

Mussel reestablishment as a best management practice: scaling their nutrient effects from the individual to the stream.

Resource Protection Group, Inc. – Reston Stream Monitoring PROGRESS REPORT

For Period January 1st, 2025 – March 31st, 2025

PROJECT NUMBER:

PERSONNEL: Sally Entrekin, Jess Jones, Athan Anderson, Donya Mohamed,
Chester Zarnoch, Rowan Scott, Denise Bruesewitz, Paul Angermeier

COOPERATOR: Resource Protection Group, Inc.

START DATE: October 1st, 2022

END DATE: September 30th, 2027

OBJECTIVES:

We will measure and analyze features of individual mussels, mussel beds, and stream reaches to describe the role mussels play in stream ecosystem function. Our fisheries management plan, focused on fish-host needs of the mussel populations, will be informed by species-specific responses of reintroduced mussels and their effectiveness in assimilating nutrients and changing physical and chemical conditions of the sediments to facilitate nitrogen removal via denitrification.

PROGRESS DURING PERIOD:

SITES

1. Jess Jones and Athan Anderson completed their *Elliptio complanata* assessment. [The slides are available here](#). The main finding was that ~60% of the mussels added to Snakeden Branch have been moved down into the lake or they have died. Glade has evidently retained ~80-90% of the mussels; however, they are difficult to find. Therefore, Athan will be assessing the vertical distribution of the mussels to verify their presence and their distribution within the Glade Run “mussel reach”.
2. Rowan Scott and Sally Entrekin collected benthic macroinvertebrates in the pools associated with the mussels and in the upstream pools that will be used for comparisons.

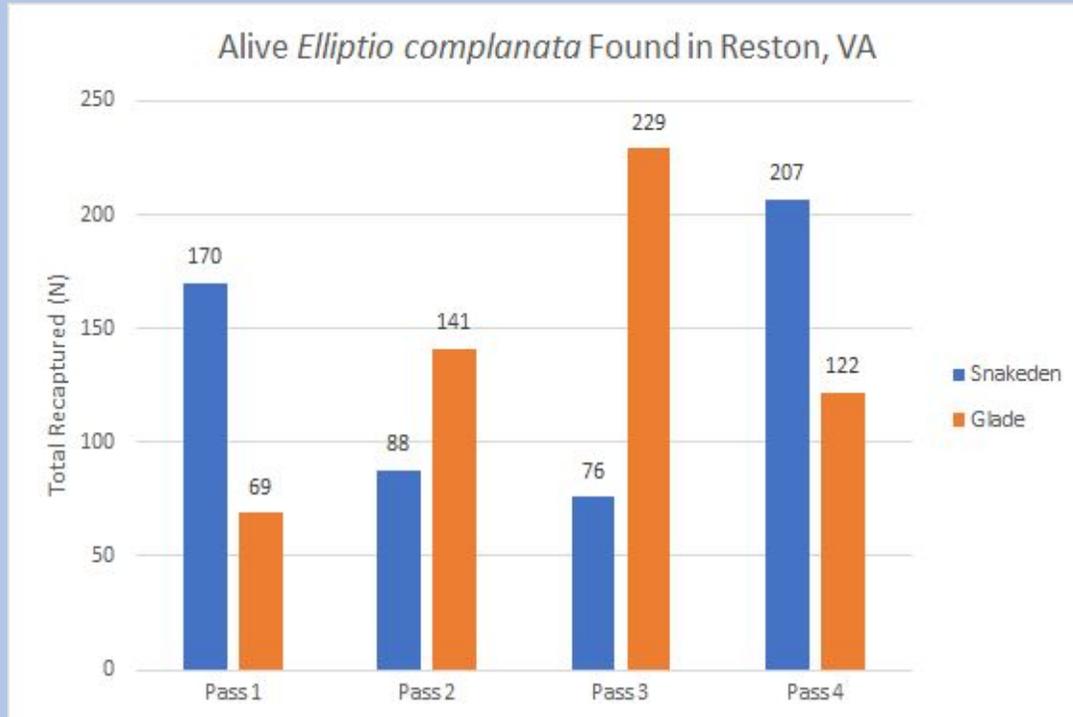
DATA:

1. Rowan Scott, PhD student in Entomology, has accessed and analyzed USGS benthic macroinvertebrate data to assess how mussels interact with macroinvertebrates.
2. Rowan Scott has continued to be downloaded, and Rowan Scott organized the data that is in the project shared drive.
3. Chester Zarnoch analyzed the mussel nutrient cycling and bio deposition experiments that he and Tim Hoellein and Denise Bruesewitz conducted in August 2024.

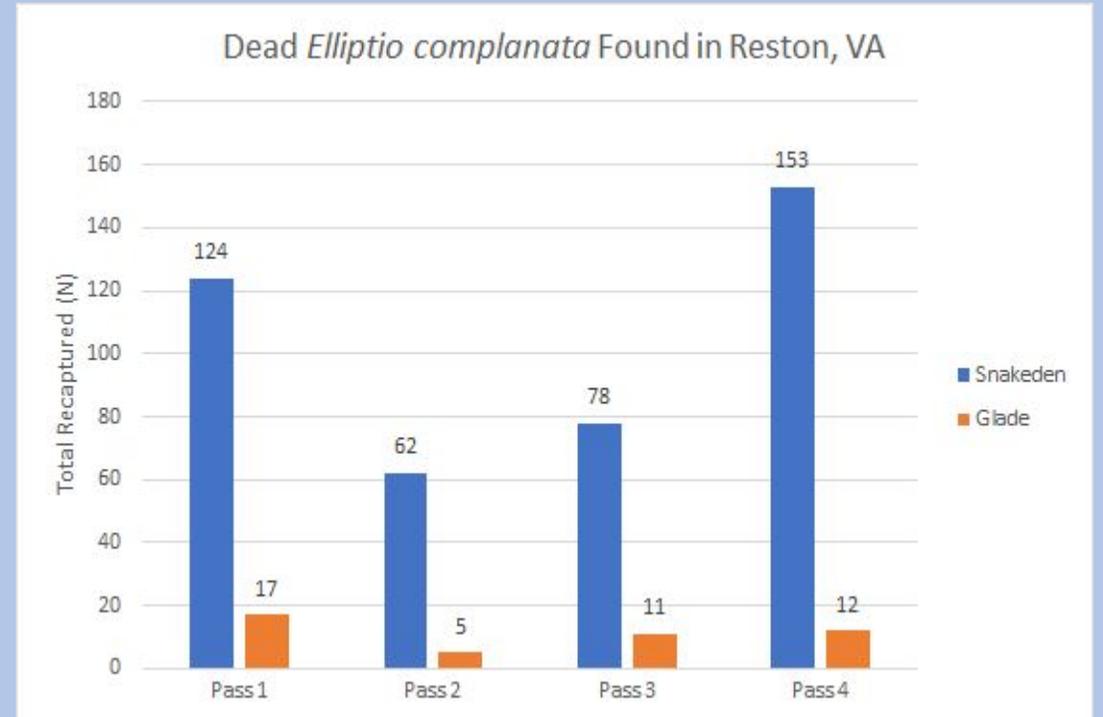
PLANS FOR NEXT QUARTER:

1. Rowan and Chester will present their results at the Society for Freshwater Science in San Juan Puerto Rico in May 2025.
2. Jess and Athan will grow out the second species of mussel, *Ligumia nastuta*, at the National Harbor, Virginia. The plan now is to introduce ~3000 to Glade Run in October 2025.
3. Sally will work with the team on an expanded experimental design that assesses how pool-specific mussel density change water and sediment nutrient chemistry in the Glade.
4. Sally is coordinating a site visit to assess why mussels are blown out at Snakeden.

Mussels Alive and Dead in Snakeden and Glade



- Mussels found alive per pass in each stream.



- Mussels found dead per pass in each stream.

Percentage of Mussels Found in Snakeden and Glade

Stream	Pass	Alive	Dead	% Found Alive	% Found in Each Pass
Snakeden	Pass 1	170	124	57.8	19.0
Snakeden	Pass 2	88	62	58.7	11.1
Snakeden	Pass 3	76	78	49.4	11.1
Snakeden	Pass 4	207	153	57.5	4.5
Glade	Pass 1	69	17	80.2	8.1
Glade	Pass 2	141	5	96.6	13.6
Glade	Pass 3	229	11	95.4	21.8
Glade	Pass 4	122	12	91.0	12.2

Mussels Found Per Habitat Unit in Snakeden

Site #	Habitat Name	Mussels Stocked	Mussels Found Pass 1	Mussels Found Pass 2	Mussels Found Pass 3	Mussels Found Pass 4	Found Outside of MR
1	Pool 1	400	7	27	33	5	-
2	Riffle 1	0	16	0	0	0	-
3	Pool 2	100	0	0	1	5	-
4	Riffle 2	0	4	0	0	0	-
5	Pool 3	400	12	0	0	0	-
6	Riffle 3	0	0	0	0	0	-
7	Pool 4	0	12	13	13	3	-
8	Pool 5	400	0	0	0	0	-
9	Riffle 4	0	0	0	0	0	-
10	Pool 6	0	0	0	0	0	-
11	Pool 7	278	0	0	0	0	-
12	Riffle 5	0	0	0	0	0	-
13	Pool 8	0	0	0	0	0	-
14	Pool 1 to Gauge Station	-	188	84	67	29	-
15	Gauge station pool	-	0	0	5	5	-
16	Below Gauge Station	-	0	36	22	0	-
	Unkown	-	0	0	6	0	27
Totals:		1578	239	160	147	47	27

Mussels Found Per Habitat Unit in Glade

Site #	Habitat Name	Mussels Stocked	Mussels Found Pass 1	Mussels Found Pass 2	Mussels Found Pass 3	Mussels Found Pass 4	Found Outside of MR
1	Pool 1	165	11	1	31	8	-
2	Riffle 1	0	3	0	0	0	-
3	Pool 2	40	13	5	11	2	-
4	Riffle 2	0	1	2	0	0	-
5	Pool 3	65	7	8	12	0	-
6	Riffle 3	0	1	3	1	3	-
7	Pool 4	245	7	48	86	51	-
8	Riffle 4	0	9	14	29	22	-
9	Pool 5	175	0	0	0	0	-
10	Riffle 5	0	8	6	5	0	-
11	Pool 6	70	1	3	5	2	-
12	Riffle 6	0	0	0	0	1	-
13	Pool 7	49	6	6	26	18	-
14	Riffle 7	0	0	0	0	0	-
15	Pool 8	133	0	0	0	0	-
16	Riffle 8	0	0	0	0	0	-
17	Pool 9	73	0	0	0	0	-
18	Riffle 9	0	0	0	0	0	-
19	Pool 10	95	0	0	0	0	-
20	Riffle 10	0	0	0	0	0	-
21	Pool 11	114	0	0	0	0	-
22	50m below gauge station		0	0	0	0	-
	Unkown	-	0	0	0	0	30
Totals:		1224	67	96	206	107	

Reston, Virginia Mussel Restoration Project

Summary of juvenile mussel production in 2023-2024
Freshwater Mollusk Conservation Center at Virginia Tech

Species	2023	2024	Total Produced	*Current Inventory
<i>Elliptio complanata</i>	5,216	15,785	21,001	881
<i>Elliptio fisheriana</i>	0	5,115	5,115	115
<i>Ligumia nasuta</i>	12,610	12,621	25,231	2,082
<i>Lampsilis radiata</i>	746	9,705	10,451	8
<i>Pyganodon cataracta</i>	969	0	969	0
Total	19,541	43,226	62,767	3,086

*Current inventory only reflects larger mussels > 20 mm produced in 2023 and grown out for > 1 year. The mussels produced in 2024 are small (< 5 mm) and are not large enough to release.



Lampsilis radiata



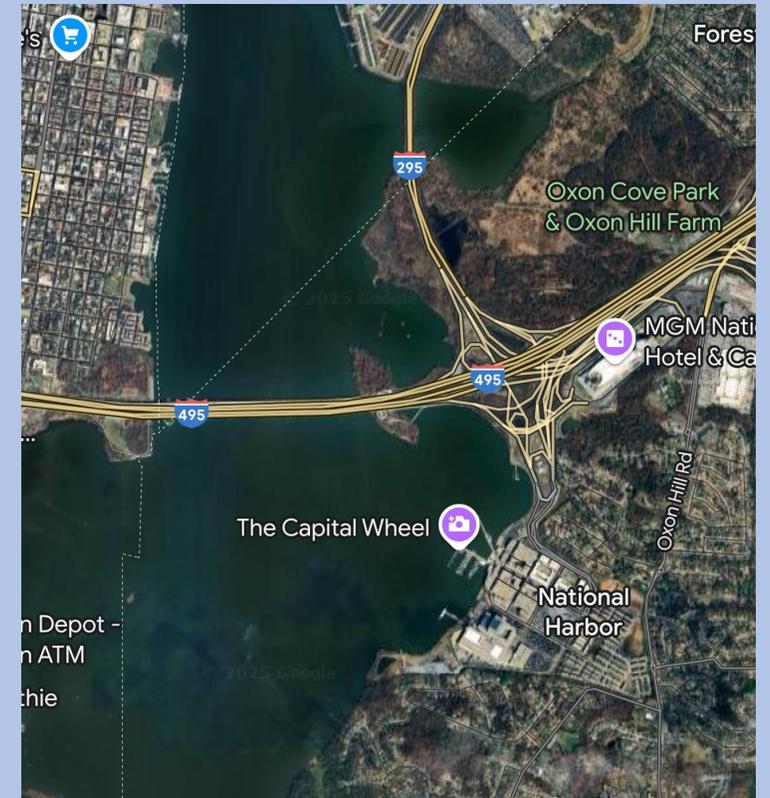
Ligumia nasuta

Suggested Growout and Stocking Strategy for 2025

- Transport ~2,000 *Ligumia nasuta* and ~500 *Elliptio complanata* in early May to National Harbor, near Washington, D.C. in coordination with Maryland DNR for further growout to 60-70 mm in length
- Stock remaining mussels sometime in early to mid July in Glade Run.
- Larger size mussels will hopefully survive better in Glade and have a larger ecological impact.



Mussel Grown at National Harbor in 2024



National Harbor