

# Findings from the Field

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## Goosefare Brook Watershed has Good Biodiversity but Phragmites is Invading

Madison S

*Loranger Memorial School, Old Orchard Beach, ME*

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## **Abstract**

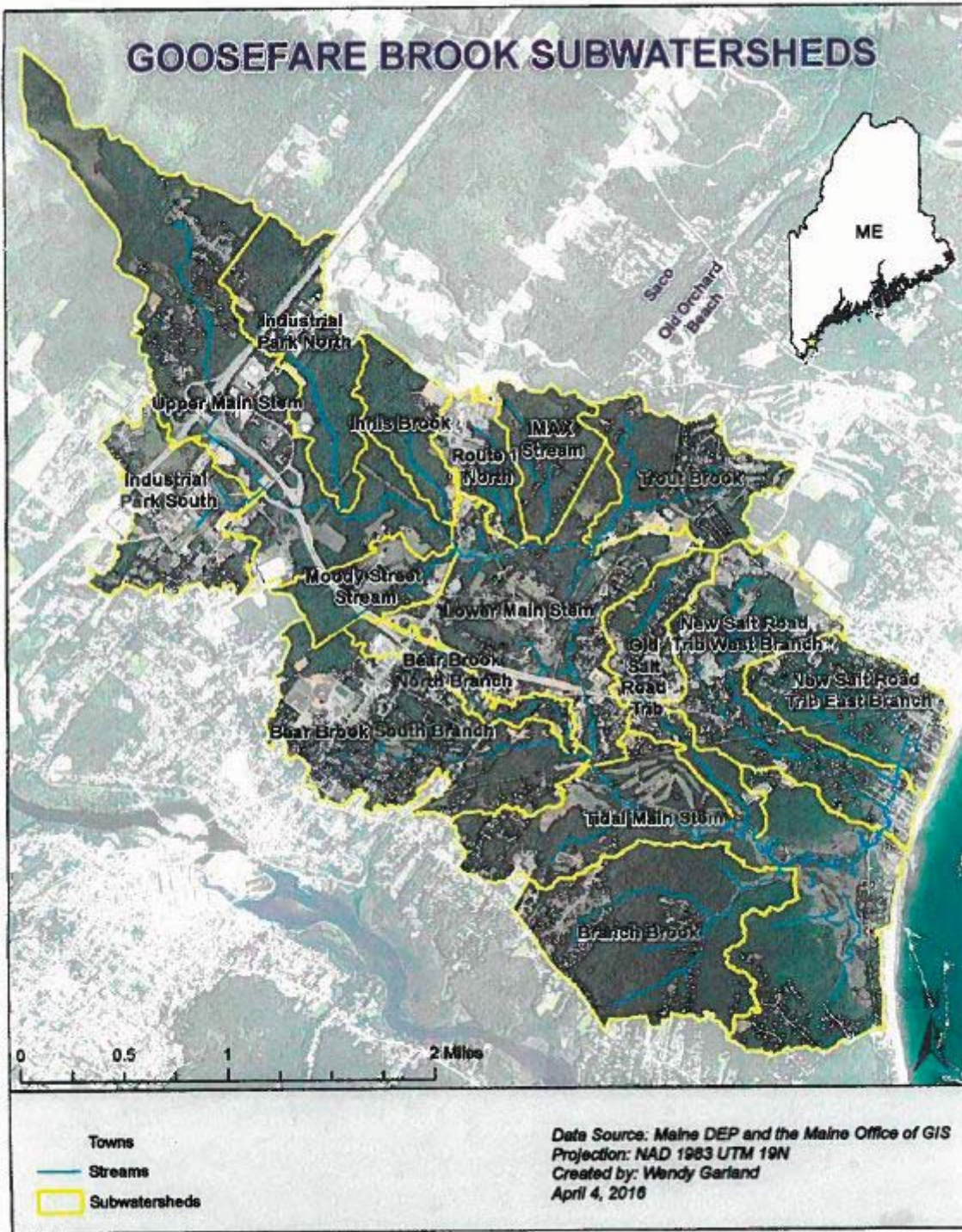
Our purpose was to find out if the Goosefare Brook ecosystem is healthy. My group focused on biodiversity. Our method was to go to sites along the Goosefare Brook watershed and count the number of different plant and animal species we found. We used a quadrat to count the number of species in a square meter. We were looking for an invasive species, phragmites. We found that phragmites is not all over the watershed, but it is in three places. Where we found it, biodiversity was lower. We concluded that the ecosystem is fairly healthy but we need to control the phragmites population so it doesn't spread.

## **Introduction**

We are investigating phragmites and biodiversity in the Goosefare Brook watershed. Phragmites is an invasive species, not native to Maine. It is a tall plant with long leaves and it grows like a wall. It has large purplish seedheads. Because it's so tall, it sways in the wind and the seeds blow around and spread so more plants grow. It fills in marshes, ponds, and streams and kills off other plants. Goosefare Brook is an important watershed in Saco and Old Orchard Beach. The Goosefare Brook is eight miles long. It starts in the Saco Heath and goes to the Ocean Park beach where it flows into the ocean. There are many unique species that live along the Goosefare watershed, including rare and endangered animals and insects. Some of them are rare Pitcher Plants, Atlantic White Cedar, and the endangered Hessel's Hairstreak Butterfly. All of these organisms live in the source of the Goosefare, the Saco Heath. We started our investigation at the heath. We observed a lot of biodiversity in the heath. We didn't see any phragmites there. Then we went to the mouth of the Goosefare Brook, where it flows into the Goosefare marsh and the ocean. We saw phragmites in the marsh and in the woods near the marsh.

Mr. Kimbark Smith from the Conservation Commission met us at the tide gate where the marsh connects to the Goosefare Brook and the ocean. He told us why the marsh is so important. "All of Ocean Park is below sea level, so the marshes are our protection from storms and rising tides," he said. Marshes also have high biodiversity levels. Many types of plants, fish, shellfish, mammals, insects, and birds depend on the marsh for food, shelter, and space to live. Phragmites could take over the marsh and hurt other species, so the Conservation Commission wants to get rid of it.

We wanted to find out if phragmites is all over the Goosefare watershed or just in one place. If it's just in one place, we could try to get rid of it before the seeds spread. Our plan was to go to Trout Brook near the Blueberry Plains, Goosefare Pond, and Old Salt Tributary. In each place groups would look for phragmites and biodiversity, look for macroinvertebrates, and test the water. We thought we would find phragmites in all those places because they are connected and all go into the marsh and we saw a lot of phragmites at the marsh.



This map shows where we went. Goosefare Pond is in the Innis Brook subwatershed on the Saco side of the town line. Trout Brook is in the northeast on the Old Orchard Beach side. Old Salt Tributary is closer to the ocean towards the middle of the highlighted area.

## Methods

I was on the team that looked for phragmites and biodiversity at Trout Brook. When we got to Blueberry Plains, we walked to Trout Brook and looked for phragmites. We found a big patch of phragmites in a little stream that is a tributary to Trout Brook. We used species identification cards to make sure it was phragmites. Then we went into the phragmites to set our quadrat. We opened a side of the quadrat and pushed the ends into the patch because we could not get the quadrat over the tall phragmites. Then we counted the biodiversity in the quadrat. Then we estimated how much of the area was covered by phragmites. Some other people in our group set a quadrat where there wasn't phragmites and counted the species in that quadrat. We wanted to compare the biodiversity count in areas with phragmites and without phragmites to find out if the biodiversity count was higher or lower.

The next day another class went to Goosefare Pond and followed the same procedure. The last day the third class went to Old Salt Tributary and the marsh and followed the same procedure. At each site, groups also looked for macroinvertebrates and tested the water quality.

Back at school, we put all our data together in a chart. We made dot graphs for phragmites and biodiversity. We looked at the TUVA website to see data for phragmites in Maine. We posted entries on Vital Signs and wrote Goosefare Brook lab reports.

## Results

DATA	Macroinvertebrates	Phragmites and Biodiversity	Water Testing
Trout Brook Tributary	<p style="text-align: center;"><u>Found</u></p> 1 caddisfly case 1 caddisfly larva 1 riffle beetle 1 filled snail 1 dragonfly nymph 10 water bugs/true bugs 1 yellow-spotted salamander  found caddisflies = Group 1, sensitive to pollution so water must be pretty good  Stream Health Index Score = 2.2 = fair	We found phragmites in a tributary to Trout Brook.  Where we found phragmites biodiversity = 4: phragmites, two short plant species and a mosquito  Where we did not find phragmites biodiversity = 7: cattails, 3 short plant species, butterflies and mosquitoes	pH was 7 = good  dissolved oxygen was 11 ppm = good  nitrates less than 5 ppm phosphates less than 2 ppm low = good

Goosefare Pond	found a few Group 2 animals, somewhat sensitive to pollution = could be good, could be somewhat polluted	No phragmites. They identified cattails, sedges, plus ten other species= high biodiversity Biodiversity 7+	pH was 7 = good  dissolved oxygen was 7 ppm = decent
Old Salt Tributary	Not many animals- not sure if dirty or just hard to find	Yes a small patch but it covered 100% of the area - biodiversity = 2: phragmites and short grass = low biodiversity Where there was no phragmites - biodiversity = 5	pH was 7 = good  dissolved oxygen was 9 ppm = good  nitrates were low = good

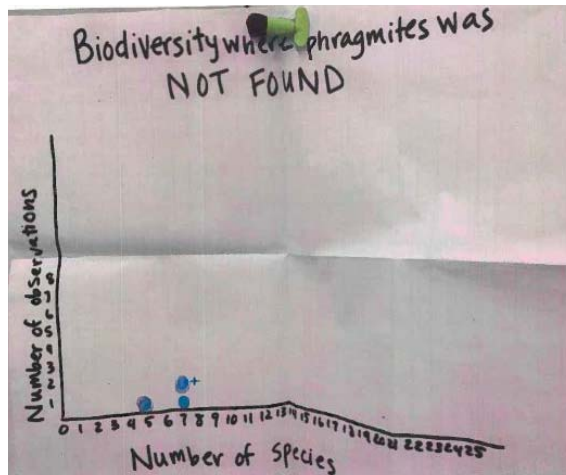
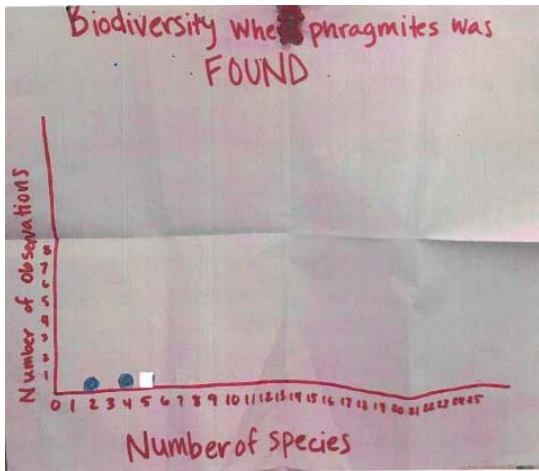
This table shows all the data we collected. At Trout Brook, my group found a big patch of phragmites in a tributary that flows into Trout Brook. The patch of phragmites was so thick that we had to make a path into it. It was hard to walk through because the phragmites would drag at our ankles and the seeds would start spreading. The phragmites formed a canopy that blocked light from getting to shorter plants that could have been growing there but weren't.



We found phragmites near Trout Brook.

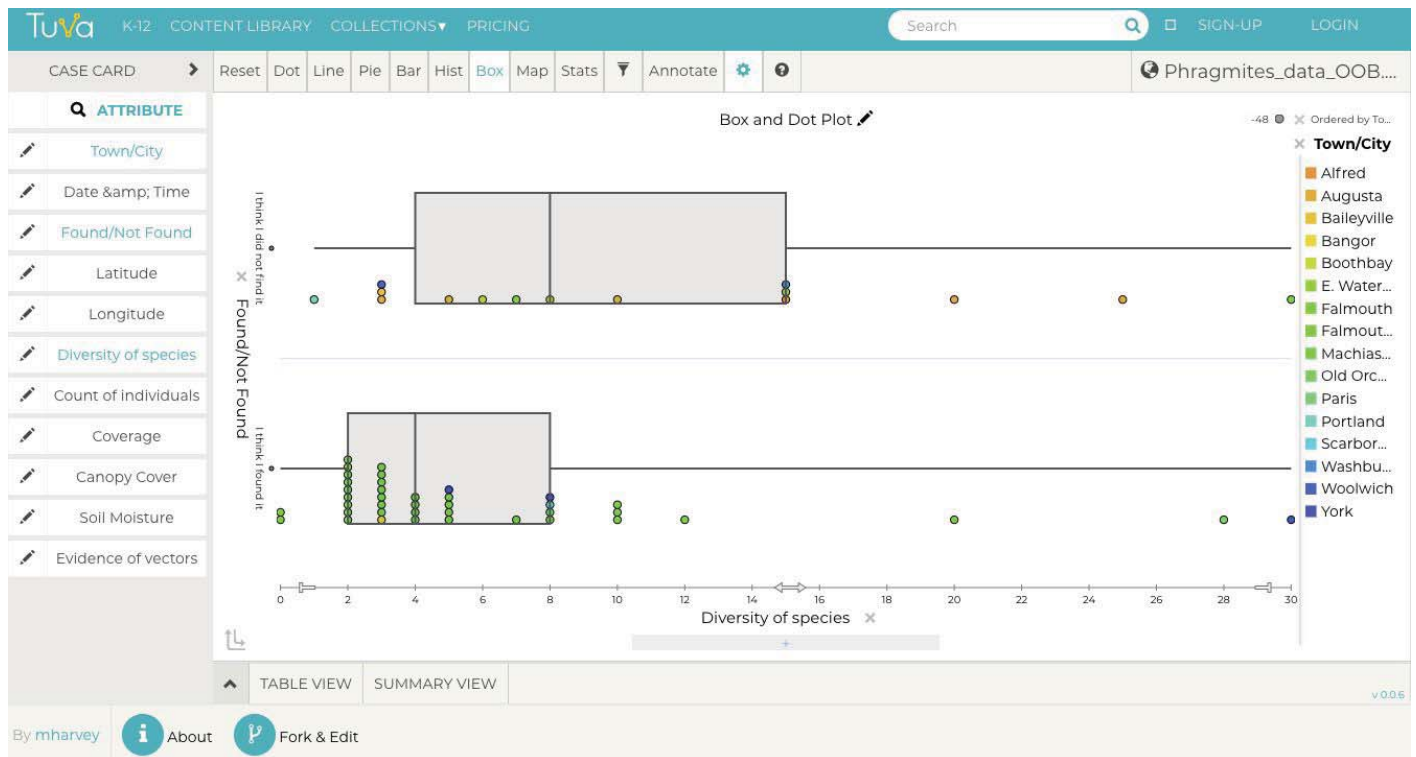


We found a small patch of phragmites in Old Salt Tributary. The biodiversity was higher in the square meter with no phragmites.



These dot plots show that biodiversity was higher in the places where we did not find phragmites. The dots where we found phragmites are Trout Brook and Old Salt Tributary. The white out covers a mistake.

## Diversity of Species in Towns in Maine Where Phragmites was Found and Not Found



I made this graph using the [TUVa phragmites database](#). It shows data from 16 towns. There is more biodiversity where people think they did not find phragmites, and the data is more spread out. Where they think they found it, the data is more towards the low end meaning they found fewer species. The tuva data helped us be more confident in our our results because the data other people collected around the state of Maine is similar to ours. Their data and our data both show that where phragmites is found, the biodiversity is lower than where it is not found.

### Discussion and Conclusion

We wanted to find out if phragmites is all over the Goosefare watershed or just in one place. We found that phragmites is not all over the watershed, but it is in three places. There is a large patch near Trout Brook Tributary, a small patch in the Old Salt Tributary, and the marsh has lots of it. We found that places with phragmites had less biodiversity and places without phragmites had more biodiversity. The TUVa data for Maine also shows that where other people found phragmites the biodiversity count was lower. We learned it is better to have more biodiversity because that means the ecosystem is healthier. We could help the ecosystem by getting rid of the phragmites. We Loranger School students want to help get rid of it. One method is to poison it. The Conservation Commission is going to get a company to do that but we might be able to help by cutting down some plants first. Mr. Smith told us it would be risky trying to take it away in the fall because the seeds spread so easily. We could take trash bags, lean the seed heads over the trash

bags and cut the plants off into the trash bags so they don't spread. We could do that next fall in September when the seed heads are still small and won't spread. We could also cut them off in the spring or even in the summer before the seedheads start to spread.

We are confident that we found phragmites and that it can cause problems. It is already filling in the marshes, which can stop the marshes from preventing flooding. Our data shows that phragmites is reducing the biodiversity in at least three places. We could look for it in more places, and we would find it because we have seen it already in the Goosefare Brook Watershed and along the road in other areas. Some people think that phragmites is beautiful, and that's why it was brought here for decoration and even planted near people's houses on the beach. We can help people understand that it is really a problem.

## **Sources**

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## **Acknowledgements**

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