Audubon International's

Natural Resource Inventory

for the City of

FAIRHOPE, ALABAMA

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

I. The aquatic resources of the Fairhope Region, including Mobile Bay, Weeks Bay, and the Fish River are central to the area's economy and the attractiveness of the community to both residents and visitors. Preserving these resources and keeping them healthy is of primary interest to the community.

II. The health of the River and Bays is directly influenced by the activities that take place adjacent to the small streams that feed them and the presence of the wetlands that serve as water filters. Streams and wetlands must be preserved, and buffered from detrimental impact.

III. A variety of upland ecosystems represent the ecological legacy of the community. The best remaining examples of these ecosystems should be preserved and protected in order to maintain biological diversity for future generations of Fairhopians.

IV. The specific areas chosen for preservation efforts should form a network of interconnected open spaces that will allow people to walk and bicycle between village centers and to and from recreational activities and other places of interest.

V. Specific locations may be chosen for inclusion in the open space network because of a number of factors including the presence of ecologically significant communities, the presence of hydric soils or other factors that dictate against development, proximity to other elements of the open space network, and opportunity.

VI. Priorities for resource conservation should be chosen based on a combination of ecological significance and immediacy of threat to the resource.

VII. A variety of mechanisms for green space preservation should be investigated, including but not limited to public acquisition, conservation easements, transfer of development rights, tax incentives, and land trusts.

VIII. The GIS database that was developed as part of this project represents an important planning tool that will be useful in making future land use decisions. It should continue to be developed and new information added to it. Key overlays that are priorities are the soils map and continued refinement of the plant communities map.

Acknowledgments. We appreciate the participation and direction provided by Christopher Baker, Fairhope's Director of Planning, and Jennifer Fidler, Fairhope's Director of Public Works. David Powell, GIS Technician for the City, was in charge of the GIS portion of this project which continues to reside with the City. Mayor Tim Kant, City Council Members Pauline Anders, Cecil Christenberry, Mike Ford, Bob Gentle, and Debbie Quinn, and Planning Commissions members Dick Charles, Jean Wilson, Ed Brinson, Bob Clark, Lee Turner, Larry Green, and Dan McCrory provided guidance, support, and discussion. David Ryan, Darrelyn Bender, Harry Phillips, and Tom Ellis met with us to discuss their areas of expertise. Peter Wiese provided advice on watersheds. Cara Stallmen and Stan Arbaczauskas provided valuable support of mapping resources from Baldwin County. Michael Shelton and Richard Coram of the Weeks Bay Watershed Project provided a number of excellent resources produced by that project. Funding for the project was provided by the Urban and Community Forestry Association and administered by Neil Letson of the Alabama Cooperative Extension System. Last but not least, we thank the many residents of the City of Fairhope Alabama who took the time to tell us how much they value the natural resources of their beautiful region.

1.0 INTRODUCTION

The City of Fairhope, Alabama is experiencing a rapid increase in population (**Figure 1**) that threatens to upset the environmental balance of the surrounding community. Because of their desire to address this issue proactively, the City Council and the Planning Commission have formed a partnership with Audubon International to conduct a natural resource inventory for the planning jurisdiction of Fairhope. Our goal was to evaluate the region from an ecological perspective, identify key resources, and suggest ways to manage, conserve, and/or preserve them in ecologically sustainable ways. This analysis is intended to serve as the first step in the creation of an open space plan for the community.

This document is not an attempt to limit development in Fairhope. It is not the role of this study to develop regulations, or even to recommend them. The goal of this project was to identify important natural resources and to suggest ways to protect them. We believe the City can and should expand the set of tools it has available for working with property owners to preserve the natural heritage of the community. As possible throughout this document, we make suggestions about strategies that we know other communities have tried. However, it is ultimately the citizens of Fairhope, through their elected officials, who must determine what steps to take, what programs to initiate, and what regulations to pursue in developing the unique open space plan that will serve the needs of this community. We applaud the City of Fairhope and its policy makers for starting down this important path, and we hope this document will be useful to them as they continue the process to its conclusion.

The City of Fairhope includes an area of approximately 3 square miles located on the east shore of Mobile Bay. However, its planning jurisdiction includes a large area outside the city limits, extending east to the Fish River and south to Weeks Bay, for a total area of roughly 80 square miles. **Figure 2** is the USGS topographic map of the immediate vicinity around the City, and **Figure 3** shows the boundaries of the planning jurisdiction. We have been asked to identify key natural resources within this area and evaluate their importance to the community and the potential implications of their loss.

From the perspective of the City's desire to integrate people and nature in sustainable ways on this property, there are three key factors that must be recognized and incorporated into the open space design. The first and most important is the symbiotic relationship of the community with its aquatic resources. Mobile Bay and Weeks Bay represent an important economic base for the community, both from the perspective of their commercial fisheries, and because they attract people to the community as residents and visitors. The loss of these aquatic resources would irreparably alter the fundamental nature of the community. The open space plan must preserve the water quality and habitat value of the bays, and in order to do that it must protect the freshwater streams and rivers that flow into them.

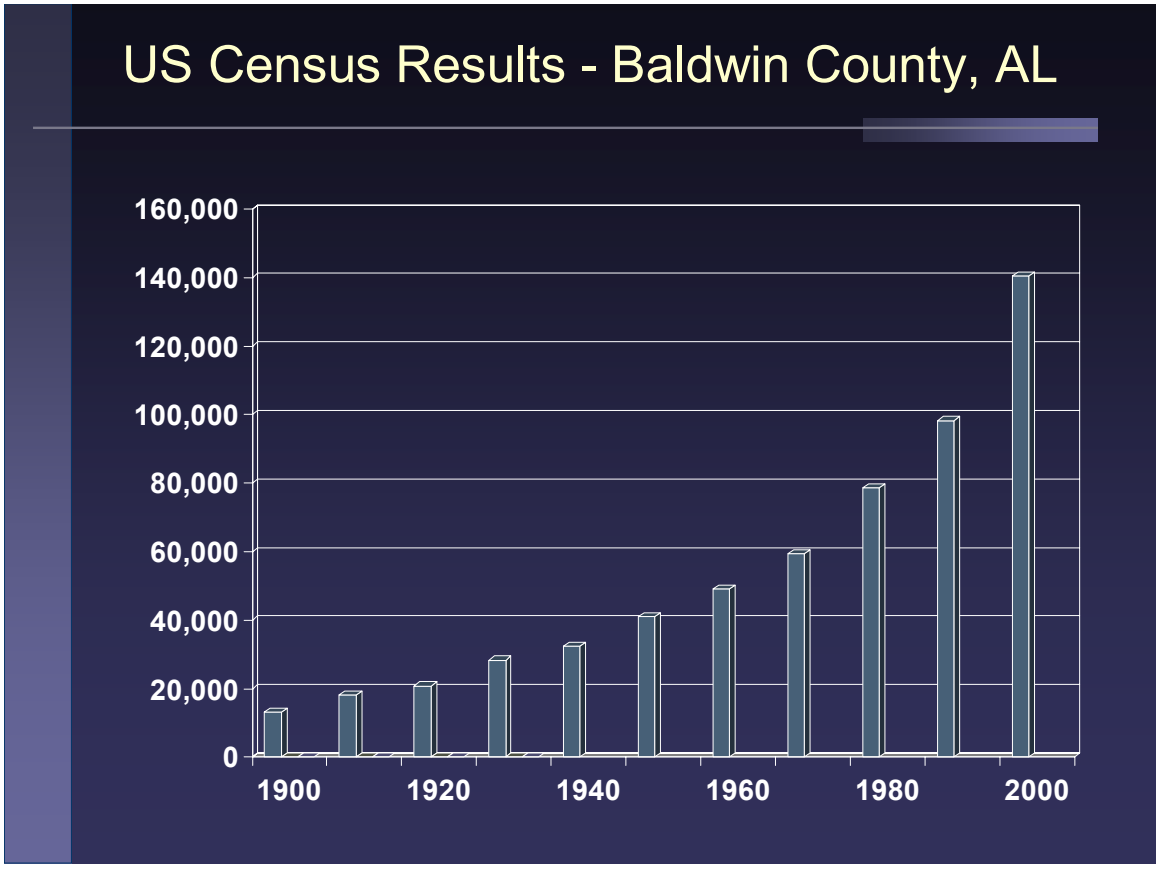


Figure 1. Population Growth in Baldwin County from 1900 to 2000.

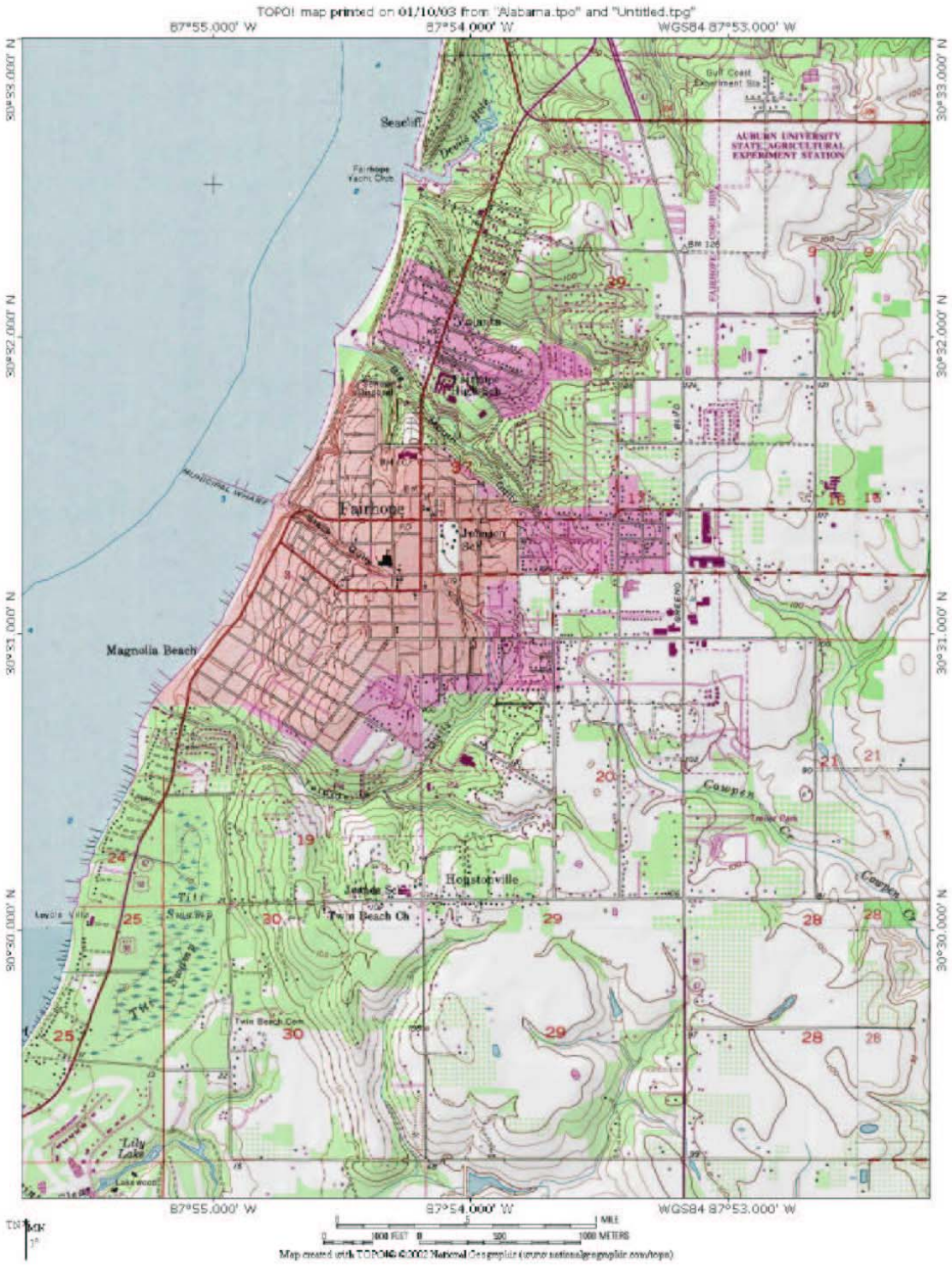


Figure 2. USGS Topographic Map of the Fairhope Area

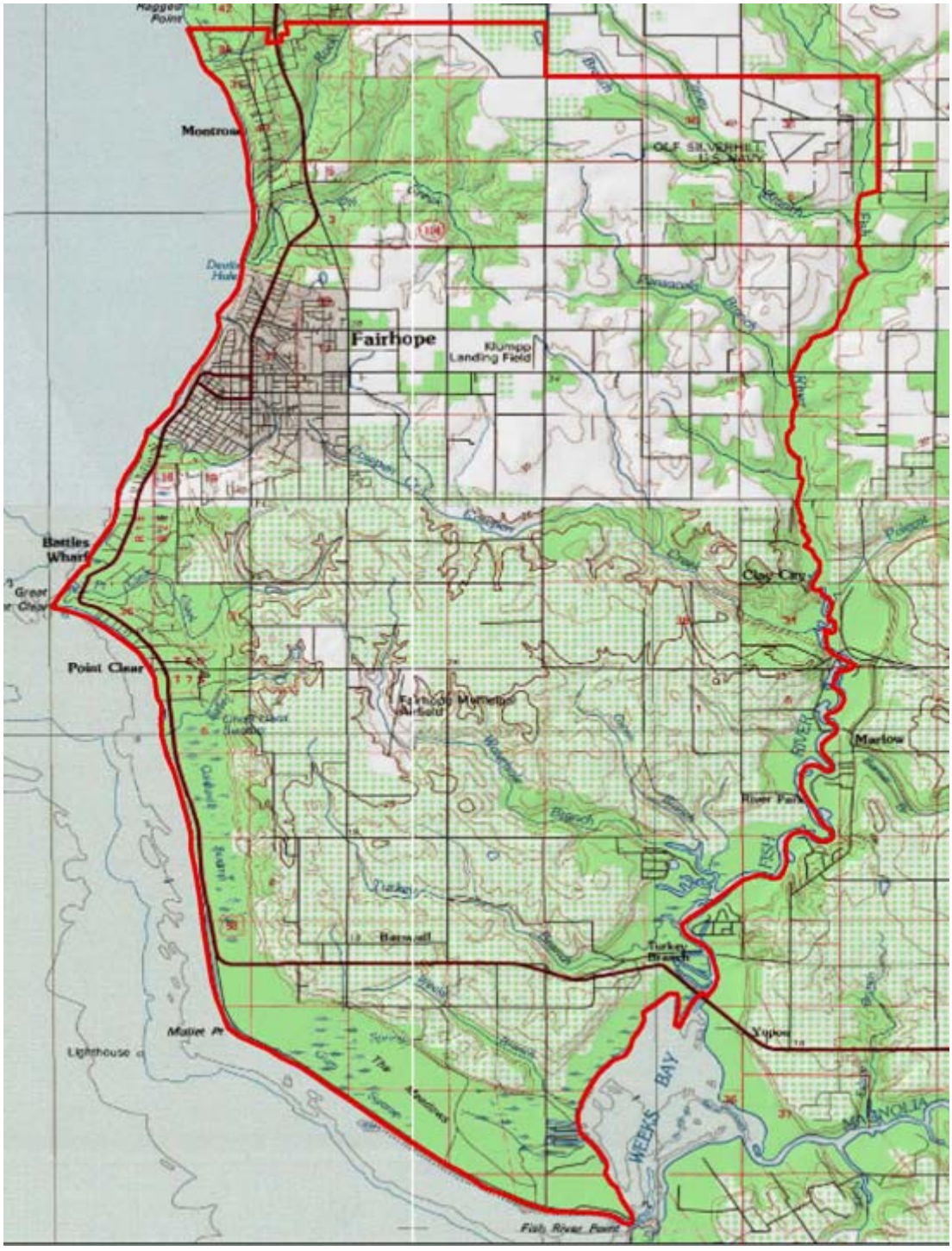


Figure 3. The Fairhope Planning Jurisdiction

The second key factor is to preserve or restore at least some examples of the terrestrial ecosystems that historically existed in the area. A complex of upland communities and isolated wetlands served as habitat for a variety of interesting plant and animal species that represent the biological inheritance of the community. These key ecosystems and their species must be maintained in the developing landscape so that future generations of human inhabitants can understand and appreciate them.

The third key factor is to recognize the quality-of-life issues that face the human population of the community. This includes ensuring the continuation of the agricultural heritage that provides income and locally-grown produce to residents. It also includes recreational needs, both active and passive, and greenspace connections that allow people to go between activities on foot or bicycle.

1.1 BASIC CONCEPTS

1.1.1 Species of Concern

A primary function of conservation design is to protect the habitat of species whose continued existence is in question, whether they are in imminent danger of extinction, or simply showing trends that could lead to problems in the future. In addition to protecting species identified by federal and state authorities, Audubon International includes a variety of species without formal status in our conservation plans. We believe that good environmental stewardship includes taking special care of populations of species that are:

-- endangered, threatened, or rare;
-- endemic;
-- important to key ecosystem processes;
-- sensitive to human disturbance; or
-- important to the community.

When such species are present, it is our obligation to afford them special protection. When they are not present, then we should concentrate on maintaining or restoring sufficient combinations of native habitat to prevent any further erosion of biodiversity on the site. Several species of special concern have been identified or are likely to occur in the City of Fairhope's planning jurisdiction. We suggest a continued effort be made to identify the locations that currently serve as habitat for these species, and that this information be stored as an overlay in the City's GIS database. As that information becomes more available, then the City can include habitat for these species as one of its considerations in designing the greenway network.

1.1.2 Wetlands and Floodplains

On a national basis, wetlands are greatly diminished, as well as being critical resources for biological communities. Between drinking water, habitat, breeding sites, and migration stopovers, wetlands provide something for virtually all animals. They are also important in maintaining the structure of the food web, as well as filtering the open water that provides

economic and recreational opportunities for humans.

The City of Fairhope borders on regionally and globally significant waters that provide an economic base, and in a sense define the community. However, there is frightening evidence that these aquatic resources are rapidly declining. A State study of surface water in the Fish River watershed (Oltz 1998) reported low dissolved oxygen levels, high fecal coliform counts, low habitat indices, and poor biological conditions. Weeks Bay has historically provided commercial harvest of shrimp, crab, and oyster, although the State has permanently closed commercial shrimping and conditionally closed the oyster beds because of fecal coliform concerns. Sedimentation, pollution, loss of habitat, and increased flooding all result from the impacts of residential and agricultural development of streams and associated wetlands and floodplains. High levels of Mercury have been documented in predatory fish over the last few years. Economically, Basnyat (1998) concluded that the capitalized value of the commercial and recreational fisheries in this area is high enough to justify public acquisition and protection of upstream wetlands.

The importance of the Bays to the community of Fairhope makes it even more critical to protect the small wetlands and streams that feed and filter the regional hydrological system. In a study of the Fish River watershed (Basnyat 1998), the largest source of nitrates was urban/residential areas and the second largest was agriculture. That study also concluded that the smallest streams are the primary sources of downriver pollution. Beck (1995) also showed that areas with the greatest potential for adding pollution to the Fish River tended to be associated with upstream tributaries. Vegetative buffers of native forest have been shown to be highly effective at reducing or eliminating the flow of nutrients and pollutants into such streams.

1.1.3 Other Rare or Significant Communities

The best way to preserve biodiversity is to concentrate on the preservation of entire communities. Therefore we look for habitats that support natural communities that are vulnerable, rare, species-rich, or highly endemic. Noss, et al. (1997) include several of the native ecosystems of the Fairhope area in their list of the most highly endangered ecosystems of the United States. These include longleaf pine forests and savannas, both terrestrial and marine coastal communities, large stream and river systems, and southern forested wetlands. Therefore we believe the City of Fairhope should emphasize throughout its planning process the preservation and restoration of these native ecosystems.

1.1.4 Historical Integrity of the Natural Community

Land use and disturbance history leave signatures that can determine not only what is currently on a site, but also what can grow there in the future. Thus it is important to understand as much about the history of a site as possible. Natural ecosystems in the planning jurisdiction of the City of Fairhope have been impacted by a variety of disturbances. Historically, the area was dominated by fire-maintained longleaf pine communities. After human colonization, forests were increasingly subjected to “high-grading” (timber removal) and turpentining. More recently, much of the forest has been cleared and converted to agricultural use including pasture, orchard, and cropland. Thus much of the property has had historical forest cover removed and

historical hydrology altered. This makes it likely that Fairhope's open space plan will need to include a variety of long-term restoration efforts.

1.1.5 Open Space Elements for Human Use

In addition to providing for the continued integrity of the natural ecosystems and communities of the planning jurisdiction, the City of Fairhope's open space plan must also provide for the open space needs of its human residents. These are many and varied. They include spaces for active recreation, such as sports and gatherings, as well as spaces for passive recreation like walking and sitting. And they include access for walkers and cyclists who choose Fairhope because of its ability to provide a lifestyle that is closer to nature. Ideally, all of the places that people want to go should be connected by greenspaces that are car-free and safe.

1.2 BIOLOGICAL SITE REVIEW

A variety of analyses of the biological elements occurring around the City of Fairhope were used in the preparation of this ecological design. Several excellent environmental assessments of the region were provided to us by the Weeks Bay NERR, the Weeks Bay Watershed Project, and the Alabama Natural Heritage Program. We also studied academic work on the local area, including Mount (1975), Beck (1995), and Basnyat (1998). In addition, we reviewed materials and databases prepared by the Geological Survey of Alabama, US Geological Survey, US Soil Conservation Service, the Baldwin County Planning Department, and the City of Fairhope. We appreciated our conversations with key community members including the City Council, the Planning Commission, the Environmental Advisory Board, the Tree Committee, the Chamber of Commerce, and the civic-minded groups who attended the public hearings on this project. Gena Todia of WETLAND RESOURCES Environmental Consulting performed many hours of plant community surveys. Finally, Audubon International staff (R. Dodson, M. Smart, and L. Woolbright) conducted several site visits. Through this combination of approaches, we believe we gained a thorough understanding of the biological elements present on the site.

1.3 ECOLOGICAL RESTORATION

Much of the City of Fairhope's planning jurisdiction has been managed for forestry and agriculture throughout the recent past. As the City moves forward with an open space planning process, we believe it inevitable that some areas currently in these land uses will be targeted for a return to more natural communities. The process of moving land from highly impacted to a more natural state is called ecological restoration. There is a great deal of debate in ecological circles about whether natural ecosystems can be completely restored, and therefore it is important to emphasize preservation of any natural or semi-natural remnants. However, land that has been completely converted to other functions will need to be restored. Thus we anticipate that restoration activity will be a significant component of this project for the next several years. Although ecological restoration is better accomplished by local firms with experience in the specific ecosystems being restored, some general principles of restoration design are covered in the following paragraphs of this document.

It is important to note that hydrologic restoration is an important part of landscape repair. Typically it is necessary to restore the hydrology of a system, including stream channels, flood plains, and wetlands, before the system as a whole can function properly. Without hydrologic restoration, recovery of native plant communities and biodiversity can be virtually impossible.

1.3.1 Native Plants

During our meetings with members of the community, several people emphasized the importance of landscaping with native plants. This practice accomplishes a variety of positive goals, including:

-- providing animals with the same food and cover plants they evolved with;
-- minimizing the need to supply extra water, fertilizer, cultivation, and other care; and
-- eliminating the need for pesticides because plants are co-evolved with local pests.

In addition, ecological principles urge the introduction of as many native species as possible into a restoration area. This maximizes plant and, subsequently, animal biodiversity. A list of native plant species is provided in **Appendix A**.

Because Fairhope shares ecosystems with a variety of other localities in the Southern Coastal Plain and Southeastern Plains natural regions, some of the plants listed under the communities in Appendix A may be out of range in the exact Fairhope locale. However, we recommend that the local ones be used as much as possible in appropriate restoration areas of the project, and that each type of restoration zone include as many of the appropriate species as can be obtained. Many are not available commercially, but local seed collectors will be able to provide small amounts of seed for some species in most years, and it is possible that the Department of Public Works can use those seeds to produce some planting material in their greenhouses. Also, given the substantial amount of development around City of Fairhope, there should be an abundance of areas available for plant salvage.

1.3.2 Vegetative Structure

Natural ecosystems are composed of layers of vegetation, typically including big trees, small trees, shrubs, woody vines, and herbaceous plants. Wildlife are largely dependent on structural habitat, so species diversity of almost all groups can be increased by adding vertical layers of vegetation to the plant community. Restoration areas and wildlife corridors should include shrub and herb layers as well as trees.

1.3.3 Edges and Buffers

Limited mowing, chemical free buffer zones should be established adjacent to all preserves and restoration areas, both terrestrial and aquatic. Buffers around aquatic systems, including wetlands, streams, rivers, and ponds, are essential to the water quality, and buffers are important to wildlife in all habitat types. Audubon International recommends that all buffers be at least 25' wide, and the wider the better. They can be planted in native grasses and wildflowers and mowed once a year in the late fall after the wildflowers have set seed. In recognition of the critical role of tributaries in water quality and commercial fisheries, Alabama Natural Heritage Program recommends a minimum buffer width of 200 feet (plus 2' per 1% slope), including all associated wetlands and floodplains, for the tributaries of Weeks Bay.

In addition, forest preserves should be provided with "soft edges". Research indicates that ecotones (the boundaries between different habitat types) can support more wildlife if there is a transition zone rather than an abrupt change. Planting a shrub layer between a forest preserve area and the low-mow grass buffer, discussed above, is a good example of how to soften an edge. The width of these transition zones can be variable to accommodate adjacent functions.

1.3.4 Invasive Exotic Plant Species

An increasingly important aspect of ecological restoration/preservation in all landscapes is controlling exotic species that are invasive. Typically these species arrive in a new location that lacks the natural population controls of their native ecosystem, and then they start to spread. Severe infestations of invasive exotics can damage natural ecosystems by outcompeting endemic species and by changing ecosystem structure and function to the detriment of the historic community.

According to a study conducted by Cornell University economists several years ago, alien plant and animal species in the United States cost the nation almost $123 billion annually. Also referred to as non-natives or exotics, these species cause damage in many ways, including predation on native species, displacement of natives, and outright habitat destruction. According to the Cornell study, fire ants alone cost the nation's economy $10 million annually; non-native weeds cost us a staggering $35.5 billion every year.

Competition among plant species is a natural part of any ecosystem, but introduction of exotic species can disrupt intricate balances and relationships evolved over thousands of years among native plants and their communities. Oftentimes, the result is a loss of biological diversity within both the plant and animal communities. There are many examples of disastrous exotic plant invasions that have resulted in losses of native species, changes in community structure and function, and even alteration of the physical structure of an ecosystem. The effects of invasions by exotics depend in large part on which species and which natural communities are involved.

Some generalized characteristics of invasive exotic species include having a long life span and high dispersal rates and being able to reproduce vegetatively (without seeds) and/or produce large numbers of seeds. These plants typically have a short generation time and are usually habitat generalists.

Some characteristics of habitats that are prone to invasion include those that have a similar climate to the place of origin of the invading plant; habitats that have been disturbed by humans; early succession habitats (for example, clear cuts and abandoned agricultural fields or pastures); and habitats that have low natural diversity. A large contributor to the success of exotic plants is an absence of predators, disease, or other factors that keep populations in check in the plant's native regions.

Like a fever when you have the flu, invasion by exotic plant species typically is just a symptom of a greater underlying problem, usually a disturbed or disrupted habitat or ecosystem. When human bodies are overly stressed, our immune systems are weakened and we become vulnerable to "invasion" by foreign bodies that cause disease. Similarly, when some type of stress weakens a natural system, it is prone to invasion by exotics that can make the natural system "sick." Careful observation will reveal that, in most cases, exotic plant species establishment and invasion is primarily associated with disturbed habitats. The disturbance, which stresses the system, may be quite subtle or readily recognizable. Some forms of disturbance that open the door to invasion by alien plant species include ditching, stream channelization, or severe erosion that results in a change in the natural hydrology of the surrounding land; unnaturally high levels of sediment accumulation in flood plains and riparian areas; soil disturbance caused by timber harvesting, agriculture or even food plot establishment; overgrazing by livestock; a prescribed fire regime that is out of sync with the ecosystem being managed; and activities associated with development.

Healthy, intact, fully functioning ecosystems are surprisingly resistant to invasion by exotic species. For example, it is not uncommon to find plant communities made up almost exclusively of exotics growing within or just outside of road rights-of-way, a highly disturbed situation where the natural hydrology has been altered through the excavation of ditches, the soil has been disturbed during road construction, and native vegetation has been removed and typically replaced with non-native grasses. If the adjacent habitat is relatively undisturbed and the plant community is intact, you will seldom find non-native species becoming established beyond the zone of influence of the roadside ditch or the area that has been disturbed. The plants that compose healthy, intact communities are so busy competing with each other that there is no room, or niche, for invasion by exotics. If exotic species become established at all, they are typically just a minor component in an otherwise diverse plant community and will remain so until a disturbance occurs that disrupts the natural balance.

An important key to winning the battle with exotic plant species is to restore native, diverse communities and natural ecological conditions to the greatest extent possible. Exotics have a difficult time colonizing or re-invading natural, healthy systems. The niche filled by exotic plants, once the exotics have been removed or killed, must be filled with other plants, preferably native species. If the niche is not filled, exotics will simply re-invade in many cases. Suitable species that can be planted to replace exotics depends on the geographical location, soils, hydrologic regime, growing season, and habitat type of the site in questions.

Unfortunately, the great climate that makes Fairhope so attractive to humans also encourages a wide variety of exotic invasives. Some of the most notable are Cogon grass (*Imperata*

cylindrica), Kudzu (*Pueraria lobata*), Chinese privet (*Ligustrum sinense*), Chinese tallow tree (*Sapium sebiferum*), and the Japanese climbing fern, *Lygodium japonicum*.

Once these species have established themselves in an area, it is virtually impossible to get rid of them. Their periodic control or treatment becomes another task that must be regularly undertaken in maintaining the landscape. A more successful strategy is to prevent the introduction of exotics in the first place. Local retailers may be willing to help encourage the use of ornamental plants that are either native or known to be non-invasive in Fairhope's climate.

1.3.5 Corridors Linking Preserves

The successful conservation of wildlife on a preserve complex including restored ecosystems depends in large part on whether or not there is sufficient natural area to supply the resources needed to support a large enough population of animals to be genetically viable. The wildlife value of a patch of vegetation depends on the size of the patch and the degree to which the patch is connected to other good habitat. Habitat corridors between patches allow animals to move back and forth from their shelters to water and feeding areas on a daily basis, without leaving the cover of natural vegetation. They also provide routes for dispersal of young and annual movements of migratory species. Ideally, all tree patches and all wetlands should be connected into this network. Connecting corridors should be as wide and tall as possible, given their locations. Bands of trees with understory shrubs and no-mow buffers are best, but are not always possible. Any connection is better than none. Wildlife corridors can also serve as people connections, wetlands buffers, riparian corridors, and other dual function landscape features.

2.0 IDENTIFICATION OF BIOLOGICAL ELEMENTS

The first step in the ecological evaluation of a site is to determine what biological communities exist on that site. It is only within the context of the natural ecoregion that a site's biological communities and populations may be evaluated. What is common in one ecoregion may be a critically rare resource in another.

South Alabama is included in Harker et al's (1993) Southern Coastal Plain natural region. That region is a fairly narrow strip between the piedmont and the Gulf, and it includes biological elements that have spread down from the piedmont, others that have spread up from semi-tropical Florida, and others that are influenced by the presence of saltwater. Thus, in comparison to other locations, there are many variations on a fairly large number of basic community types.

Upland communities in the Fairhope region include Harker et al.'s (1993) southern mixed hardwoods forest, sandhill, and pine flatwoods. Southern mixed hardwoods forest predominates the piedmont areas farther north across much of the southeast. In the coastal plain they are restricted to wetter places and are sometimes called "hammocks." More common in the Fairhope area are the pine-dominated forests. These include pine flatwoods and sandhill (or "high pine") communities typically dominated by longleaf pine with a variety of shrub and understory components.

The wetlands in the planning jurisdiction are primarily Harker et al's (1993) Southern Swamp Forest. These are bottomland and floodplain forests typically associated with rivers and streams. This community is characterized by relatively high productivity, and it supports a wide variety of wildlife. It represents a distinctive assemblage of plants, and also serves valuable functions in water storage and flood control. Many other wetlands in the area are hydric pine stands. In addition, there are some isolated wetlands in depressions located outside the floodplains. These are the local systems called "Grady ponds" that historically were dominated by cypress, gum, sweet bay, slash pine, and red maple.

Finally, there are also estuarine wetlands in the area. These are the salt marshes in the intertidal zone that are dominated by salt-tolerant grasses, rushes, and sedges.

Lists of plant species characteristic of these community types are given in **Appendix A**.

2.1 Watersheds of the Fairhope Planning Jurisdiction

A watershed is defined as the sum of the land area that drains into a specified low point. It is important to consider conservation issues on the watershed level because it is frequently impossible to separate downstream effects from their upstream causes. However, most watersheds include other smaller ones, so there is always an element of subjectivity in deciding what level of the nested series to focus on. For the purposes of this study, we recognize that the bluff effectively divides Fairhope into drainages that flow east into the Fish River and Weeks Bay, and those that flow west into Mobile Bay. Within each of those categories, we have chosen to lump together small drainages into 8 areas from north to south, for a total of 16 management

units (**Figure 4**). We hope this will be a manageable number of units, with each unit large enough to be biologically meaningful. The watersheds of the Fairhope planning jurisdiction are:

Watersheds flowing West into Mobile Bay (from N to S)

- Rock Creek
- Devil's Hole / Fly Creek
- Unnamed Volanta area Gully
- Big Mouth Gully
- Stack Gully
- Tatumville Gully
- Point Clear Creek
- Bailey Creek/Caldwell Swamp/Gum Swamp

Flowing east into Fish River and Weeks Bay (from N to S) (after Beck 1995)

- Caney, Picard, and Rockhead Branches
- Pensacola and Worm Branches
- Still Branch
- Cowpen Creek
- Green and Louis Branches
- Waterhole Branch
- Lower Turkey Branch
- Weeks Branch

2.2 SPECIES OF PARTICULAR INTEREST

The Alabama Natural Heritage Program has identified several rare native species within the planning jurisdiction of Fairhope. Each species is followed by its Heritage Program Element Ranks, where G refers to the global ranking (rarity throughout the world) and S to the state ranking, and the numbers are generally interpreted as: 1 – critically imperiled, 2 – imperiled, 3- very rare or vulnerable, 4 – apparently secure, and 5 – demonstrably secure. Plant species identified included: silverbell (*Halesia carolina*, G4G5S2), nodding clubmoss (*Lycopodiella cernua*, G5S1S2), yellow-eyed grass (*Xyris drummondii*, G3S3), incised groovebur (*Agrimomia incisa*, G3S2), and atlantic white cedar (*Chamaecyparis thyoides*, G4S3) (ALNHP appendix 4).

Animals identified by that effort included: gopher tortoise (*Gopherus polyphemus*, G3S2), green water snake (*Nerodia cyclopion*, G5S2), one-toed amphiuma (*Amphiuma pholeter*, G3S1), gulf killifish (*Fundulus grandis*, G5S3), alligator snapping turtle (*Macroclemys temminckii*, G3G4S3), greater siren (*Siren lacertina*, G5S3), and Alabama redbelly turtle (*Pseudemys alabamensis*, G1S1 and FWS endangered) (ALNHP appendix 4). We note that two of these species have additional significance. The redbelly is an endemic species, the backwaters of Weeks Bay making up a large part of its entire global range. It subsists on aquatic vegetation and invertebrates, so the health of the aquatic systems of this immediate area determines its global fate.

A - Rock Creek

B - Devil's Hole / Fly Creek

C - Unnamed – Volanta area Gully

D - Big Mouth Gully

E - Stack Gully

F - Tatumville Gully

G - Point Clear Creek

H - Bailey Creek / Caldwell Swamp / Gum Swamp

I - Caney, Picard, and Rockhead Branches

J - Pensacola and Worm Branches

K - Still Branch

L - Cowpen Creek

M - Green and Louis Branches

N - Waterhole Branch

O - Lower Turkey Branch

P - Weeks Branch

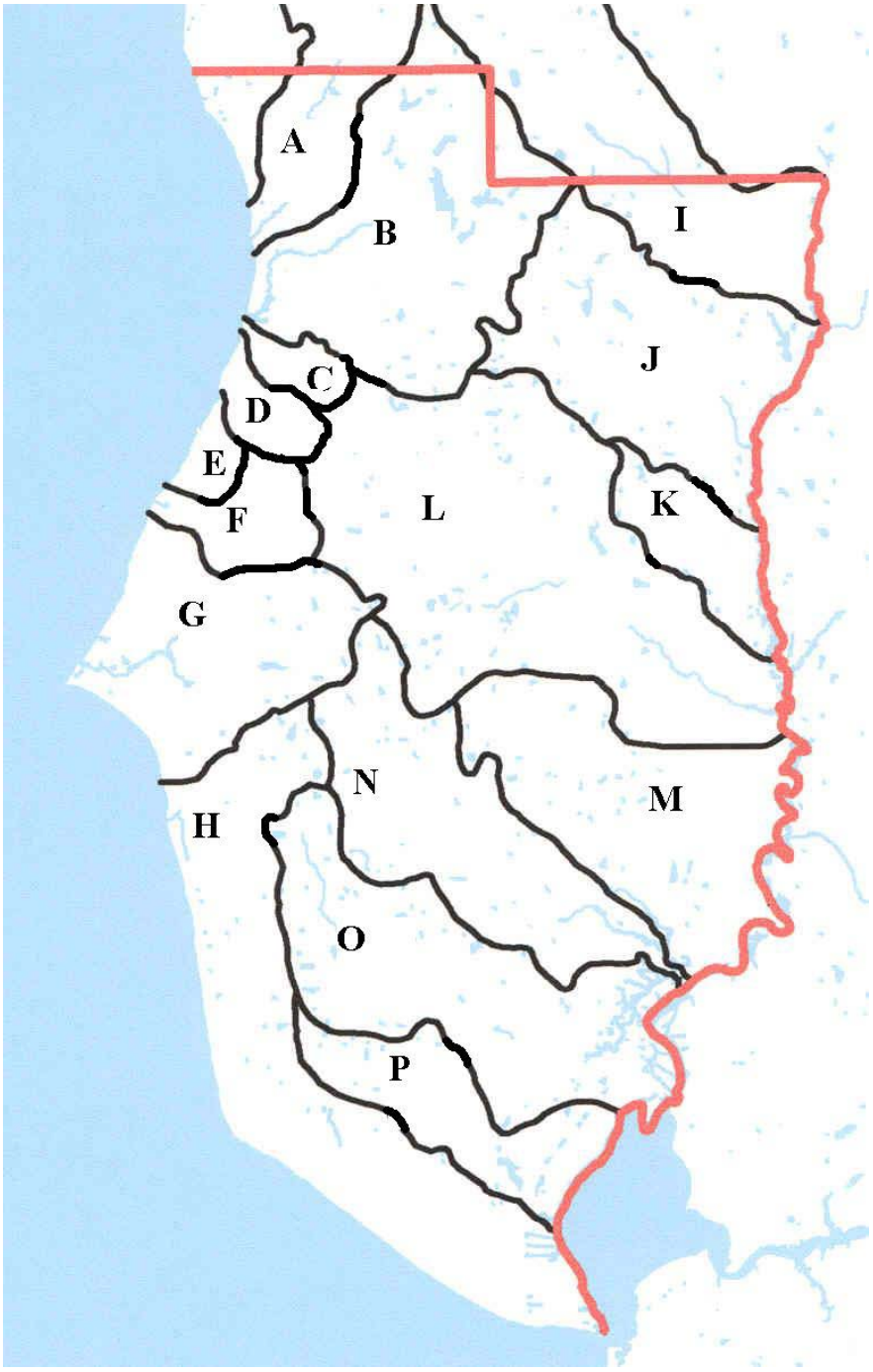


Figure 4. Watersheds of the Fairhope Planning Jurisdiction

The Gopher Tortoise is a keystone species in the upland pine ecosystems that constitute its habitat. It digs deep burrows that turn over the soil, bring up nutrients from the subsoils, and provide habitat for a variety of other species.

In addition to the things actually found in the planning district, it is likely that other listed species occur in low numbers or in less accessible habitats. Candidates include the eastern indigo snake (*Drymarchon corais couperi*), the red-cockaded woodpecker (*Picoides borealis*), the wood stork (*Mycteria americana*), and the sweet pitcher plant (*Sarracenia rubra*). There are also several freshwater mussels that may be in the Fish River or its tributaries. The point of speculating about the occurrence of these various species of federal and state concern is that well chosen natural preserves in the Fairhope area have a high likelihood of contributing to the survival of all sorts of biodiversity that we may not even know is there.

A list of species of interest to the City of Fairhope could not leave out the oysters, shrimp, crabs, and finfish that are responsible for the commercial and recreational fisheries of the area. Nor could it leave out species that are loved but not rare. We did not get a whole lot of specific suggestions of such things at the public hearings, but I suspect that many people would include live oaks in their personal lists, as I would include box turtles in mine. Fairhope is blessed with many wonderful plants and animals that are worthy of preservation that will hopefully keep them from ever becoming rare in the first place. It is also important to recognize that Fairhope lies in one of the main flyways for migratory birds moving between summer and winter ranges. As such, the area provides essential habitat for stop-overs.

Because of a lack of knowledge at this time about exactly where in the planning jurisdiction these species are located, it is not possible to include specific populations in the criteria used to identify areas of high priority for conservation. However, we hope that the City will incorporate a species overlay into its ongoing GIS mapping efforts and use it to keep track of future sightings of species of interest. This will allow this information to be used as one of the criteria considered in decisions about the development of the greenway network.

2.3 SIGNIFICANT NATURAL AREAS

An aerial photograph of the site is shown in **Figure 5**. As is plain from this view, the vast majority of the area has been converted to agricultural purposes and no longer supports native plant assemblages. However, numerous valuable natural features continue to exist.

Bays and shorelines are clearly top priority resources for the City of Fairhope. Mobile Bay is much larger, more visible from downtown Fairhope, and probably more significant commercially. However, Weeks Bay also has a significant commercial and recreational impact. In addition, Fairhope has a greater impact on Weeks Bay because it makes up a large proportion of the watershed. Therefore both bays should be viewed as critical resources.

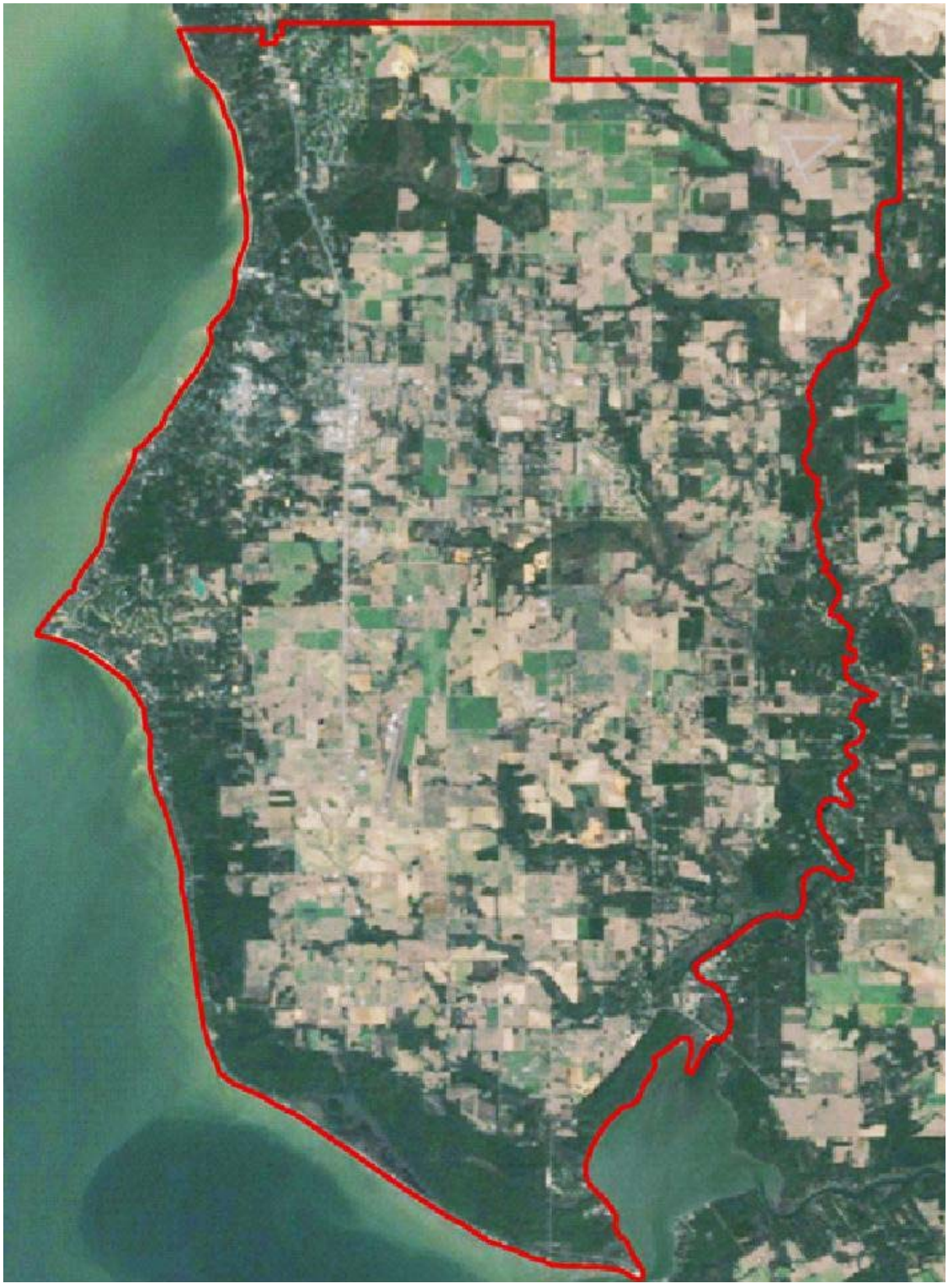


Figure 5. Satellite Image of the Fairhope Region

Conservation of the Bays will require buffering their margins from negative impacts. This means preserving the fringe wetlands that serve as natural water filters and are themselves important habitat features. This includes the large wetlands on the southwest shore, Caldwell Swamp and Gum Swamp, which are significant natural features in their own right.

The water quality of the bays also depends on the quality of the water coming down the streams and rivers into the bays. Fairhope has numerous streams flowing into both bays, from the small branches to the Fish River. In the north, the headwaters of Fly Creek are still clean and surrounded by a large undeveloped area that contains woodlands and isolated waterbodies. To the south, Point Clear Creek is spring-fed with clear water and deep holes. Cowpen Creek, on the other hand, is a major tributary of the Fish River and Weeks Bay that has headwaters already impacted by development. Each of these is a significant natural feature. Many are associated with fringe wetlands, such as the tidal swamp forests the Fish River, and these wetlands are important to preserve.

In addition to preserving the fringe wetlands along all streams, rivers, and bays, the City must consider terrestrial buffers along those sections that do not have wetlands. Natural ecosystems are good water quality buffers that need to be kept in place or restored. Allowing lawns and crops to extend down to the water's edge is guaranteed to introduce fertilizer and pesticide residues into the bays. Septic systems and farm animals in the floodplains will lead to increased fecal coliform counts. Rip-rap, bulkheads, and other hard surfaces replace the natural buffers and reduce the ability of the ecosystems to keep themselves clean.

Isolated wetlands are also important natural resources because of their contribution to habitat and to ground water recharge. They also must be preserved and buffered to keep them clean. Historically, Grady Ponds were the main type of isolated wetlands in this area. Grady soils include a clay layer that blocks infiltration of surface water resulting in a perched water table that typically supported a forested swamp community. Although most of the Grady Ponds in the area have been cleared and many filled, the soils that supported them are still there. These soils indicate areas that will likely present continuing drainage and mosquito problems if they are developed. Therefore their best use is probably low-density or open space. We suggest restoring a Grady Pond as a community education project and encouraging landowners to restore others.

Pitcher plant bogs are a signature feature of the area. We understand there are extensive pitcher plant bogs in the southwestern wetlands with their Plummer soils, but at this point they have not been mapped. This is an example of the continuing effort that is needed to expand the GIS database.

Near the Bay, particularly in the Battles Wharf area, are concentrations of Leon sands. These are Spodosols, meaning they have a hardpan, or restrictive layer, below the surface that perches water. Most areas mapped as Leon are forested wetlands that can be characterized as pine flatwoods. Topography is pretty flat with gradual sloping towards coastal streams that flow into the bay. Upland inclusions occur within this soil map unit. The forest cover on this soil type filters water that flows slowly over the perched layer to the streams. Even small streams with a relatively small watershed tend to be perennial because of the flow of water seeping from

adjacent wetland areas. If these areas are lost to development the streams will be impacted and, therefore, the health of the bay.

In addition to its aquatic resources, Fairhope also has numerous significant terrestrial resources. Remnants of the pine flatwoods ecosystem are scattered throughout the area. This is a completely distinct assemblage with some wonderful species like the gopher tortoise and the red cockaded woodpecker. The bluff is also a prime natural resource, both from a scenic perspective like the Red Bluff in Montrose, and from the perspective of its contribution to the biodiversity of the region. There is a great deal of community interest in preserving and protecting the significant stands of upland forest in the region.

Many of the ecosystems of the Fairhope region, including the pine woods, pitcher plant bogs, and upland marshes were historically regulated by fire. As human development increased, fire suppression became more common. Prior to the 1930's many of these systems experienced fires on an average of every five years or so. As a result of less frequent fires some fire-dependent species have become less common. In addition some of these areas have accumulated so much fuel that a fire now could be devastating to the natural and human communities. As a part of preserving ecosystems, we must also plan for their maintenance.

2.4 HIGH QUALITY AGRICULTURAL AREAS

Much of the land area of the planning jurisdiction has been converted to agriculture. As part of the planning process, we were asked to determine whether portions of this area were more suitable for agriculture and should therefore be reserved for that purpose. In reviewing the soils map for the region, our conclusion was that the upland soils of the area, in general, are good agricultural soils, and that the soils that are not good for agriculture are the hydric (wetland) soils. Thus the key distinction is not good versus poor agricultural soils, but dry versus wet ones.

Fairhope has an abundance of hydric soils that tend to be associated with the floodplains and the stream channels. In addition, numerous pockets of Grady soils form isolated wetlands throughout several broad areas of the planning jurisdiction. In general, these soils tend to pool water at and near the surface. These characteristics are not compatible with good agricultural uses. They are also not appropriate for development because they will ultimately create both water and mosquito problems.

The upland (non-hydric) soils of the planning jurisdiction tend to be good for agricultural purposes as well as being suitable for development. We did not distinguish any patterns that suggested certain areas for agriculture and others for development. Rather it appears that development and agriculture will be competing land uses throughout much of the dry portions of the planning jurisdiction. Both are desirable functions in the Fairhope area. However, the planning decisions segregating them will need to be based on considerations other than this report.

3.0 GENERAL RECOMMENDATIONS

3.1 CONCEPTUAL DESIGN FOR THE GREENWAY NETWORK

The goal of this project is to provide information that can be used to develop a network of open spaces, green spaces, and recreational areas connected by pedestrian and bicycle-friendly corridors. It is evident that there is support from diverse constituencies for the development of such a plan. The largest support for a single item in the discussion at our first public hearing was for developing a system of parks, and the second largest was for connecting parks with greenways. In addition, we understand that the Chamber of Commerce has identified open space as one of their top priorities. Clearly this is an idea whose time has come.

Although the actual design of the greenway network is a step beyond the scope of this project, we were asked to comment on and make suggestions for open space elements as such things emerged from our review of natural resources. We have included a variety of suggestions in section 4 under the discussions of individual watersheds. In brief, the major ideas included there suggest a conceptual design based on three rings of open space elements. This concept is described below, and a conceptual sketch is attached as **Figure 6**.

- The inner ring includes hubs inside the City corresponding to areas identified as resource concentrations: Big Mouth Gully, the Pier and downtown parks (Stack Gully watershed), and Tatumville Gully. These three hubs would be connected by a trail system through the gullies, along the existing bayfront, and along sidewalks through downtown.
- The middle ring includes areas of significant natural ecosystems identified in the Fly Creek watershed (wetlands and pine forest), the eastern portion of the Cowpen Creek watershed (in the golf course area), Waterhole Branch (in the airport area), and in the Caldwell Swamp area. Connecting corridors would need to be identified to connect between these and from them to the inner and outer rings.
- The outer ring would include portions of the buffer system for the Fish River and Weeks Bay. Key areas have been identified on the margin between the Rockhead and Pensacola Branch watersheds, at the easternmost edge of Cowpen Creek, at the easternmost edge of Turkey Branch, and in the Gum Swamp area. These hubs would also require connecting corridors between them. Connections to the inner rings could likely be accomplished by using streamside buffer zones.

Regardless of whether or not the City decides to adopt a concept such as the one suggested above, opportunities exist to add other places to the network of open spaces and connecting corridors. Some of the likely "hubs" in such a system are existing features already in use by the community. These include city and county parks, schools, playing fields, etc. Consider connections to the Weeks Bay NERR property as well. Others depend on future purchases or easements. Emphasis should be placed on large tracts of property that remain undeveloped, such as the Corte property, and the big wetlands so as to include hubs large enough to serve as wildlife habitat. The City needs to be proactive as opportunities present themselves.

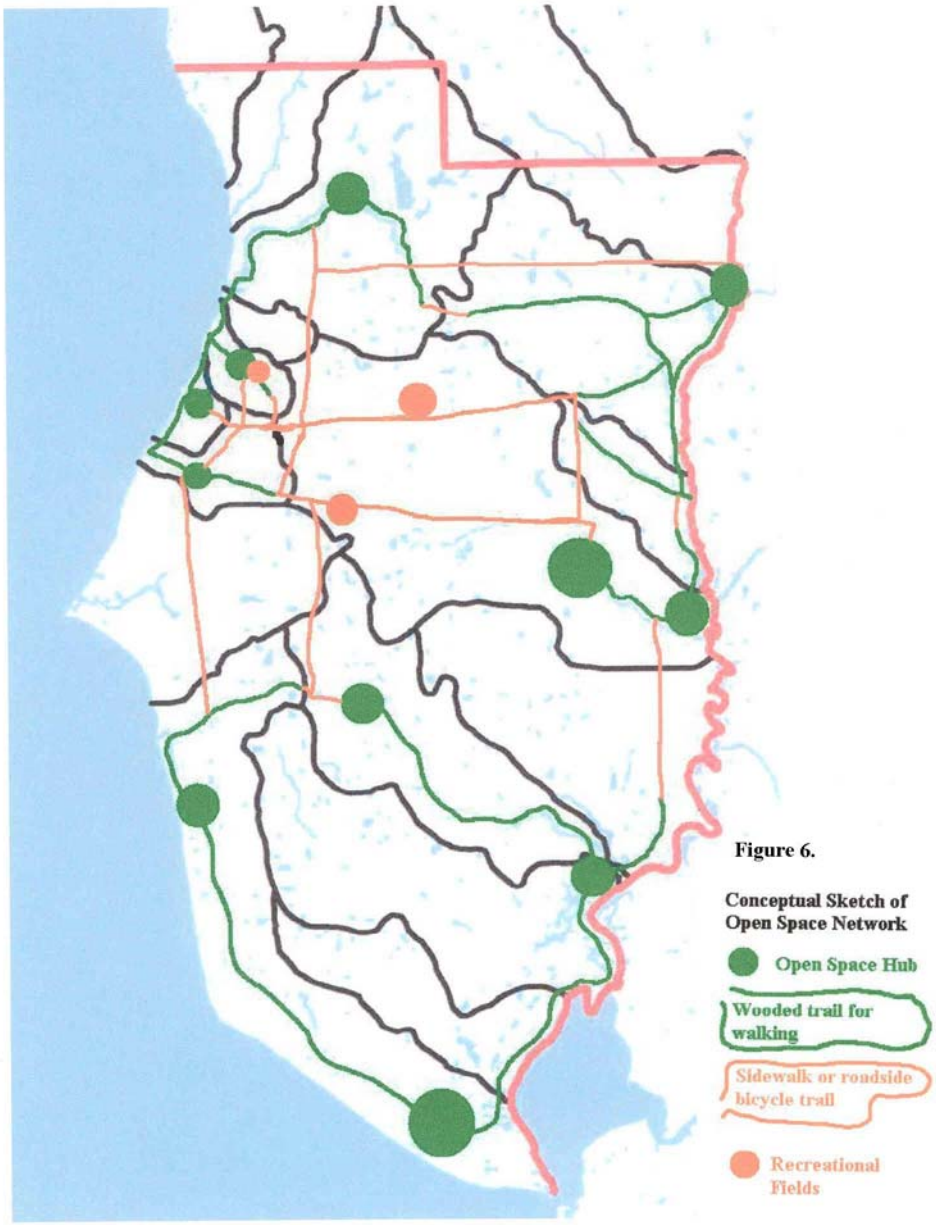


Figure 6. Conceptual Sketch of Open Space Network

There is a good bit of interest, for example, in using the Walley dirt pit as a recreational feature, and if the Agricultural Experiment Station ever becomes available, the City or its partners will need to move quickly to keep that property from being subdivided. In addition the City should focus its efforts on parcels that are identified in this report as valuable resources.

The "spokes" that connect the hubs can be varied. The riparian buffers recommended in section 3.2 (below) will make excellent corridors connecting across much of the landscape. Corridors intended for wildlife should be wide and vegetated, like the riparian buffers, while those intended just for people can be varied. The gullies in the City are another example of connecting elements that have already been identified. When cleaned up and equipped with trails and interpretive signage, they can be important corridors connecting neighborhoods with each other and with the waterfront.

This network of open spaces, green spaces, and natural ecosystems can accomplish many functions including active and passive recreation, wildlife habitat, and water quality improvement. By including isolated wetlands and their buffer zones, whether owned by the City, eased to the City, or simply preserved by conscientious owners, ground water quality can be preserved.

A comprehensive system of open space is guaranteed to include a variety of private property, whether included for habitat value, wetlands conservation, stream buffer, or simply access to other places. Our experience has been that most people want to do the right thing for conservation and the environment, but that many times they don't know what that is. Educational materials on native plantings for backyard stream buffers and other natural areas, information on buffering wetlands, removal of exotics, avoiding the overuse of lawn chemicals, and even improving habitat by such means as providing nest boxes, are all examples of informational materials that the City should try to provide. Many of these are available from cooperative extension, the websites of environmental groups, and other sources, but some would be much better if tailored to the local area. The Weeks Bay NERR has developed a variety of suitable materials that they might be willing to share with the City. In addition, perhaps the Environmental Committee can be persuaded to assist with this effort.

An obstacle to including all important natural features in the green space network is a basic lack of information on what exists where. Fairhope's planning jurisdiction covers a very large area, and there has been no concerted effort to conduct a natural inventory on the species level. The City has made a good start by undertaking the current study. In addition, the tree inventory is an excellent example of the type of information that needs to be collected. Perhaps the Tree Committee would be willing to expand their inventory efforts to cover the entire planning jurisdiction. Fairhope appears to be blessed with an abundance of civic-minded, knowledgeable citizens capable of helping to expand the information base.

Once a network is in place, it will be necessary to manage it. A good start would be the development of a long-term tree replacement plan for the City that could eventually be expanded to cover the whole network. In addition certain natural areas will need a burn plan, and a plan will have to be developed for the control of exotic species.

3.2 CREATE RIPARIAN BUFFERS FOR WATER QUALITY

Another central issue that has been a recurrent theme in all of our discussions is the impact of human activities on the quality of water in the streams, rivers, and bays. It has been widely recognized that unbuffered development and agriculture along waterways is introducing nutrients and other chemicals to the water and compromising the natural mechanisms by which water quality is maintained. There are also concerns that the regulatory oversight provided by existing agencies has not been effective in limiting the degradation of water quality. Clearly this is a major issue for a community whose economy and lifestyle are centered on the bays.

The only way to ensure that water quality does not further degrade is to provide natural buffers and filters around the waterways, from the headwaters to the bays themselves. This is likely to be a contentious issue because it limits the use of property, but it is one that the community must deal with. Minimally disturbed native vegetation will provide the best buffering capacity, and marginal wetlands are the natural filters. In order to move forward, we must make plans that limit future impact to these resources where they still exist, and we must try to repair past damage to these resources.

A review of City planning and zoning documents suggests that the primary goals of the greenspace ordinances are recreational spaces and walking access, and the primary goals of the stormwater ordinances are to prevent flooding and to provide for drainage. Although there are provisions in both that can be applied to wetlands protection and riparian buffer zones, there does not appear to be specific recognition of the importance of these to water quality. The City should consider specifically recognizing in its zoning regulations the importance of riparian buffers for wetlands, streams, and other bodies of water. In addition to creating variable-width zones of native plant materials and chemical restrictions, the Weeks Bay NERR has guidelines for waterfront construction that might be a useful reference in considering options.

As for the repair of prior damage to riparian zones, voluntary programs of replanting and creation of conservation easements can be considered. Previously converted wetlands along waterways should be restored.

A final water quality issue that was raised is the impact of septic systems in areas close to waterways. Especially in areas with high rainfall and extensive wetlands and floodplains, septic systems can contribute to fecal coliform issues of the type that caused the closing of commercial oyster beds in Weeks Bay. Numerous private septic systems currently exist in areas of the planning jurisdiction, and it is likely that their impact on water quality could be reduced by connecting them to a sewer system. We do not recommend that action at this time, both because of the expense of sewer systems and because their existence can drive population and development increases. However, we recommend that the City develop a map of existing septic systems that will allow the evaluation of their impact and facilitate the consideration of options.

The extent to which water-quality buffers can be incorporated along Fairhope's streams varies by watershed. Some areas are already developed right down to the stream edges, and other areas are still open. For areas that are already developed, efforts should be made to educate residents

and encourage voluntary participation in replanting native vegetation and protecting riparian buffers from impacts. In areas that have not yet been developed, the City should consider more restrictive land-use regulations to require vegetated buffers along stream channels.

Intact streamside buffer zones can be important features that play wonderfully diverse roles in the landscape. They protect water quality, provide habitat and movement corridors for wildlife, support passive recreation, and they can also serve as corridors in the greenway network. Many of Fairhope's streams extend from town all the way to the Fish River and Weeks Bay. Thus they are well-placed to provide connections for people to get back and forth across the landscape.

3.3 CONTROL STORMWATER RUNOFF

Another recurring theme has been the need to deal with storm water runoff issues. As increasing development has added impervious surface to virtually all areas of the planning jurisdiction, runoff has increased. The effects are felt most in the City proper, where downtown contributes to increased flow in the gullies, and the Winn-Dixie parking lot and Greeno Road area add to the Cowpen Creek flow. In addition to erosion upstream, there are increasing sedimentation problems downstream and in the bays.

This issue also has two parts: prevention of future damage and repair of past damage. Future damage is addressed in the City's zoning ordinances, which require on-site storage and slow release. However, the intensity of storms and the frequency of severe (so-called "100 year" and so forth) events has increased in recent years, consistent with the predictions of some of the global warming models. It would be prudent to plan for on-site storage requirements significantly in excess of what might have seemed reasonable in the past. The City might also consider the idea of limits on the percent of a watershed that could be covered by impervious surface.

The issue of past increases in run-off is a complicated one because of lack of information. It is our understanding that a current map of existing storm drains does not exist. A thorough understanding of where the impervious surfaces are and where the runoff from them goes would be extremely useful in trying to design the diverters and impoundments that will be required to reduce existing runoff.

One excellent idea for minimizing the impact of prior development on Cowpen Creek is to create additional stormwater storage on the 40-acre site owned by the City at county road 44 and Oberg Road. That location is appropriately placed to intercept and moderate much of the increased run-off from headwater development before it has the opportunity to do additional damage downstream. Engineering studies would be required to calculate the size of the retention pond required and the characteristics of flow control to ensure good release rates. We suggest that scenario be actively investigated, and also that at least part of the detention basin be planted with vegetation accurate to the historic Grady Ponds of the Fairhope area so that the pond can do multiple duty as an educational feature, wildlife habitat, and attractive scenery to compliment the other functions of the park.

3.4 ZONING AND SUBDIVISION ISSUES

There was considerable concern expressed throughout this process about regulation of land uses in those areas of the planning jurisdiction that are unzoned. Unfortunately, it is our understanding that City zoning regulations do not apply to the planning jurisdiction outside of the City limits, so the City has no way to enforce land uses in these areas. State law defines the process by which zoning ordinances can be applied to these areas. This process requires the County to delineate a special area and then hold a public referendum of the voters in that area.

The City's subdivision regulations do apply to the planning jurisdiction outside of the city limits. This means, in essence, that the City can develop a density plan for the unzoned areas of the planning jurisdiction, but cannot control land uses. We recommend that the City consider developing both a density plan in the subdivision regulations and a land use plan for the entire planning jurisdiction. While the land use plan would not be legally binding on property owners, it would at least allow voluntary compliance with articulated objectives.

Additional input during this process expressed the desire for a green space requirement in the City's subdivision regulations and the idea that the City should partner with developers to identify special features that might be included in the green space of each subdivision. We believe these ideas are included in the latest version of the City's subdivision regulations, and that they evidence the commitment of the City to proactive greenspace planning.

It is clear that the City should continue to expand its efforts to partner with developers to achieve positive outcomes. Much of this happens during the planning stages when developers should be encouraged to have a continuing discussion with City planners. Many jurisdictions find it useful to require wetlands mapping and plant community mapping on parcels proposed for development. This would allow the City to continuously upgrade its natural resource inventory and GIS database, as well as make informed decisions about protecting wetland buffers, corridors, and other important ecological features.

3.5 ISSUES THAT CAN BE ADDRESSED BY RESIDENTS

As the Fairhope area continues to experience development and population growth, the actions of individuals in their yards, farms, and businesses increasingly contribute to a variety of environmental stresses. On the other hand, it is also important to recognize that residents are really the only solution to many of the issues that confront the community. Watersheds, open spaces, and the ranges of all sorts of species cross political boundaries and lot lines. One of the keys to successful conservation planning in Fairhope will be the ability of the community to pull together and the willingness of neighbors to work together for the common good.

Because of the importance of Fairhope's aquatic resources, a key contribution residents can make is to safeguard the streams and rivers that border their properties. The most important thing the City can do in this regard is to provide information about good and bad practices. Perhaps lawn and garden stores would participate in printing and distributing such material.

Neighborhoods and their associations can encourage the use of this information. Probably the single most important practice is setting aside buffer zones (at least 25' wide but preferably much more) and planting them with native plant materials. It is also important to prevent the use of any fertilizers or pesticides within these buffers.

An issue identified during public meetings is what to do with the yard wastes that frequently end up in piles that encourage exotic termites, or get surreptitiously dumped into a convenient gully. It is increasingly common for municipalities to create centralized composting facilities. Advantages are that residents have a way to dispose of yard wastes that does not result in dumping, and that a centralized facility can control and prevent termite infestation. There are costs associated with compost plants, such as a dozer and operator to turn the piles. These costs can be much greater if the municipality collects the wastes rather than accepting their delivery. However, many municipalities recover significant portions of these costs by selling the finished product, or by replacing with it materials that they once purchased.

Another big issue is lawn-care chemicals. In some communities the run-off of home lawn products, including pesticides and fertilizers, greatly overwhelms agricultural sources of these pollutants on a per acre basis. It is difficult to wean people away from fertilizers and pesticides, but consistent and persistent educational messages can help. Manufacturers and distributors of lawn care products can be important allies because they have good information about when and how much to use various products. Distributors can frequently provide information about organic, slow-release, and lower toxicity options to popular products. Educational materials about chemical-free buffer zones and native (low maintenance) plantings can be made available.

Another issue in which residents play a large role is the escape of invasive exotic plants that continue to be used for landscaping. Residents should be encouraged to remove known invasives from their property. They should also lobby local plant providers to propagate and sell native stock.

Much of Fairhope's planning jurisdiction is under agricultural use. Best Management Practices (BMPs) have been developed for pastures, farm fields, and other common agricultural functions. The City can encourage the availability of materials and implementation of these practices in partnership with the Natural Resource Conservation Service and Cooperative Extension.

3.6 MECHANISMS FOR PROTECTING OPEN SPACE

There are many ways that municipalities and private foundations work with property owners to preserve open spaces and important ecological features. Although a complete survey of such methods is beyond the scope of this natural resource inventory, a partial list of successful strategies we have seen in other communities would include:

- Municipal ownership. Some features are important enough that municipalities choose to purchase them outright. Funding for such purchases can come from a variety of sources, including a per-unit development fee that goes into a dedicated open space fund.

- Land trust ownership. Municipalities can partner with private non-profit entities that share similar goals. We know that a land trust is now under consideration in the Fairhope area.
- Conservation easements. Ownership remains private, but certain property rights are granted to either the municipality or a private group. Often the property owner recognizes tax advantages through this voluntary donation of valuable considerations.
- Purchase or donation of development rights. Ownership remains private but the right to develop a parcel is transferred to the municipality or a private group in order to ensure that development patterns match planning objectives.
- Transfer of development rights. Rather than outright purchase, the municipality can establish mechanisms whereby additional density is allowed in some areas in exchange for reduced density in others.
- Property tax incentives. Some municipalities have established programs under which property owners in targeted areas are given a percentage reduction in property taxes in return for an agreement to maintain a desired land use for a specified period of time.

3.7 CONTINUE TO BUILD THE CITY'S GIS DATABASE

A common theme of our meetings with residents and interested parties was a desire to know more about the natural resources of the Fairhope area. Current efforts along these lines include the City's tree inventory and the County's mapping efforts. As a part of this project, we established a database that resides with the City's GIS department. That effort represents a good beginning to compiling information about the natural resources of the planning jurisdiction that can be used to make decisions about future land uses. The overlays available at present include streets, topography, floodplains, wetlands, city properties, and plant communities of special interest.

It is important to realize, however, that this type of project is by definition a long-term effort. Much information that would be useful to know is simply not available. A very fundamental and essential overlay is the basic soils map. It is our understanding that NRCS is currently developing a digitized soils map for southern Alabama. A top priority should be to obtain this product when it is ready and incorporate it into the City's database. This will require the allocation of time and funds.

Other efforts simply take time and manpower (volunteer or professional) to search out the information that is needed. There is virtually nothing known, for example, about the occurrence and distribution of endangered and threatened species within the planning jurisdiction (see section 2.2). Compiling this information needs someone to agree to be a central clearing house for information gathered by a variety of people on all sorts of scales through time. Likewise, the overlay of plant communities of special interest (section 2.3 and Appendix C) is only a start at collecting a huge amount of information about a very large geographic area.

Gathering this information is a cumulative effort that is never wasted. The more we know about

the resources of the planning jurisdiction, the better prepared we can be to make sound decisions about land use issues. We can never be too well informed, and we also typically must make decisions based on whatever information is already available. Therefore it is important to continue to support the collection and organization of information, and to continue to work on making that information available to and useful to interested parties like developers, realtors, and community groups. Unfortunately, without a diligent commitment from the top, this sort of unglamorous information collection and management seldom gets made a priority in the day-to-day cycle of municipal activity.

4.0 WATERSHED RECOMMENDATIONS

4.1 GENERAL ISSUES

4.1.1 Prioritization of Watersheds

Patterns of development within the planning jurisdiction are not evenly spread among the watersheds. The downtown area, including the small watersheds containing the gullies, is mainly developed with well-defined open spaces. The projects identified for this area can be addressed through time. Likewise, with the notable exception of waterfront properties, there is relatively little current development pressure on the easternmost and southernmost portions of the planning jurisdiction.

The area under the most immediate development pressure is the western portion of the Cowpen Creek watershed. In addition to the pattern of development in this area, Cowpen Creek also has high ecological significance because of its contribution to the flow of the Fish River and the water quality of Weeks Bay. The combination of these factors suggests that Cowpen Creek watershed be viewed as the top priority for immediate attention. The Point Clear Creek watershed appears to be the next likely area of development pressure, so it also is a high priority.

In addition to those watersheds that are under the most immediate development pressure, the City might also consider the advantages of starting now to consider how best to handle the areas under the least amount of pressure. Looking many years into the future to a landscape that is much more developed and much less natural, future residents are likely to appreciate past actions that ensured the continued existence of large natural areas. From that perspective, the top priority is probably the Bailey Creek / Caldwell Swamp / Gum Swamp watershed in the west. In addition, the southeastern Branch watersheds (Green / Louis, Waterhole, Turkey, Weeks) would be prime candidates for foresight. These would all be prime areas to target for density reduction and preservation efforts. This type of effort would attempt to create community wild areas to complement the village centers envisioned in the master plan.

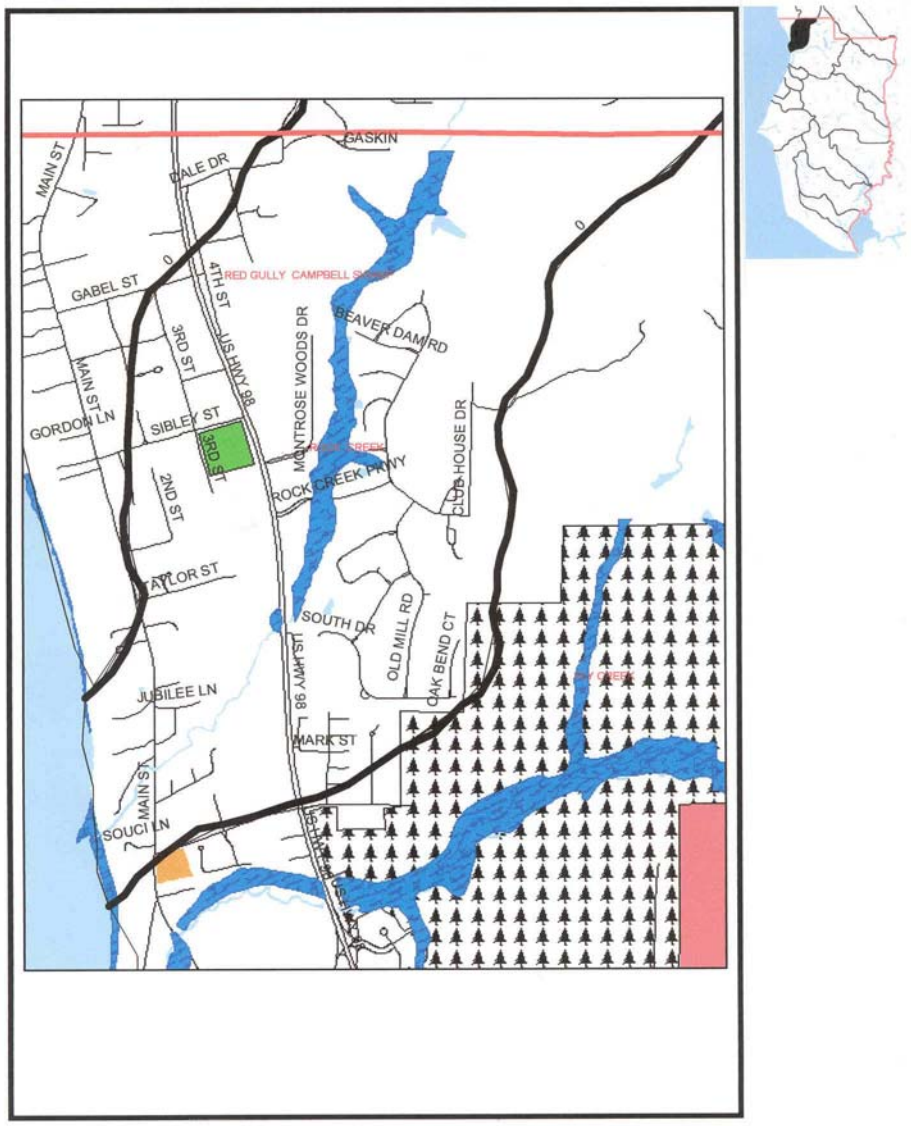
4.1.2 General Recommendations for all Watersheds

The central importance of aquatic resources and water quality concerns to the City of Fairhope suggests several steps that apply to all watersheds. General strategies for protecting water quality and establishing procedures are listed below.

- The City should develop regulations that discourage and regulate wetland impacts, including impacts to isolated wetlands; prevent the platting of lots in wetlands or riparian zones, and prevent the use of wetlands for stormwater detention. These regulations should be as strong as or stronger than county wetland regulations. They should apply to all development and not just subdivisions.

- Seek conservation easements (CE's) on wetlands and riparian corridors; create an entity (such as a land trust) or develop an arrangement with existing entities (i.e., Weeks Bay Reserve Foundation, Alabama Coastal Foundation) that can hold and enforce CE's.
- The City (or its CE partners) should develop educational material and programs to educate landowners about CE's, how they work, the advantages and disadvantages, etc.
- The City should have one point of contact that interested landowners can go to for information on CE's.
- Develop a program for the entire planning jurisdiction to eradicate and control invasive plant species.
- Investigate both voluntary and regulatory methods to prevent the propagation and sale of invasive exotic plants within the planning jurisdiction.
- Ensure that stormwater is properly detained in all new development and that detention areas are sited so that wetlands and streams are not impacted.
- Seek funding and implement a program to install stormwater detention areas in older subdivisions and other developed areas that were established before the City required on-site stormwater detention.
- Develop an incentive program for landowners to restore and protect Grady ponds and other wetlands.
- Seek out one or more Grady ponds in the planning jurisdiction for restoration as a demonstration project and obtain a grant to do the work.
- The City should pursue active partnership with the Weeks Bay Watershed Project so that efforts are not duplicated and the two can work together to accomplish common goals.

4.2 WATERSHEDS FLOWING WEST INTO MOBILE BAY

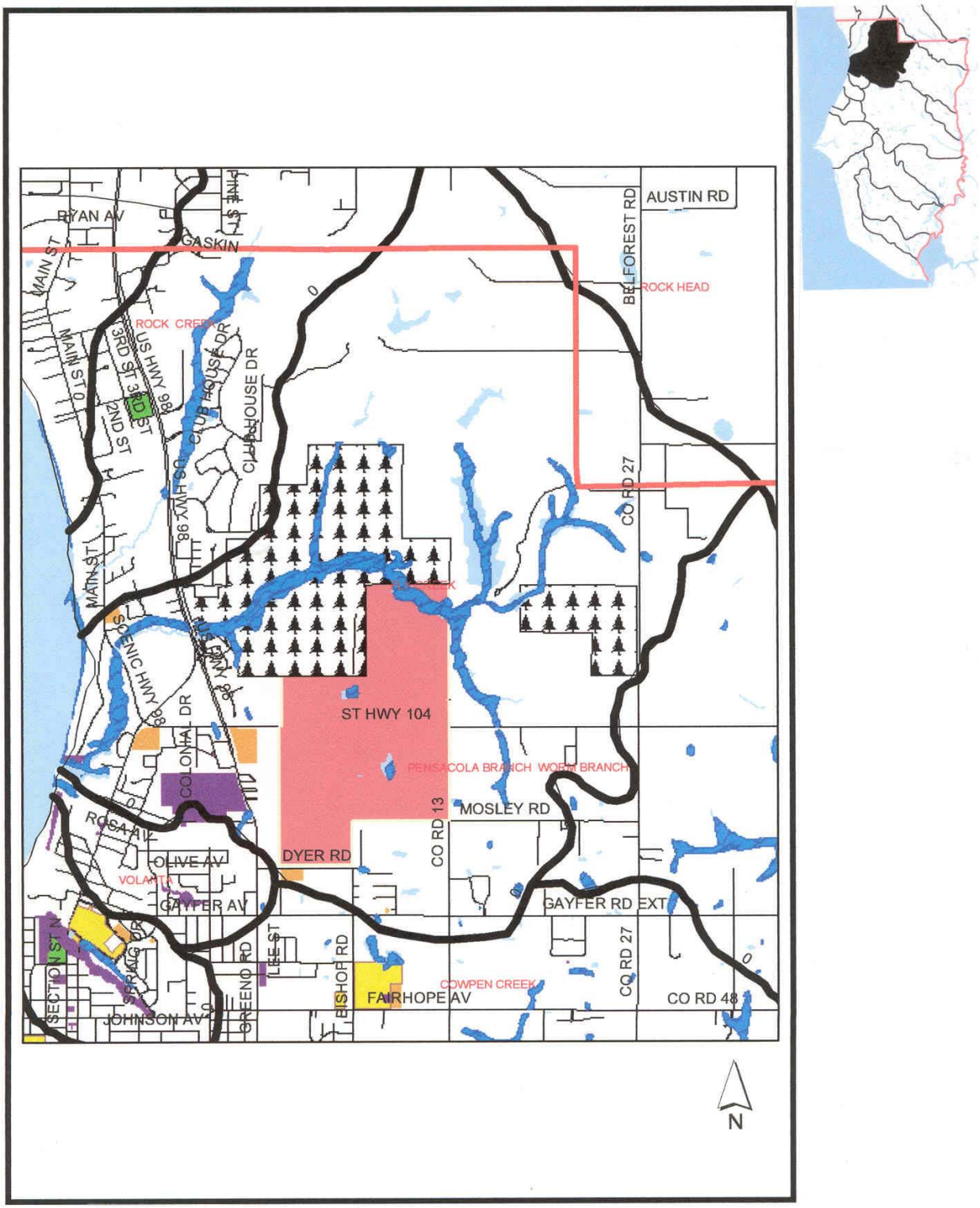


4.2.1 Rock Creek

4.2.1 Rock Creek

Rock Creek is a fairly small watershed in the northwest corner of the planning jurisdiction. A good deal of development has already occurred in this area. Significant wetlands are associated with the margins of the creek and with the bayshore. No plant communities of special interest have been identified in this watershed, although a large upland to the southeast in the Fly Creek watershed overlaps the watershed boundary.

- Work with Rock Creek Golf Course managers to reestablish vegetative buffers where they are missing and to develop a plan to minimize the amount of fertilizer and other chemicals that run off of the greenways into the creek and its tributaries.
- Identify sources of sedimentation and take necessary steps to stop it.
- Work with developers and landowners to obtain CE's or donations of land along the stream corridor and its tributaries.

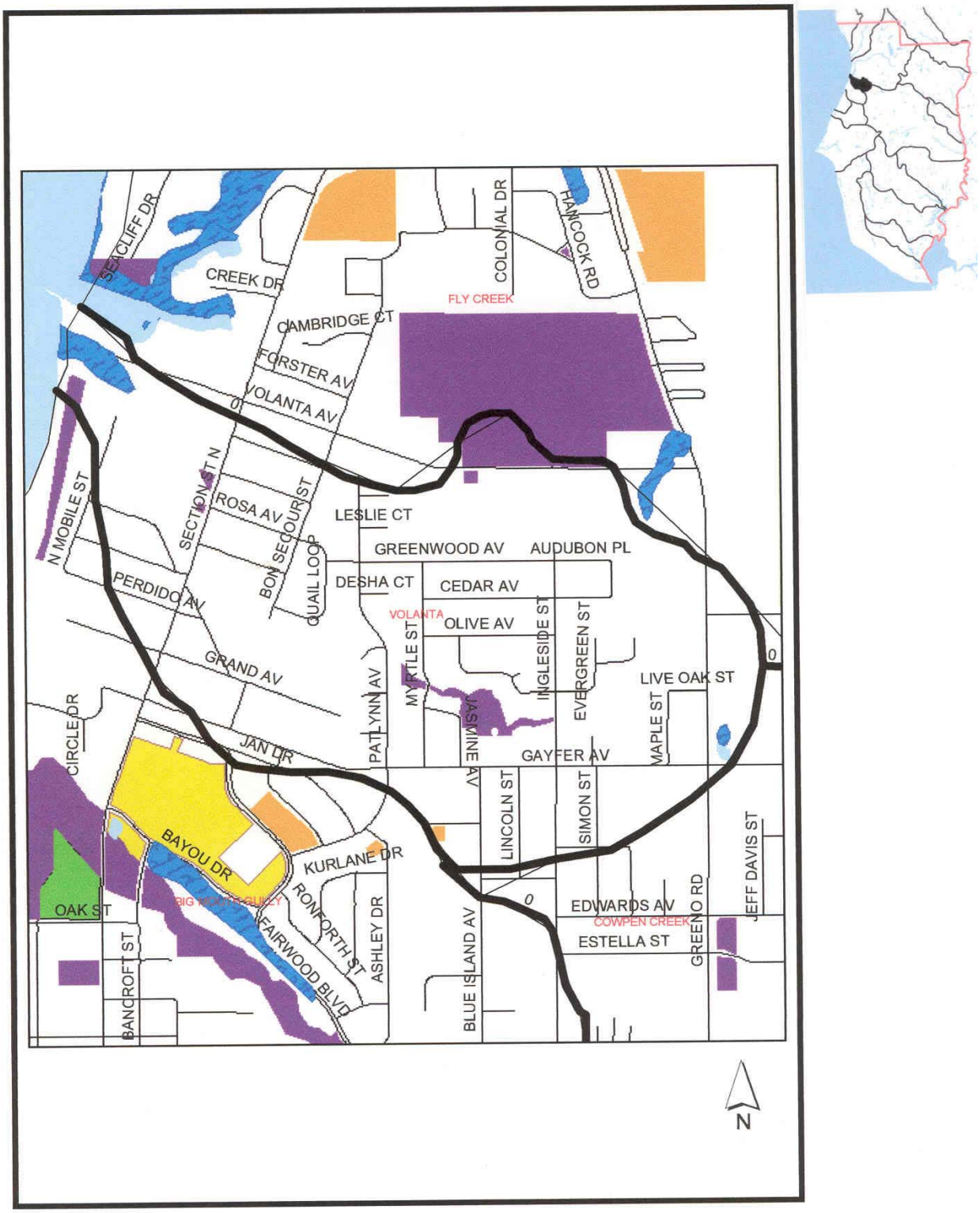


4.2.2 Devil's Hole / Fly Creek

4.2.2 Fly Creek/Devil's Hole

Although the western part of this watershed is fairly developed, the eastern side of US highway 98 contains substantial high-quality uplands. The location of one of the largest patches of pine forest in the planning jurisdiction, combined with the marginal wetlands along Fly Creek makes this area a high priority for conservation. Another notable feature of this watershed is the Auburn Agricultural Station. A fair concentration of Grady soils occurs in the southern portion of this watershed. These features suggest that one of the hubs of the City's open space network might occur in this area.

- Work with the owners of the Corte's prime longleaf forestland located in the headwaters of Fly Creek to ensure long-term preservation, conservation, and proper management. In partnership with the landowners, the City should explore land acquisition, CE's, restrictive covenants, and other conservation tools. Any conservation plan for this land should include a prescribed burn program based on the natural longleaf pine fire regime.
- Identify sources of sedimentation and take necessary steps to stop it.
- Work with developers and landowners to obtain CE's or donations of land along the stream corridor and its tributaries.
- Work with landowners to preserve and manage forested uplands west of Highway 98.
- Reestablish vegetative riparian buffers where missing.

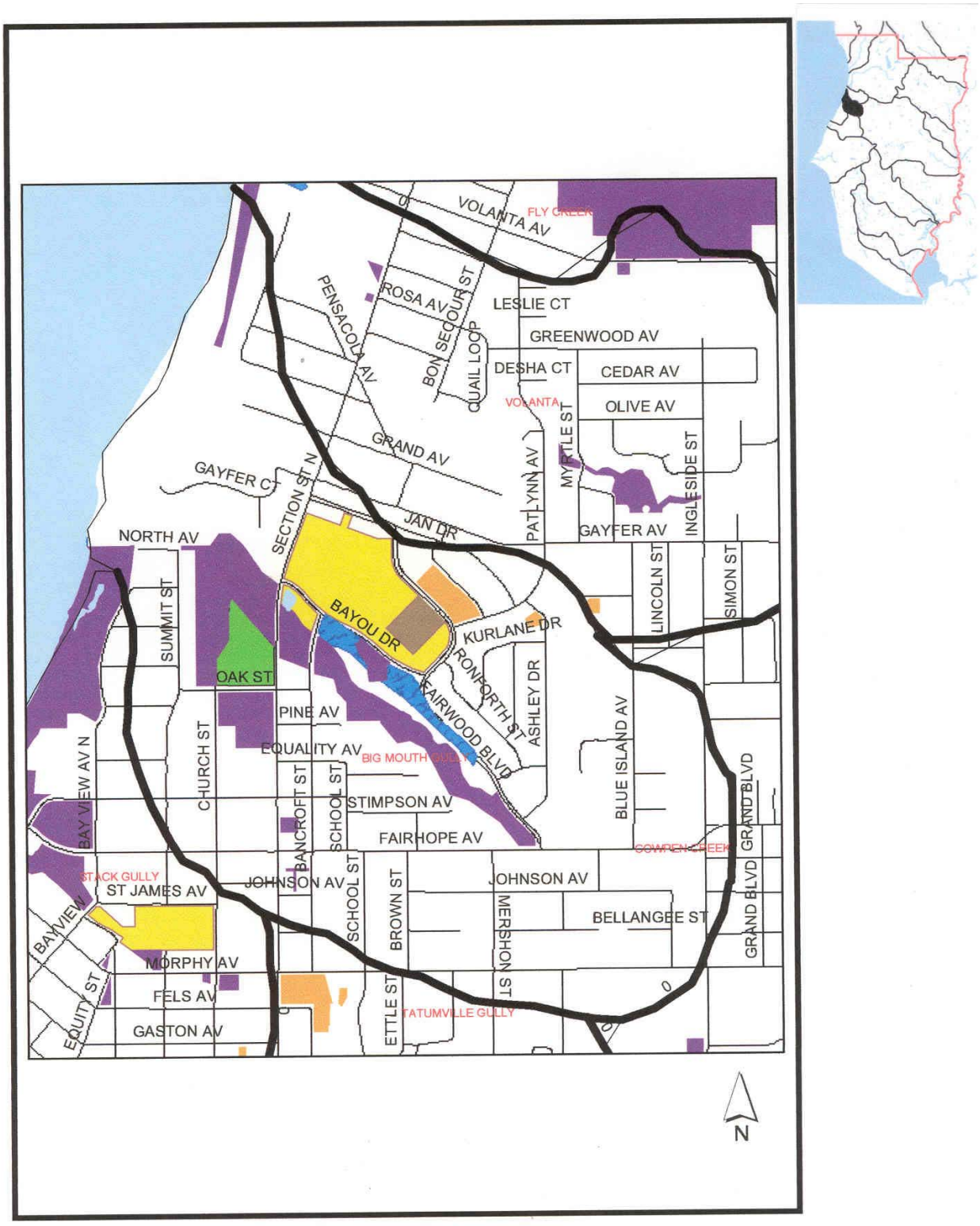


4.2.3 Unnamed – Volanta area Gully

4.2.3 Unnamed gully – Grand Ave / Volanta Ave.

This is one of the smallest watersheds of the planning jurisdiction. Its northern boundary corresponds roughly with Volanta Ave., its southern one with Gayfer Ave., and its eastern one with Greeno Rd. It is for the most part developed.

Fairhope's Gullies are natural resources of historical and biological significance to the community. They suffer from exotic invasive plants, increased storm water flow, and erosion. There is considerable interest in the community in solving these problems and restoring the gullies as parts of the open space network. Because this gully is small and relatively isolated from other features, it is lower on the priority list than the ones that follow. However, it should ultimately be included in the efforts associated with gully maintenance such as storm drain mapping, exotic species control, and erosion control measures.



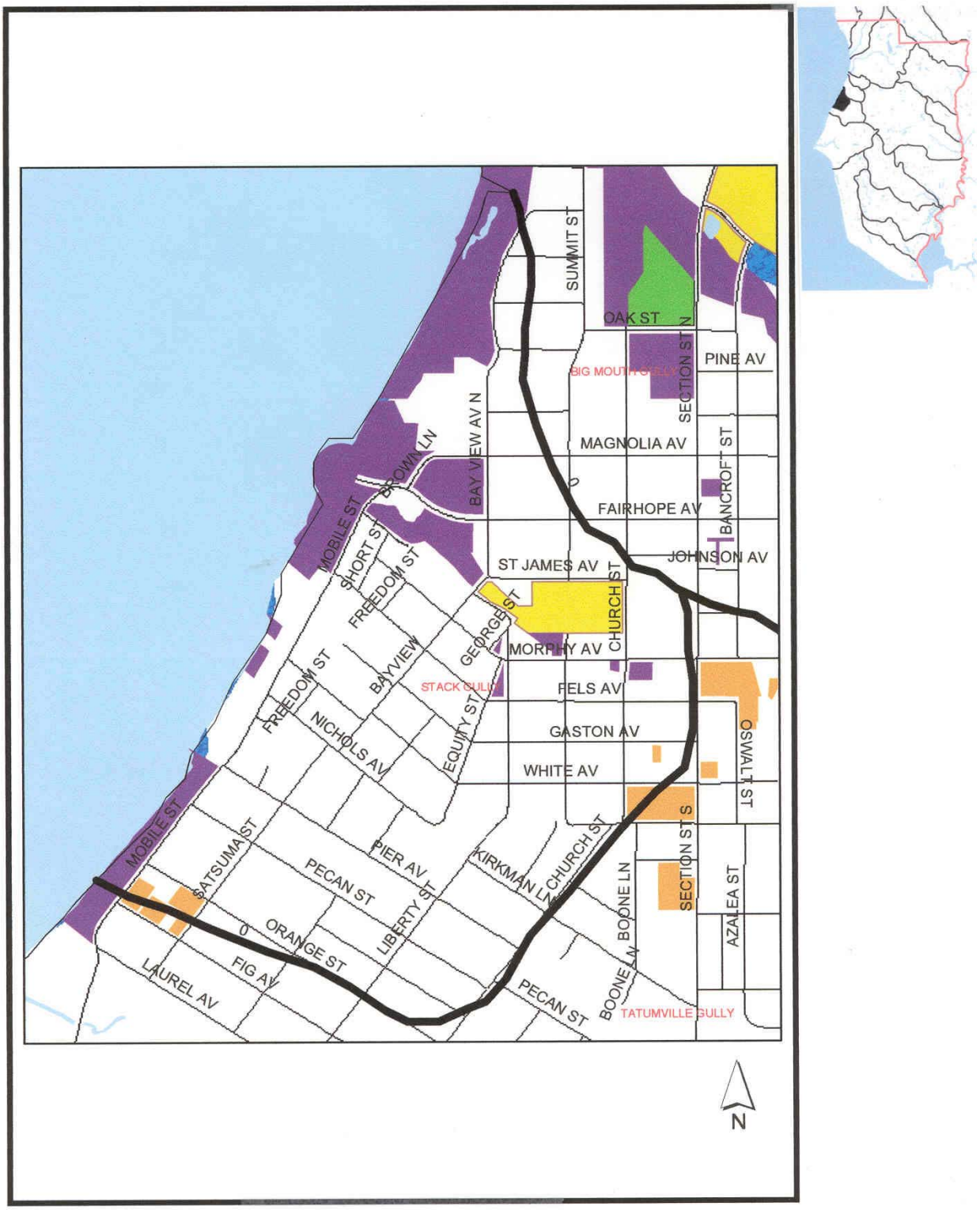
4.2.4 Big Mouth Gully

4.2.4 Big Mouth Gully

This watershed includes much of the City proper, roughly from Gayfer Ave. in the north to Morphy Ave. in the south, and almost to Greeno Rd. in the east. Besides the large gully, this watershed includes a good deal of school and city-owned property and the colony cemetary. This combination of features suggests a destination area in the open space network, with the gully serving as part of the open space corridor system. A connection from the bottom of the gully to the public bayfront park system in the Stack Gully watershed will be a critical link in the open space network.

Several factors suggest that Big Mouth Gully is the one of the City's gullies to use for demonstration restoration projects. It is next to the middle school so that students can potentially participate in some projects and use the area for educational purposes. The watershed contains several city-owned properties that can be incorporated into the project's landscape, including the sewage treatment plant and the Nix Center. We suggest using a combination of resources including city workers, student groups, Eagle Scout projects, and civic groups as appropriate to complete individual parts of the larger project. As techniques are proven effective in this setting, they can be applied to the other gullies. Elements of the gully restoration effort include:

- Install a series of water control structures in the gully to retain stormwater, provide some water treatment, and improve wildlife habitat.
- Create a map of the storm drain system in this watershed and investigate the possibility of storm water retention outside of the gully proper.
- Develop an interpretive trail that can be incorporated into existing and planned trail systems.
- Identify eroding areas and take necessary measures to correct.
- Eradicate exotic plant species and replant with natives.



4.2.5 Stack Gully

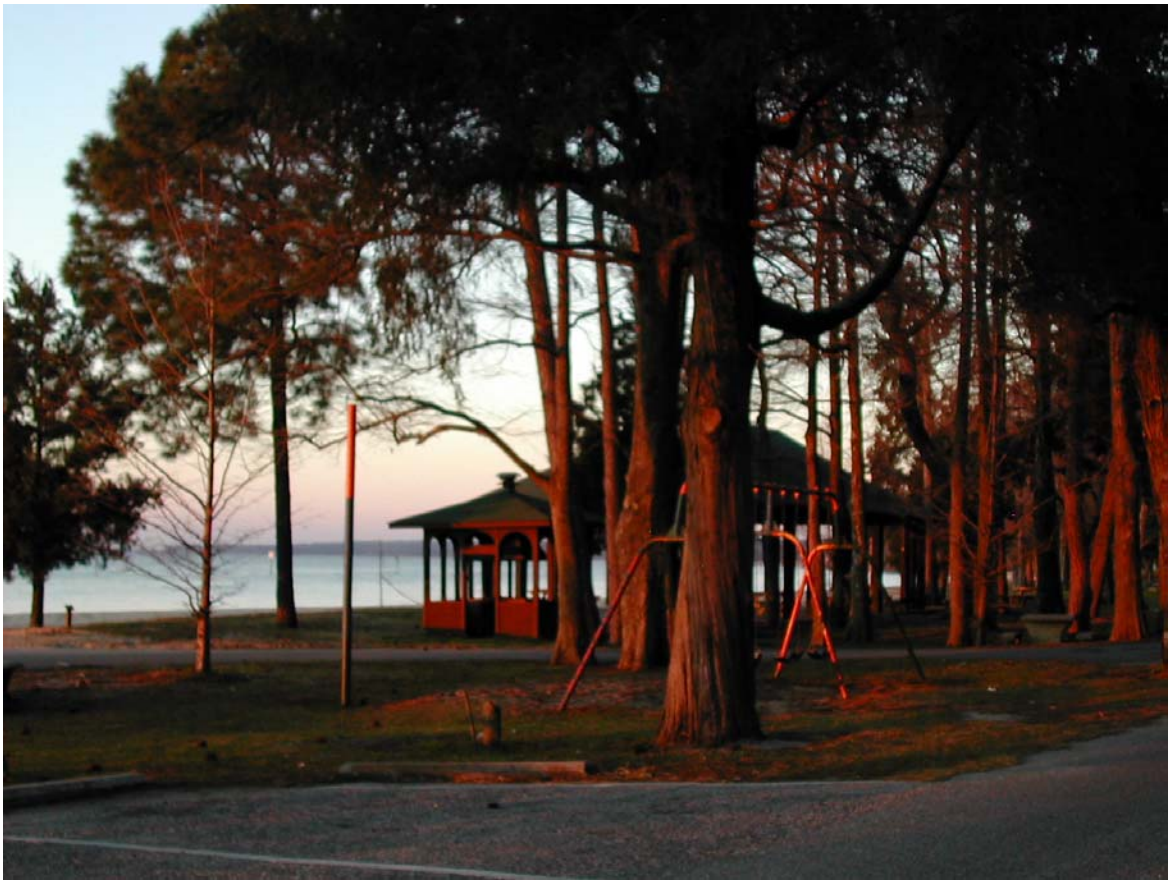
4.2.5 Stack Gully

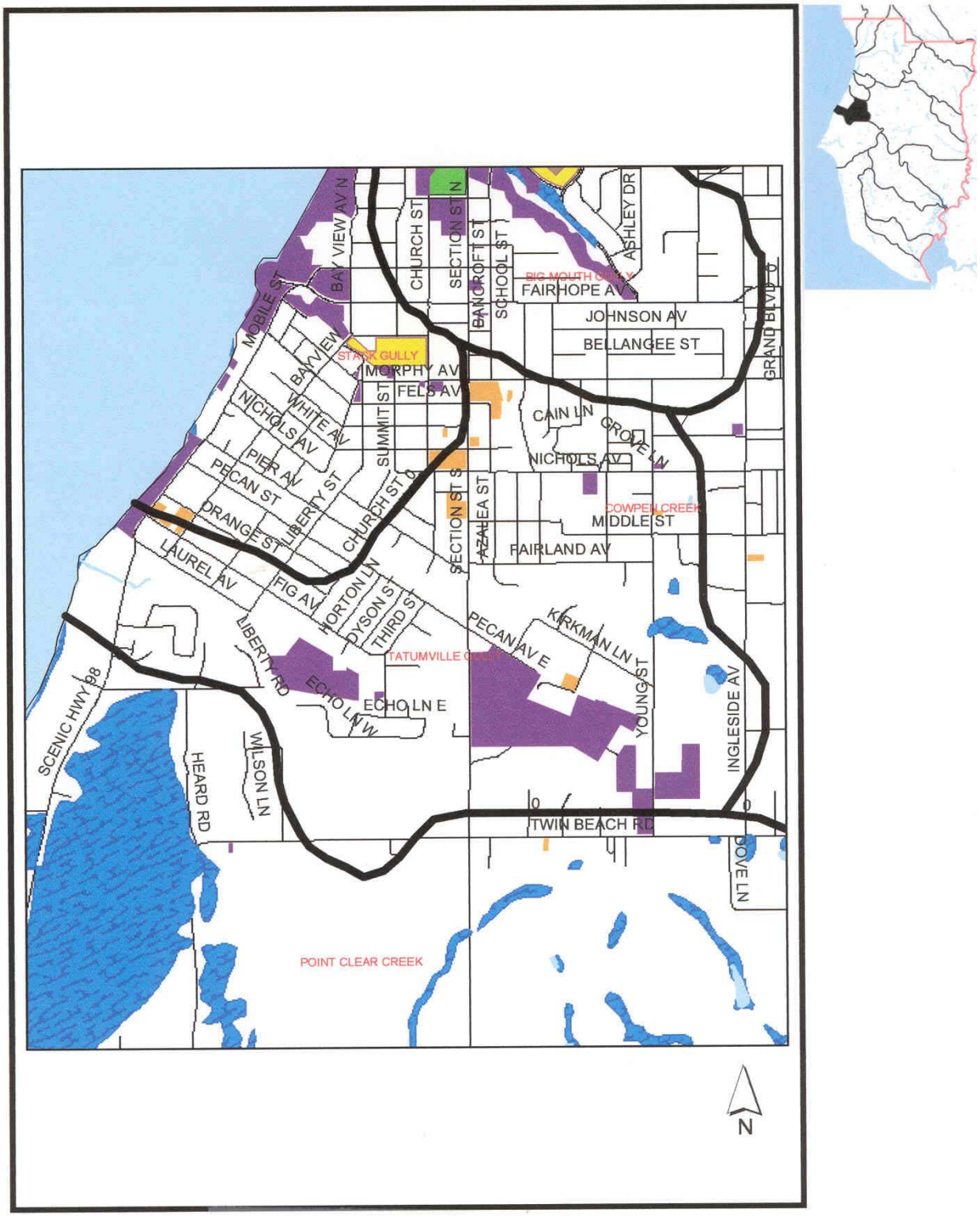
This watershed is also contained within the City proper, west of Section St., roughly between Fairhope Ave. in the north and Orange St. in the south. It includes much of the public open space of downtown Fairhope such as the pier, picnic area, and parks. It also includes a lot of bayfront and the K-1 school. Many view this watershed as the heart of Fairhope, and access to these features certainly needs to be included in the open space system.

The gully itself is much shorter than Big Mouth, but it suffers from the same issues. A map of the storm drains in this part of town is also needed. A plan for repairing past erosion damage and preventing further erosion damage is a top priority for this watershed.

The City Parks along Fairhope Ave. are a significant resource that appears to be underutilized. Many more people can be seen walking along the bayfront sidewalk on a given day than walking through the parks. Paths through the parks to get from downtown to the pier would increase usage, as would picnic tables and park benches.

The storm drain that empties out just behind the Pier could be used to supply an ornamental fish pond that would compliment the beauty of the bluff and pier areas.

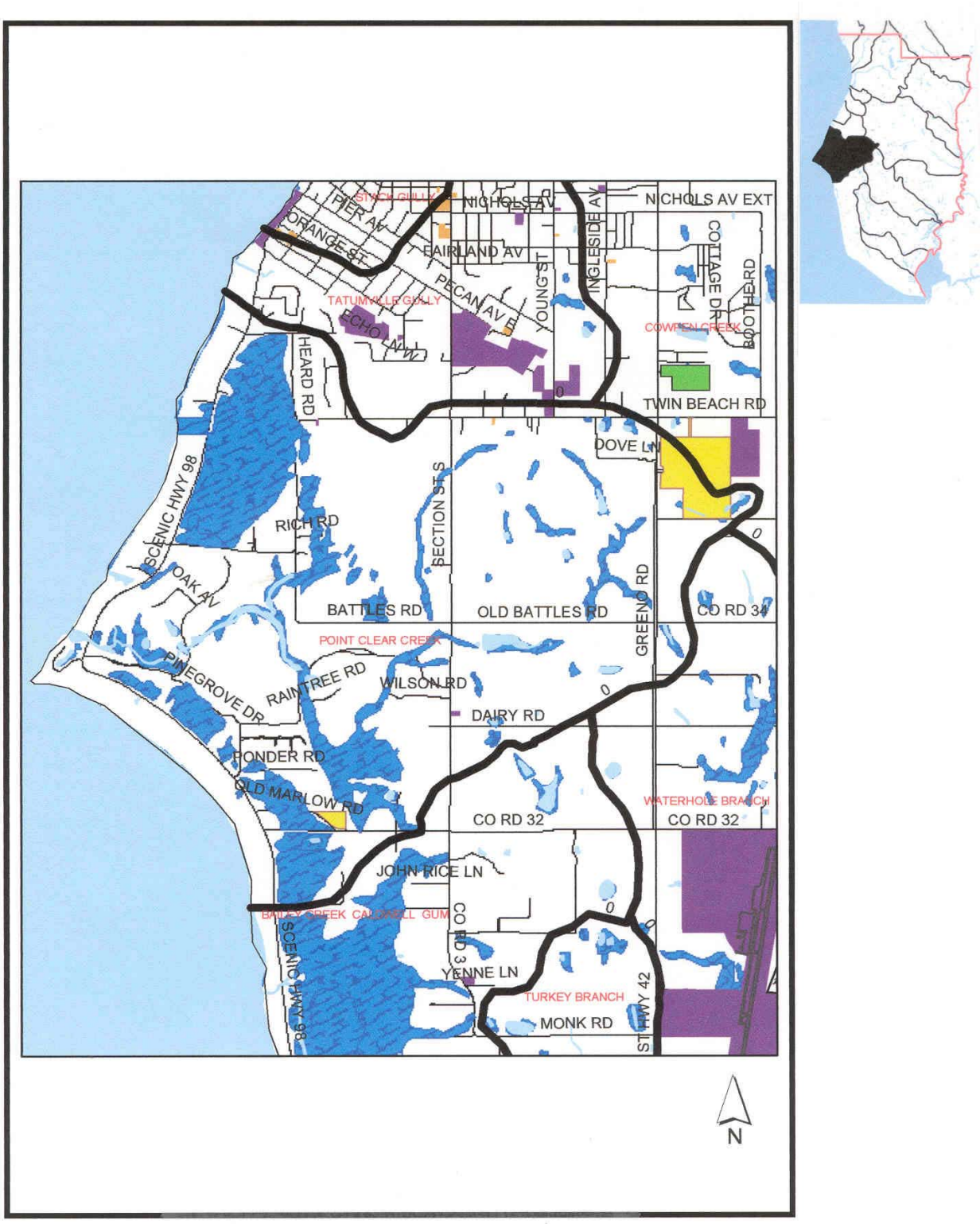




4.2.6 Tatumville Gully

4.2.6 Tatumville Gully

This watershed lies mainly to the east of Stack Gully, lying generally to the west of Young St. down to Twin Beach Rd. in the south. It includes some City development, particularly in the north around Nichols Ave. and Fairland Ave., and in the west along Section St. and the Pecan / Fig region. To the south it includes a great deal of undeveloped area. The City also owns a lot of property in this watershed, much of which is in the vicinity of the Public Works complex. This Gully presents the opportunity for a trail corridor running to the Bay south of the City proper. The concentration of City-owned property suggests the possibility of another park or recreational facility in this area.

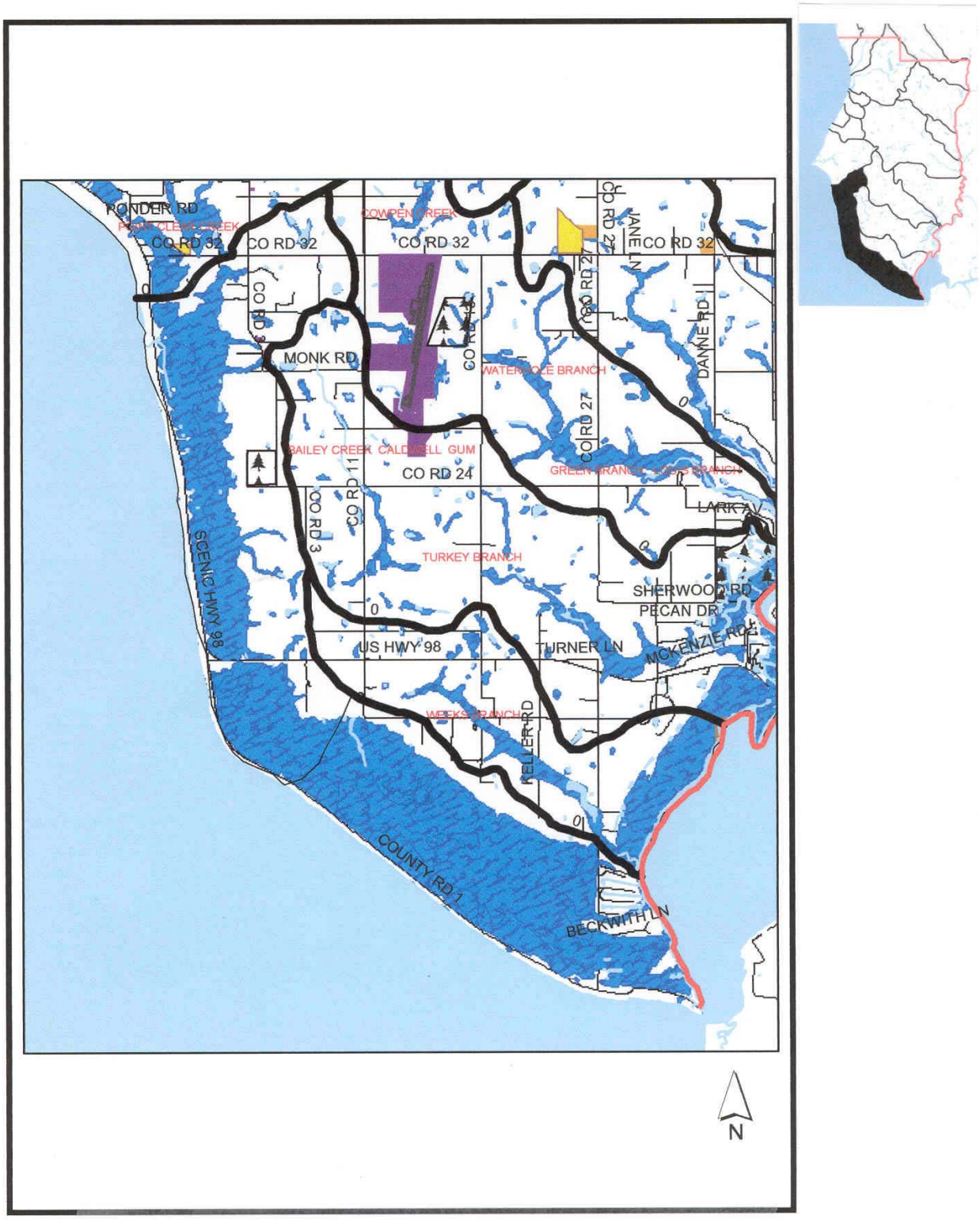


4.2.7 Point Clear Creek

4.2.7 Point Clear Creek

This is a fairly large watershed just south of the City proper. There are extensive wetlands in the western portions of the watershed. Some Grady soils are located in the easternmost part of this watershed. The need to protect the wetlands and maintain their hydrological connections and upland buffers will provide challenges to development in an area that appears to be facing considerable development pressure in the near future. This watershed represents a priority for developing wetlands protections and development guidelines that can later be applied to other areas of the planning jurisdiction.

- Work with Lakewood Golf Course managers to reestablish vegetative buffers where they are missing and to develop a plan to minimize the amount of fertilizer and other chemicals that run off of the greenways into the creek and its tributaries.
- Work with other landowners to reestablish streamside buffers where they are missing.
- Work to purchase land or obtain CE's on remaining upland and wetland forestland.



4.2.8 Bailey Creek / Caldwell Swamp / Gum Swamp

4.2.8 Bailey Creek/Caldwell Swamp/Gum Swamp

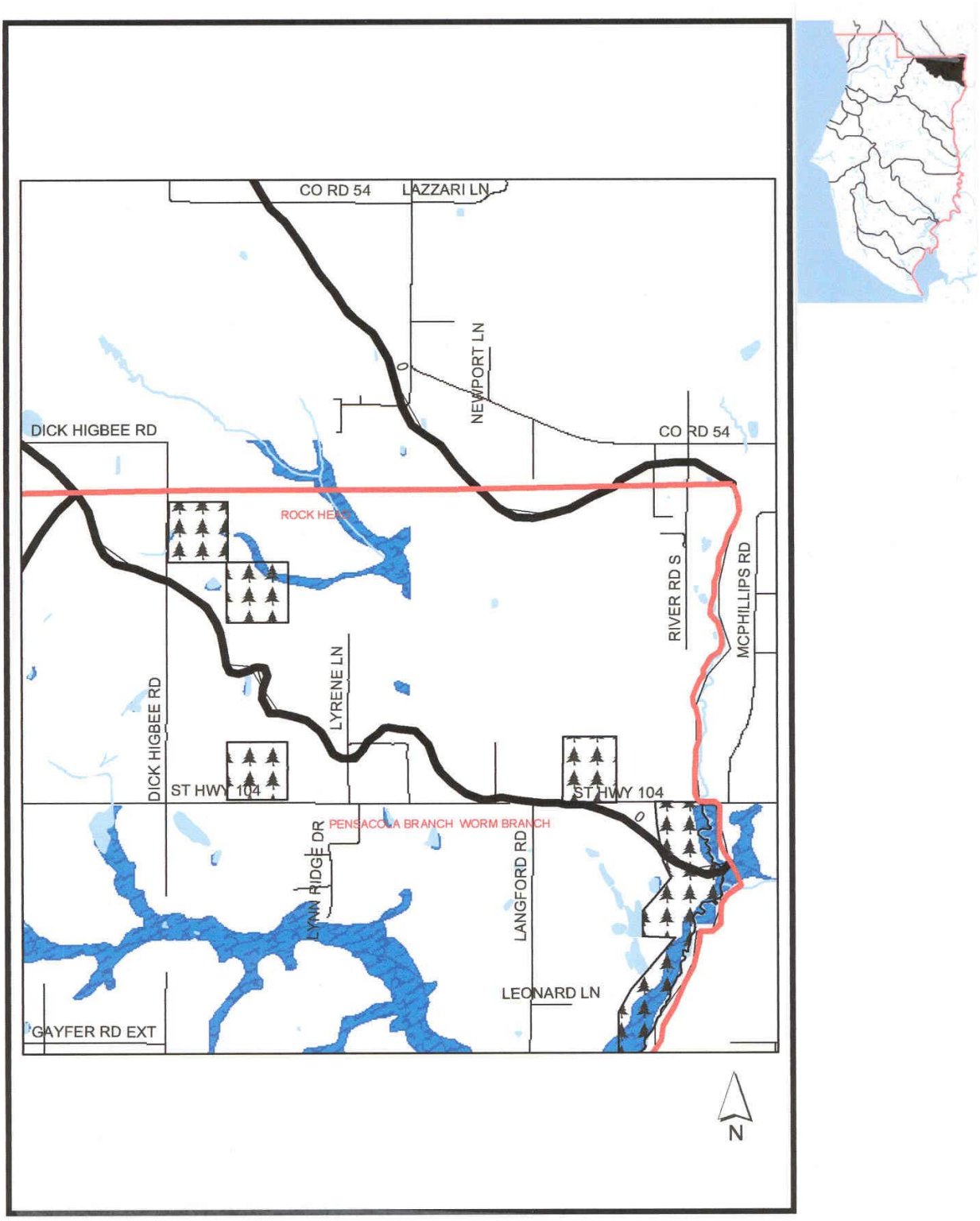
This large watershed features an almost continuous forested wetland along the shore of Mobile Bay. This is a tremendous resource for water quality in the Bay, as well as providing open space and wildlife habitat. The top priority for this watershed is to maintain this feature and protect it from conversion and fragmentation.

One issue in preserving the integrity of the coastal swamp forest is maintaining the hydrological connections that created and shaped it. It appears that the construction of Scenic Highway 98 and county road 1 limited the extent to which water from the Bay can periodically flood these wetlands. The City should lobby for re-creation of those connections any time either of these roads is slated for any significant construction activity. This should not cost the City anything, but it will require a good deal of persistence and negotiation.

Another issue in these forests is fuel load. Historically these forests were fire-maintained. Periodic burning kept the fuel load low and the plant community dominated by pines. Fire suppression during recent times has affected the composition of the forest, allowing many more oaks and other late-successional species to invade. It has also resulted in a build-up of course wood and pine straw on the forest floor. We visited areas that had significant amounts of burnable material. This represents a potential threat to both ecosystems and property if a fire does get started. A management program including mechanical fuel reductions and small controlled burns would restore the historical balance and allow a return to a more natural management regime that relied on periodic fires.

- Seek CE's on wetlands and stream corridors.
- Work with the landowners, who constructed a dirt road with no culverts through Caldwell Swamp, and state and federal regulators to reestablish a hydrologic connection between the north and south parts of the swamp.
- In partnership with landowners, develop a prescribed burn plan for fire-dependent communities within this wetland system.
- Seek funding to acquire as much of the wetland system as possible.
- Develop an invasive exotic species eradication and control plan for the area.
- Using existing woods roads and trails develop a trail system that can be used for walking, biking, bird watching, horseback riding, and other passive recreational activities.

4.3 WATERSHEDS FLOWING EAST INTO FISH RIVER AND WEEKS BAY (AFTER BECK 1995)

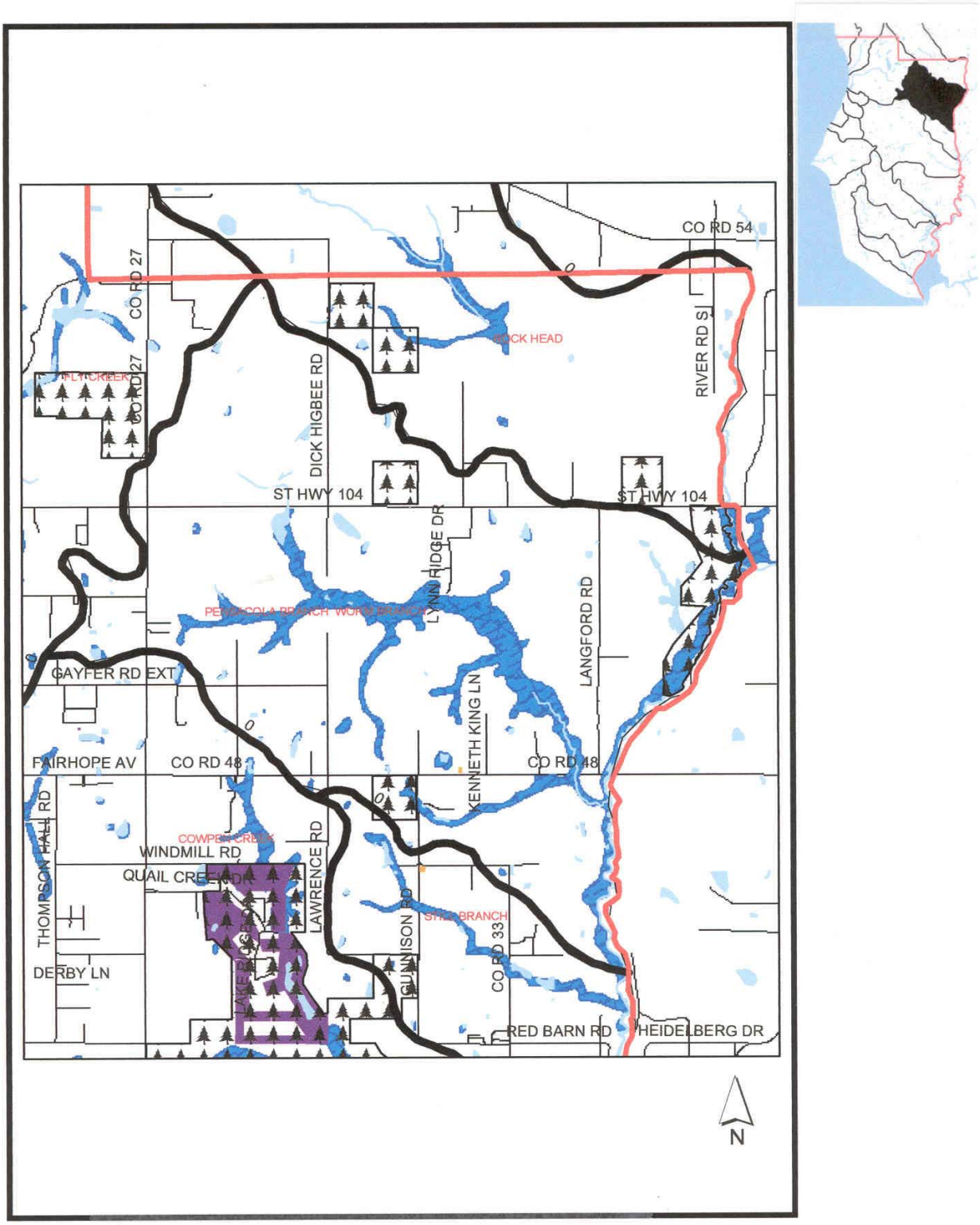


4.3.1 Caney, Picard, and Rockhead Branches

4.3.1 Caney/Picard/Rockhead Branches

This is a small watershed that lies primarily in the jurisdiction to the north. It currently faces little development pressure and contains some ecologically interesting parcels. These include wetlands associated with the stream channels. High-quality uplands are located in the vicinity of Dick Higbee Rd. in the north, along State Hwy 104 in the south, and along the Fish River in the far southeast corner of the watershed. The proximity of the latter parcel to the marginal wetlands along the River, and the combined value of these natural systems in regulating water flow and quality make them a high priority for conservation action.

- Seek CE's on wetlands and stream corridors.
- Work with landowners to restore streams, wetlands, and riparian buffers where needed.
- Acquire land or obtain CE's on remaining upland forestland.
- Reestablish upland buffers around stream corridors.

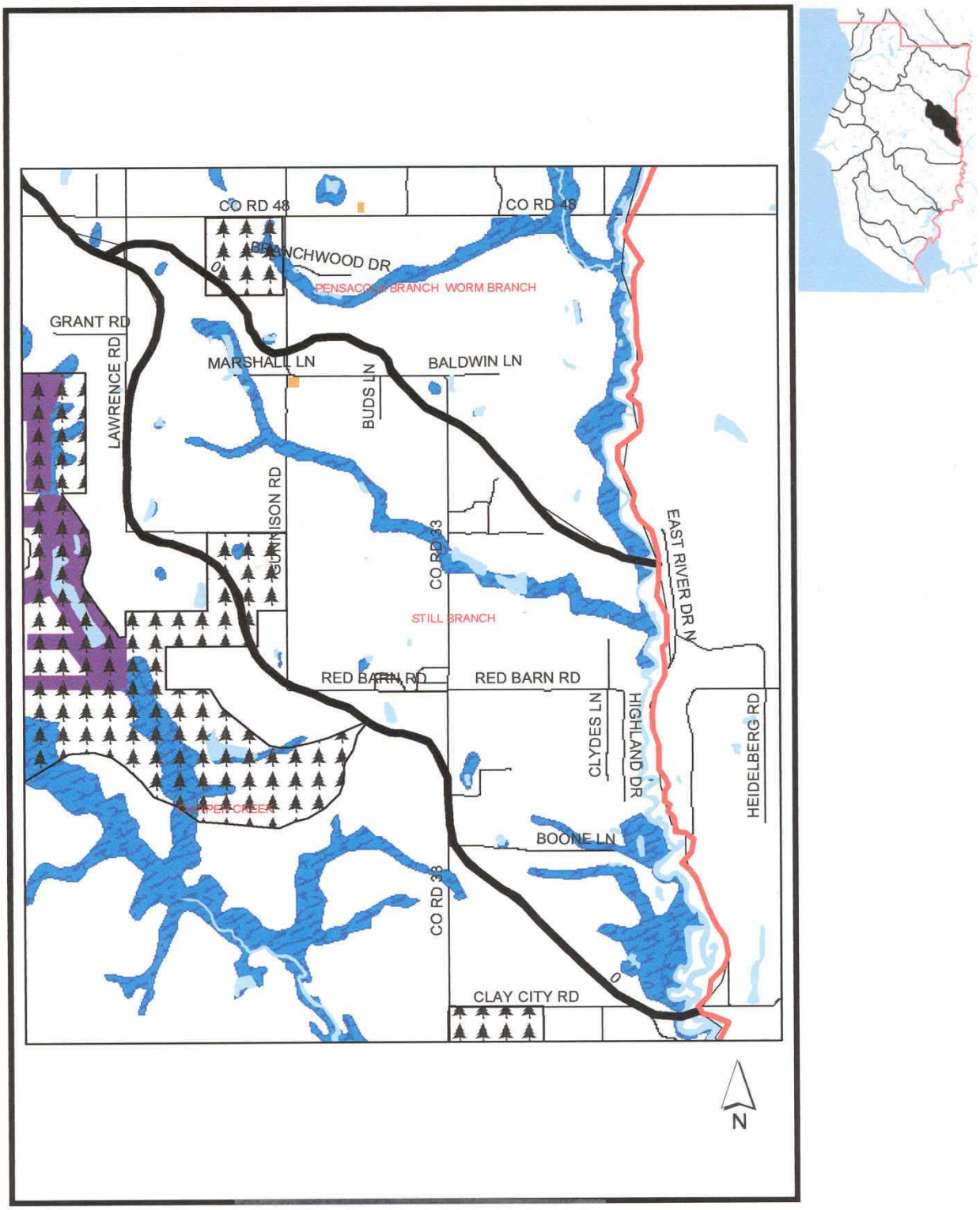


4.3.2 Pensacola and Worm Branches

4.3.2 Pensacola and Worm Branches

This watershed is not yet under heavy development pressure. It features significant wetlands along the stream channels and a continuation of the high-quality upland / wetland River buffer area discussed above. These are the highest priorities for conservation action, along with a remnant patch of high-quality uplands at the headwaters of Worm Branch.

- Seek CE's on wetlands and stream corridors.
- Work with landowners to restore streams, wetlands, and riparian buffers where needed, especially where streams cross through sod farms and other agricultural areas.
- Acquire land or obtain CE's on remaining upland forestland.
- Reestablish upland buffers around stream corridors.

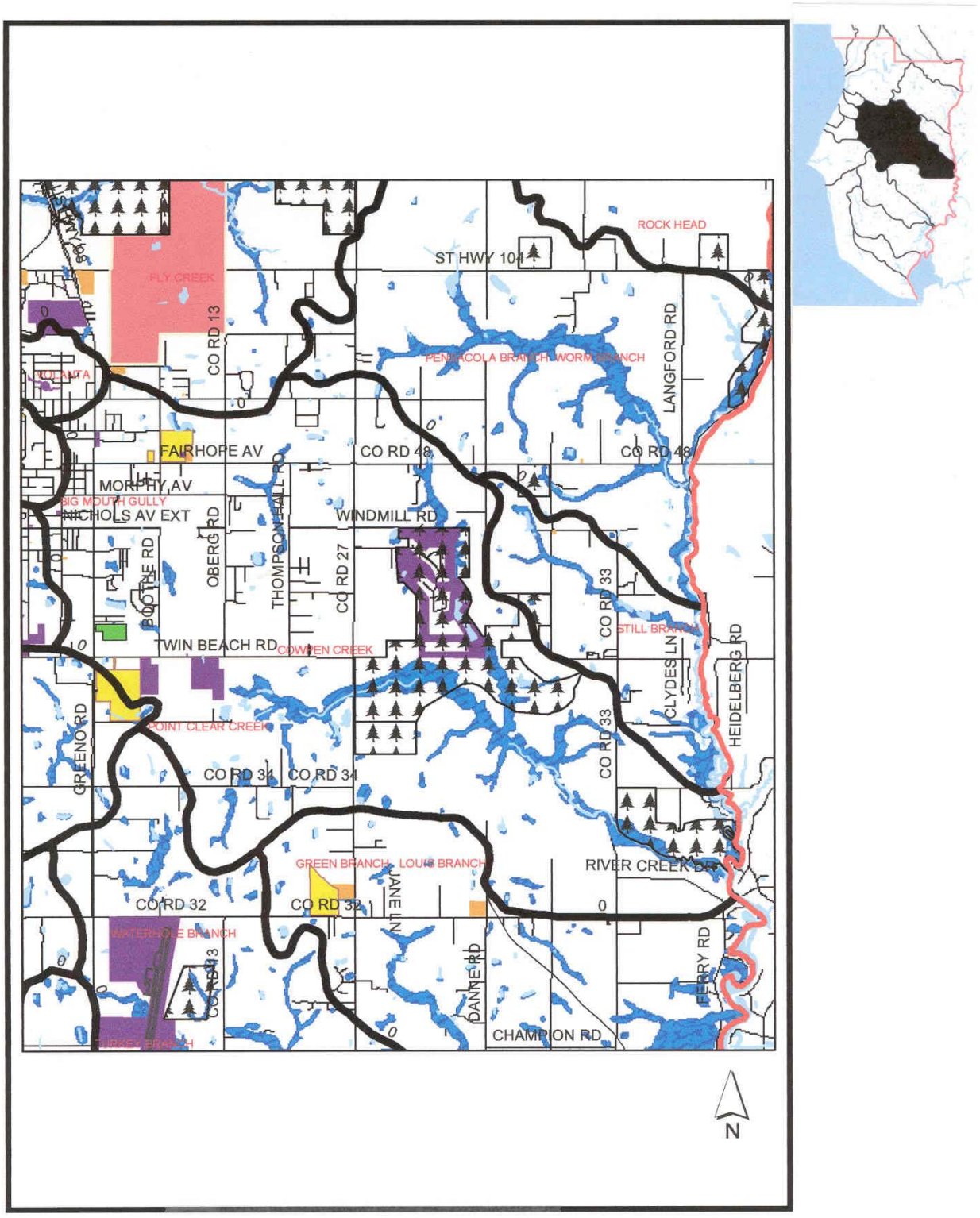


4.3.3 Still Branch

4.3.3 Still Branch

Still Branch is a small watershed tucked into the northeast corner of the Cowpen Creek area. Priority conservation goals include the wetlands along the Still Branch corridor and those along the Fish River. In addition, a portion of the high-quality uplands identified in the Cowpen Creek watershed extends across the watershed boundary in the vicinity of Gunnison Rd.

- Seek CE's on wetlands and stream corridors.
- Work with landowners to restore streams, wetlands, and riparian buffers where needed, especially where streams cross through sod farms and other agricultural areas.
- Acquire land or obtain CE's on remaining upland forestland.
- Reestablish upland buffers around stream corridors.



4.3.4 Cowpen Creek

4.3.4 Cowpen Creek

Cowpen Creek watershed is the largest of the watersheds in the planning jurisdiction, the one that is under the most immediate development pressure, and the one that is currently experiencing the most persistent stormwater runoff and erosion issues. In addition, particularly in the eastern portion of the watershed, it contains some of the ecologically sensitive resources of the planning jurisdiction. Concentrations of Grady soils occur both in the northern part of this watershed (in the vicinity of Gayfer Ave.) and in the southern part (generally in the area of county roads 32 and 34). For all of these reasons, this watershed has been identified as the highest priority for immediate action.

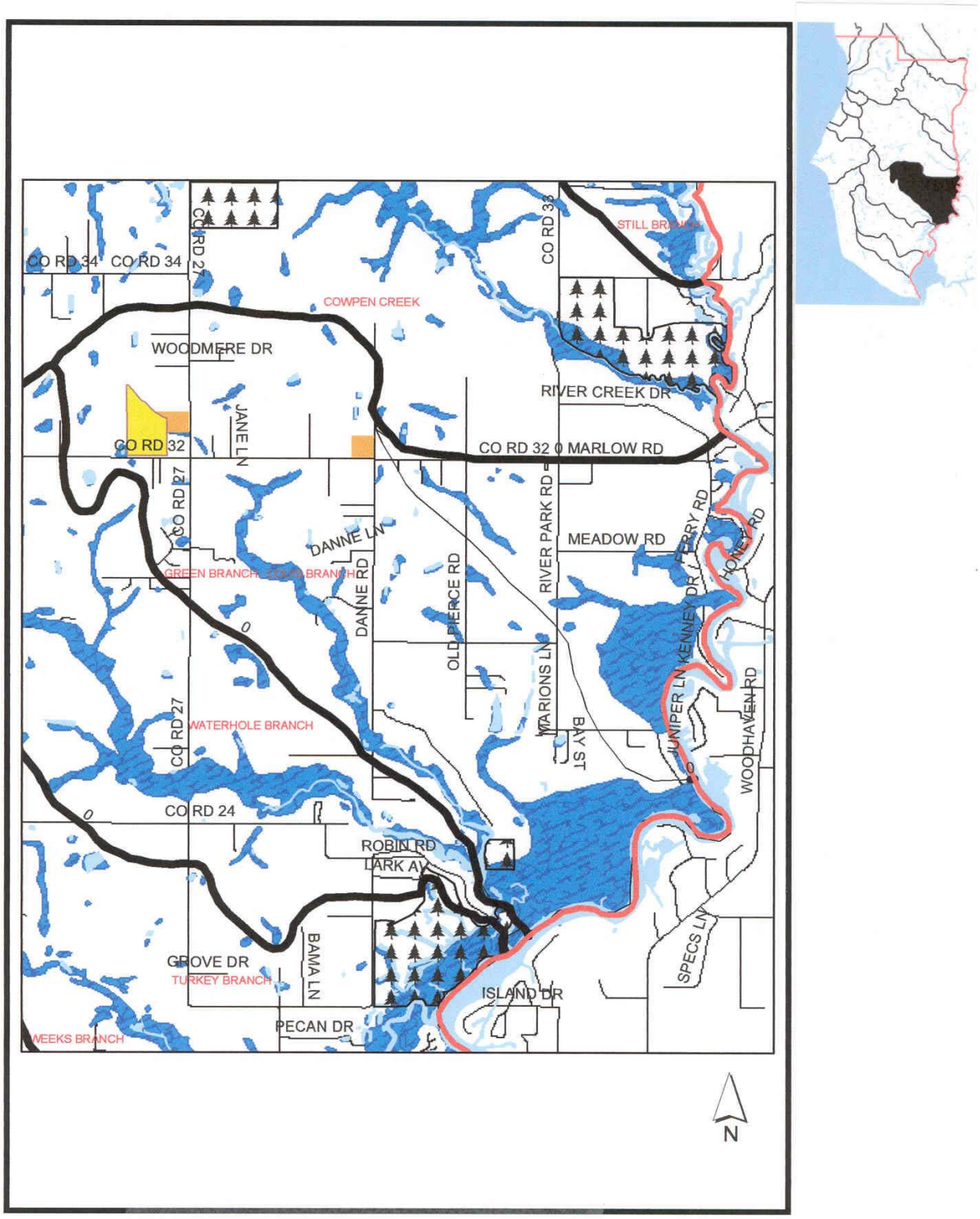
Public meetings revealed much concern about existing run-off and drainage issues related to the development that has already occurred along the Greeno Road commercial strip. It appears that excess storm water running away from this area creates considerable downstream flooding and sedimentation. A combination of approaches will be required to deal with these issues. One is a careful analysis of how much on-site storage capacity will be required to handle any future development in this area. A second is the addition of storage capacity on the 40-acre parcel owned by the City at county road 44 and Oberg Road, as discussed previously in section 3.3. A third is the identification of the eastern end of this watershed as a green space hub, as discussed below.

Although it is beyond the scope of this report to recommend specific areas for development, we notes that the area of this watershed between Fairhope Ave. and Twin Beach Rd. and east to county road 27 generally lacks the ecologically sensitive features that are identified in this report as conservation priorities or obstacles to development. Thus it appears that this location, which is currently under a good deal of development pressure, might be a logical place for a village center. The biggest concern in developing this area is the prevention of additional stormwater runoff issues such as the one discussed above. Any further development in this area must err on the side of providing more stormwater detention in created wetland habitats than is projected to be needed.

In contrast to the above, we have identified the eastern end of the Cowpen Creek watershed as an area that should be considered for one of the major green space hubs in Fairhope's open space network. The City currently owns a fair amount of property surrounding the golf course, and this complex is in close proximity to other high-quality pine forests as well as wetlands complexes associated with the Creek. The Creek corridor, in turn, provides an ecological linkage to the Fish River where there are additional high-quality upland and wetland ecosystems that are priorities for conservation as a part of the Fish River buffer system. Another strong advantage of locating major greenspace in this area is its proximity to the City, within easy bicycling distance of downtown, local schools, and the potential village center discussed above.

- Modify the outlet for the stormwater detention area next to the Winn Dixie shopping center so that water is retained for long periods of time (create wetland conditions). Plant native wetland trees, shrubs, and herbaceous species and install a boardwalk and wildlife viewing area.

- Another opportunity for storm water retention exists on the 40-acre tract that was donated to the city on Twin Beach Rd. at Oberg Rd. Although an engineering study will be necessary to calculate water volumes and storage areas, this parcel should be large enough to store the entire upstream flow of this watershed for some period of time. We suggest a Grady Pond theme for this storm basin. Plantings should be historically accurate Grady Pond species and interpretive information should encourage other property owners to restore their Grady Ponds. The location of this parcel near the High School should allow some synergy on this project.
- Work with Quail Creek Golf Course managers to reestablish vegetative buffers where they are missing and to develop a plan to minimize the amount of fertilizer and other chemicals that run off of the greenways into the creek and its tributaries.
- Invasive exotic species, especially cogongrass (*Imperata cylindrica*), are a serious problem within the watershed. A program that educates the public and encourages exotics eradication and control should be developed. The city should set the example by controlling exotics on their own properties and by developing a demonstration project.
- Work with landowners to reestablish riparian buffers where they are missing.
- Seek CE's on wetlands and stream corridors.
- The city-owned Quail Creek Golf Course should be available to the public for activities other than golfing. A separate trail system, perhaps along the outer edges of the course, should be developed for walking, biking, bird watching, etc. Another alternative would be to set aside certain times of the day when the course would be open to the public for other activities. This course is adjacent to fairly extensive longleaf pine forests that could be incorporated into a trail system (see item below)
- Acquire the longleaf forestland that is still intact within the watershed. Most is owned by one landowner and it is currently on the market. If acquisition is not possible, efforts should be made to acquire CE's.
- Work with the owners of longleaf stands to develop and implement a prescribed burning program.

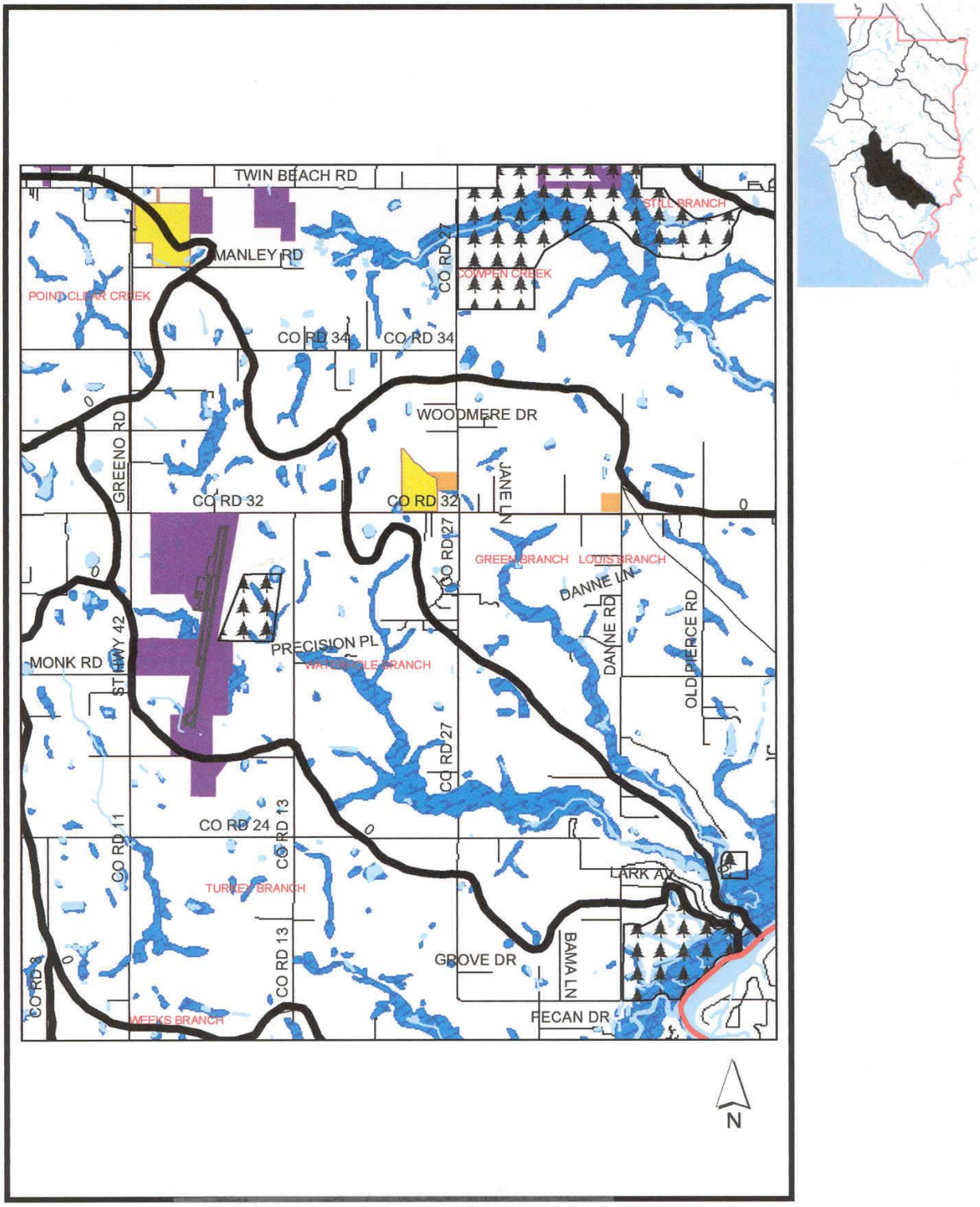


4.3.5 Green and Louis Branches

4.3.5 Green and Louis Branches

This watershed features large areas of wetlands on the western banks of the Fish River. These are high priorities for conservation efforts, as are the stream channels themselves. Concentrations of Grady soils occur in the western portion of this watershed, generally north of county road 32.

- Work with landowners to reestablish riparian buffers where they are missing.
- Seek CE's on wetlands and stream corridors.
- Work with and educate landowners whose lots back up to Green Branch to prevent wetland and stream impacts.
- Identify low quality agricultural land that can be restored to upland forestland.
- Seek CE's on remaining pine savanna and forested uplands.

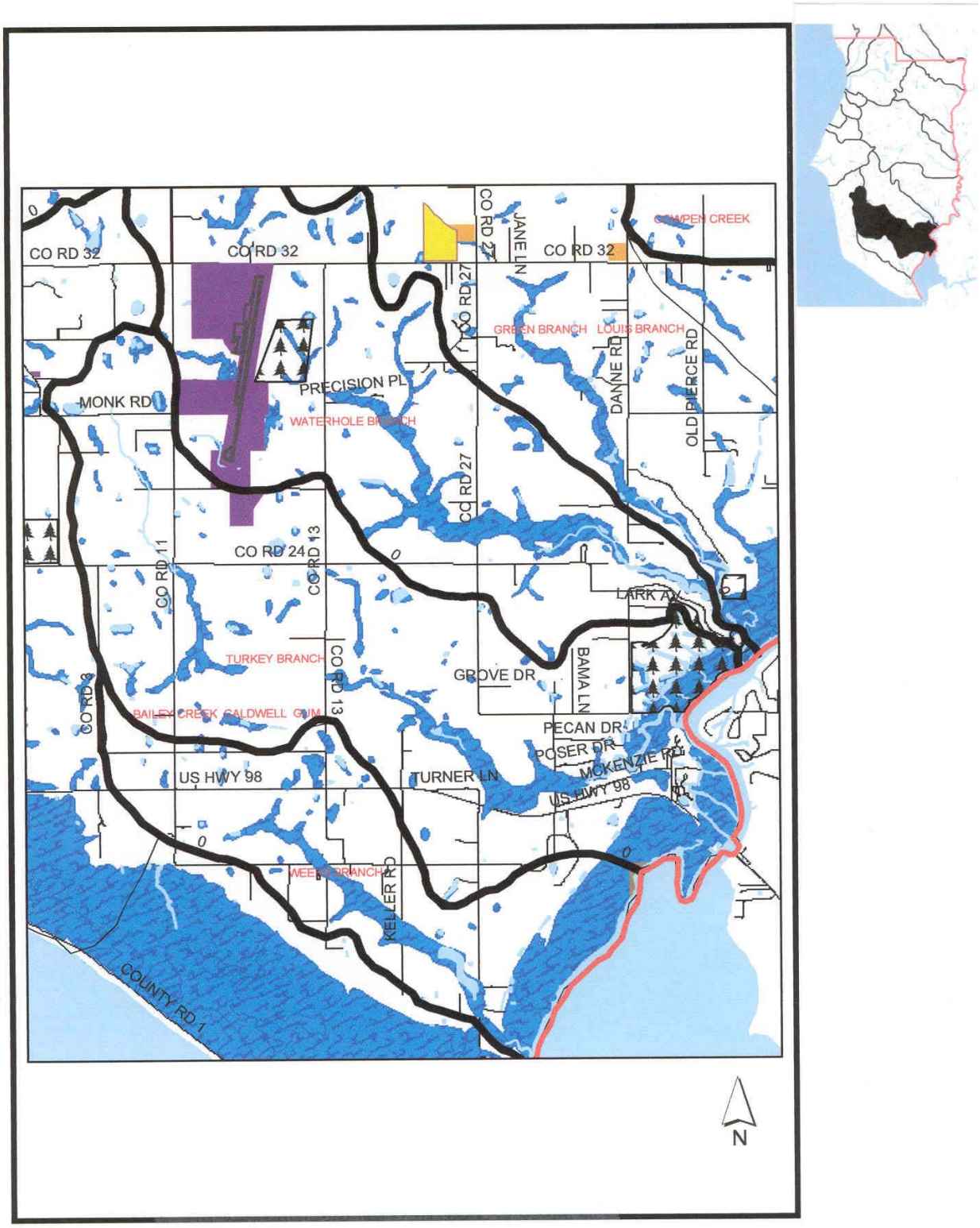


4.3.6 Waterhole Branch

4.3.6 Waterhole Branch

The Waterhole ranch watershed has relatively little area along the Fish River, but broadens to the west where the Branch is associated with significant wetlands that are the highest conservation priority in this watershed. Concentrations of Grady soils occur in the northern reaches of this watershed, generally north of county road 32, and also in the southwest in the vicinity of county roads 11 and 13. This area also has the airport and associated City-owned property, as well as a patch of high-quality forest nearby. These features suggest the possibility of placing a smaller open space hub in this region.

- The streams and wetlands in the headwaters area have been highly impacted by agriculture and surrounding development. There is a need for extensive stream and wetland restoration in the headwaters of this system. Upland buffers are also very desirable and should be reestablished where possible. Since virtually all land is privately owned, it will be necessary to work with landowners to achieve this goal.
- Seek CE's on wetlands and stream corridors.
- Identify sources of sedimentation and take necessary steps to stop it.
- Purchase land or obtain CE's on remaining upland forestland.



4.3.7 Lower Turkey Branch

4.3.7 Turkey Branch

The Turkey Branch watershed contains a great deal of sensitive wetlands, especially to the east along the Fish River. The River corridor is the highest conservation priority in this watershed, followed by the stream buffer zone. One specific area of note is in the extreme northeast corner of the watershed where a significant stand of high-quality forest remains in association with the riverine wetlands. Much of the western half of this watershed features hydric soils including Grady soils. In general, this watershed lends itself to low density and open space uses more than development.

- The streams and wetlands in the headwaters area have been highly impacted by agriculture and surrounding development. There is a need for extensive stream and wetland restoration in the headwaters of this system. Upland buffers are also very desirable and should be reestablished where possible. Since virtually all land is privately owned, it will be necessary to work with landowners to achieve this goal.
- Seek CE's on wetlands and stream corridors.
- Identify sources of sedimentation and take necessary steps to stop it.
- Purchase land or obtain CE's on remaining upland forestland.

4.3.8 Weeks Branch

4.3.8 Weeks Branch

Weeks Branch is another small watershed that is best used for open space rather than development. It includes important wetlands along the margin of the Fish River, as well as along the stream channel itself. Concentrations of Grady soils are found in the northern part of this watershed in the vicinity of US 98.

- Seek CE's on wetlands and stream corridors.

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Appendix A. Native Plant Lists for The City of Fairhope (from Harker et al. 1993)

A.1 Southern Mixed Hardwoods Forest

These forests are sometimes called hammocks. They are closed canopy forests in ravines, on slopes, and upland rolling hills. A wide variety of species occur in these mesic forests with topography, moisture, and other abiotic factors determining species composition on a particular site. Species with northern affinities drop out on a southern gradient and are generally absent in peninsular Florida.

Canopy

Characteristic Species	
Carya glabra	pignut hickory
Fagus grandifolia	American beech
Liquidambar styraciflua	sweet-gum
Magnolia grandiflora	southern magnolia
Morus rubra	red mulberry
Oxydendrum arboreum	sourwood
Persea borbonia	red bay
Pinus glabra	spruce pine
Pinus taeda	loblolly pine
Prunus caroliniana	Carolina laurel cherry
Quercus hemisphaerica	Darlington's oak
Quercus michauxii	swamp chestnut oak
Quercus nigra	water oak
Quercus virginiana	live oak
Associates	
Carya pallida	sand hickory
Celtis laevigata	sugar-berry
Diospyros virginiana	common persimmon
Fraxinus americana	white ash
Liriodendron tulipifera	tuliptree
Magnolia pyramidata	pyramid magnolia
Quercus alba	northern white oak
Quercus austrina	bluff oak
Tilia americana	American basswood
Ulmus alata	winged elm
Ulmus americana	American elm

Woody Understory

Acer saccharum	Florida maple
Aralia spinosa	devil's-walkingstick
Callicarpa americana	American beauty-berry
Calycanthus floridus	eastern sweetshrub
Carpinus caroliniana	American hornbeam
Cercis canadensis	redbud

Chionanthus virginicus	white fringetree
Cornus florida	flowering dogwood
Dirca palustris	eastern leatherwood
Euonymus americana	American strawberry-bush
Hamamelis virginiana	American witch-hazel
Ilex ambigua	Carolina holly
Ilex opaca	American holly
Juniperus virginiana	eastern red cedar
Magnolia macrophylla	bigleaf magnolia
Osmanthus americanus	devilwood
Ostrya virginiana	eastern hop-hornbeam
Sebastiana fruticosa	Gulf Sebastian-bush
Smilax bona-nox	fringed greenbrier
Smilax pumila	sarsaparilla-vine
Stewartia malacodendron	silky-camellia
Styrax grandifolium	big-leaf snowbell
Symplocos tinctoria	horse sugar
Vaccinium arboreum	tree sparkleberry
Zanthoxylum clava-herculis	Hercules'-club

Herbaceous Understory

Actaea pachypoda	white baneberry
Adiantum pedatum	northern maidenhair
Campanula spp.	bellflower
Goodyera pubescens	downy rattlesnake-plantain
Hepatica nobilis	liverwort
Hexastylis arifolia	little-brown-jug
Mitchella repens	partridge-berry
Passiflora lutea	yellow passion-flower
Polygonatum biflorum	King Solomon's-seal
Polystichum acrostichoides	Christmas fern
Sanicula spp.	black-snakeroot
Trillium spp.	wakerobin
Uvularia spp.	bellwort

A.2 Sandhill

Sandhill, also called high pine, is a vegetation type that occurs on rolling hills of sand throughout Florida north of Lake Okeechobee and into southern Georgia and southern Alabama. It is generally an open, long-leaf pine forest with a grass and oak shrub understory. Pineland three-awn (wiregrass), *Aristida stricta*, is the characteristic ground cover species and is important in facilitating low intensity ground fires. This vegetation type is highly tolerant of and requires fire on a regular basis. Slash pine has been brought in to replace long-leaf pine on many sites.

Canopy

Characteristic Species	
Pinus elliottii	slash pine
Pinus palustris	long-leaf pine
Quercus laevis	turkey oak
Associates	
Carya alba	mockernut hickory
Diospyros virginiana	common persimmon
Quercus falcata	southern red oak
Quercus geminata	sand live oak
Quercus incana	bluejack oak
Quercus margaretta	sand post oak
Quercus marilandica	blackjack oak
Quercus stellata	post oak
Sassafras albidum	sassafras
Vaccinium arboreum	tree sparkleberry

Woody Understory

Gaylussacia dumosa	dwarf huckleberry
Gaylussacia frondosa	blue huckleberry
Gelsemium sempervirens	yellow jessamine
Ilex glabra	inkberry
Licania michauxii	gopher-apple
Opuntia spp.	prickly-pear
Quercus minima	dwarf live oak
Quercus pumila	runner oak
Rhus copallinum	winged sumac
Rubus cuneifolius	sand blackberry
Smilax auriculata	greenbrier
Vitis rotundifolia	muscadine

Herbaceous Understory

Andropogon gerardii	big bluestem
Andropogon ternarius	split-beard bluestem
Andropogon virginicus	broom-sedge
Aristida stricta	pineland three-awn
Aster spp.	aster
Aureolaria flava	smooth yellow false-foxglove
Balduina angustifolia	coastal-plain honeycomb-head

Berlandiera pumila	greeneyes
Chamaecrista fasciculata	partridge-pea
Croton argyranthemus	healing croton
Dalea pinnata	summer farewell
Galactia spp.	milk peas
Indigofera caroliniana	indigo
Lechea spp.	pinweed
Liatris spicata	blazing star
Liatris tenuifolia	short-leaf gayfeather
Muhlenbergia capillaris	hair-awn muhly
Pityopsis graminifolia	golden aster
Pteridium aquilinum	northern bracken fern
Rhynchosia spp.	snout-bean
Schizachyrium scoparium	little false bluestem
Solidago spp.	goldenrod
Sorghastrum nutans	yellow Indian grass
Sporobolus junceus	wire grass
Stillingia sylvatica	queen's-delight
Stylosanthes biflora	side-beak pencil-flower
Tephrosia virginiana	goat's-rue

A.3 Pine Flatwoods

Flatwoods range from open forests of scattered pines with little understory to dense pine stands with a rather dense undergrowth of grasses (particularly *Aristida)*, saw palmettos, and other low

shrubs. Flatwoods occur on level topography with acidic sands. The dominant canopy species is usually *Pinus elliottii*, but can be other pine species depending upon latitude, soils, hydroperiod, and fire frequency.

Canopy

Characteristic Species	
Pinus elliottii	slash pine
Associates	
Pinus palustris	long-leaf pine
Quercus chapmanii	Chapman's oak
Quercus geminata	sand live oak
Quercus myrtifolia	myrtle oak
Quercus virginiana	live oak

Woody Understory

Gaylussacia dumosa	dwarf huckleberry
Hypericum spp.	St. John's-wort
Ilex glabra	inkberry
Kalmia hirsuta	hairy-laurel
Licania michauxii	gopher-apple
Lyonia lucida	fetterbush
Myrica cerifera	southern bayberry
Persea palustris	swamp red bay
Quercus pumila	runner oak
Serenoa repens	saw palmetto
Vaccinium arboreum	tree sparkleberry
Vaccinium elliottii	Elliott's blueberry

Herbaceous Understory

Agalinis spp.	false foxglove
Aristida spp.	three-awn
Aster spp.	aster
Chrysopsis spp.	golden aster
Cladonia spp.	lichen
Eriocaulon spp.	bog buttons
Lachnocaulon spp.	hat pins
Lechea spp.	pinweed
Solidago spp.	goldenrod
Verbesina virginica	white crownbeard
Xyris spp.	yellow-eyed-grass

A.4 Southern Swamp Forest

The Southern Swamp Forest includes many types of forested wetlands including bottomland hardwood, cypress-tupelo, sloughs, and other forests of the floodplain. These forests are closed canopy and have a variety of understories that range from dense shrub to a mix of herbs and

grasses and, on some sites, very little cover.

Canopy

Characteristic Species	
Acer negundo	box elder
Acer rubrum	red maple
Betula nigra	river birch
Carya aquatica	water hickory
Carya glabra	pignut hickory
Catalpa bignonioides	southern catalpa
Celtis laevigata	sugar-berry
Chamaecyparis thyoides	Atlantic white-cedar
Fagus grandifolia	American beech
Fraxinus caroliniana	Carolina ash
Fraxinus pennsylvanica	green ash
Gordonia lasianthus	loblolly-bay
Halesia spp.	silverbell
Juniperus virginiana	eastern red cedar
Liquidambar styraciflua	sweet-gum
Magnolia grandiflora	southern magnolia
Nyssa aquatica	water tupelo
Nyssa sylvatica	black tupelo
Persea borbonia	red bay
Pinus elliotti	slash pine
Pinus glabra	spruce pine
Pinus palustris	long-leaf pine
Pinus taeda	loblolly pine
Platanus occidentalis	American sycamore
Populus deltoides	eastern cottonwood
Populus heterophylla	swamp cottonwood
Quercus laurifolia	laurel oak
Quercus lyrata	overcup oak
Quercus michauxii	swamp chestnut oak
Quercus nigra	water oak
Quercus phellos	willow oak
Quercus virginiana	live oak
Taxodium distichum	southern bald-cypress
Ulmus americana	American elm

Woody Understory

Alnus serrulata	brookside alder
Ampelopsis arborea	peppervine
Aronia arbutifolia	red chokeberry
Aster carolinianus	climbing aster
Berchemia scandens	Alabama supplejack

Bignonia capreolata	crossvine
Carpinus caroliniana	American hornbeam
Cephalanthus occidentalis	common buttonbush
Clethra alnifolia	coastal sweet-pepperbush
Cliftonia monophylla	buchwheat-tree
Cornus foemina	stiff dogwood
Crataegus marshallii	parsley hawthorn
Cyrilla racemiflora	swamp titi
Diospyros virginiana	common persimmon
Forestiera acuminata	eastern swamp-privet
Gelsemium sempervirens	evening trumpet-flower
Ilex cassine	dahoon
Ilex coriacea	large gallberry
Ilex decidua	deciduous holly
Ilex glabra	inkberry
Ilex myrtifolia	myrtle dahoon
Ilex vomitoria	yaupon
Itea virginica	Virginia sweetspire
Leucothoe axillaris	coastal doghobble
Leucothoe racemosa	swamp doghobble
Lyonia lucida	fetterbush
Magnolia virginiana	sweetbay
Myrica cerifera	southern bayberry
Myrica heterophylla	evergreen bayberry
Persea palustris	swamp bay
Planera aquatica	planertree
Rhapidophyllum hystrix	needle palm
Rhododendron viscosum	clammy azalea
Rubus argutus	saw-tooth blackberry
Sabal minor	dwarf palmetto
Salix caroliniana	coastal-plain willow
Salix nigra	black willow
Sambucus canadensis	American elder
Smilax bona-nox	fringed greenbrier
Smilax glauca	sawbrier
Smilax laurifolia	laurel leaf greenbrier
Smilax walteri	coral greenbrier
Toxicodendron radicans	eastern poison-ivy
Vaccinium arboreum	tree sparkle-berry
Vaccinium corymbosum	highbush blueberry
Viburnum nudum	possumhaw
Viburnum obovatum	small-leaf arrow-wood
Vitis aestivalis	summer grape
Vitis rotundifolia	muscadine
Wisteria frutescens	American wisteria

Herbaceous Understory

Bacopa spp.	water hyssop
Carex spp.	sedge
Crinum americanum	seven-sisters
Juncus effusus	lamp rush
Leersia virginica	white grass
Lemna spp.	duckweed
Limnobium spongia	American spongeplant
Ludwigia palustris	marsh primrose-willow
Nymphoides aquatica	big floatingheart
Oplismenus setarius	short-leaf basket grass
Osmunda regalis	royal fern
Panicum rigidulum	red-top panic grass
Peltandra virginica.	arrow-arum
Polygonum pensylvanicum	pinkweed
Pontederia cordata	pickerelweed
Sagittaria spp.	arrowhead
Saururus cernuus	lizard's-tail
Thelypteris palustris	eastern marsh fern
Zizaniopsis miliacea	marsh-millet

A.5 Upland Marsh

Upland Marsh occurs in basins or depressions located outside the floodplain, such as old lake beds, ponds, and sinkholes. The frequency of fire determines the degree of shrub invasion. Hydroperiod can vary from 50 days to all year.

Characteristic Herbaceous Species

Bidens bipinnata	Spanish-needles

Eleocharis spp.	spike-rush
Eupatorium capillifolium	dogfennel
Hydrocotyle spp.	marsh-pennywort
Juncus effusus	lamp rush
Lachnanthes caroliniana	Carolina redroot
Leersia spp.	cut grass
Ludwigia palustris	marsh primrose-willow
Ludwigia repens	creeping primrose-willow
Nelumbo lutea	American lotus
Panicum hemitomon	maiden-cane
Panicum spp.	panic grass
Phragmites australis	common reed
Pontederia cordata	pickerelweed
Sagittaria spp.	arrowhead
Utricularia spp.	bladderwort
Woodwardia spp.	chain fern
Xyris spp.	yellow-eyed-grass

Characteristic Woody Species

Baccharis spp.	false willow
Cephalanthus occidentalis	common buttonbush
Hypericum spp.	St. John's-wort
Myrica cerifera	southern bayberry
Salix caroliniana	coastal-plain willow
Salix spp.	willow
Sambucus canadensis	American elder

A.6 Salt Marsh

Salt Marsh is an intertidal coastal community type consisting of salt-tolerant grasses, rushes, sedges, and other halophytic herbs. The closest thing to salt marsh in Fairhope is actually brackish. Some of these species may not occur here because it is not salty enough.

Characteristic Herbaceous Species

Aster tenuifolius	perennial saltmarsh aster

Batis maritima	turtleweed
Boltonia diffusa	small-head doll's-daisy
Distichlis spicata	coastal salt grass
Juncus effusus	lamp rush
Juncus roemerianus	Roemer's rush
Limonium carolinianum	Carolina sea-lavender
Paspalum distichum	jointed crown grass
Pluchea spp.	camphorweed
Salicornia virginica	woody saltwort
Scripus spp.	bulrush
Sesuvium portulacastrum	sea-purslane
Solidago sempervirens	seaside goldenrod
Spartina alterniflora	saltwater cord grass
Spartina bakeri	bunch cord grass
Spartina cynosuroides	big cord grass
Spartina patens	salt-meadow cord grass
Spartina spartinae	gulf cord grass
Typha spp.	cat-tail

Characteristic Woody Species

Baccharis halimifolia	groundseltree
Borrichia frutescens	sea ox-eye
Iva frutescens	jesuit's-bark

Appendix B. Summary of Public Comments from the 5/14/03 Town Meeting

Individual Comments Received:

- Bay/shoreline areas are a critical resource
- Watershed concept is important (Fly Creek & Cowpen Creek watersheds mentioned)
- Where did we find good flatwoods & Grady pond?
- Non-native exotics a big problem
- Upland longleaf pine important; plant & animal species should be considered
- Replant dying longleaf in park
- Address gullies
- Think about putting weir structures in gullies
- Stormwater going into gullies
- Pitcher plant bogs and bluffs are significant and should be protected
- Should air quality be considered? (Response: outside scope of study)
- Groundwater should be a consideration
- Concerned about watersheds impacted by future development (mentioned were Fly & Rock creeks & Co. Rd. 13 extensions)
- Future location of solid waste disposal
- Sonny Callahan's committee (former U.S. congressman) looking at sewer service along coasts of AL, MS, & FL
- Failing septic systems are a concern; need a GIS overlay of septic systems
- Some dispute between Corps of Engineers & citizens about what is wetlands
- Need to preserve green space that can be used by people
- Auburn University agricultural experiment station property is important due to ag history of the area

Breakout Session Group Reports:

- Need a system of parks
- Make environmental aspects a feature (amenity) of developments
- Use a land trust to set aside green space
- Use grants to aid in setting aside green space
- Integrate land use into districts; mixed land use
- Wetlands along south part of Scenic 98 & Co. Rd. 1 important
- Aquifers important
- Tree stands important
- Protection of property rights important
- Groundwater resources important
- Wetland functions important (will inventory include assessment of wetlands & streams?)
- We need to pay our own way and depend only on grants
- Redesign & restore gullies

- Use conservation easements to preserve riparian buffer zones
- Need walking, biking, horseback riding trails that connect neighborhoods
- Upland/longleaf pine preservation should not be left out
- Native species inventory is needed
- Future use of Walley dirt pit for water retention & recreation
- Un-bulkheaded areas of rivers important
- Areas with Spodosols (Leon sands have a hardpan below surface that perches water; some are found in the Battles Wharf area & other areas along the Bay)
- Unzoned areas important
- Cultural resources & natural resources interlinked (i.e., Pt. Clear boardwalk)
- Property directly north of Fly Creek (Corte land) important
- Wetlands west of Weeks Bay important
- Gullies – run-off from them
- Weaning of pesticide use important
- Need an asphalt (impervious surface) study
- Subdivision concerns
- Restoration of impaired wetlands important
- Need to map storm drains
- Streamside buffer zones important

Appendix C. Annotated List of Plant Communities of Special Interest Included in GIS Overlay.

This section is still under development and will be provided by Gena Todia when it is ready.

Appendix D. Partial List of Invasive Exotic Plants of the Fairhope Region. (Modified from Alabama Invasive Plant Council Draft Invasive Plant List)

1. Chinese privet	Ligustrum sinense
2. cogongrass	Imperata cylindrica
3. tropical soda apple	Solanum viarum
4. kudzu	Pueraria Montana var. lobata
5. hydrilla	Hydrilla verticillata
6. Eurasion water milfoil	Myriophyllum spicatum
7. Tallowtree, popcorntree	Triadica sebifera (Sapium sebiferum)
8. Johnsongrass	Sorghum halepense
9. Japanese honeysuckle	Lonicera japonicum
10. multifllora rose	Rosa multiflora
11. Nepalese browntop	Microstegium vimineum
12. alligatorweed	Alternanthera philoxeroides
13. musk thistle, nodding thistle	Carduus nutans
14. gaint salvinia	Salvinia molesta
15. Japanese climbing fern	Lygodium japonicum
16. Silktree, mimosa	Albizia julibrissin
17. chinaberry tree	Melia azedarach
18. tree-of-heaven	Ailanthus altissima
19. large crabgrass	Digitaria sanguinalis
20. Chinese wisteria	Wisteria sinensis
21. sicklepod	Senna obtusifolium (Cassia obtusifolia)
22. Chinese yam	Dioscorea oppositifolia
23. Amur honeysuckle	Lonicera maakii
24. purple nutsedge	Cyperus rotundus
25. torpedograss	Panicum repens
26. water hyacinths	Echomia crassipes
27. common reed	Phragmites australis
28. annual bluegrass, speargrass	Poa annua
29. tall fescue	Lolium arundinaceum
30. glossy privet	Ligustrum lucidum
31. autumn olive	Eleagnus umbellate
32. Morrow's honeysuckle	Lonicera morrowii
33. Chinese lespedeza	Lespedeza cuneata
34. shrubby lespedeza, bicolor	Lespedeza bicolor
35. purple loosestrife	Lythrum salicaria
36. giant reed	Arundo donax
37. Chinese silvergrass	Miscanthus sinensis
38. golden bamboo	Phyllostachys aurea
39. parrot's feather	Myriophyllum aquaticum
40. Canada thistle	Cirsium arvense
41. coral ardisia	Ardisia crenulata
42. wild taro	Colocasia esculenta

43. clematis	Clematis terniflora
44. glorybower	Clerodendrum bungei
45. air-potato	Dioscorea bulbifera
46. heavenly bamboo	Nandina domestica
47. old world marsh fern	Macrothelypteris torresiana