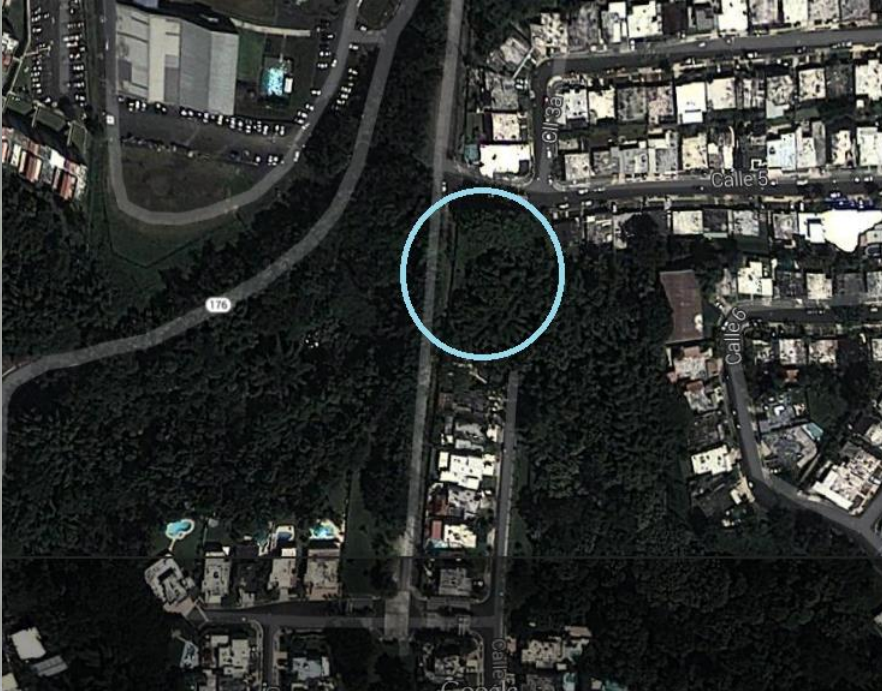# Chironomidae, Ephemeroptera, and Caddisfly: Indicators of Total Phosphorus levels in Río Puerto Nuevo and Río Grande de Loíza.

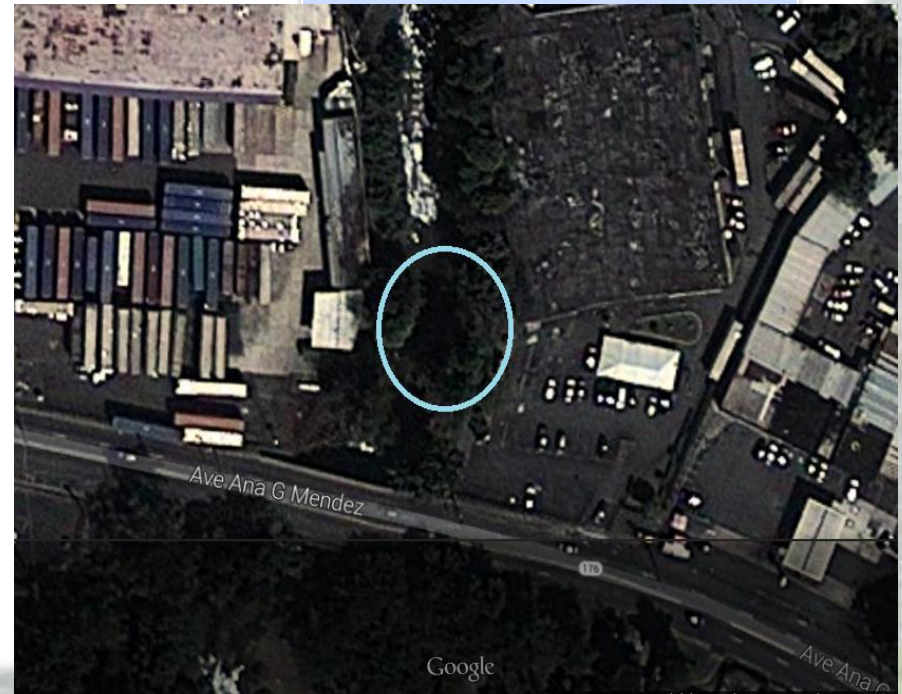**Alice Garrastegui**
Gabriela Rosario
University Gardens High School

Río Puerto Nuevo:

Up:
PN_RivStrm_154 [forested]

Right:
PN_SenStrm_49 [commercial]

Río Grande de Loíza:

RGL_MrcutoCrk_46

Introduction:

- Phosphorus is an essential nutrient for all life forms found within a body of water, including streams.
  - Eutrophication
- Macroinvertebrates are organisms that are large enough to be seen with the naked eye and lack a backbone.
- The basic principle behind studying macroinvertebrates is their tolerance towards pollution.

Chironomidae:

- Most abundant and diverse group of macroinvertebrates.
- Sensitive to pollution and tolerant to pollution.
- Blood red color; low dissolved oxygen.

Ephemeroptera:

- Three tails and wings.
- Usually most abundant are: Heptageniidae, Caenidae, and Tricorythidae.
- Relatively intolerant to pollution.

Caddisfly:

- Silk cases.
- Diverse
- Sensitive to pollution and oxygen depletion.

Hypothesis:

The total phosphorous of a stream affects the abundance of Chironomidae, Ephemeroptera and Caddisfly. Therefore, it is expected to find a difference between the abundance of these macroinvertebrates with the total phophorous found in the Rivera, Puerto Nuevo and Maracuto Stream.

Methodology:

• Four replicas of total phosphorous (TP) samples were taken per stream each visit.

• Four macroinvertebrate samples were collected per stream each visit.

• TP samples were sent to St.Michael's College to be processed.

• Macroinvertebrate samples were classified.

• Maracuto stream data was retrieved from data base.

• The data of TP levels and the abundance of Chironomidae, Ephemeroptera and Caddisfly were plotted on graphs.

Data:

PN_SenStrm_49

	2012-09-04	2012-10-20	2012-11-17	2012-12-02
1	0.051996	0.081098	0.101168	0.068956
2	0.054003	0.043466	0.066246	0.065142
3	0.063891	0.07782	0.09407	0.001918

PN_RivStrm_154

	2012-09-04	2012-10-20	2012-11-17	2012-12-02
1	0.071765	0.101168	0.097756	0.088424
2	0.092337	0.109899	0.053401	0.078627
3	0.082564	0.07782	0.100732	0.084078

Data:

RGL_MrcutoCrk_46			
	2012-09-08	2012-11-04	2012-12-08
1	0.041181	0.042897	0.057330
2	0.031794	0.047742	0.055312
3	0.037951	0.060257	0.058037

Data:

PN_SenStrm_49	
	2013-03-29
1	**0.097707**
2	**0.0978**
3	**0.104944**

PN_RivStrm_154		
	2013-09-29	20123-10-20
1	**0.084347**	**0.077667**
2	**0.091862**	**0.066905**
3	**0.082677**	**0.063751**

Data:

Data:

PN_SenStrm_49
[2012]

- Chironomidae
- Ephemeroptera
- Caddisfly

17%

13%

70%

PN_RivStrm_154
[2012]

8%

7%

- Chironomidae
- Ephemeroptera
- Caddisfly

85%
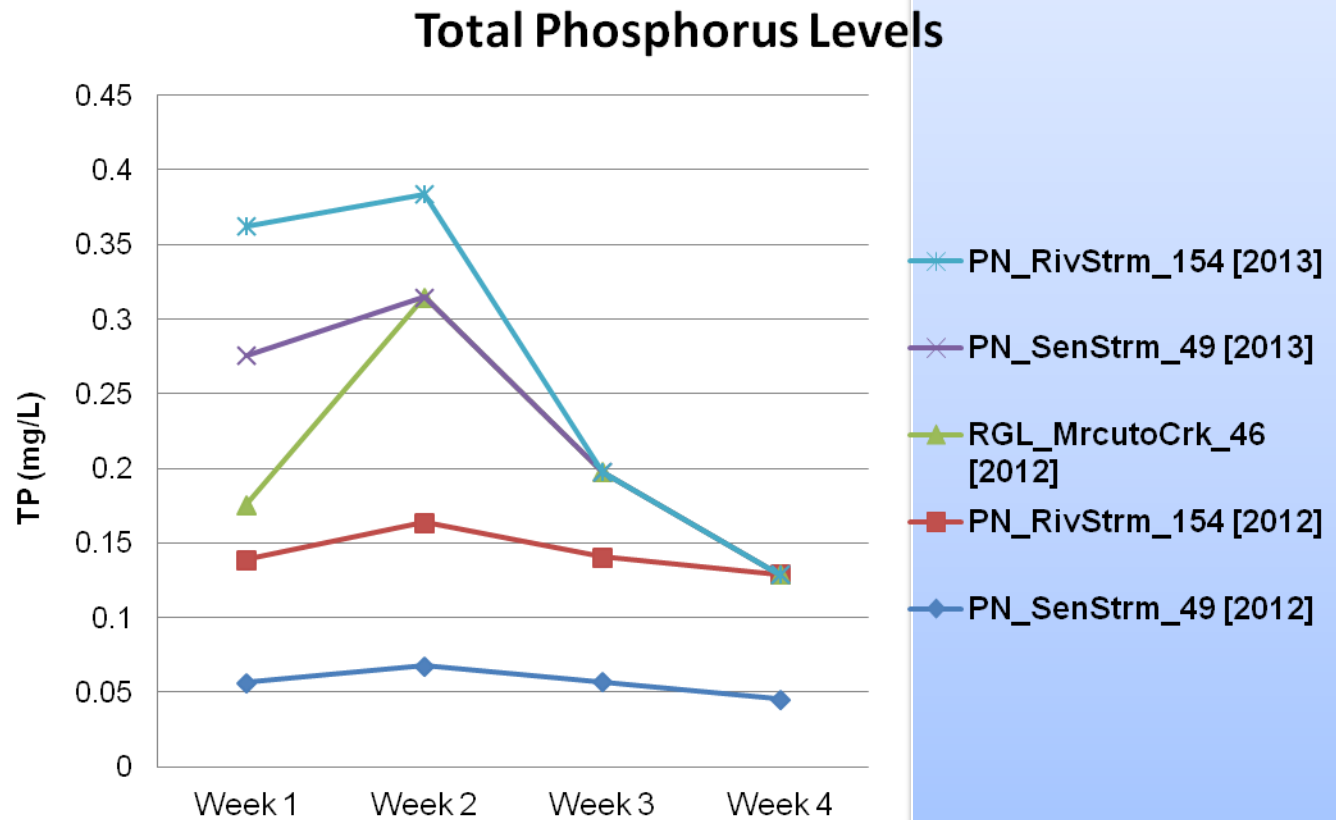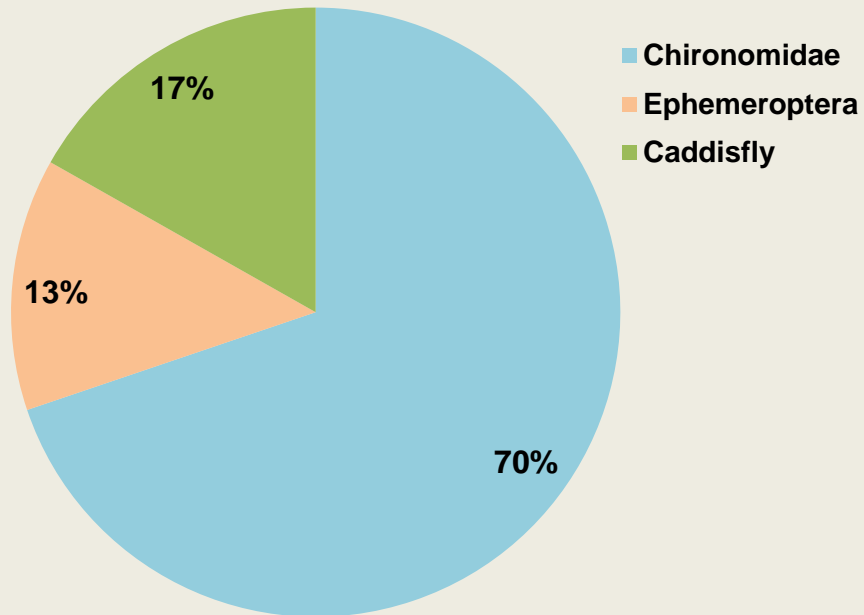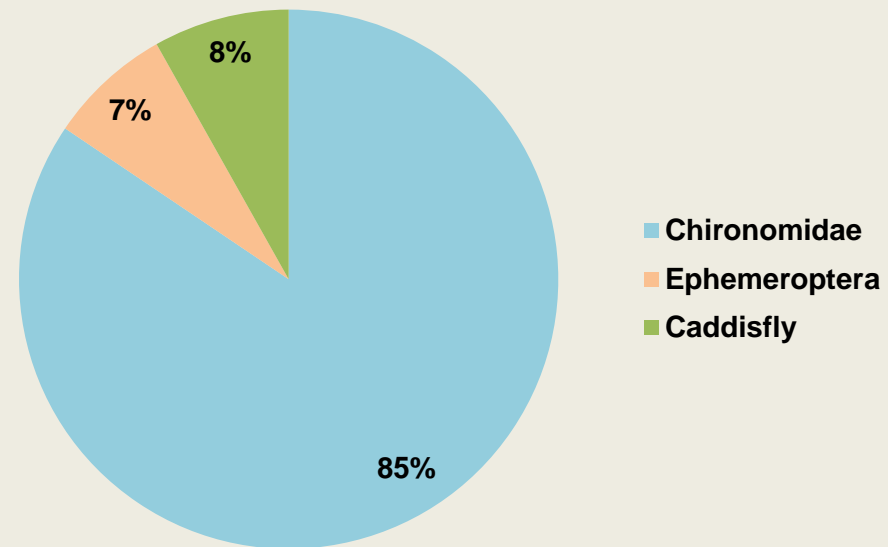
Data:

RGL_MrcutoCrk_46
[2012]

- ■ Chironomidae
- ■ Ephemeroptera
- ■ Caddisfly

Pie chart values: 22%, 59%, 19%

Data:

PN_SenStrm_154
[2013]

- Chironomidae
- Ephemeroptera
- Caddisfly

75%
20%
5%

PN_RivStrm_154
[2013]

- Chironomidae
- Ephemeroptera
- Caddisfly

0%
16%
84%
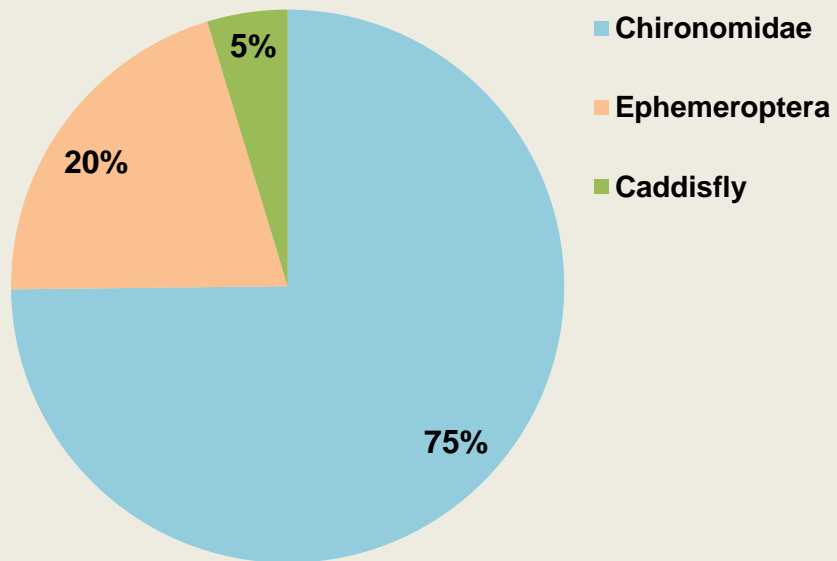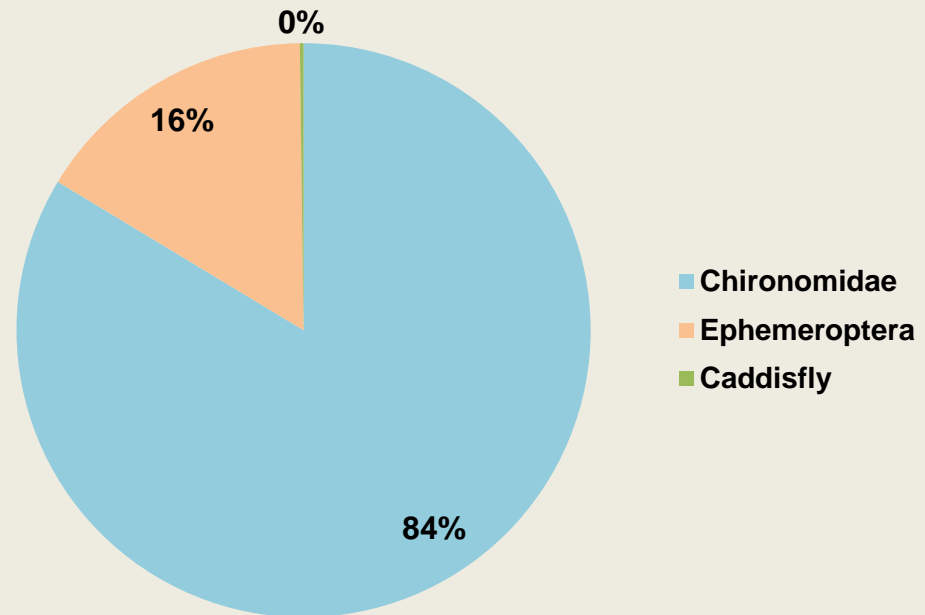
Analysis :

- No more than 0.1 mg/L (US EPA)
- Appropriate levels of TP
- Repercussion on macroinvertebrates
- Differences in years
- Forested vs. Commercial

Conclusion :

Our findings demonstrate that the TP levels measured are under the corresponding criteria; hence, the streams are not undergoing eutrophication. Nevertheless, it can still be seen how the approximation to the limit results in a greater amount of Chironomidaes and as the number lowers, the abundance of macroinvertebrates is that of Ephemeropteras. The amount of TP found may be influenced by the the streams' surroundings and the costumes of Puerto Ricans living in those areas.

Acknowledgments:

References:

- http://midge.cfans.umn.edu/
- https://insects.tamu.edu/fieldguide/aimg3.html
- http://www.unc.edu/~shashi/TablePages/totalphosphorous.html