Hunter-Clyde Watershed Group
Stewardship Plan 2008

*3D View of the Hunter-Clyde Watershed

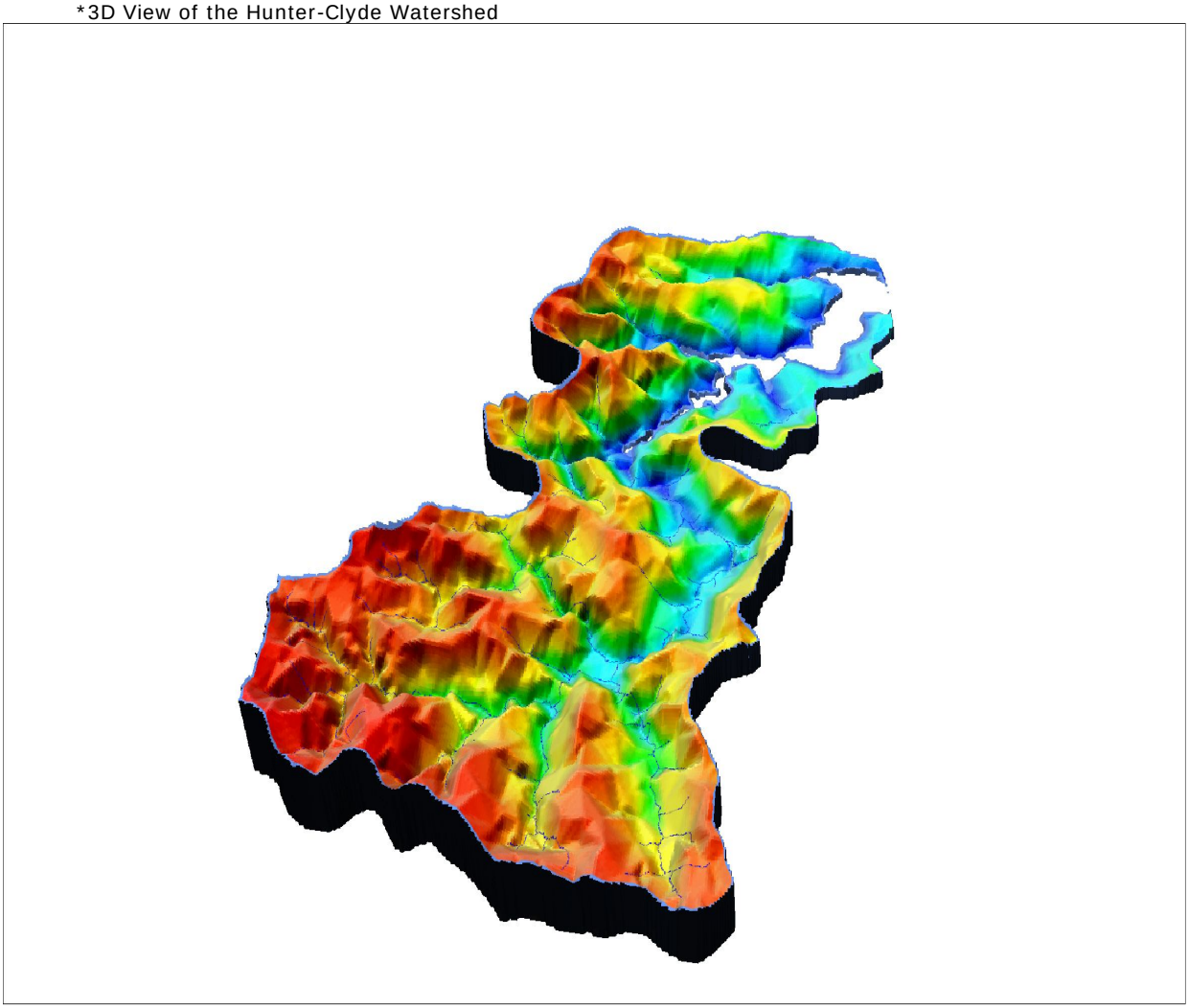


Table of Contents

1.0 Section A: Introduction

The Hunter-Clyde Watershed Group (HCWG) is a community run group that is focused on the well being of the Hunter and Clyde River in the New Glasgow, Rustico, and Hunter River area. Our goals are to improve and maintain the health of the watershed's ecosystem, increase community involvement and relations, as well as sustaining our local economy. This group started in 2000 and currently we raise funds through local memberships and from provincial and federal funding programs.

The Hunter Clyde watershed is a river system whose watershed is approximately 9000 hectares (approximately 22,000 acres) of land, extending from the Hunter river area to Rustico Bay.

The Hunter Clyde Watershed group has been formed to preserve and restore the health of the river so that it can continue to enhance and support the communities and the current farming and fishing industries. More recently, this area has become a popular tourist destination and the growing eco-tourism market has a promising future. All of these factors put stress on the surrounding eco–system and so it is very important to closely monitor any changes within the watershed, as a healthy watershed relates to a healthy community.

1.1 History

Where the Hunter River meanders through New Glasgow the river is known as the River Clyde. Although the river is primarily known as the Hunter River, the name River Clyde has been passed down from the originating families to their descendants and exists as the common name for the section of river that passes through New Glasgow.

At the mouth of the river lies the Rustico area and Rustico Bay, which was settled in the 1760's by Acadian families with the surnames of Gallant, Martin, and Doiron. The place name, Rustico Bay, is thought to originate from Rene Rassicot, a native of Normandy France, who settled on the North side of PEI in 1724. In 1765, Samuel Holland called it Harris Bay, with Grand Rastico as a secondary name. Later, the name Rustico Bay took precedence.

Development along the river blossomed with the advent of the railway that passed through Hunter River. Mixed farming and lumbering were the most common industries and the railway allowed products from

these industries to be exported and imported with ease. The river was essential for providing power for mills and water for livestock. Until the invention of diesel engines, trains stopped in Hunter River to refill their steam engines from an abundant water reservoir. In fact, the width of the river necessitated a ferry crossing in the 1820's to assist travelers in crossing the Hunter River.

A few kilometres north in New Glasgow, water was essential for farming families and for the New Glasgow Fire Department, which presently and historically served the areas of Hunter River and Rustico. Earlier, shipbuilding was popular in this area because of the abundant mature stands of forest and the convenience of easy passage from the River Clyde to the Gulf of St. Lawrence.

1.2 Your Role

This Stewardship Plan paper has been developed so that members of the community can be educated and informed on the health of the watershed, while at the same time allowing concerned citizens of the community to come forth with their questions and comments about the watershed. We invite all interested parties to contact us with your comments and concerns. This is your watershed, this is your home, and we want you to tell us about it.

For more information, to set up a meeting or a group presentation, please contact Michael Willcock. He can be reached through e-mail, (michael.willcock@gmail.com) or by telephone at 902-963-3165 until March 31st. Afterwards please contact Andrew Lush (andrew@treesintrust.com), President of the HCWG for you inquiries.

Michael will be working with the Hunter Clyde Watershed Group through a partnership with Atlantic Agritech.Inc until the end of March and is looking forward to meeting anyone with an interest in the watershed.

2.0 Critical Issues

The HCWG has learned over the past several years that community members have some concerns about the health of their watershed and the surrounding lands. Getting community members to fill out a small survey allowed us to understand the role watershed health had in their lives. This also allowed us to listen to recommendations made from community members, as they are the ones who would be most affected by any drastic changes in the overall health of the watershed.

With the rising debates on issues such as nitrates, soil erosion, and land use, the HCWG felt it was necessary to research these and other issues in our community. This stewardship plan serves as a reflection of the comments made by community members with regards to these issues, and hopes to inform community members with the facts regarding these issues.

During the summers of 2005 and 2007, the HCWG embarked on an extensive sampling routine in order to profile the watershed and its sub watersheds with the information obtained serving as the backbone of information for the Hunter-Clyde Watershed Stewardship Plan.

The information discovered will be used to educate the public on these critical issues most voiced by community members, so that a clear view of the watershed's health is available. We once again encourage all readers to contact us with their thoughts and concerns.

Background

Safe drinking water is everyone's business. Managing drinking water supplies properly, from the source water to the consumer's tap, takes a great deal of knowledge and coordination among multiple stakeholders, from governments and businesses, to individuals like you and me.

The primary concerns which come to mind are parameters which relate to drinking water, safety of human contact, health of ecosystems and the organisms that survive within that eco-system.

When dealing with water quality issues it is important to understand the different systems that effect water quality. People often ask what the difference between a watershed and an ecosystem is for instance. The following will hopefully address these issues so that you, the

reader, will be able to fully understand the importance of clean water within our communities.

While water quality issues are very important when dealing with watershed health and sustainability, it is important not to forget that the surrounding land, (as well as land use practices) drastically affects the health and productivity of the watershed.

As we are all very much aware, the land in PEI is used for many things: from golf courses, roadways, potato fields, and forestry practices, to soccer fields and nature trails. As an island community we utilize our land in many different ways. However, because of PEI's small landmass, we often see the effects of poor land use practices on much of the surrounding areas. To ensure long-term sustainability of our natural environment we must take steps to reduce our effects on surrounding areas due to increased land use.

Because of this level of intensive land use our soil is very vulnerable to degradation. With the largest consumer of land being the agricultural industry, our land is very susceptible to nutrient loading and soil erosion, which directly affects our watershed and the health of the community. Although the Hunter Clyde Watershed has less land devoted to agriculture than the average area of PEI, it is still very important to understand these issues.

Finding a balance between land-use, water and soil quality, and long term sustainability is a very difficult thing to do. But this is something that all islanders should have an interest in as we must preserve our land and water systems if we wish to live and prosper in a healthy environment. It is possible to achieve something like that, but changes will be needed to ensure this happens in the future.

2.1 Critical Issue 1: Groundwater

Background
Here on PEI, 100% of our water usage comes from groundwater. So it is of the utmost importance that we protect our water source from contamination.

Domestic wells are contained within sandstone and are generally range between 25-50 meters and some instances up to 100 meters in areas that are well above sea level. The average water use per day in PEI is 218 litres/day/person, compared to an average of 335 litres/day/person in Canada*. (Geological Survey of Canada 2007)*

National groundwater quality on PEI is considered good and generally requires no treatment beyond disinfecting prior to use. Most bacteria problems are related to well construction or maintenance issues. However, where natural groundwater quality is compromised elevated nitrate levels are the most wide spread groundwater issue. (*Geological Survey of Canada, 2007)*

Groundwater is also very important to our wetland ecosystem, as groundwater sustains rivers, lakes, and streams. It is important to note that shallow groundwater and surface water are interconnected as surface water is composed of 100% groundwater. Surface waters therefore are affected to a higher degree with the water quality characteristics of groundwater.

Key Questions:

1. What are Canadian Standards for Groundwater contamination and how does our watershed rank?
2. What effect do land use practices have on our groundwater?
3. How does groundwater contamination affect surface water?

2.2 Critical Issue 2: Nitrates

Background

The latest geological survey of Canada study published in April 2007 revealed a growing trend in the levels of nitrates in PEI waters. But what are Nitrates? What effects do they have? More importantly, what is the relationship between nitrates and the Hunter-Clyde Watershed?

Nitrates (NO3) are an essential source of nitrogen (N) for plants and can easily leach into the ground water. This happens because plants do not utilize all of the available nitrates that are available in the soil during the growing season. What remains in the soil during the fall and winter (non-growing season) is then leached down into the groundwater.

Effects on Aquatic Organisms

Excessive nitrates lead to an imbalance in surface waters. This reduces available oxygen for aquatic organisms and causes algae blooms. These algae blooms consume the dissolved oxygen in the water which affects the ecology of the stream or river drastically, essentially choking the life out of the stream. Acceptable levels for nitrates in aquatic life are below 2.9 PPM. Anything above that will have an effect on the aquatic life in that ecosystem.

Human Health

Concerns for human health begin when nitrates reach levels above 10 PPM in our drinking water. Babies under the age of 6 months, the elderly and pregnant woman are most affected. A condition known as “blue baby” syndrome occurs when babies are fed high levels of nitrate (greater than 10 PPM).

The first step in this process is to have your well tested to verify that you actually have a nitrate issue with your water supply. Unfortunately, removing nitrates from your well is not a simple or cheap process. Nitrates are not removed from water like other contaminants, boiling water will actually increase the concentration, while chemical and mechanical treatments will also have no effect.

Reverse osmosis systems are the most effective household option and range in price from $400 upwards. Digging a deeper well is a very expensive option, but can be effective as water quality increases as you go deeper. However the most effective way to remove nitrates is preventing excess nitrates from entering our water systems in the first place.

Key Questions:

1. What are the trends for nitrate levels in our watershed?
2. What are the effects on fish and other aquatic organisms?
3. How do we monitor for nitrates in the watershed and what programs are in place to monitor them?

2.3 Critical Issue 3: Surface Water Quality

Background

In nature, water is never "pure". It picks up bits and pieces of everything it comes into contact with, including minerals, silt, vegetation, fertilizers, and agricultural run-off.

Canada's diverse physical geography, from its coastal regions to the mountains and the prairies, the northern tundra and the Canadian Shield, means that the characteristics of water vary greatly across the country. Even in relatively pristine areas, water in its natural state will likely require some type of treatment before it is safe to drink.

Guidelines for the Protection of Aquatic Organisms

The Canadian Water Quality Guidelines for the Protection of Aquatic Life help to protect all plants and animals that live in our lakes, rivers, and oceans by establishing acceptable levels for substances or conditions that affect water quality such as toxic chemicals, temperature and acidity. As long as conditions are within the levels established by the guidelines negative effects should not be seen.

These guidelines are based on toxicity data for the most sensitive species of plants and animals found in Canadian waters and act as science-based benchmarks for the protection of 100% of the aquatic life species in Canada, 100% of the time. The HCWG's basis for protecting the watershed is rooted within these Guidelines. *(Environment Canada, 2007)*

Water quality measurements fall into three broad categories:

- Physical characteristics such as temperature, colour, suspended solids and turbidity;
- Chemical characteristics such as nutrients, minerals, metals, oxygen, and organic compounds;
- Biological characteristics such as the types and quantities of aquatic plants, animals, algae, bacteria and protozoan parasites.

Key Questions:

1. What are the Canadian Standards for Surface Water?
2. Are our surface waters contaminated?
3. How do we ensure ongoing protection of our surface waters?

2.4 Critical Issue 4: Eutrophication (Nutrient Loading)

Background

Eutrophication is an increase in nutrients (typically phosphorus and nitrogen) into the water system. This leads to a very large and fast increase in plant growth leading to depletion in oxygen levels (Dissolved Oxygen) in the water. The reduction of oxygen in water is called hypoxia. The complete loss of oxygen in a water system is called anoxia.

If there is a huge drop in available oxygen many aquatic organisms are affected. Fish kills, smaller catches, reductions in shellfish numbers, and the stench of decaying plant material and algae are all results of eutrophication.

Increased nutrient loading in watersheds directly leads to degraded water quality and ecosystem health. Nutrient inputs into our watershed are dominated by non-point sources (e.g., surface runoff, groundwater, and soil erosion). The amount of nutrients coming from an area is largely dependent on the predominant land use for instance, agriculture and developed land versus natural wetlands and forests.

Non-point pollution is the most difficult source of nutrients to manage, although when these sources are controlled, eutrophication decreases. Some regulations like waste water treatment specifications and agricultural regulations which limit the amount of fertilizer used on fields have shown to decrease non-point nutrient loading dramatically.

Key Questions:

1. How do we monitor non-point pollution?
2. How can we incorporate better land use policies into the communities and areas within the watershed?
3. Where has eutrofication occurred within the Hunter-Clyde watershed?

2.5 Critical Issue 5: Soil Erosion

Background

Many islanders feel that soil erosion is the number one environmentally related issue on the island. As water levels rise and intense land use increases, our soil is a quickly shrinking resource. We see it on our shrinking coasts, we see it in our fields, and we are also seeing it in our streams and rivers.

In PEI it is estimated that 2,000,000 tonnes of soil washes into our streams and waterways every year. Because of poor land use practices we are losing the very soil that has sustained our communities for generations. Not only has it affected people here on PEI, it's affecting our ecosystem health as a whole as well.

As topsoil is washed into streams several things occur. Pesticides, fertilizers, and other chemicals are washed into the water leading to nutrient loading, fish kills, and lowered productivity of shellfish farms. Also, the soil itself settles onto the bottom of the streams and rivers. This affects the speed of the streams, as well as many smaller animals that feed off of the bottom of ponds.

Sediment loading in streams and rivers can actually lead to flooding if the stream is totally blocked off. This could possibly affect land owners directly if their land or houses are affected due to flooding.

Students take on much of the work that is done within the Hunter-Clyde watershed with regards to soil erosion during the summer. Over the years, student teams have been successful in their attempts to reduce soil erosion into our streams and rivers by creating many brush mats along the stream and river boundaries, as well as planting many hundreds of trees.

Key Questions:

1. Can we reclaim soil that has already eroded into our streams and rivers?
2. How can we ensure that in the future, soil erosion is not a significant problem in our watershed?
3. Can we do more than just make brush mats in summer?

2.6 Critical Issue 6: Fish Habitat

Background

In PEI, the main reason for fish habitat degradation is from soil erosion. When soil enters our water systems (stream rivers, ponds, etc), it also carries with it nutrients, pesticides, chemicals and anything else that is picked up along the way to the water's edge, even the soil itself is detrimental to the health of the water system. While any one of these things can pose a threat to fish habitat, a mixture of these things can cause utter devastation.

With trends showing an increase in agricultural land use over the past several years, we must take steps to reduce soil erosion and nutrient loading of our streams. If this is not done eventually there will be no fish left, as their habitat will be degraded to the point where they cannot dwell there for extended periods of time. This will not only cause a drop in bio-diversity in the watershed, but also our recreational fishers (along with out tourism) will be affected. *(PEI Dept. Environment, 2007 Recreational Fishery Policy Report)*

Because of this concern over the quality of our streams, many people have become interested in stream enhancement. For the past several years, the HCWG has taken part in stream enhancement projects by hiring students to create brush mats and to restore the streams in general. It is important to keep up these summer restoration projects as it creates jobs, but also educates the public about the importance of a healthy watershed.

Key Questions:

1. How can we increase our efforts with regards to stream enhancement/water monitoring efforts?
2. How do we restore fish to parts of our watershed that may have already been affected?
3. How can we increase recreational fishing without lowering the fish population?
4. Have we lost any specific species of fish due to habitat degradation? If so, can we re-introduce them?

3.0 Section A: Conclusion

We hope that this information has helped you to understand a little bit more in depth about the problems and critical issues faced by this particular watershed. Our hopes are that you, the reader, will be able to educate yourself with this material and formulate your own opinions based upon what you see in your community, and your environment.

As you have seen by reading this document watersheds are very diverse parts of environment--parts that we cannot live without. Protection of our watershed is key to long term sustainability in the Hunter Clyde Watershed and on PEI.

At this point in time we invite you to take your new found knowledge and opinions and contact us, so that we can get a better understanding of what the community members feel to be the most important issues. Recommendations from community members have been used to help create this Stewardship Plan and will continue to be used to update this document in the future.

We welcome any and all community members to contact us with questions, comments, or concerns about any aspect of the watershed. We are hoping to create an open document that truly reflects the concerns of the community members, and also shows attainable short term as well as long term goals for the watershed.

4.0 Section B: Community Outreach Information

4.1 Introduction

After the completion of Section A an extensive outreach program was initiated by the HCWG to inform community members of the critical issues surrounding our watershed. This information was put out to the community in an attempt to bring the residents up to speed on these issues so that the HCWG could then approach residents on these issues to see what could be done to enhance our watershed.

From February 20th 2008 until February 22nd 2008, Public Consultation Meetings were held in the communities of North Rustico, Hunter River, and New Glasgow. These meetings allowed the residents of these communities to voice their opinions and ideas with regards to the enhancement of the watershed as they have firsthand knowledge of the watershed as many of the residents have lived there for several years, to several decades.

From these meetings the HCWG will be creating recommendations for the next 5 years which coincide with the information gathered from the public consultation process. We will be looking at short term, and long-term goals that we feel are obtainable and will have the most impact on the community.

This can easily be considered the first step toward creating a much more involved organization within the communities that holds the health of the environment and the community above everything else.

Each meeting was well attended and much information was gathered from the participants of these meetings and without their input this document could not have been created, so to everyone who attended the meetings, from all of us at the HCWG thank you very much for your input!

5.0 Raised Issues

5.1 Environmental Education

Many concerns were raised by members in all community meetings about the lack of environmental education not only in the community, but in the school system as well. With the ever increasing environmental issues that we see in the media as well as our daily lives it is easy to understand why an increase in environmental education is necessary not only on the individual level, but on the community level as well.

It was expressed that education within the community about their local watershed is very important as community members feel that their children (as well as themselves) do not understand their local environment enough. Community members voiced the fact that many would like to see the opportunity to get involved with some sort of event that would enhance the watershed. Some ideas that were raised were the creation of events such as “Family Tree planting Day” or to have an event based around canoeing or kayaking.

Other members expressed concerns about there not being environmentally related courses taught in the school system of PEI. Although this falls well outside of the reach of the HCWG with regards to what we can implement, it does show that there is an increased concern towards environmental issues both at home and abroad.

Possible next steps:

1. Create a Hunter-Clyde Watershed specific education program to be administered throughout the communities.
2. Find and partner with organizations that run environmental education programs within communities.
3. Contact the Dept. Of Education about possible educational programs being incorporated into the school year.

5.2 Water Quality Sampling Data

Concerns were expressed by many people throughout the public consultation process about water sampling within the watershed. When we presented our information about the 2007 water sampling runs that we did for nitrate levels, the response was “are you going to continue testing the water?” and “what else do you sample for other than nitrate levels?”

Although we have shown with our sample runs from 2007 that nitrate levels are not an issue in the Hunter-Clyde watershed, people are still expressing the interest of seeing on-going sampling for nitrate data, as well as other relevant data that shows the overall health of the watershed and over time will be able to show trends in the water quality. It was also expressed that people would like to see more locations sampled for more parameters other than just nitrates.

One opinion expressed during all the meetings was that people wanted to know if there was any way to measure the amount of soil entering our waterways

Possible Next Steps:

1. Define new locations to be sampled for next year’s sampling run.
2. Research ways to make our sampling run more effective and quantitative.
3. Look at different parameters to analyze besides nitrate data.

5.3 Sedimentation in Waterways

The heaviest concerns were raised when the issues of soil erosion were discussed. Many community members (especially older ones who have been living here for the past several decades) have noted that several streams and ponds have had their overall capacity severely reduced due to the effects of soil erosion. The Mill pond and Campbell's pond were two ponds that were mentioned several times over the course of the public consultation process.

Many questions were asked if there was anything we would be able to do about the sedimentation in our waterways, whether there was money, (and the will) to take on projects that would see both the Mill pond and Campbell's pond dredged, their flow rate increased, and their overall capacity brought back to a sustainable level.

Possible Next Steps:

1. Define the main contributors to sedimentation within our watershed.
2. Profile all the streams, ponds, and rivers so that we know the current level of sedimentation.
3. Figure out where our efforts would be best utilized to reduce sedimentation entering our waterways.
4. Begin efforts to dredge the Mill pond and Campbell's pond.

5.4 Restocking of Fish Species

Many of the attendees of the public meetings were recreational fisherman. These individuals stated that over the years they have seen a drastic decrease in the number and size of catches within the watershed. They have also stated that they have noticed that as the waterways fill more and more with sediment from soil erosion that there are less and less fish.

There were also several people who brought forth the idea of creating a local fish hatchery that would coincide with the people who would theoretically be involved with enhancing the streams to a point where fish could return and spawn in the streams, thus increasing the number of fish in the streams and ponds, and increasing the overall health of the waterways. It was also mentioned that at one point in the past there was a hatchery in the area and that it would be good to see another one built in order to restock the streams.

Possible Next Steps:

1. Consult Wildlife Conservation officials to understand what species of fish live within our watershed, and what species have left our watershed.
2. Look at our streams and define the physical barriers to fish migration upstream.
3. Look into the possibility of creating a fish hatchery within our watershed.

6.0 Recommendations

6.1 Introduction

Throughout the course of this project the amount of information coming in about residents' concerns has grown on a daily basis. Although this is a good thing it must be noted that not every concern can be addressed at this time. After taking all comments and concerns into account, we have created this document and regard it at the starting point to future endeavours.

From the beginning the creation of this document has been intended to act as an outline for actions that we can undertake to enhance our watershed and incorporate community concerns. Much thought has been put into these recommendations as we are trying to be as efficient as possible because of limited resources. All of the issues raised by community members have been taken into account, and we have looked at them carefully to see what can be addressed at this time.

We have looked at short-term and long-term goals so that we will be able to act now but at the same time plan for the future. We will also be continuing our summer student programs where we enhance our streams and rivers by incorporating tree planting techniques as well as soil capture techniques.

6.2 Short Term Goals

a) Environmental Education
b) Water Quality Sampling data and Water Quality index

As mentioned in Section B, environmental education and involvement were raised as key issues that community members would like to see action on. It was expressed that people would like to see programs started for youth, and environmental education brought into schools.

To act on these issues, we have created a partnership with the Atlantic Chapter of the Sierra Club. They are currently creating a PEI specific water quality education program and will be bringing it into the community and schools of the Hunter-Clyde Watershed during the 2008/2009 school year.

This will be accomplished by getting presentations and activities into the schools, as well as community events encompassing issues related to our watershed.

Another short term goal is to improve upon our previous water sampling plan by encompassing more sampling locations in each sub-watershed as well as incorporating the CCME Water Quality Index specifically for our watershed.

A Water Quality Index (WQI) provides a convenient way to summarize complex water quality data in order to present it to a general audience. This is good as the information we obtain about our watershed will be available and easily understood by all residents in our watershed.

To summarize a watershed in terms of water quality various chemical and non-chemical sampling is required at various representative points in the watershed. Since a watershed is a large geographical area we have broken it down into representative sub watersheds.

By sampling in each sub watershed we can gather water quality data and input the results into an index. This index will categorize the water sampling and allow us to give a number out of 100 (100 being excellent). As such, at each sampling year we can record a running performance in the watershed and report it to residents in terms of a score from 1- 100 (as described further below).

1. Excellent - CCME WQI Value 95-100

- Water quality is protected with a virtual absence of threat or impairment; conditions are very close to natural or pristine levels.

2. Good – CCME WQI Value 80-94

- Water quality is protected with only a minor degree of threat or impairment; conditions rarely depart from natural or desirable levels.

3. Fair – CCME WQI 65-79

- Water quality is usually protected but is occasionally threatened or impaired; conditions sometimes depart from natural or desirable levels.

4. Marginal – CCME WQI 45-64

- Water quality is frequently threatened or impaired; conditions often depart from natural or desirable levels.

5. Poor – CCME WQI 0-44

- Water quality is almost always threatened or impaired; conditions usually depart from natural or desirable levels.

(CCME Water Quality Index 1.0 User Manual, 2001)

We plan to continue this process for several years in order to accurately profile our waterways. This way we will be able to see what factors contribute to a decreased water quality level in our watershed. Once that is done we can take steps to reduce those factors and effectively improve or waterways.

6.3 Long Term Goals

a) Reduce sedimentation entering our waterways and reduce current sedimentation from streams and ponds.
b) Increase fish populations in our watershed and research the possibility of creating a fish hatchery in the Hunter-Clyde watershed.

During our public consultation meetings two issues were raised numerous times by community members that although are very important to the overall health of the watershed, they will take much more planning and resources than are currently available. Over the next 5 years we plan to examine the possibilities with regards to these issues, so that we can eventually act upon these recommendations to enhance our watershed further.

The first issue that was raised by residents was the issue of the Mill Pond and Campbell's Pond. These are two well known ponds in the area that have become so filled with silt that their overall capacity (and health) have been reduced drastically. Many residents have commented on how they would like to see both of these ponds dredged and restored.

Dredging a pond is a very difficult thing to do for several different reasons, with the main reason being cost. It takes a very long time to do and several pieces of heavy equipment are needed to do the work. With the rising cost of fuel and having to pay for the labour this is not something that the HCWG can undertake at this time. That being said, dredging of these two ponds (as well as other ponds located within the watershed) is key to restoring the watershed to its full capacity.

In the future we do hope to be able to work with landowners, business owners, and community members to accomplish this task as the overall health of the watershed is everyone's concern.

The second long term goal is to construct a fish hatchery within the boundaries of the watershed. Again, this is a fairly expensive project, one which the HCWG cannot undertake at this time but the reason for doing this is to be able to restock the fish numbers of the rivers after the sediment issues have been taken care of.

Our initial priorities are to revitalize the rivers and streams, and then using the fish provided from the fish hatchery, restock the rivers. This hatchery could also be used to help restock the river systems within

the boundaries of the Trout River Environmental Coalition and the Wheatley River Improvement Group.

The hatchery could also serve the important purpose of educating people. There are quite a lot of possibilities with regards to partnering with schools and community groups for environmental education benefits, as well as the hatchery being a focal point for the community for eco-tourism issues. In recent years, the communities within the Hunter-Clyde Watershed have seen an increase in tourists visiting in the summer and this would be a great place to incorporate walking trails or an interpretation site.

7.0 Final Conclusion

Throughout the creation of the Stewardship Plan many people have had the opportunity to voice their opinions, publicly state their ideas, and generally have a say in what types of actions the HCWG should undertake over the next 5 years. The next task is to act on the issues that have been brought up and analyzed.

Although this is quite an easy thing to say, accomplishing these tasks will prove difficult. Historically, watershed organizations have been composed mostly of volunteer members who are involved for part of the year and then when summer funding has been used up work on the watersheds stops, only to begin again when the next round of funding arrives.

In order for any organization to function properly there must be at least one dedicated employee year round. This enables the organization to deal with matters that come up throughout the year and enables a smoother transition from winter to spring, summer and fall events. This is why the HCWG is attempting to create a paid management position along with a paid technician position; so that they can incorporate the recommendations put forth in this document and continue to enhance the watershed not only during the summer time, but throughout the entire year. At this time we are looking into different ways we can make this a possibility.

We believe that with continued (and increased) support for the group as well as this document that we will be able to partner with the community, the province, and any and all other organizations concerned with the natural environment of this beautiful place that we call home.

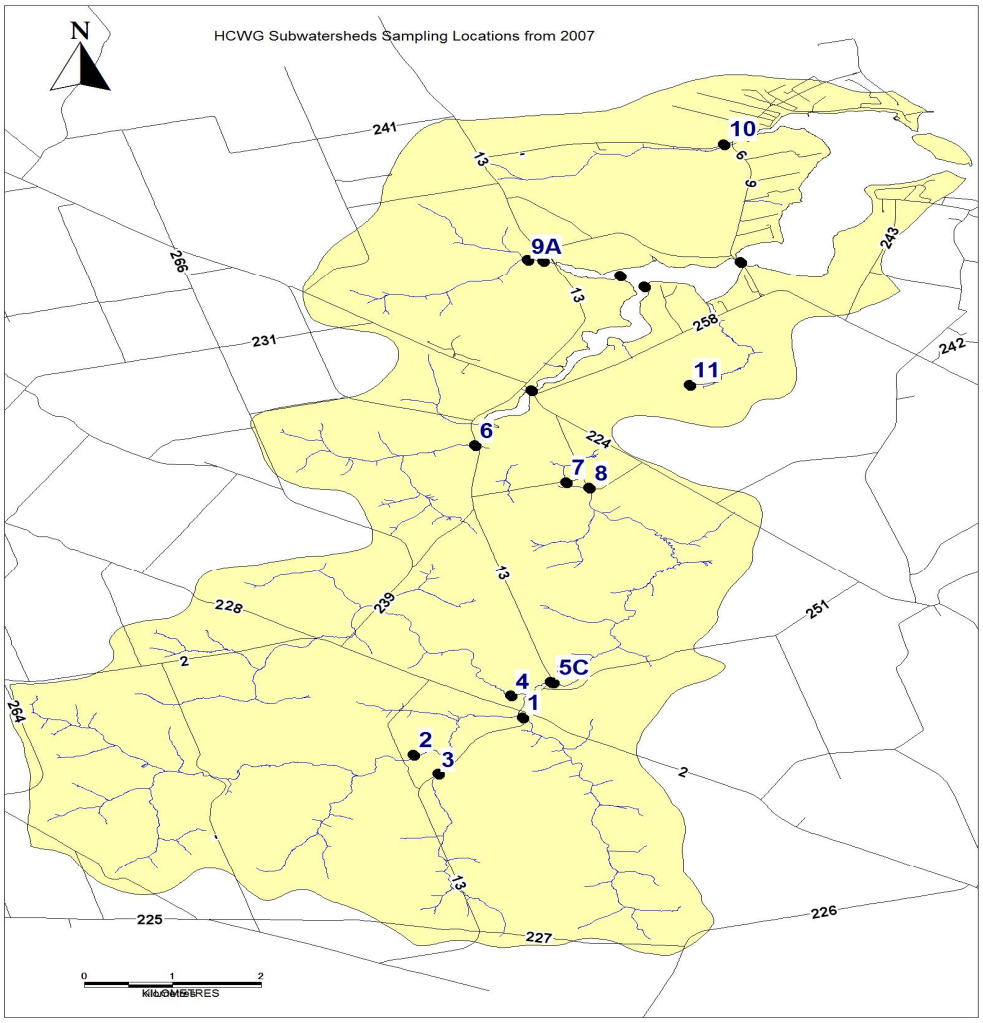
Thank you all who have taken the time to talk with us, share with us, and build with us over the last several months. Without your input this document could never have been completed. It is also important to remember that this document has always been considered a beginning, so now that we have a starting point, the end is what we make it. With your continued support we can and will create an environment here in the Hunter Clyde Watershed that we can all be proud of.

8.0 Watershed Break Down

8.1 2007 Sampling Locations and Site Data

This map shows our sampling locations from 2007. These sites were decided upon in order to represent our watershed with each sampling location flowing into a major sub watershed. This allowed these samples to represent the entire sub watershed.

Figure 1.1* Outline of the Hunter-Clyde Watershed and sampling locations from 2007.

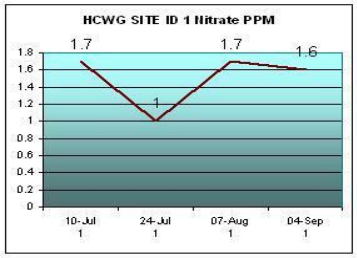


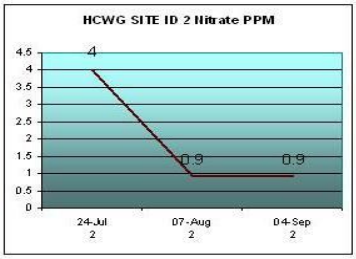
Site Location Information:

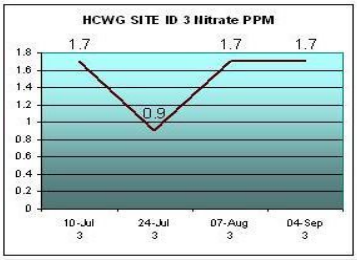
Site ID #	Location Description (Approximate Location)	Latitude N	Longitude W
1	Clarence' Farm Services in Hunter River Route 13	46.3541	-63.3620
2	Across from McGrath Electric	46.3478	-63.3656
3	Across the road from civic # 3966 on Route 13	46.3446	-63.3620
4	Behind the new church in Hunter River	46.3578	-63.35130
5	Hunter River sewage facility	46.36005	-63.34512
6	Moffatt's Brook Route 13 by the Stanley bridge School sign.	46.40037	-63.35655
7	Below Campbell's Pond on Campbell's Road	46.39405	-63.34313
8	150 meters upstream from sample location #7	46.39316	-63.33980
9	Pond before it become the Estuary at the B&B	46.43182	-63.34652
10	Route 6 junction by North Rustico	46.45153	-63.31998
11	Behind Atlantic AgriTech	46.4106	-63.32504

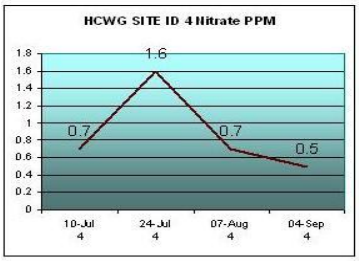
These graphs indicate the nitrate data gathered from the 2007 surface water monitoring project.

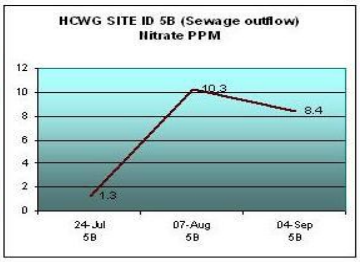
Figure 1.2 * Nitrate concentrations for each sampling location from 2007.

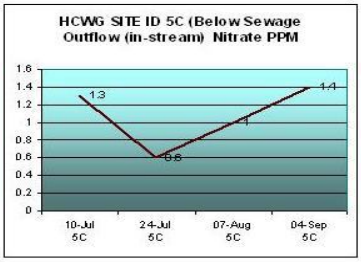


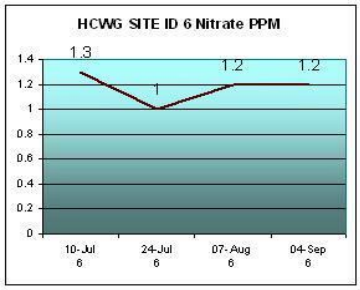


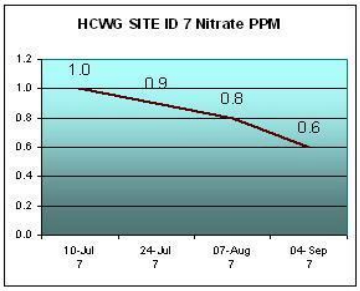


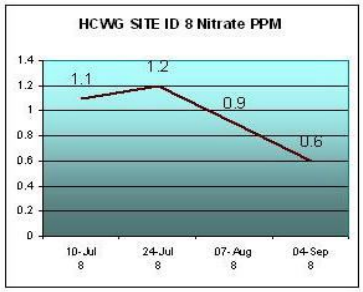


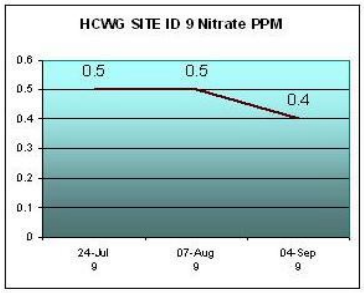


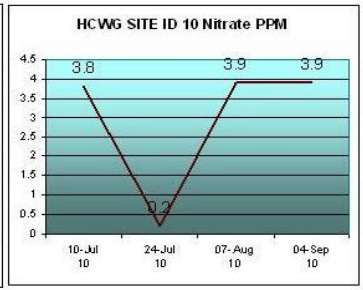


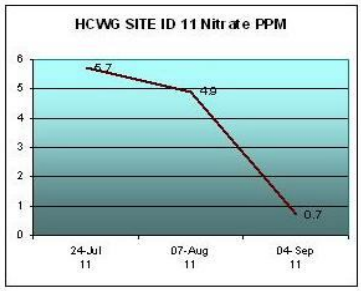


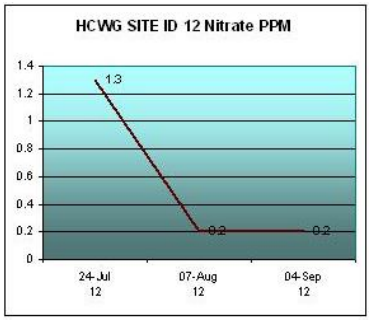












8.2 Sub watershed Data

This map indicates the change in elevation throughout our watershed with the color red indicating higher points, and blue indicating points closer to sea level.

Figure 1.3 * Hunter-Clyde Watershed, Sub watersheds and Elevation

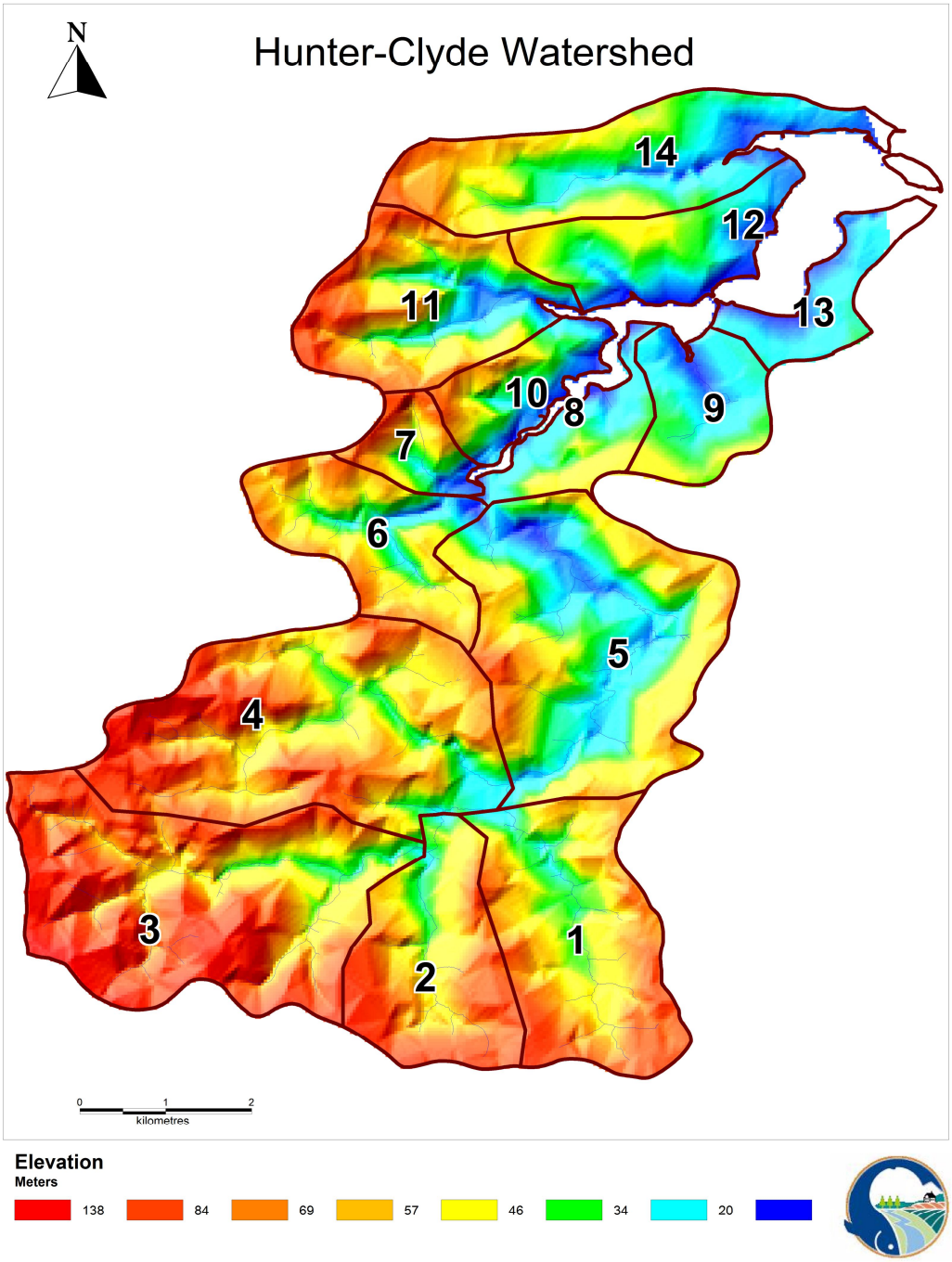
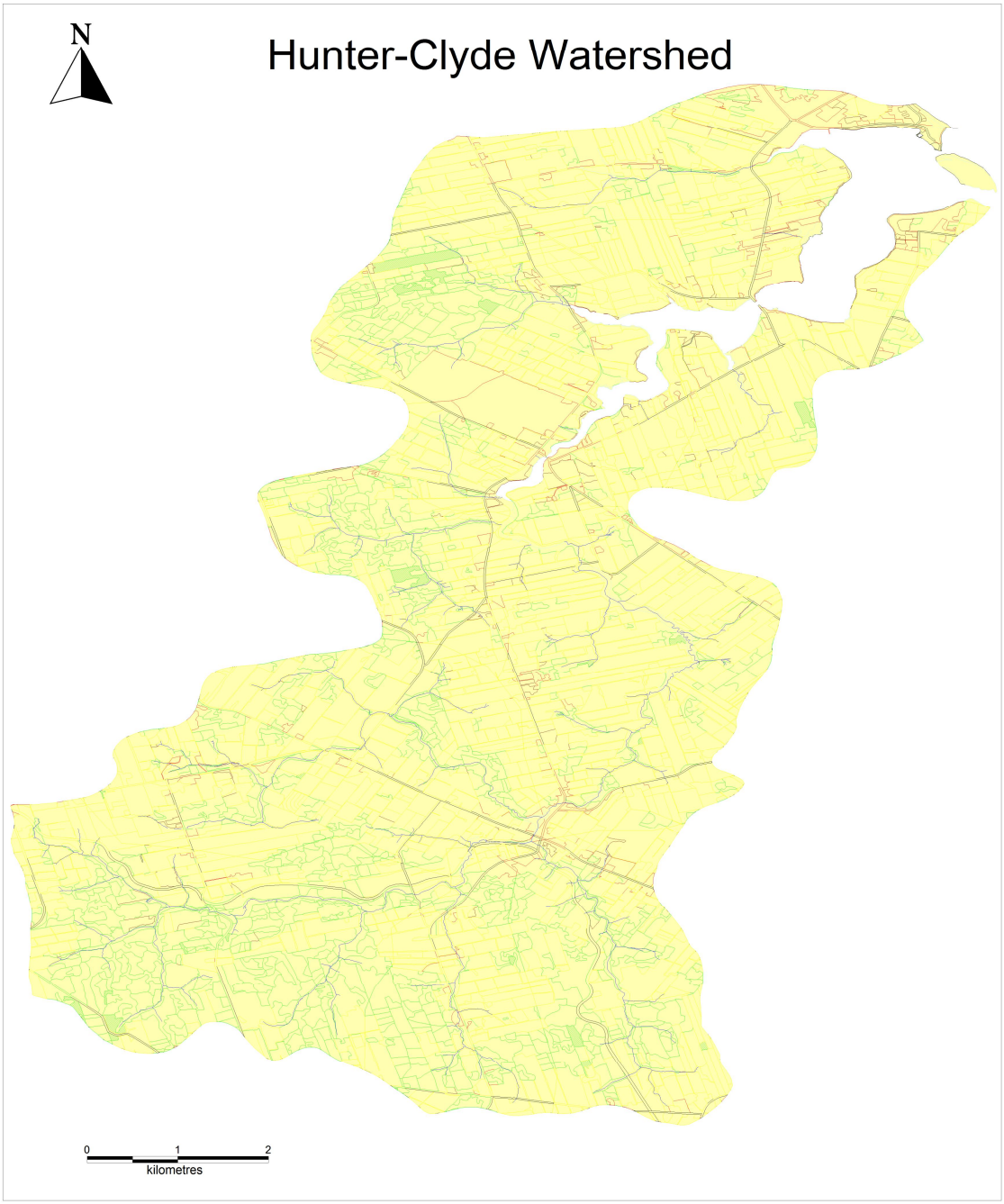


Figure 1.4* Hunter-Clyde Watershed Land-use Break down

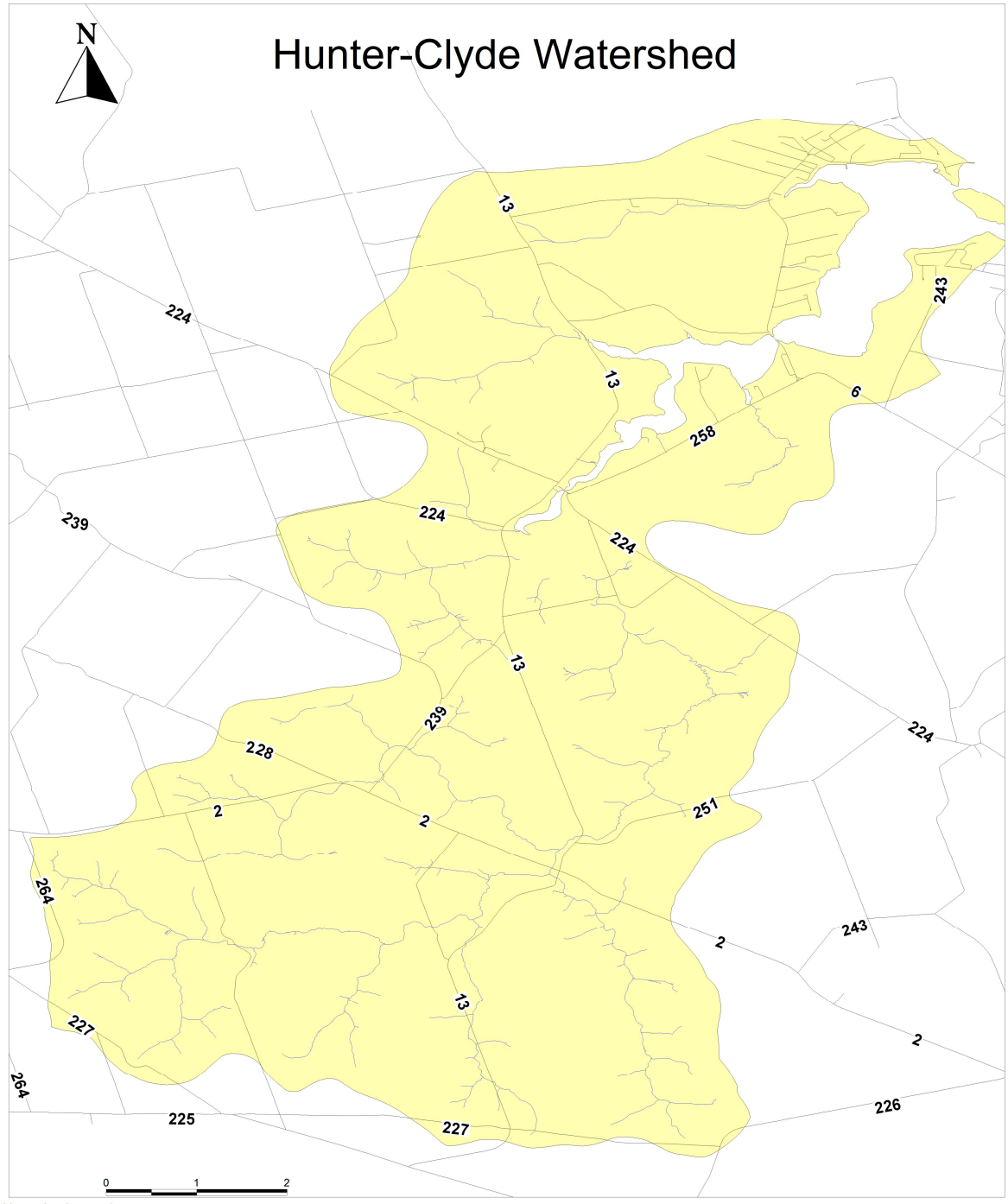
This map defines land use in the Hunter-Clyde Watershed. Yellow field represent agriculture, red fields represent residential and green fields represent forest lands.



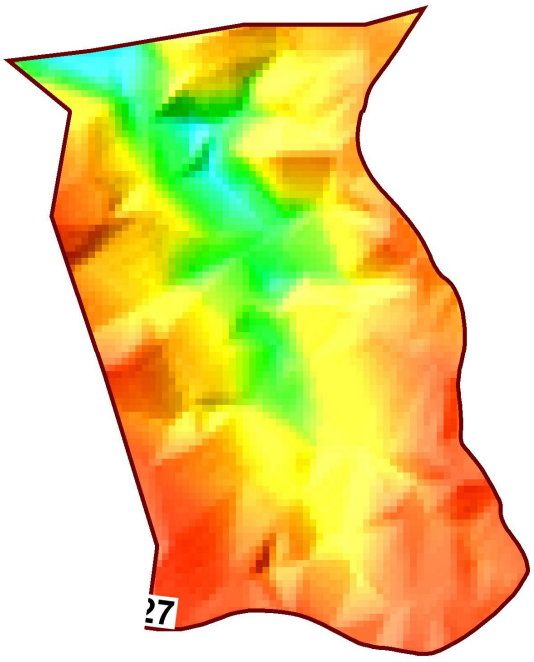
No active Legend.

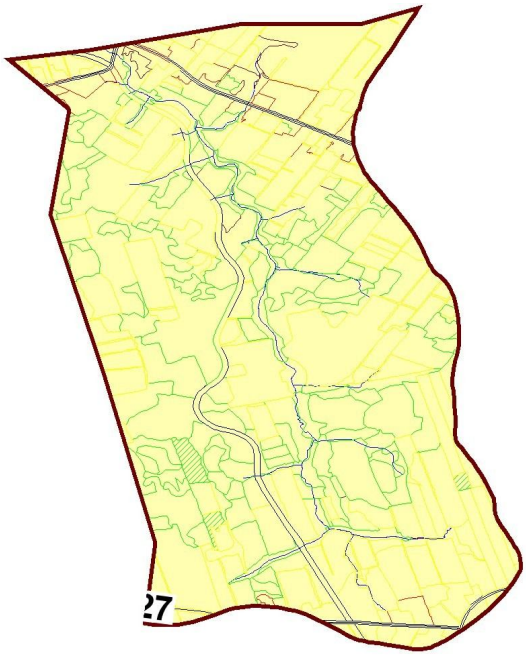
Figure 1.5* Hunter-Clyde Watershed and Road Network

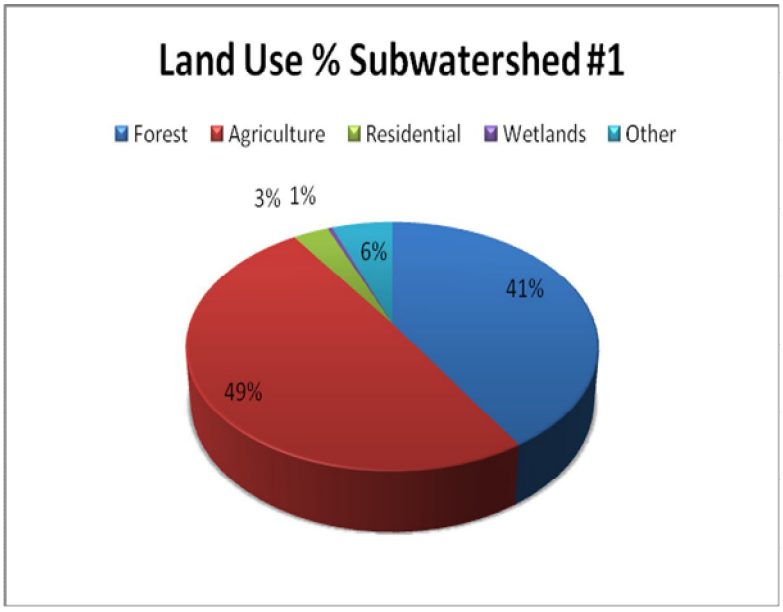
This map indicates the road structure of the Hunter-Clyde watershed.



Sub watershed #1

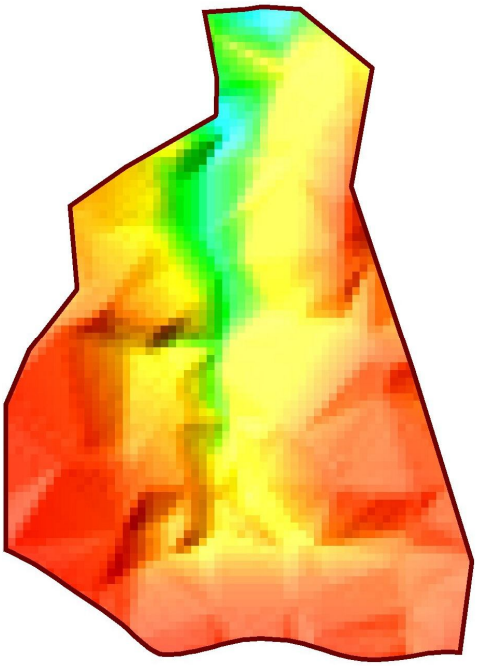


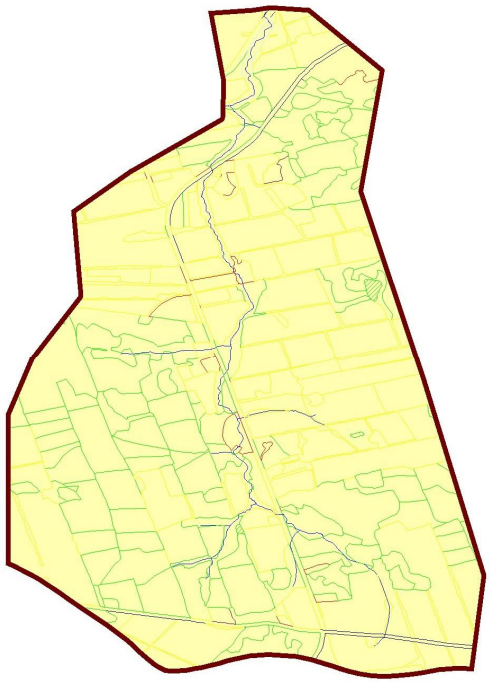


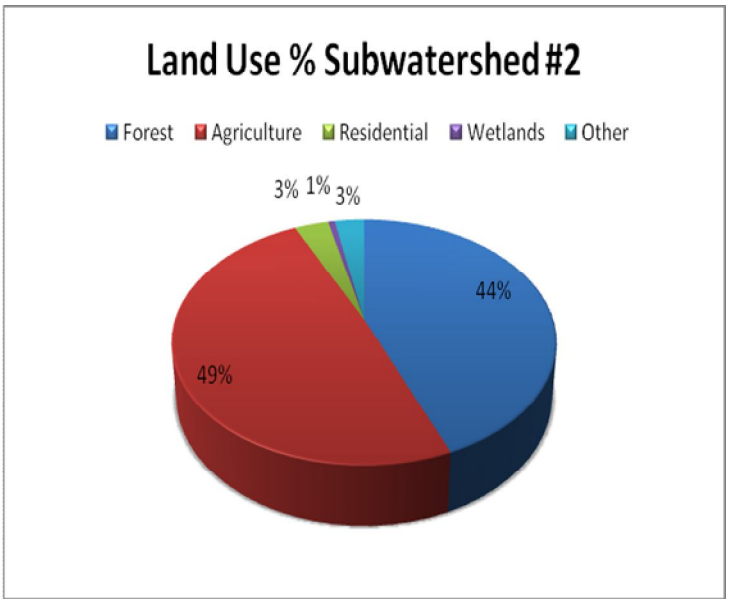


The total land area of Sub watershed #1 is 2009 acres with 49% of that area being dedicated to agricultural practices, 41% forest cover, 3% residential, 1% wetland and 6% composed of other land use practices.

Sub Watershed #2

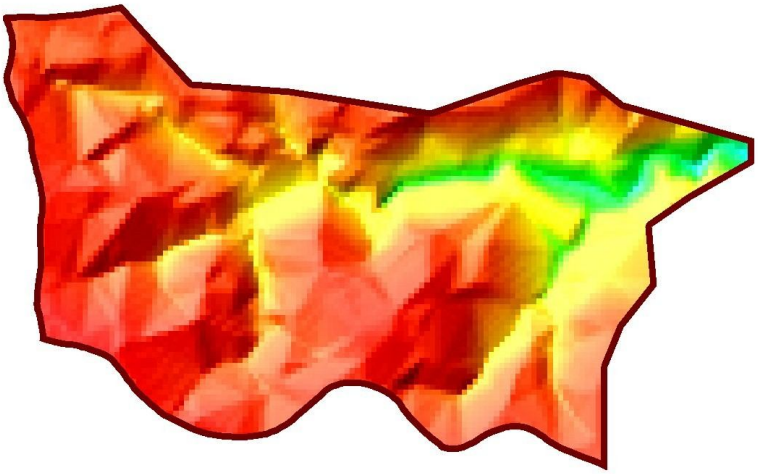


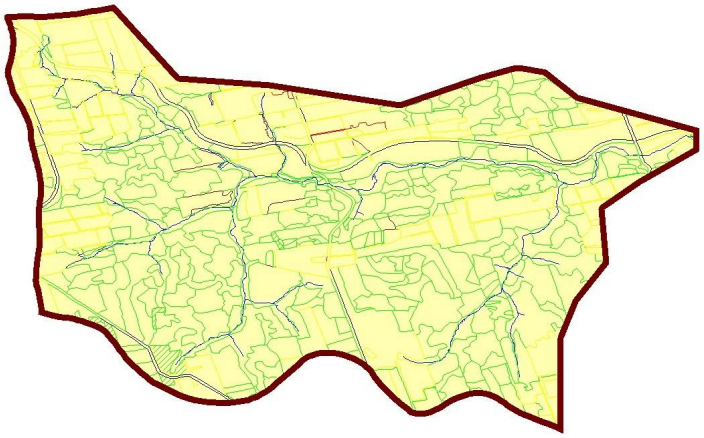


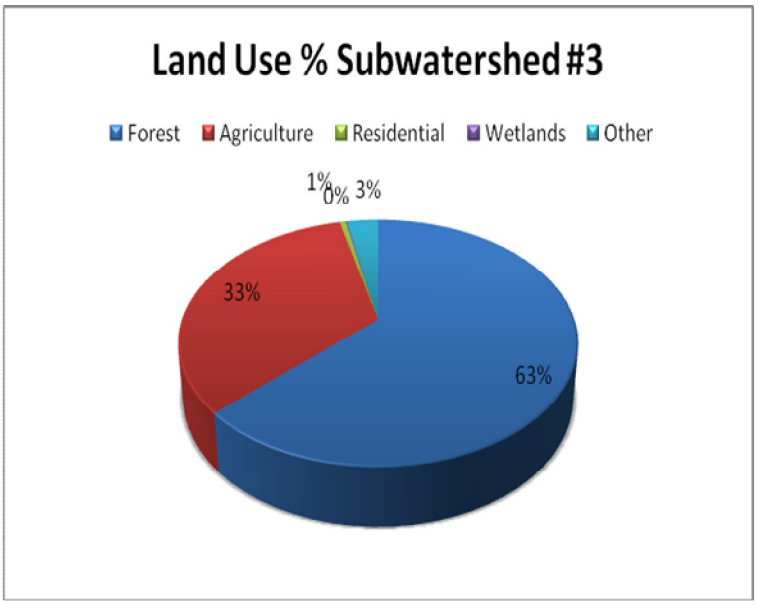


The total land area of Sub watershed #2 is 1520 acres with 49% of that area being dedicated to agricultural practices, 44% forest cover, 3% residential, 1% wetland and 3% composed of other land use practices.

Sub Watershed #3

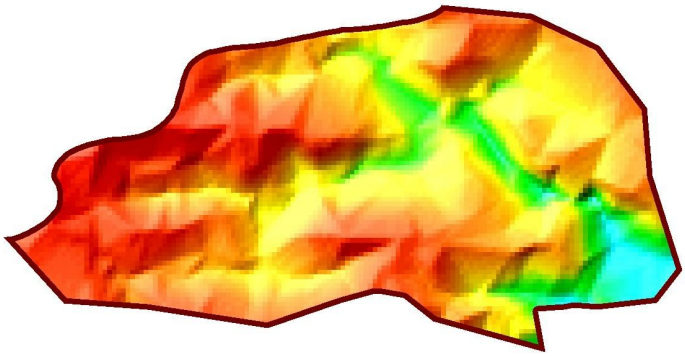


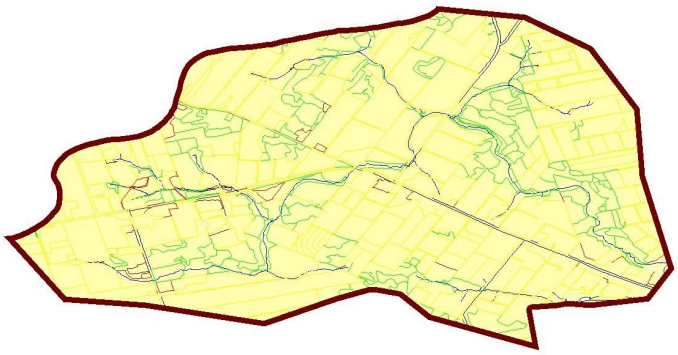


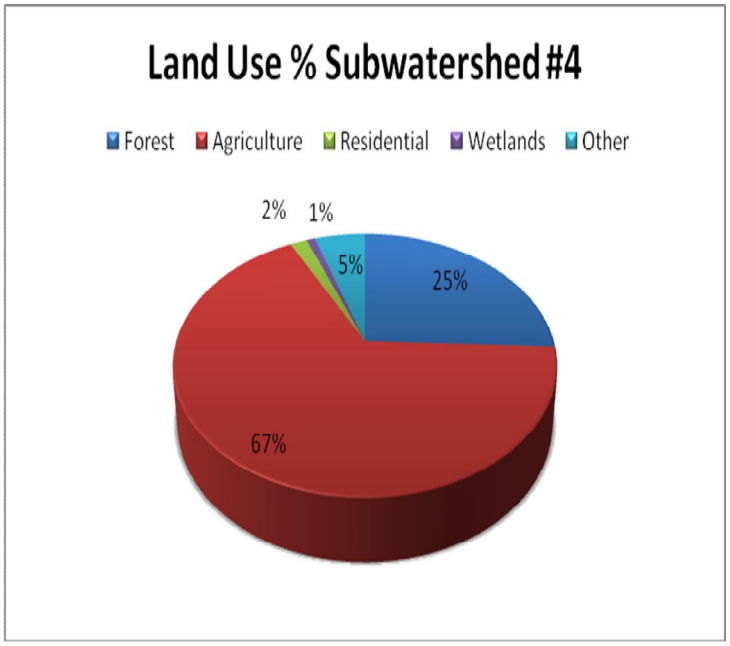


The total land area of Sub watershed #3 is 3226 acres with 33% of that area being dedicated to agricultural practices, 63% forest cover, 1% residential, 0% wetland and 3% composed of other land use practices.

Sub Watershed #4

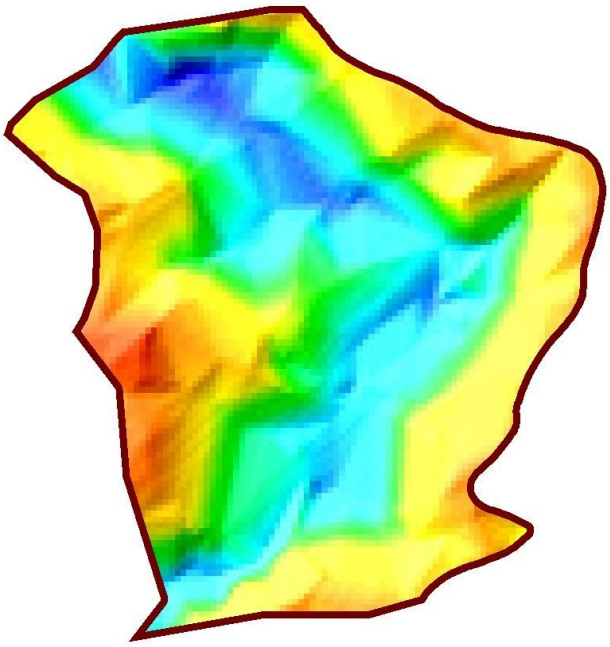


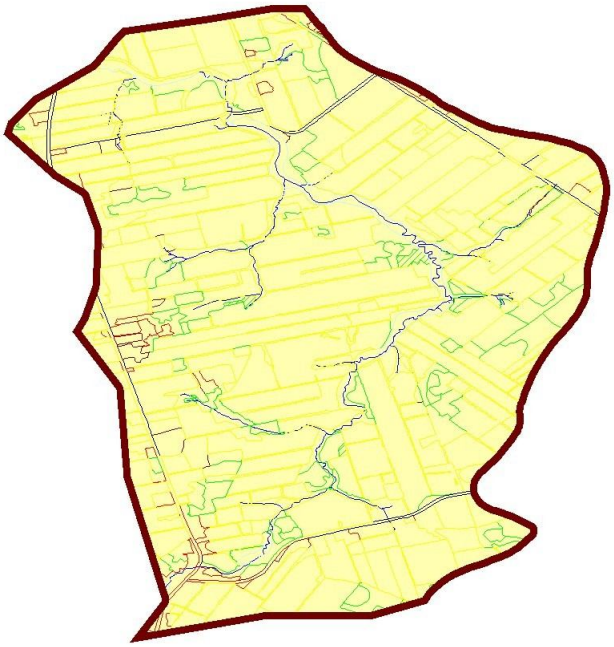


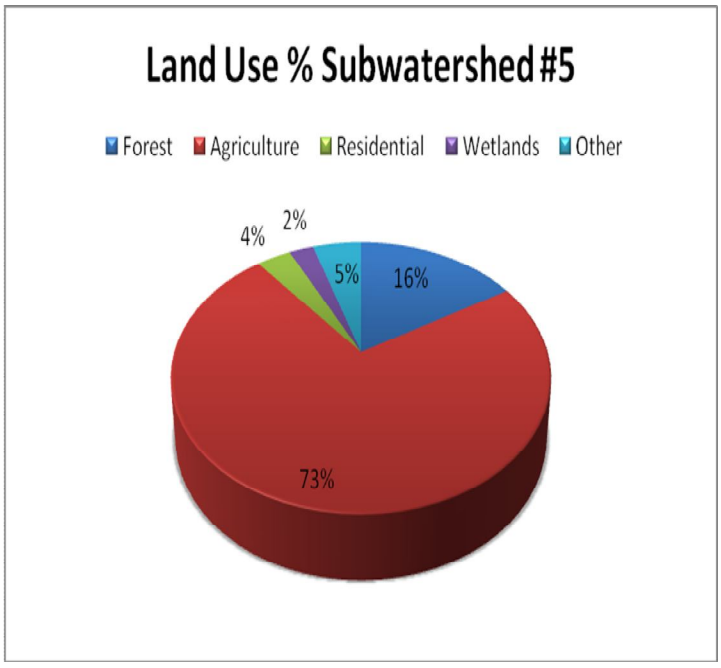


The total land area of Sub watershed #4 is 3248 acres with 67% of that area being dedicated to agricultural practices, 25% forest cover, 2% residential, 1% wetland and 5% composed of other land use practices

Sub Watershed #5

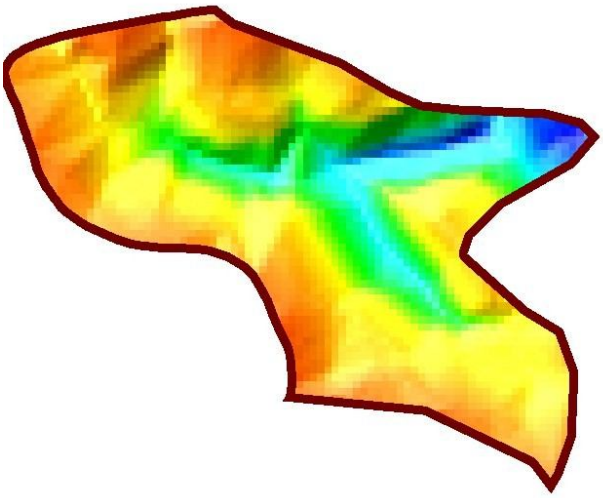


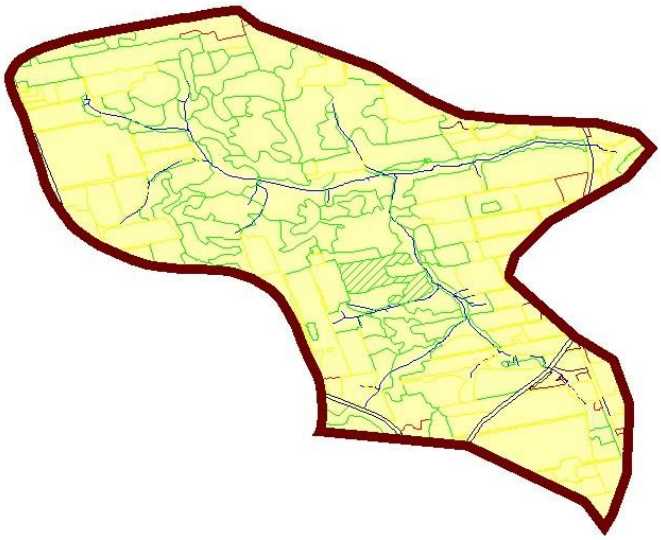


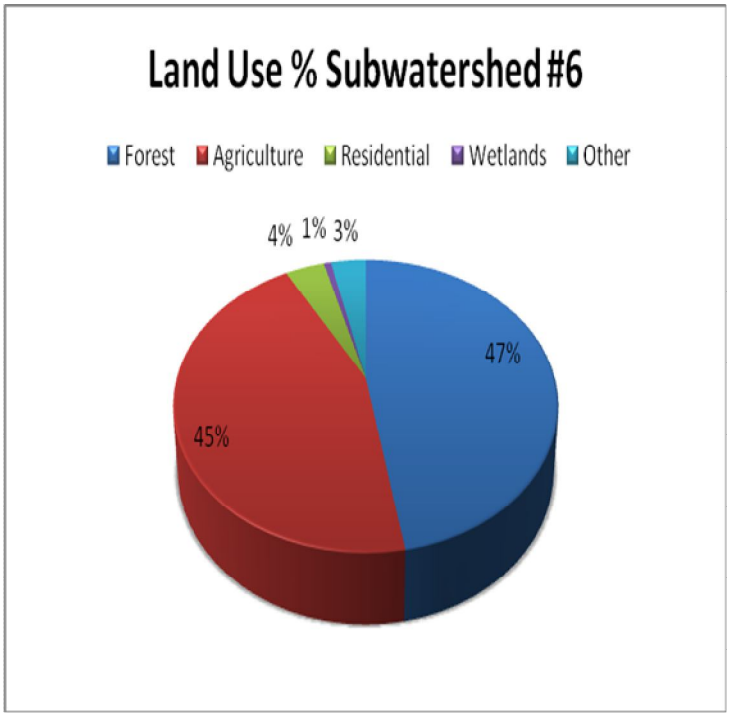


The total land area of Sub watershed #5 is 3072 acres with 73% of that area being dedicated to agricultural practices, 16% forest cover, 4% residential, 2% wetland and 5% composed of other land use practices.

Sub watershed #6

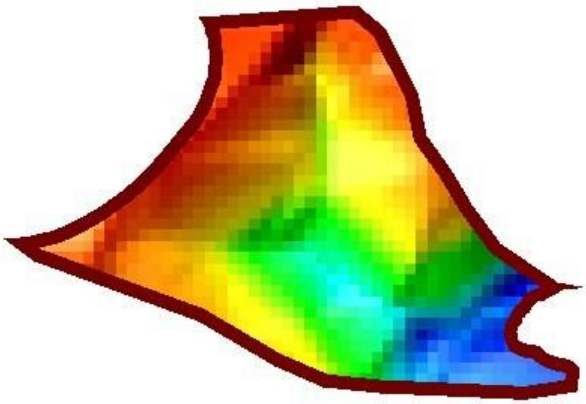


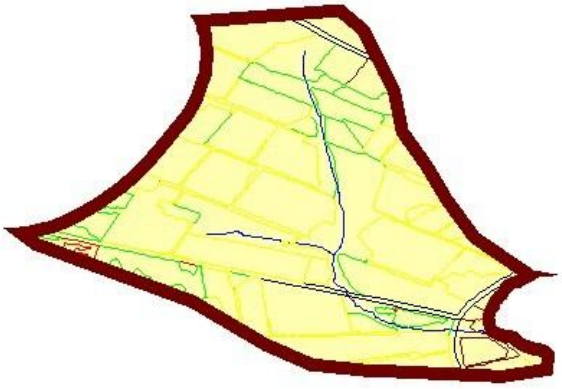


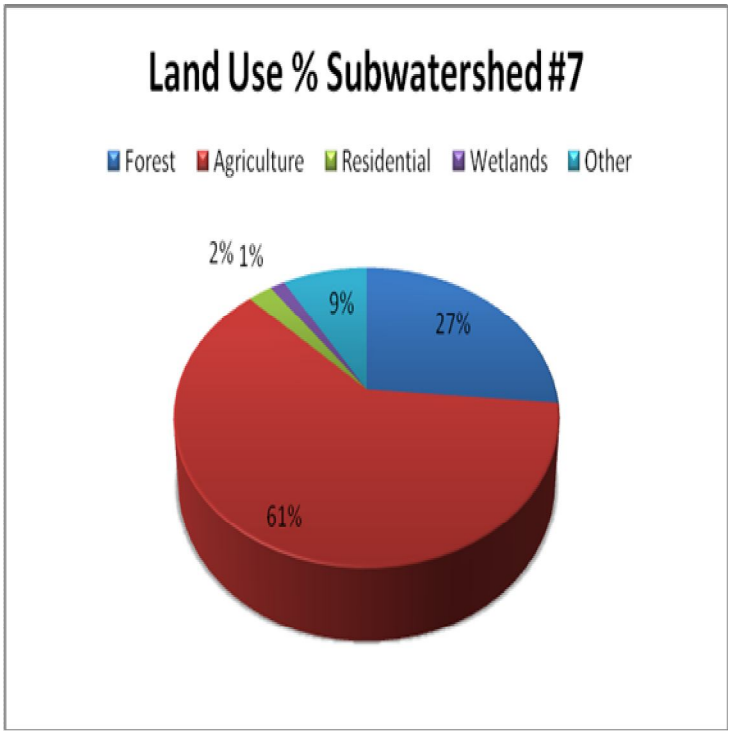


The total land area of Sub watershed #6 is 1225 acres with 45% of that area being dedicated to agricultural practices, 47% forest cover, 4% residential, 1% wetland and 3% composed of other land use practices.

Sub Watershed #7

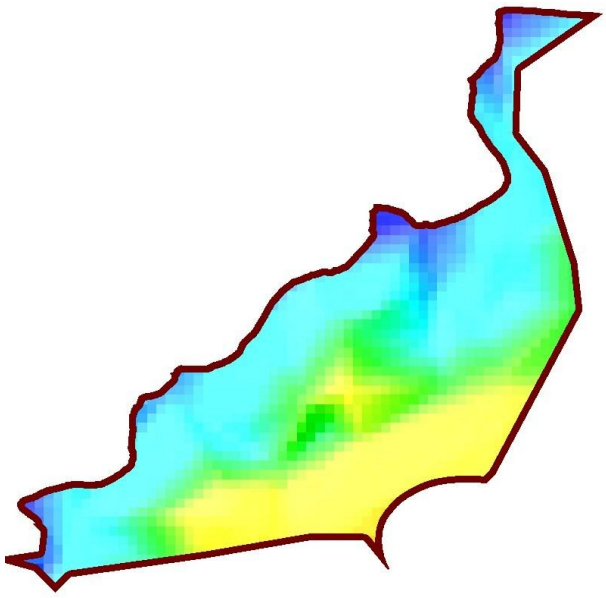


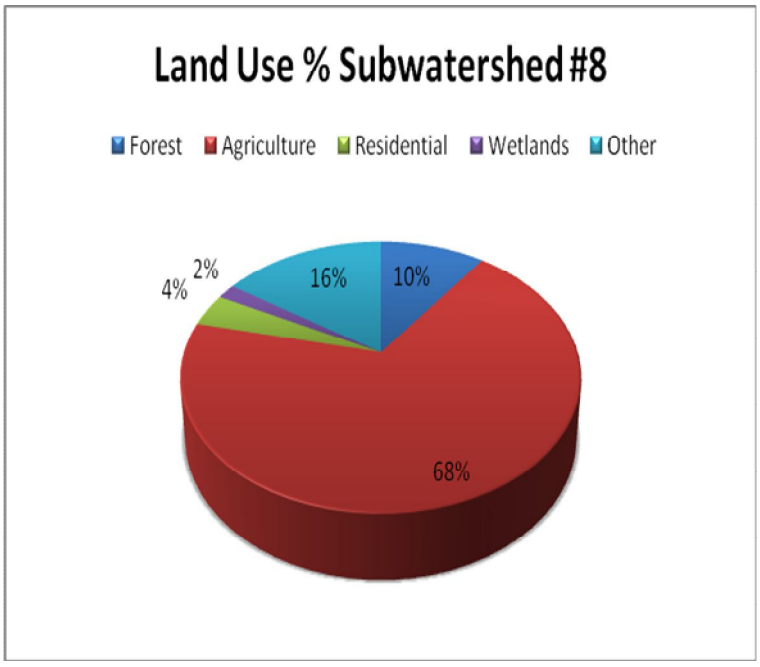




The total land area of Sub watershed #7 is 412 acres with 61% of that area being dedicated to agricultural practices, 27% forest cover, 2% residential, 1% wetland and 9% composed of other land use practices.

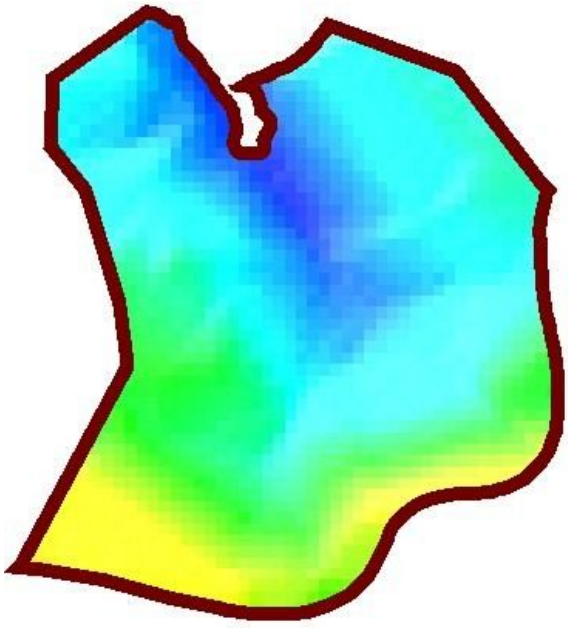
Sub Watershed #8

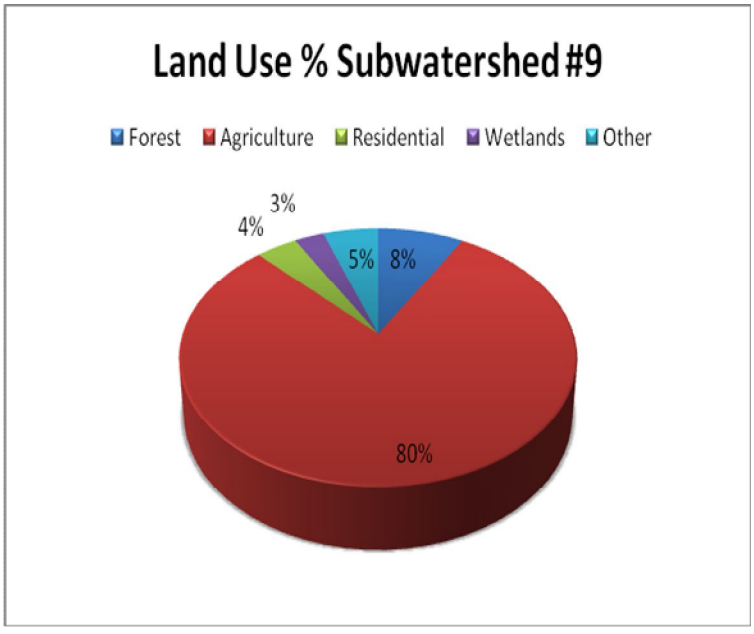




The total land area of Sub watershed #8 is 613 acres with 68% of that area being dedicated to agricultural practices, 10% forest cover, 4% residential, 2% wetland and 16% composed of other land use practices.

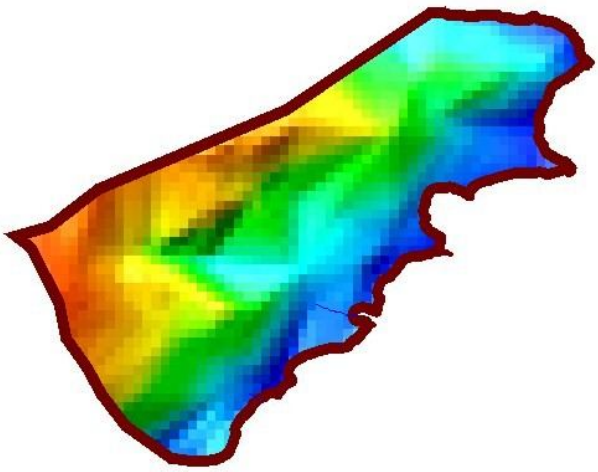
Sub Watershed #9

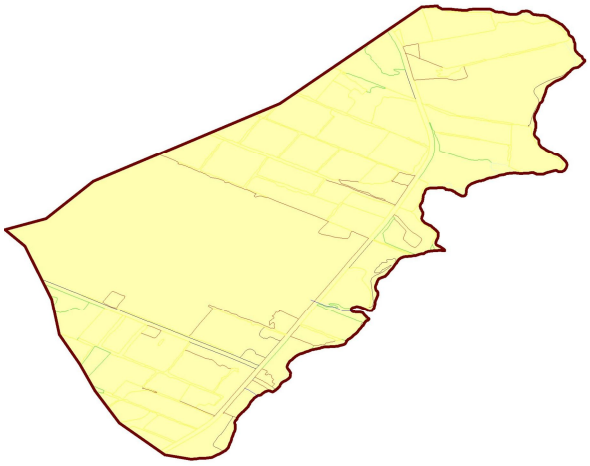


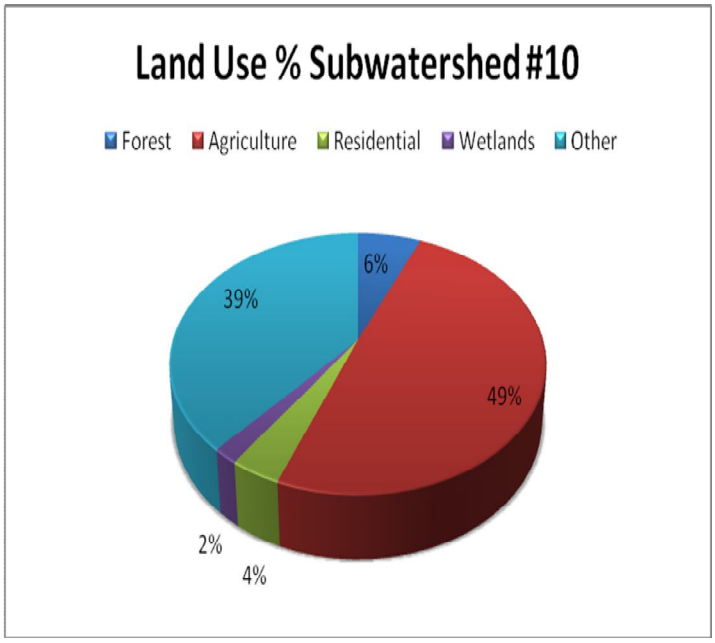


The total land area of Sub watershed #9 is 802 acres with 80% of that area being dedicated to agricultural practices, 8% forest cover, 4% residential, 3% wetland and 5% composed of other land use practices.

Sub Watershed #10

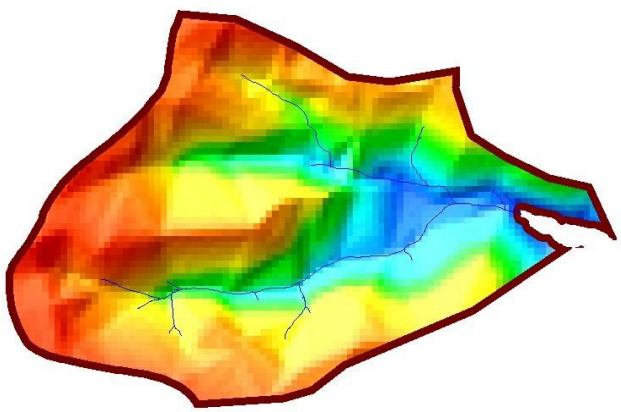


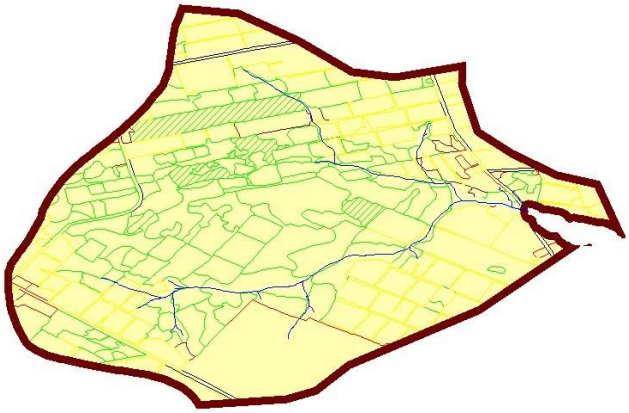


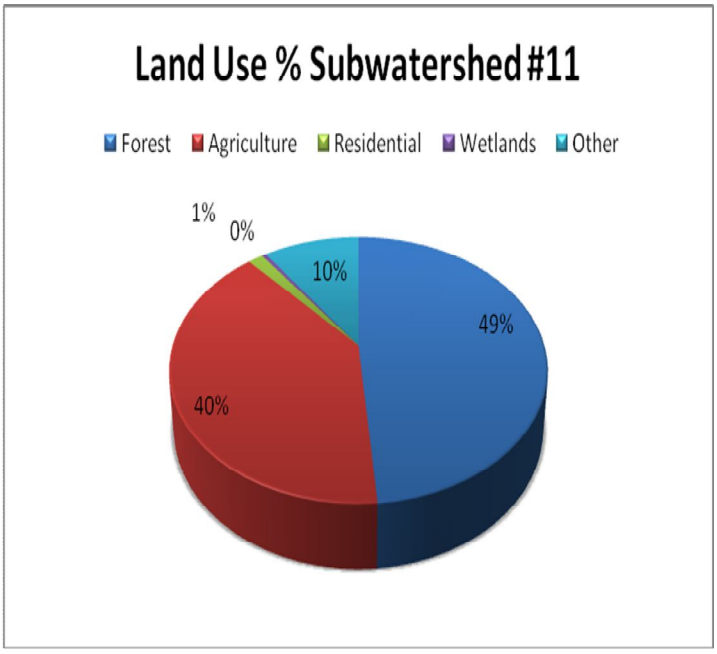


The total land area of Sub watershed #10 is 648 acres with 49% of that area being dedicated to agricultural practices, 6% forest cover, 4% residential, 2% wetland and 39% composed of other land use practices.

Sub Watershed #11

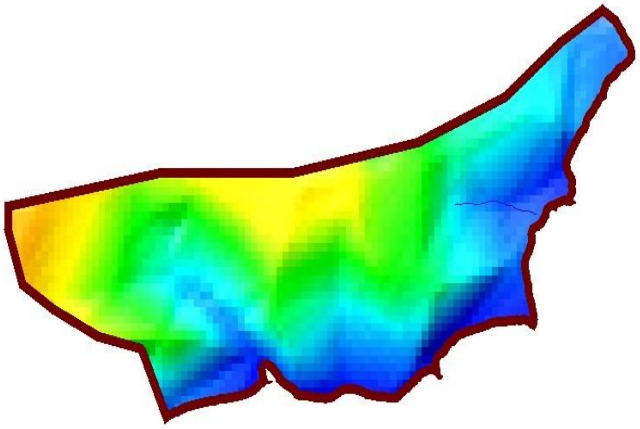


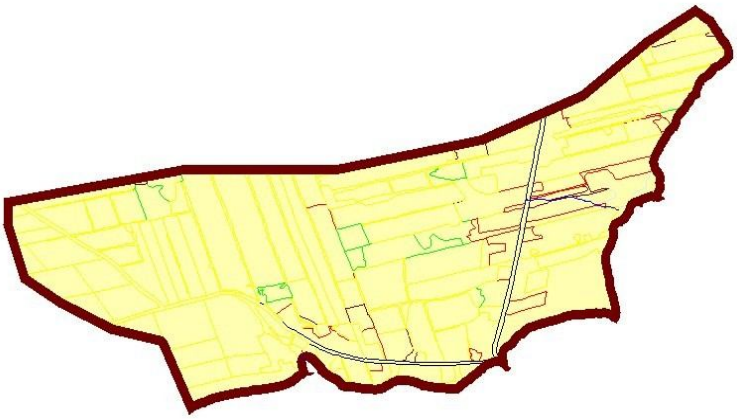


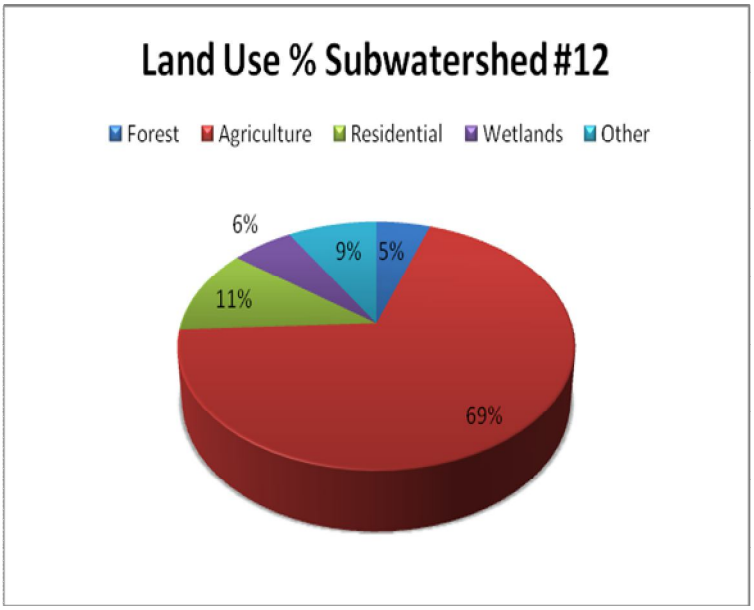


The total land area of Sub watershed #11 is 1580 acres with 40% of that area being dedicated to agricultural practices, 49% forest cover, 1% residential, 0% wetland and 10% composed of other land use practices.

Sub Watershed #12

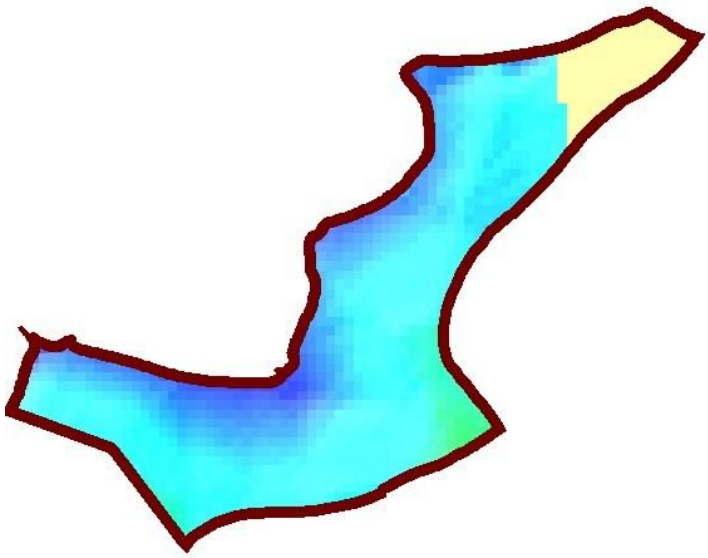


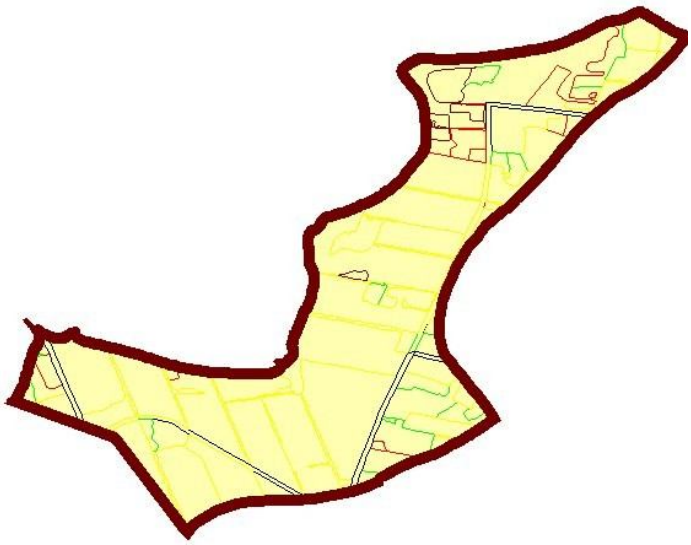


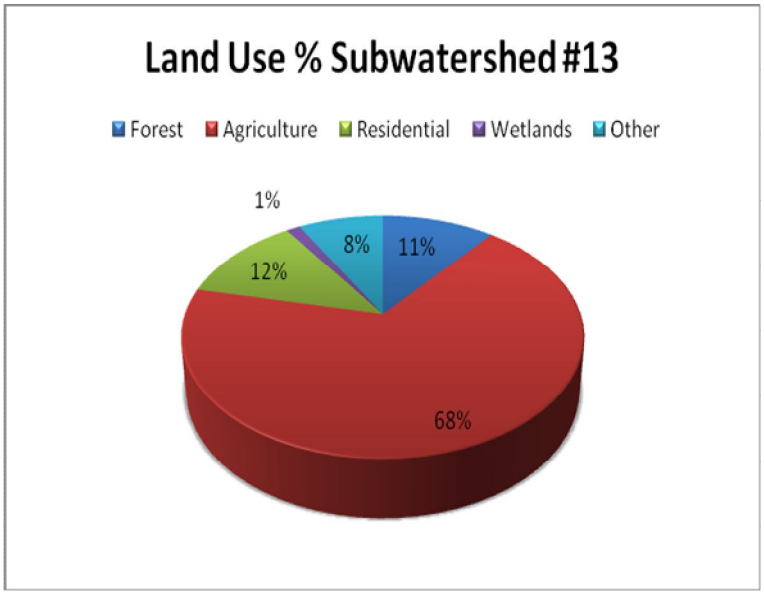


The total land area of Sub watershed #12 is 1085 acres with 69% of that area being dedicated to agricultural practices, 5% forest cover, 11% residential, 6% wetland and 9% composed of other land use practices.

Sub Watershed #13

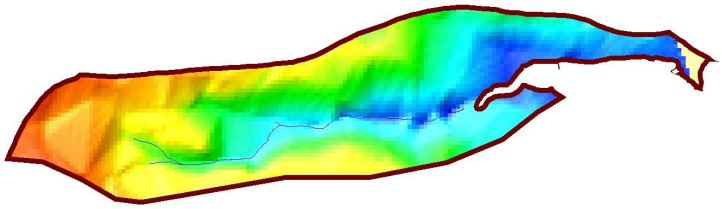


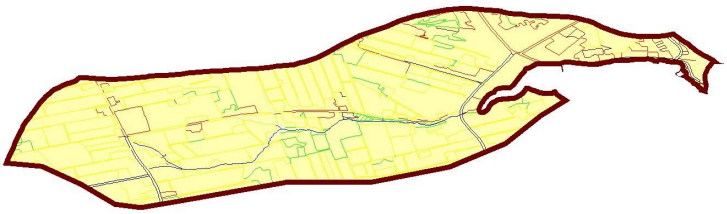


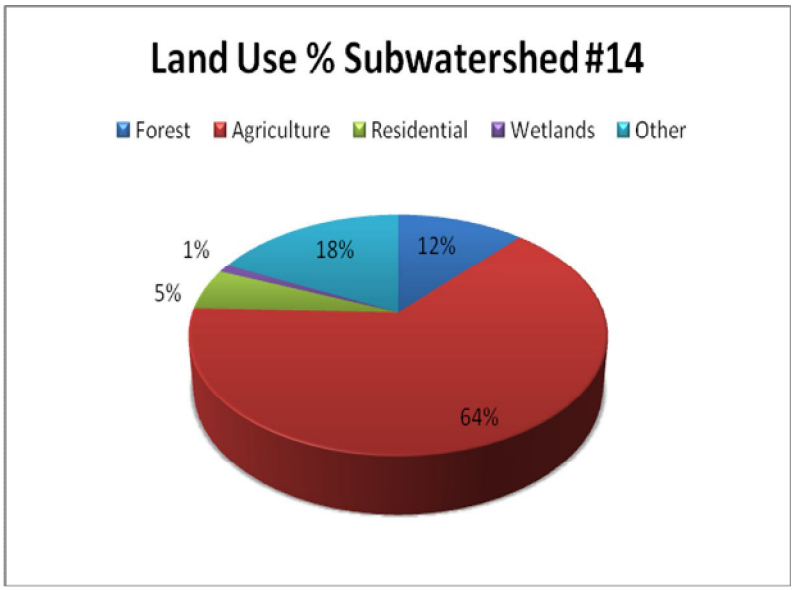


The total land area of Sub watershed 13 is 600 acres with 68% of that area being dedicated to agricultural practices, 11% forest cover, 12% residential , 1% wetland and 8% composed of other land use practices.

Sub Watershed #14







The total land area of Sub watershed #14 is 1903 acres with 64% of that area being dedicated to agricultural practices, 12% forest cover, 5% residential, 1% wetland and 18% composed of other land use practices.

9.0 References

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