precipitation."**[1] These events carry significant amounts of toxic pathogens directly into our bays with the potential to cause massive fish kills and shellfish bed closures.[2] **This can be prevented inexpensively in comparison to sewering watersheds.**

At a minimum, there should be no road runoff into any estuary's watershed and especially Waquoit Bay, which is recognized as an Area of Critical Environmental Concern and a significant nursery for several important fisheries. There are simple and affordable solutions including vegetated buffers, rain gardens and infiltration systems that provide effective treatment of storm water. It is vitally important to the marine ecology and tourist industry to protect all of our bays and estuaries. We have taken the time to document some of the more egregious sources of road runoff directly into Waquoit Bay and its three tributaries.[3]

We will be appealing to Mashpee and Falmouth Boards of Selectmen and Conservation Commissions to recognize this problem and understand that it can be addressed easily in a few years. We will suggest that an ad hoc committee in each town (or possibly jointly) be formed to make recommendations within a year and also to investigate sources of funding.

[1] https://www.c2es.org/content/extreme-precipitation-and-climate-change/
[2] https://www3.epa.gov/npdes/pubs/usw_b.pdf
[3] See topographical maps - available on request

Shellfish Aquaculture As A Tool To Restore Water Quality In Waquoit Bay

Falmouth and Mashpee share the waters of Waquoit Bay, and responsibility under State mandate for restoring the Bay to the health it enjoyed as recently as 1950. This essay provides context for understanding how the Bay lost its good health and why the proposals of both Falmouth and Mashpee to use shellfish aquaculture to help restore Waquoit Bay's degraded ecosystem are a very good idea.

Waquoit Bay is an estuary. Here, where land and water meet, and fresh water meets the salt water of the ocean, all of the nutrients for life are likely to be naturally abundant. Marine plants, animals and bacteria proliferate in a rich, complex web of mutual interaction: living, growing, eating one another, dying and in doing so releasing their nutrients for the next generation of life.

An intact estuary is a wonder. If you had visited Waquoit Bay in 1620, the year the Pilgrims landed on the Cape, you would have encountered an abundant little world of rich fisheries and shellfish beds, clear water showing dark beds of eelgrass waving in the current against a background of white sand with blue crabs scuttling, on the margins healthy marshes and beaches full of shorebirds and fiddler crabs, with gulls and terns swooping overhead. That sounds like the Bay my grandparents described when they built their house on the Bay in 1900. Even when I was a child in the 1940s and 1950s, an echo of this abundance was hovering over the Bay. Today, in the summer of 2020, the Bay is still a beautiful, magical place, but its waters are often murky, eelgrass, scallops and fish nurseries are gone, sediments are grey and mucky, and mats of algae often dot the water's surface, piling ashore to cover the beaches. After a few hot, quiet cloudy days, sometimes large sections of the Bay lose all their oxygen and fish come floating to the surface, dead. It can stink.

Why has all that happened? It is not a local problem; similar issues affect estuaries all over the world. A worldwide nitrogen overload is the usual diagnosis – an interesting and important story. However, in this essay I consider only Waquoit Bay.

- Why, specifically, is there now too much nitrogen in the Bay's waters?
- How does excess nitrogen upset the balance of the Bay's ecosystem?
- What does the State expect the towns of Falmouth and Mashpee to do to reduce nitrogen and restore the balance?
- Why may growing shellfish be a part of the solution?
- How much can shellfish aquaculture actually accomplish?

In a future essay I will review the towns' proposals to grow shellfish, and difficulties they may encounter.

Why is there now too much nitrogen in the Bay's waters?

A short answer: too many people have moved into the Waquoit Bay watershed since WWII, building houses served by Title V septic systems, maintaining lawns with too much fertilizer and water, paving over too much surface and neglecting proper storm drains. Nitrogen from these sources gets into our groundwater and our streams, and from there reaches the Bay. Added to this, to the south and west of us the burning of fossil fuels in vehicles, buildings and industrial and electricity plants dumps compounds of nitrogen into the atmosphere that rain down on us as "atmospheric deposition." Every day, twice a day, the tidal ebb and flow of ocean water with a fairly low concentration of nitrogen flushes out the Bay, but the extra load of nitrogen from groundwater and streams, added to "atmospheric deposition," leaves the Bay with higher concentrations than it can handle, more so in the upper reaches of the tidal rivers and sub-estuaries than near the two entrances.

How does excess nitrogen upset the balance of the Bay's ecosystem?

Again, there is a simple story to tell. It begins with phytoplankton. These microscopic plants are at the base of the aquatic food chain. They use nitrogen in the water, together with other nutrients and the energy from sunlight, to produce themselves. The more nitrogen, the more they grow, clouding the water and blocking sunlight from other

plants such as eelgrass. Normally, shellfish will filter out the phytoplankton and clear the water, assisted by the microscopic animals that eat the phytoplankton and all the animals in the food chain that feed on the microscopic animals. If they all do their job, all is well. But if they cannot handle the phytoplankton blooms, eelgrass beds become sick and begin to disappear. With eelgrass declining, many varieties of young fish as well as scallops that depend on the eelgrass decline. Excess nitrogen also encourages macroalgae (seaweed) to proliferate. As phytoplankton and macroalgae die and bacteria break them down, oxygen in the water column is often depleted, creating fish kills. In a cumulative process, over the years the plant and animal populations of the Bay degrade and the sediments are altered so that future episodes of algae blooms and fish kills became more likely. This is where the Bay is today. I should add that, in addition to excess nitrogen, overfishing of shellfish, careless destruction of marshes, and heavy use of the Bay by the moorings and propellers of motor yachts have further degraded the resources of the Bay.

What does the State expect Falmouth and Mashpee to do to restore the balance?

An unfunded mandate. The State of Massachusetts created the Massachusetts Estuaries Project (MEP) to assess the current condition of all of the State's impacted estuaries. It tasked the MEP with determining for each estuary a so-called ***Total Maximum Daily Load (TMDL).*** This is a "regulatory term in the Clean Water Act, describing a value of the maximum amount of a pollutant that a body of water can receive while still meeting water quality standards."[1] The standard for Waquoit Bay is the maximum concentration of nitrogen that could sustain a healthy population of marine plants and animals as it existed about 1950.

The primary assumption underlying this policy goal is that, if we can reduce the levels of nitrogen in the Bay's waters to the TMDL for nitrogen, the eelgrass and the animals depending on it will come back, we will not have any more fish-kills, the bottom sediments will recover, and all will eventually be well again.

Once a TMDL has been determined, and compared with current flows of nitrogen into Waquoit Bay, the question can then be posed: How much nitrogen entering the system from ***locally controllable sources*** must be removed to bring nitrogen concentrations to the TMDL? For our purposes, locally controllable sources include human septic waste, excess fertilizer, stormwater runoff, tidal flushing rates, and, as we shall argue, the nitrogen shellfish sequester in their bodies when they filter phytoplankton. Atmospheric deposition is not controllable by local action.

Towns are on the hook to comply. Detailed actions to remove nitrogen to reach the TMDLs for estuaries within their jurisdictions are left up to individual towns. The towns must also pay most of the cost. They can expect to receive some technical help from the Cape Cod Commission, the EPA, and local scientists. If they follow State planning guidelines they may become eligible for some financial help (low or no-interest loans for example) from the State. Federal financial help may or may not be available.

Town leaders in Mashpee and Falmouth were frightened by the expense of their initial proposals to build central sewer plants as virtually their only policy. Falmouth proposed and piloted a variety of alternatives that, it was hoped, would be less expensive and politically more feasible than 100 percent sewering. One of these was oyster aquaculture, playing a minor role in one or two of the western estuaries. In all its plans Waquoit Bay has been last. Only in 2019 have plans been proposed to develop oyster aquaculture in Waquoit Bay. Unless these plans are successful, if we wait for Falmouth to implement its other plans on its current timetable, most of us will not live to see even the beginning of improvements to the Bay's condition.

Mashpee has done somewhat better. It has developed and is implementing a promising shellfish program involving quahog seeding and oyster aquaculture in its southern sub-estuaries (Great and Little Rivers and Hamblin and Jehu Ponds.) Mashpee has only this year begun to address the funding of its plan to build a wastewater treatment facility for its upper watersheds. There is no telling how long implementation will be held up by lack of funds and political will.

Why may growing shellfish be a part of the solution?

As we have seen, shellfish filter phytoplankton from the water. Growing more of them might, by controlling phytoplankton, create clearer water and short-circuit the cascade of events leading to the death of eelgrass, the loss of habitat for young fish, eutrophication and fish-kills. Then the shellfish can be harvested and sold, removing the nitrogen they obtain from feeding on phytoplankton. This could be credited to the nitrogen that must be removed from an estuary to meet its TMDL, allowing for reduced sewering and other expensive measures. In addition, shellfish have economic

value on the market to offset the expense of growing them. They can provide income and jobs for people and taxes for the towns. A win-win all round.

It is crucial to see clearly that shellfish aquaculture does not reduce the nitrogen flowing from groundwater and rivers. This nitrogen still stimulates phytoplankton and macroalgae growth. Adding shellfish only neutralizes some of this nitrogen by removing the phytoplankton, clarifying the water and removing a cause of degradation. It is, like so many other technological fixes in our society, a human intervention to correct an imbalance caused by humans in a natural self-sustaining system. It does not restore the natural system to a self-sustaining state.

Can it be a permanent part of the solution? Maybe. In any case it can buy us time to implement longer-term measures to reduce the flow of nitrogen from groundwater and streams into the Bay.

How much can shellfish actually accomplish?

You are welcome to review the massive worldwide scientific literature on both the biology of shellfish and actual commercial and public shellfish aquaculture projects. I will present the bottom line of two recent studies, both of which refer directly to oyster aquaculture in Waquoit Bay. They are in fair agreement on the growth of individual oysters in our waters. They are in radical disagreement on the amount of water surface in the Bay required to neutralize a given quantity of nitrogen by growing and then harvesting oysters.

An individual oyster growing in Waquoit Bay, whether natural or farmed, will grow in two or three years from seed (spat) to harvestable size of 3 – 3.5 inches, and its flesh and shell at harvest will contain about 0.28 grams of nitrogen, dry weight. Oysters also produce "pseudofaeces" that are broken down by bacteria which send some of the nitrogen into the atmosphere, while some is buried semi-permanently in the sediment and the rest returns to the water to be reused. That process may add about 20 percent to the nitrogen removed by an oyster. Exact figures await further research. These figures suggest that a farm growing two or three million oysters from seed and harvesting a million each year could remove about 300 kg of nitrogen per year from an estuary.[2]

The following table presents two estimates of the expected size of oyster aquaculture farming required to make a substantial difference in the condition of Waquoit Bay. The first is in The Cape Cod Commission, in its Watershed Report on Waquoit Bay in 2017, page 7. The second is based on page 52 of the previously cited Reitsma and Murphy presentation. The meaning of these figures can be grasped from the following claims. 1) Waquoit Bay has about 896 acres of open surface in the main Bay and about 1,600 acres overall. 2) Between 23,000 and 24,000 Kg of nitrogen must be removed from the Bay per year in order to reach the TMDL.

Study	Grams/oyster	Oysters/acre	Kg/acre	Acres	Total Kg
CCC	0.25	x 1,000,000	= 250	x 46	= 11,500
Reitsma & Murphy	0.28	x 120,000	= 33.6	x 300	= 10,080

There is no easy way to reconcile these estimates. The first claims we can devote only 3 percent of the total surface of the Bay, or 5 percent of the main Bay, to remove almost 50 percent of the nitrogen. The second claims we would have to devote about 33 percent of the main Bay or 19 percent of the total surface to get about 47 percent of the nitrogen. I personally believe the first estimate is too optimistic. I hope the second is too pessimistic.

The result of this study can be stated in two propositions. First, shellfish aquaculture cannot do the job alone no matter how successful. For one thing, too much excess nitrogen enters the Bay from septic systems, fertilizer and road runoff. For another, actually growing enough shellfish to make a big difference is beset with political, social and regulatory difficulties. But, on the other hand, shellfish aquaculture is a very powerful, and probably very low-cost way to neutralize the excess nitrogen entering Waquoit Bay. We need to support our local governments in their attempts to develop shellfish aquaculture.

[1] Cape Cod Commission, Watershed Report: Upper Cape, Waquoit Bay, Falmouth, Mashpee & Falmouth, October 2017, p2

[2] "Nitrogen Uptake in Shellfish: What's in Our Oysters and Clams" by Josh Reitsma and Diane Murphy, Cape Cod Cooperative Extension & Woods Hole Sea Grant, Presentation at 2nd Annual Cape Coastal Conference, June 5, 2014

How well do you understand *YOUR* role in the water quality of our ponds & estuaries?	GREEN-5pts each	YELLOW-2pts each	RED-Subtract 1pt each
I am aware of the degradation of our ponds/estuaries over the past decade(s)		Yes	No
Type of grass on my property**1	Fescues, Rye, or "Cape Cod Lawn"	I don't know	Bluegrass
Type of fertilizer used on my lawn	Topsoil, Compost, Grass Clippings	Granular Water Insoluble Nitrogen	Spray Combination Fertilizer, Pesticide, etc.
Chemical Fertilizer is applied	Never or 1x in Fall	1xFall and 1xSpring	Throughout Season
I have seen road run-off during/after rains**2	Yes	No	What is Run-Off?
As a dog owner (or if I were a dog owner!), I do (would) always pick up after my dog and dispose of it safely.	Yes	Sometimes	No, Should I?
I have visited the website/ Facebook/other Social media for any of the following organizations: • APCC - Assoc. to Preserve Cape Cod • Barnstable Clean Water Coalition • CPWB - Citizens for the Protection of Waquoit Bay • WBNERR - Waquoit Bay National Estuarine Research Reserve • Friends of WBNERR • Mashpee Clean Waters • SSCEF - Sporting Safety Conservation & Education Fund • Water Stewards of Falmouth • Your Town's website	Yes, Routinely	A few times	No
I have volunteered/donated to any of the organizations listed above.	Yes	No, but will do so this summer!	No

* Water/rain from road flowing directly (unfiltered) into pond/estuary

** **Extra Credit is Available! (Earn 3pts ea)**

1) I am willing to share information requested about my lawn care company.
2) I have seen road run-off, I like ice cream and am willing to take pictures after a rain.
3) I have/am interested in denitrifying septic systems, composting toilets or urine diverting toilets.
4) I will attend the CPWB Annual Meeting via Zoom on Wednesday, August 19 at 6.30PM

How did you score? Highest Available Score = 49 Lowest Available Score = -8

Greater than 30—Great Job! You are an advocate for our waters! *SHARE YOUR KNOWLEDGE!* SPREAD THE WORD!

Less than 15—It is time for you to learn more. Read this newsletter! Visit websites. Attend CPWB Annual Meeting-August 19.

Do You Know if Your Lawn is Green?

CPWB is conducting a survey. We want to find out how many of us are aware of the nitrogen use laws and whether or not our lawn care companies are implementing them. Please find a brief summary below. Ask your lawn care companies about this issue to make sure they are complying with the law and if they are, please share the company's information with us via email: cpwb1981@gmail.com. Send us **the name of the company, the contact person you use and how long they have been working for you. Add any additional comments that you think might be helpful to your neighbors.** We'd like to be able to promote good stewards!

FALMOUTH: All application of nitrogen shall comply with the following standards:

A. The application of nitrogen is prohibited between October 16 and April 14 unless specifically designated by the Town Department of Natural Resources or the Board of Selectmen.
B. No person shall cause nitrogen to apply to, or otherwi
C. No person shall apply nitrogen directly before or during a heavy rain event.
D. The application of nitrogen is prohibited within 100 feet of Resource Areas.

https://ecode360.com/27443489

MASHPEE: All application of nitrogen to turf shall comply with the following standards:

A. The application of nitrogen is prohibited between October 30th and April 14th.
B. No person shall cause nitrogen from any fertilizer application to apply to, or otherwise be deposited on any impervious surface.
C. No person shall apply nitrogen 24 hours before or during a heavy rain event or apply nitrogen onto saturated ground.
D. The application of nitrogen is prohibited within 100' of the following Resource Areas.

https://www.mashpeema.gov/sites/g/files/vyhlif3426/f/uploads/nitrogenbylaw.pdf

Newsletter © 2020 Sara B Slaymaker

Kids! Families! Help Our Bay!

Earn a Free Ice Cream Cone from Smitty's!

Here's how to earn that delicious cone
and help Waquoit Bay and its rivers at the same time!

Go out just after a heavy rain with your phone and take a photo of road run-off! **(Check with an adult! Be safe!)**

What's **road run-off**? Hang on! Here's some quick info!

When it rains, water washes off the edges of the roads. There are lots of substances on the surface of roads that can pollute bays, rivers, ponds or streams. That means, there are lots of things that you can't necessarily see lying on the road that are poisonous for the environment. Some of them got there from cars. When that polluted or dirty water runs off the road right into a nearby bay, river, pond or stream, that's not good at all! It makes too much algae or too many tiny plants grow in the water. Those new plants kill off other important plants and animals that make the bay or river their home. And, then there are the bacteria from dog waste and other chemicals from cars that close shellfish beds and beaches to swimming! No!

BUT! There is a way to fix this! If the water from the road goes into the ground near the road instead of right into a bay, river, pond or stream, the dirty things in the water get taken out. When the water then makes its way to the bay, river, pond or stream, it's much cleaner. The people in the town who build the roads know how to make the run-off water go into the ground not nearby bays, rivers, ponds or streams. They just are not always doing it! (For even more information on road run-off, please go to the CPWB website: https://www.protectwaquoitbay.org/our-work/road-runoff/).

Here are photos to show you what road run-off looks like:

So, we need **YOU** to go out in the rain or after a heavy rain and take photos of places around Mashpee and Waquoit where this is happening! CPWB will use the photos to help the towns see exactly where these problems are and just how important it is to fix them.

For every photo of a different run-off location you submit, you'll earn **a free cone at Smitty's**. If you work as a team or family, you'll each get a cone! We want as many different locations as possible, so if we get the same site twice, we'll let you know. You earn a cone for sites that are photographed for the first time. Check the CPWB Facebook page for updates.

Participation is open until Labor Day – Monday, September 7, 2020.

Here's how to submit your photos and get your Smitty's cones!

Go to: cpwb1981@gmail.com

Attach the photo(s) and include the following information in your email:

1. **Names of people involved**
2. **Your email address for response from CPWB**
3. **Exact location of each photo**
4. **Date of photo(s)**