



Indian River County 2030 Comprehensive Plan

Chapter 3D

Natural Groundwater Aquifer Recharge Sub-Element

**Indian River County Community Development Department
Adopted: October 12, 2010**

TABLE OF CONTENTS

INTRODUCTION	1
Natural Features	1
Stratigraphy	2
Aquifer Recharge	2
EXISTING CONDITIONS SECTION	4
Natural Groundwater Aquifer Recharge Areas	4
Water Use	4
Water Quality	5
Abandoned Flow Wells	6
ANALYSIS	7
Natural Groundwater Recharge Areas	7
Water Use	7
Water Quality	10
Abandoned Flow Wells	10
GOAL, OBJECTIVES AND POLICIES	12
PLAN IMPLEMENTATION	17
EVALUATION AND MONITORING PROCEDURES	18

LIST OF FIGURES

<u>Figure</u>		<u>Page</u>
3.1	General Stratigraphy of Indian River County	2.1
3.2	General Stratigraphy of Indian River County	2.2
3.3	Location of the Ten Mile Ridge and the Atlantic Coastal Ridge	2.3
3.4	Natural Aquifer Recharge Areas	3.1
3.5	Priority Water Resource Caution Areas	5.1

LIST OF TABLES

<u>Table</u>		<u>Page</u>
3.1	Natural Groundwater Aquifer Recharge Sub-Element Implementation Matrix	19
3.2	Natural Groundwater Aquifer Recharge Sub-Element Evaluation Matrix	21

INTRODUCTION

In Indian River County, the land area is underlain by two aquifers, the surficial aquifer and the Floridan aquifer. Together, these aquifers comprise the primary water supply for the county.

Generally, aquifers are recharged as precipitation percolates down through surface soils and layers. Because of the variable permeability of different soils, the rate of aquifer recharge varies from location to location. Overall, soils with the greatest permeability have the highest recharge rates and constitute "prime recharge areas". Besides soils, the presence of overlying confining layers also determines the location and effectiveness of a particular aquifer recharge area.

Because of their function as sources of potable water, aquifers are important resources. While aquifers provide water necessary to sustain urban development, they are also threatened by that development. In fact, the creation of impervious surfaces, such as roads, parking lots, and buildings, reduces the area available for rainfall percolation and alters the total rate and volume of recharge in that area. Furthermore, urban runoff, saltwater intrusion, and disposal of chemical wastes and pollutants can also affect the quality of groundwater. For these reasons, the Natural Groundwater Aquifer Recharge Sub-Element is closely related to both the Future Land Use Element and the Conservation Element of the Comprehensive Plan.

Natural Features

Although the topography of Indian River County is generally flat, there are several important physiographic features. These features include sand ridges, the inter-ridge area, and the Upper St. Johns River Basin.

- Sand Ridges

Running parallel to the coastline in the eastern part of the county are two sand ridges. Those ridges are historic coastlines that serve as important aquifer recharge areas. The first, known as the Atlantic Coastal Sand Ridge, is located approximately one-half mile west of the Indian River Lagoon (IRL). While historically over 50 feet tall, that ridge has been reduced in elevation due to excavation associated with sand mining and development.

The second ridge, known as the Ten Mile Ridge, is roughly demarcated by the current Interstate 95 corridor. That ridge pre-dates the Atlantic Coastal Sand Ridge and has a maximum height of approximately 35 feet.

- Inter-ridge area

Between the two sand ridges lies a flat shallow depression referred to as the inter-ridge basin. Historically drained by the South Prong of the St. Sebastian River, that basin is currently traversed by a network of drainage canals; consequently, only a small portion is still drained by the St. Sebastian River.

- Upper St. Johns River Basin

West of Interstate 95, the topography of the county is relatively flat with a rise in elevation near the Indian River-Osceola county line. Between that rise and Interstate 95, the land is marshy and poorly drained. Flowing north to form the headwaters of the St. Johns River Basin, the St. Johns Marsh comprises a large portion of this area.

Stratigraphy

Within Indian River County, there are three important sub-surface strata. The first, extending from the earth's surface to approximately 200 feet below ground, contains Pleistocene sands situated above a confining unit. The surficial aquifer is located within those Pleistocene sands.

Known as the Hawthorn Formation, the second strata consists of a low permeability confining unit that separates the surficial aquifer from the Floridan aquifer. That strata is approximately 150 to 200 feet thick.

Containing the Floridan aquifer, the third strata extends from several hundred feet to 3,000 feet below the earth's surface. That strata consists of the Oldsmar, Lake City and Avon Park limestone formations, the Ocala Group, and the Undifferentiated Oligocene Rock layer.

Figures 3.1 and 3.2 depict the general stratigraphy of Indian River County.

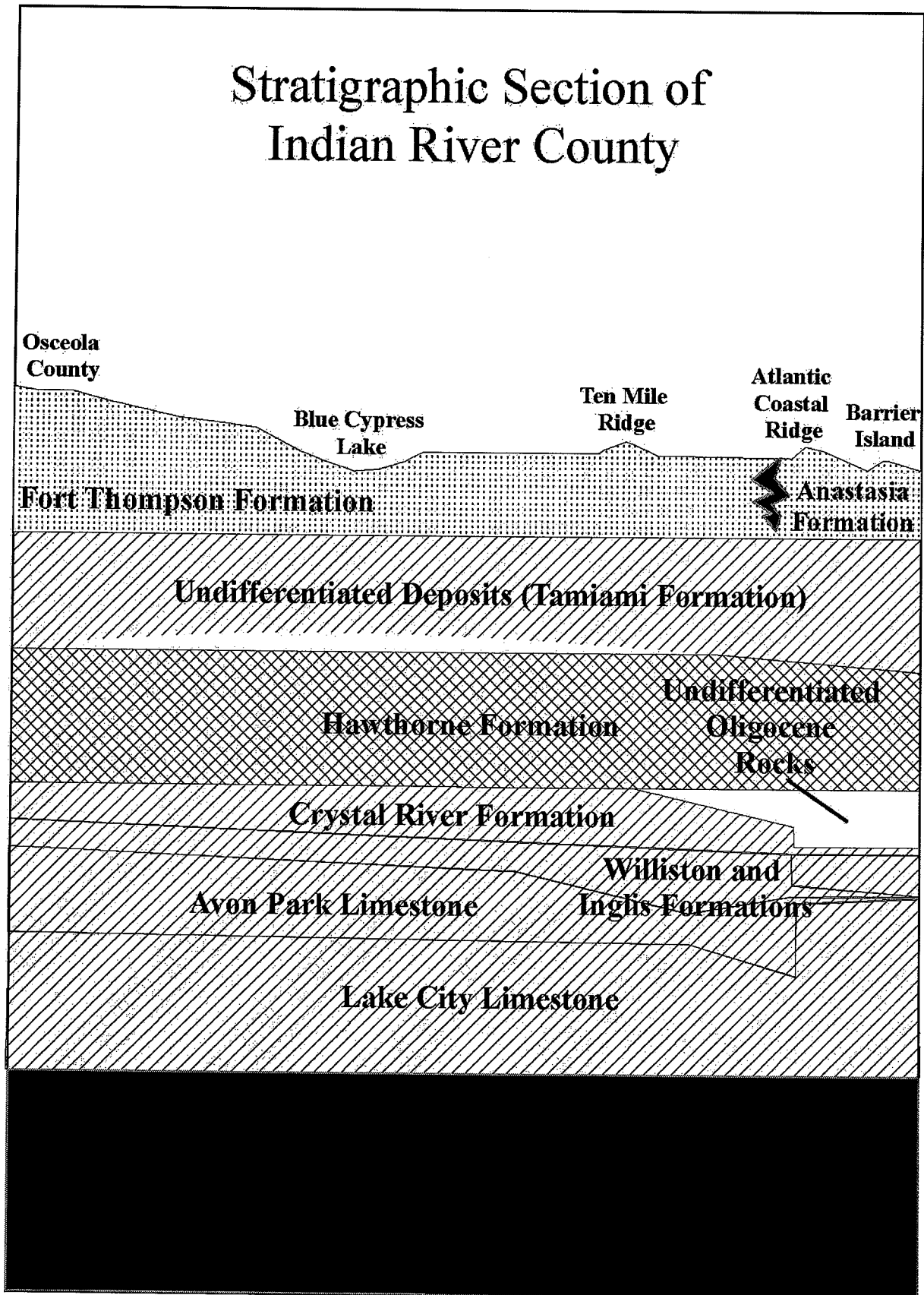
Aquifer Recharge

- Surficial Aquifer

In Indian River County, the surficial aquifer is recharged by several sources. The primary source of recharge is percolation of rainfall. Percolation occurs primarily along the Atlantic Coastal Sand Ridge and the Ten Mile Ridge where coarse permeable sands are exposed at the surface. Figure 3.3 depicts the location of the Ten Mile Ridge and the Atlantic Coastal Ridge.


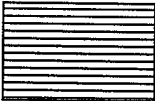

Within the inter-ridge basin, wetlands contribute to surficial aquifer recharge. Because the water table is close to the surface where wetlands are present, precipitation over wetlands directly recharges the surficial aquifer.

Figure 3.1



**GENERALIZED STRATIGRAPHIC CROSS SECTION OF
INDIAN RIVER COUNTY**

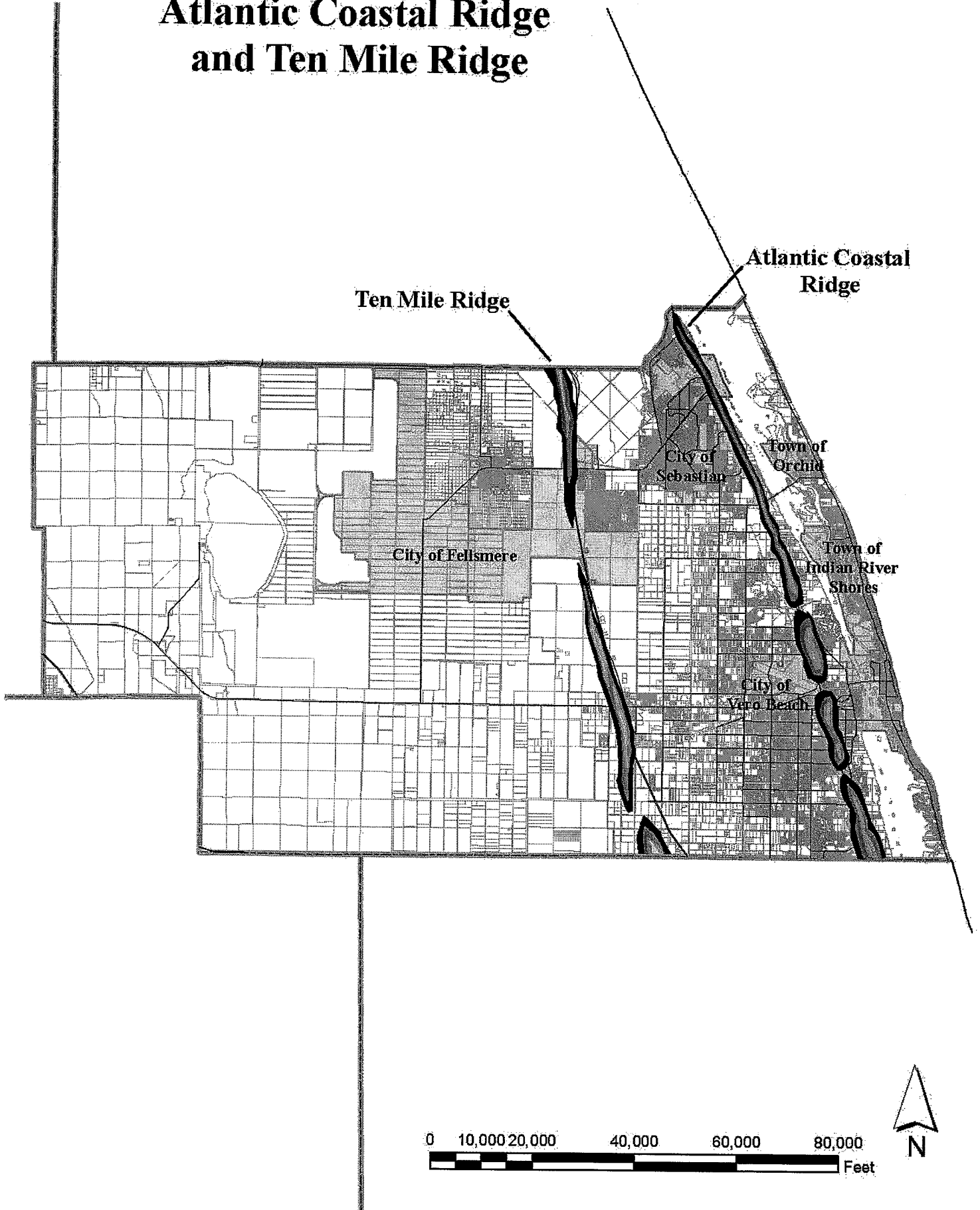
Series	Formation	Thickness	Description	Well Yield	Hydrogeologic Unit
<i>Holocene</i>	Undifferentiated deposits	0-25 feet	Variable mixture of sand, clay, coquina, and organic material	Varies highly – mostly less than 100 gal/min	Clastic Zone
<i>Pleistocene</i>	Fort Thompson and Anastasia Formations	100-200 feet	Coquina with sand, silt, and organic material	100 gal/min to 700 gal/min	
<i>Pliocene</i>	Tamiami Formation	0-60 feet	Fragmented to cemented coquina and limestone	100 gal/min to 700 gal/min	Shallow Rock Zone
<i>Miocene</i>	Hawthorne Formation	70-520 feet	Silty to sandy clay, thin shell / limestone beds, phosphatic	Less than 100 gal/min	Intermediate Confining Unit
<i>Oligocene</i>	Suwannee Limestone	0-190 feet	Chalky to crystalline limestone	Less than 100 gal/min	Upper Floridan Aquifer
<i>Eocene</i>	Ocala Limestone	20-220 feet	Limestone-dolomitic near base	100 gal/min to over 700 gal/min	
		100-500 feet	Limestone and dolomite	More than 700 gal/min	
	Avon Park Formation	100-500 feet	Dolomite, dolomitic limestone, limestone, gypsum	Less than 100 gal/min	
	Oldsmar Formation	600-700 feet	Limestone and dolomite	100 to 700 gal/min	Lower Floridan Aquifer
		1,000 feet	Limestone and dolomite	Boulder zone used as receiver site for injection wells	

	Surficial Aquifer		Confining Unit		Floridan Aquifer
---	-------------------	---	----------------	---	------------------

Source: U.S. Geological Survey Water-Resources Investigation Report 88-4073

Figure 3.3

Atlantic Coastal Ridge and Ten Mile Ridge



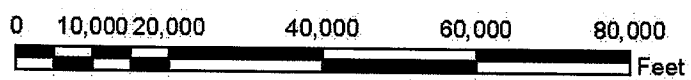
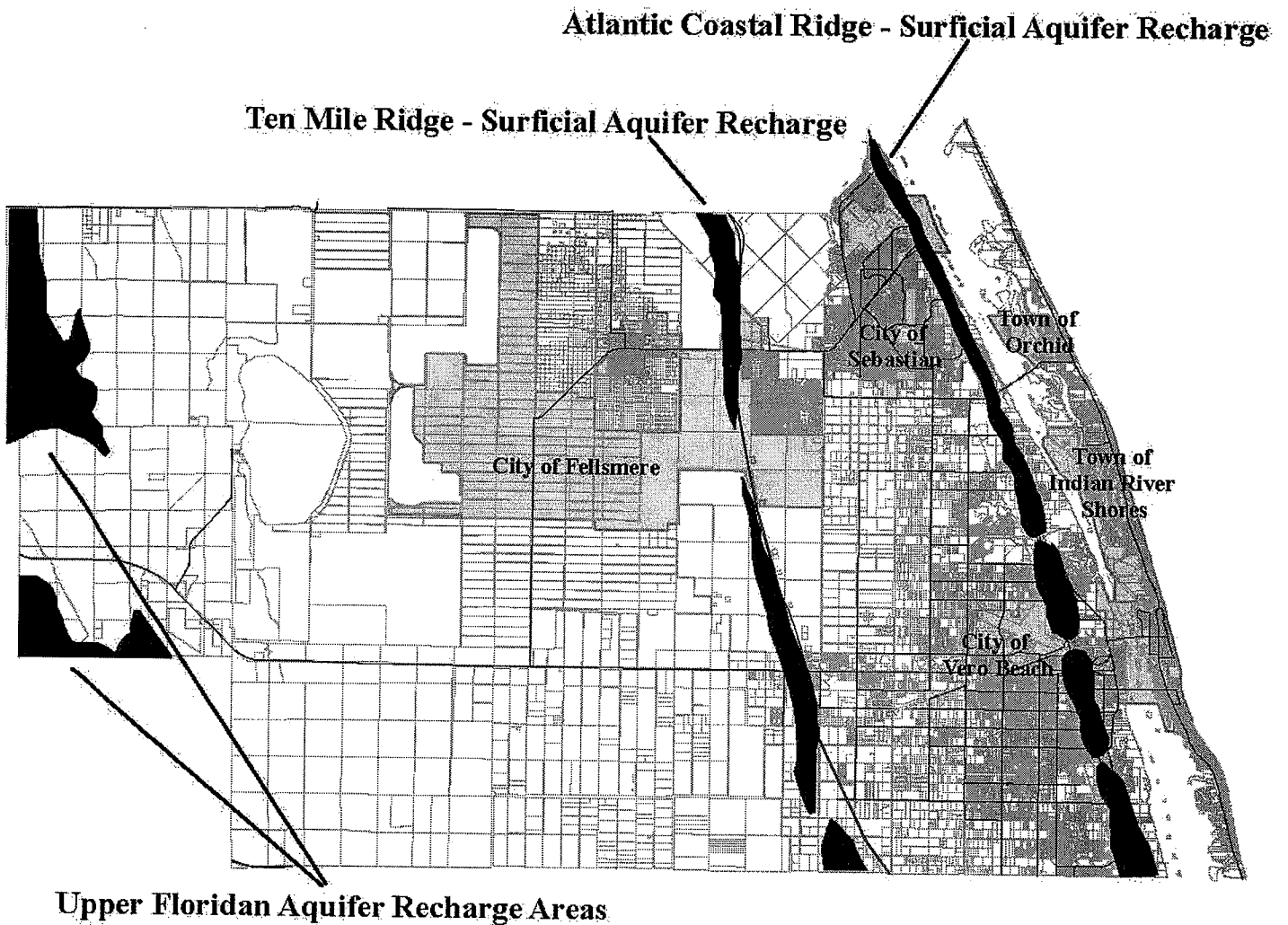
- **Floridan Aquifer**

While the Floridan aquifer spans the entire county, it is recharged by rainfall occurring primarily west and northwest of Indian River County. Because the top of the Floridan aquifer is orientated towards the southeast and it consists of Oligocene limestone of relatively low permeability, water moves eastward through the aquifer and eventually discharges into the Atlantic Ocean.

Within the county, the primary recharge area for the Floridan aquifer is the Osceola Plain west of Blue Cypress Lake. That portion of the Osceola Plain is not a prime recharge area and constitutes only a small portion of the county's land area. For those reasons, Indian River County contributes minimally to the recharge of the Floridan aquifer.

The recharge areas for the Floridan aquifer and the surficial aquifer are depicted in Figure 3.4.

Natural Aquifer Recharge Areas in Indian River County



EXISTING CONDITIONS

Natural Groundwater Aquifer Recharge Areas

- Surficial Aquifer

In 2006, the surficial aquifer had a depth ranging from several feet to approximately 150 feet and an annual recharge rate of 16 inches. Due to high percolation rates, the Atlantic Coastal Sand Ridge and the Ten Mile Ridge were identified as important recharge areas for the surficial aquifer. In addition to recharge from the ridge areas, wetlands and rainfall contribute to recharge in the inter-ridge recharge area, while seepage from drainage canals, agricultural irrigation, and water percolation from the Floridan aquifer contribute to recharge of the surficial aquifer throughout the county.

- Floridan Aquifer

Currently, the upper zone of the Floridan aquifer ranges in depth from approximately 350 to 650 feet below ground level. The lower zone of the Floridan aquifer descends to a depth of approximately 2,000 feet. Currently, recharge of the Floridan aquifer in Indian River County is estimated to be 0-4 inches annually. That recharge principally occurs in the area of the Osceola Plain west of Blue Cypress Lake. The majority of the Osceola Plain is located outside of the boundaries of Indian River County.

Water Use

In 2006, Indian River County's total groundwater withdrawal was estimated at 199.06 million gallons per day (MGPD). Of this total, more than two-thirds (2/3) of the water was withdrawn from the Floridan aquifer. Nearly all public drinking water was withdrawn from the Floridan aquifer in 2006.

Accounting for 163.86 million gallons per day, or 82.31% of total annual groundwater withdrawal, agriculture was the single highest water use category in 2006. During that same year, potable water use totaled 15.94 million gallons per day, while per capita water use was estimated at 104 gallons per day. In 2006, the breakdown of groundwater use was as follows:

USE	Million Gallons/ Year	Percent of Total Permitted Withdrawals
Potable Water	5,819.63	8.01%
Agricultural	59,808.99	82.31%
Rec., Golf, Commercial/Industrial, Other	7,030.36	9.68%
Total	72,659.36	100%

In 2005, 10% of domestic water was withdrawn from the surficial aquifer by private wells. In that same year, the Indian River County Health Department estimated that there were 33,587 private wells located in the county. The remaining 90% of domestic water came from the Floridan aquifer. Currently, the Indian River County Utilities Department supplies 9.5 MGD for potable water use. Both of the County's water treatment plants utilize reverse osmosis (RO).

- **Regional Groundwater Model**

Currently, the St. Johns River Water Management District (SJRWMD) is preparing a regional groundwater model that will provide an updated estimate of groundwater quality and quantity in the surficial and Floridan aquifers. Early indications from the SJRWMD suggest that there will be no significant reduction in the quantity or quality of water available in the Floridan aquifer in Indian River County through 2025. With respect to the surficial aquifer, however, there are preliminary indications from the SJRWMD of potential drawdown impacts in the Fellsmere and Vero Beach wellfield areas.

- **Priority Water Resource Caution Areas**

Priority Water Resource Caution Areas (PWRCA) are areas designated by the SJRWMD where existing and anticipated water supplies may not meet projected future demand without unacceptable impacts to water resources. Currently, half of the counties within the SJRWMD's jurisdiction are designated as PWRCA.

Based on the SJRWMD's most recent groundwater model runs, the Floridan aquifer in Indian River County can sustain continued development through 2030. For that reason, SJRWMD does not anticipate that Indian River County will be designated a PWRCA.

Figure 3.5 depicts the PWRCA within the SJRWMD.

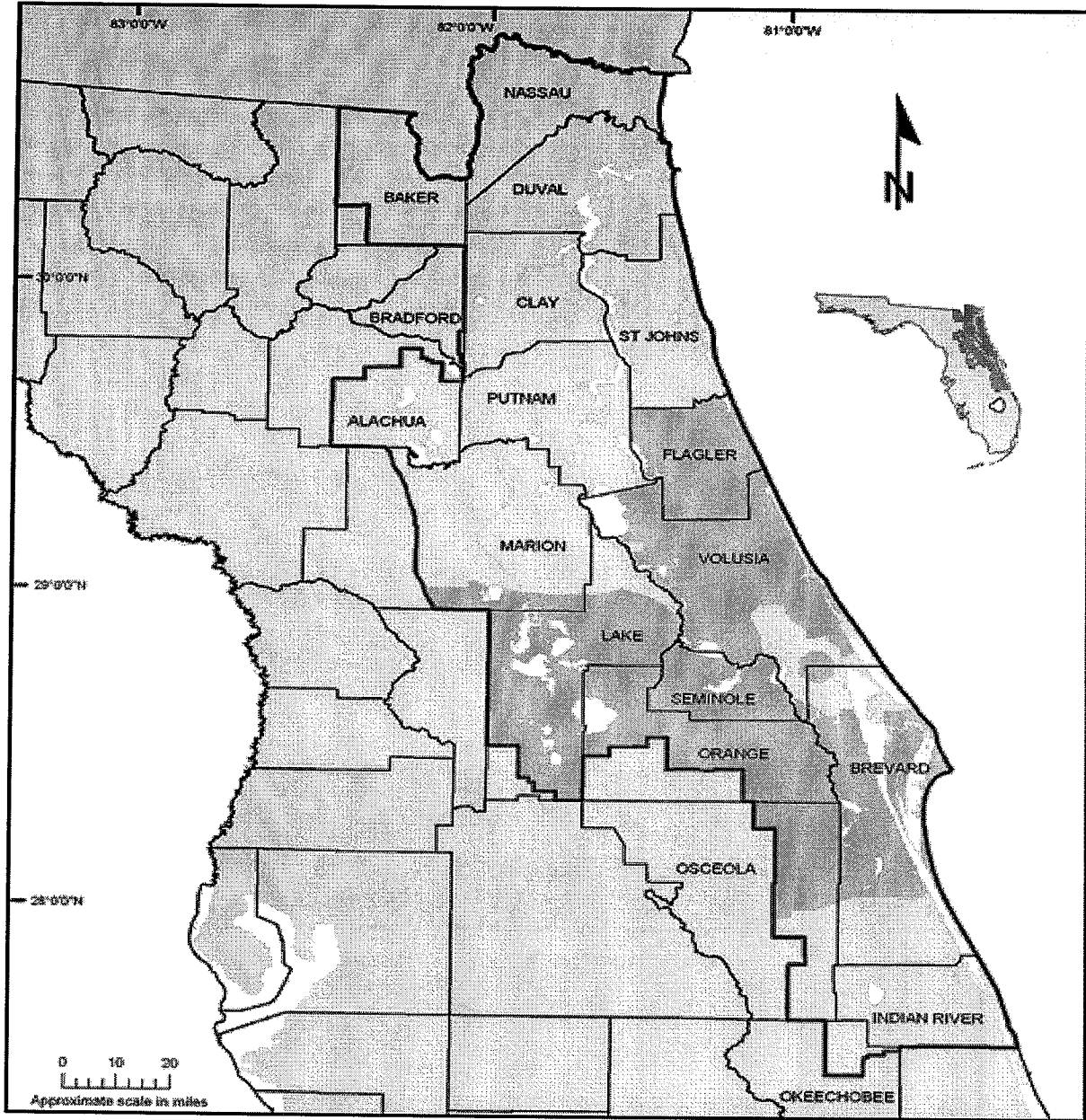
- **Watering Restrictions**

In an effort to conserve water, the SJRWMD, in 1991, began prohibiting the irrigation of lawns and landscapes between 10 a.m. and 4 p.m. Recently, the SJRWMD adopted additional watering restrictions that limit lawn and landscape irrigation to 2 days per week.

Water Quality

Currently, water quality in the surficial aquifer is potable throughout most of the county, with the exception of wells located near the Indian River Lagoon. Although the quality of water in the surficial aquifer is considered potable, surficial aquifer water contains high concentrations of minerals.

Priority Water Resource Caution Areas (PWRCAs) Within The St. Johns River Water Management District



Priority water resource caution areas in the St. Johns River Water Management District, 2005

Legend	
— District boundary	— County boundary
<div style="display: inline-block; width: 15px; height: 10px; background-color: #cccccc; border: 1px solid black;"></div> Priority water resource caution area	<div style="display: inline-block; width: 15px; height: 10px; background-color: white; border: 1px solid black;"></div> Water body

In 2006, the state standard for arsenic in drinking water was reduced from a maximum concentration of .05 mg/l to .01 mg/l. Currently, the maximum detected level of arsenic in Indian River County's public drinking water is .0003 mg/l. In 2005, the levels of inorganic contaminants contained in Indian River County's public drinking water were well within state drinking water standards.

Abandoned Flow Wells

From 1996 to 2004, Indian River County's annual production of citrus declined by 21%. Generally, as citrus production declines, abandoned citrus groves increase. When citrus groves are abandoned, the flow wells used to irrigate those crops are left behind. While most of these wells are not free-flowing at the time of abandonment, many wells begin to leak over time. While not all abandoned flow wells are the result of citrus farming, all leaking abandoned flow wells waste water and may contribute to groundwater pollution and mosquito problems.

- Flow Well Plugging Program

Since 1990, Indian River County has participated in a cost-share program with the SJRWMD to plug abandoned flow wells. Through the flow well plugging program, county staff works in coordination with the SJRWMD and the Environmental Health Department to locate and plug abandoned flow wells. To date, 375 abandoned flow wells have been successfully plugged.

ANALYSIS

Natural Groundwater Aquifer Recharge Areas

- **Surficial Aquifer**

Within the county, the Atlantic Coastal Sand Ridge and the Ten Mile Ridge are the primary recharge areas for the surficial aquifer. Since nearly 1/3 of the county's water comes from the surficial aquifer, those recharge areas warrant protection.

Over the past 50 years, development along the Atlantic Coastal Sand Ridge and the Ten Mile Ridge has compromised the functionality of surficial aquifer recharge by disrupting the natural percolation process and by allowing contaminants to enter into the groundwater. To limit future impacts, the county should continue to enforce its wellfield and aquifer protection land development regulations.

In addition to enforcing LDRs, the county should seek properties within primary surficial aquifer recharge areas for purchase under its Environmental Lands Program. Although the primary objective of the Environmental Lands Program is to protect native ecosystems, one of the criteria used to rank prospective properties is whether those properties are located within a primary surficial aquifer recharge area. Since undisturbed properties within primary aquifer recharge areas often contain rare habitats and wildlife, such properties are good candidates for purchase under the Environmental Lands Program.

Currently, the funds remaining from the county's 2004 environmental land bond referendum to acquire conservation lands are nearly exhausted. Given current economic conditions, it is unlikely that a new environmental land acquisition bond referendum will be approved in the near future. If economic conditions improve in the next few years, however, another bond referendum may be appropriate. Contingent upon the availability of funding, the county should make it a priority to acquire and conserve lands within the primary recharge areas of the surficial aquifer.

- **Floridan Aquifer**

Except for the extreme western portion of the county, west of Blue Cypress Lake, Indian River County lies largely outside of the Floridan aquifer recharge area. Currently, the County land use designation for that area is AG-3, Agriculture, one unit per 20 acres. Going forward, the County should maintain that low development density designation in the Floridan aquifer recharge area, since that low density designation limits the potential for impervious surface and promotes open space for aquifer recharge.

Water Use

From 1996 to 2006, per capita water consumption in Indian River County increased from 70 gallons per

day to 104 gallons per day. During the same time period, agricultural water consumption dropped approximately 11 million gallons per day, or 18%. Currently, agricultural water use is the single largest water use category in the county. Although agricultural water consumption has declined over the last ten years, it is anticipated that other non-citrus agricultural uses, including possible bio-fuel crop production, will slow or reverse this trend.

From a regional perspective, an increase in water consumption over the long-term warrants concern. Between 1995 and the present, groundwater consumption within the SJRWMD's jurisdiction increased by 422 million gallons per day, or 20%. According to estimates by the SJRWMD, water consumption in the district will increase by an additional 100 million gallons per day by the year 2025. At that rate of increase, groundwater will not sustain district-wide demand through 2025.

To promote water conservation, the county should implement the policies under Objective 4 of the Potable Water Sub-Element.

- SJRWMD Groundwater Model Update

According to information from a new SJRWMD regional groundwater model, there will be no significant reduction in the quantity or quality of water available in the Floridan aquifer in Indian River County through 2030. For that reason, it is anticipated that Indian River County will not be designated as a Priority Water Resource Caution Area (PWRCA). A PWRCA designation means that an area does not have adequate current or anticipated groundwater supplies to meet projected future demand without unacceptable impacts to water resources.

In the surficial aquifer, preliminary indications from the SJRWMD are that drawdowns occurred in the Vero Beach and Fellsmere wellfield areas. Once complete, the regional groundwater model will provide updated information regarding the quality and quantity of water in the surficial and Floridan aquifers.

Going forward, the county needs to closely monitor forthcoming water supply data and take action as necessary if anticipated water supplies change. One such action should be development and implementation of an alternative water supply plan.

- Alternative Water Supply Plan

At present, the county's water treatment plant consumptive use permits allow for a maximum groundwater withdrawal of 13.79 million gallons per day by 2021. At that time, however, demand is projected to be significantly higher than that amount. To remedy this potential shortfall, the county recently applied for several new permits and for a revised consumptive use permit allowing greater withdrawal. In response to that application, the SJRWMD recommended that the county install six new wells and begin to analyze the potential for alternative water sources to lessen the withdrawal from the Floridan aquifer.

In 2006, Indian River County began developing an alternative water supply plan. In that plan, numerous potential alternative water sources are identified. Those sources include:

- Seawater desalination
- Surface water / reservoirs
- Surficial Aquifer
- Upper Floridan Aquifer

In light of the potential for a future groundwater supply shortfall, the county should continue to investigate alternative water sources and continue work on developing an alternative water supply plan.

- Watering Restrictions

In 1991, the SJRWMD began prohibiting the irrigation of lawns and landscapes between 10 a.m. and 4 p.m. district-wide. Since then, the SJRWMD modified that rule to prohibit watering more than two days per week. Recently, the SJRWMD proposed additional restrictions such as limiting watering to one day per week during certain parts of the year in an effort to increase water conservation.

Rather than adopt a water conservation ordinance in-line with the SJRWMD's watering restrictions, Indian River County's approach has been and will continue to be to promote public education on water conservation measures and to conserve water by means other than restricting watering times, such as requiring drought tolerant species in the county landscape ordinance and promoting water re-use.

- Geohydrology Report Update

In 1988, the U.S. Geological Survey published a water resources investigations report on geohydrology in Indian River County. That report contained technical information regarding the aquifers in the county, subsurface geology, and groundwater quality. While some information contained in that report such as the subsurface geology is unlikely to change through time, information such as aquifer drawdown and saltwater intrusion are likely to change.

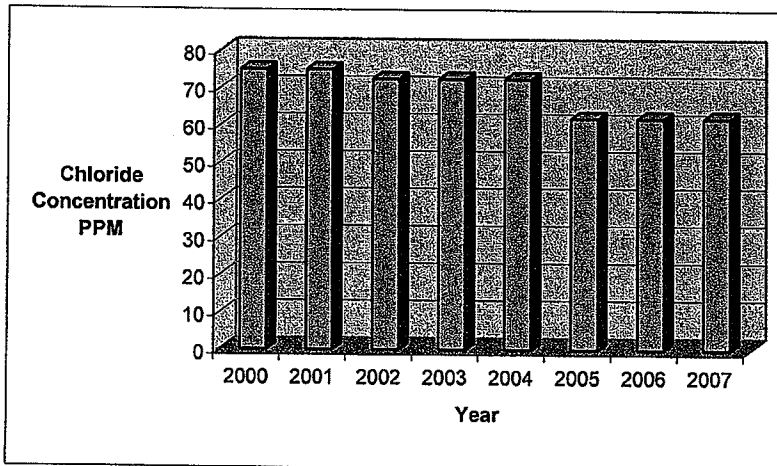
Generally, these dynamic aspects of the county's groundwater system fluctuate in response to human activities such as groundwater pumping rates and development in groundwater recharge areas. Since significant development and population growth has occurred since 1988, the county needs an updated geohydrology report. Going forward, the county should contact the U.S. Geological Survey and request an updated countywide geohydrological study with seismic profiles, or comparable data.

Once complete, the county should use the information contained in the updated geohydrology report to aid in the development of an alternative water supply plan and to guide future growth in a manner that minimizes impacts to groundwater resources.

Water Quality

Currently, water from the county’s water treatment plants meets or exceeds all minimum state and federal standards for safe drinking water. Due to the nature of the aquifers in the Indian River County area, however, saltwater intrusion is a concern. Saltwater intrusion generally occurs when groundwater withdrawal is high in a particular area, creating a void or depression for saltwater to intrude. Since most of the County’s wells draw from the Floridan aquifer, chloride levels in these wells are indicators of the degree of saltwater intrusion. In Indian River County, chloride levels in water from the Floridan aquifer generally exceed state and federal standards. To remove chloride and bring chloride levels well within maximum contaminant levels, the county’s water plants use the reverse osmosis treatment method.

Since 2000, chloride levels in county drinking water have steadily declined. Presently, the chloride levels in treated groundwater are well below the state and federal maximum level of 250ppm.



Due to the inherent quality of groundwater within Indian River County and the treatment technologies available, degradation of water quality is not anticipated with future increases in withdrawals.

Abandoned Flow Wells

Abandoned flow wells in the county constitute a large-scale “waste” of groundwater. Often, abandoned wells flow for years before being capped and have the potential to waste millions of gallons of water in that time. In addition to wasting water, abandoned flow wells provide easier access for surface pollutants to get into groundwater, may threaten crops and structures, and often contribute to mosquito problems.

- Flow Well Plugging Program

Since 1990, Indian River County has participated in a cost-share program with the SJRWMD to plug

abandoned flow wells. Through that program, abandoned flow wells are identified by county staff and plugged in coordination with the St. Johns Water Management District and the Environmental Health Department. As a result of the program, more than 375 wells have been plugged or repaired through 2007, saving millions of gallons of groundwater per day.

Despite the flow well plugging program's success, many abandoned wells remain in the county. While SJRWMD staff has documented fewer reports of abandoned flow wells over the last few years, this decline is probably attributable to the remaining abandoned flow wells in the county being less conspicuous. For that reason, the County needs to continue its policy to require that abandoned flow wells on development sites be identified and plugged by developers.

Going forward, the county should continue to participate in the flow well plugging program. Although funding may be an issue in the future due to budget constraints, the importance of groundwater and the negative impacts that broken flow wells can have on existing groundwater supplies are reasons for continuing the program as long as funding is available.

GOAL, OBJECTIVES AND POLICIES

GOAL

To protect the function of natural groundwater aquifer recharge areas, to prevent the contamination of groundwater and to extend the life span of the county's aquifers through water conservation.

OBJECTIVE 1 Protection of Water Quality

Through 2020, there will be no instances of contamination of groundwater aquifers or public supply wells within the county. For the purpose of this objective, water quality will be based on primary and secondary maximum contaminant levels (MCLs), as defined by the FDEP in Chapter 17-550, F.A.C.

Policy 1.1: By 2010, the county shall update the Surficial Primary Recharge Overlay District (SAPROD) map using a geographic information systems (GIS) format.

Policy 1.2: By 2012, the county will assist the SJRWMD and FDEP in developing a Wellhead Protection Area (WHPA) map for Indian River County by providing the following information:

- the location of existing public wellheads;
- the proposed location of future public wellheads; and,
- potential conflicts between existing and future land uses and public wellhead protection areas.

The WHPA map will be compatible with the county's G.I.S. database.

Policy 1.3: The county shall continue to prohibit the location of septic systems within two hundred feet of a public water supply well, unless otherwise approved by the FDEP or HRS.

Policy 1.4: The county, through its stormwater permitting processes, shall ensure that stormwater management structures, except those located within the SAPROD, are designed to function as aquifer recharge areas.

Policy 1.5: The county shall continue to protect existing and future public water supply wells from contamination by continuing to implement Chapter 931 of the County's land development regulations and by prohibiting any non-residential land use which stores, handles, or produces a toxic degradation or petroleum-based product, or any substance regulated under 40 CFR 302, 40 CFR 122.21, and/or Chapter 487, F.S. from locating within 1,000 feet of a public water supply well. The minimum radial separation distances for land uses and structures from public wellhead regulated areas are as follows:

- 200 feet for on-site disposal systems, unless approved by the FDEP or DHRS;
- 300 feet for wet retention/detention areas, unless approved by the SJRWMD;
- 500 feet for landfill and/or transfer stations, above ground or underground storage tanks, feed lots and animal facilities, and WWTP effluent discharges, unless approved by the FDEP;
- 1,000 for any mining and/or excavation of waterways or drainage facilities which intersect the water table.

Policy 1.6: The county shall prohibit new developments or changes of uses that produce hazardous materials from locating on the Atlantic Coastal Sand Ridge or the Ten Mile Ridge areas of Indian River County.

Policy 1.7: The county shall continue to prohibit injection wells for the disposal of wastewater.

Policy 1.8: The county, in cooperation with the Indian River Soil and Water Conservation District (IRSWCD), shall discourage the use of flood irrigation with water from the Floridan aquifer by providing incentives for low volume irrigation systems.

OBJECTIVE 2 Preserving the Quantity of the Surficial Aquifer

Through 2025, there will be no reduction in the availability of groundwater from the surficial aquifer. For the purpose of this objective, water quantity will be based on SJRWMD's most recent regional groundwater model.

Policy 2.1: The county shall implement water conservation measures, as designated in the policies under Objective 4 of the Potable Water Sub-Element and Objective 4 of the Sanitary Sewer Sub-Element, to protect the surficial aquifer from depletion.

Policy 2.2: The county shall use natural groundwater aquifer recharge areas for passive parks and open space.

Policy 2.3: To ensure preservation of the surficial aquifer, the county shall continue to issue permits for all proposed excavation/mining projects in the unincorporated county that are exempt from SJRWMD permitting requirements. For proposed excavation/mining projects that are located along the Atlantic Coastal Sand Ridge and are exempt from SJRWMD permitting requirements, the county shall prohibit the following:

- excavation within 1,000 feet of a public supply wellfield;
- excavation within 1,000 feet of any platted subdivision not serviced by potable water; and,
- excavation that results in an average elevation less than 25 feet above mean sea level.

Policy 2.4: The county shall preserve the aquifer recharge function of palustrine wetlands by adopting the Comprehensive Wetlands Management Program, as described in the Conservation Element.

Policy 2.5: The county will require all wet detention/retention ponds with a surface area greater than one (1) acre be designed to utilize stormwater runoff for irrigation.

Policy 2.6: By 2011, the county shall contact the U.S. Geological Survey and request an updated county-wide geohydrologic survey.

OBJECTIVE 3 Preserving the Quantity of the Floridan Aquifer

Through 2025, there will be no reduction in the availability of groundwater from the Floridan aquifer. For the purpose of this objective, Floridan aquifer quantity will be based on SJRWMD's most recent regional groundwater model.

Policy 3.1: The county shall protect and preserve open space in the west portion of the county, which has been identified as a natural groundwater aquifer recharge area for the Floridan aquifer, by designating those areas for agricultural use with a very low residential density, as depicted on the future land use map.

Policy 3.2: The county shall coordinate with the SJRWMD and the IRSWCD to encourage the use of low volume irrigation systems to prevent over pumping from the Floridan aquifer.

Policy 3.3: The county shall continue to require that new developments install a minimum of 50% water-conserving xeriscape plant material, as specified in the Landscape ordinance.

Policy 3.4: The county shall reuse 100% of treated wastewater effluent for irrigation to prevent over pumping of the Floridan aquifer.

Policy 3.5: The county shall, depending on funding availability, renew its annual contract with the SJRWMD to identify and plug or repair abandoned free flowing artesian wells.

Policy 3.6: The county shall implement the policies of Potable Water Sub-Element Objective 8.

OBJECTIVE 4 Intergovernmental Coordination

By 2012, Indian River County will have written intergovernmental coordination agreements with local governments and state agencies to ensure protection of the natural groundwater aquifer system.

Policy 4.1: The county shall cooperate with agencies, such as the SJRWMD and the FDEP, in performing assessments of groundwater resources, and shall review any recommendations for incorporation into the land development regulations. County support shall include, but not be limited to, providing information, providing staff assistance, and implementing recommendations.

Policy 4.2: The county shall assist the SJRWMD with updating SJRWMD's water supply assessments by providing water use data relating to agricultural irrigation, recreational irrigation, and public supply.

Policy 4.3: The county will assist the SJRWMD in coordinating with the other counties to the west and northwest of Indian River County to protect the natural groundwater aquifer recharge areas of the Floridan aquifer by maintaining a very low land use density in these areas, compatible with densities identified in the Indian River County future land use map.

Policy 4.4: The county shall continue to utilize existing interlocal agreements with other local governments, as identified in table 11.3 of the Intergovernmental Coordination Element, to ensure maximum efficiency of water management, by combining resources and eliminating duplication.

OBJECTIVE 5 Capital Improvements

By 2015, the County shall protect a minimum of 1000 additional acres of aquifer recharge areas for the surficial aquifer through conservation easements and fee simple acquisition compared to 2009 baseline data.

Policy 5.1: The county will maintain a 5 year schedule of capital improvement needs for public facilities, to be updated annually in conformance with the review process for the Capital Improvements Element of this plan.

Policy 5.2: The county shall pursue state and federal sources of funding available for the preservation and protection of environmentally sensitive areas, such as natural groundwater aquifer recharge areas.

Policy 5.3: The county shall evaluate and rank proposed capital improvement projects for the acquisition and preservation of the natural groundwater aquifer recharge areas according to the following guidelines:

- Level One - Whether the acquisition is needed to protect public health, to protect the function of aquifer recharge, and to fulfill the county's legal commitment to provide water services.
- Level Two - Whether the acquisition will improve the existing condition and prevent or reduce future capital costs.

Policy 5.4: The county shall continue to monitor water quality at county water treatment and wastewater treatment plants.

PLAN IMPLEMENTATION

An important part of any plan is its implementation. Implementation involves execution of the plan's policies by taking actions and achieving results.

For the Natural Groundwater Aquifer Recharge Sub-Element, implementation involves various activities. While some of these actions will be ongoing, others are activities that will be taken by certain points in time. For each policy in this element, Table 3.1 identifies the type of action required, the entity or entities responsible for taking the action, the timing, and whether or not the policy necessitates a capital expenditure.

To implement the Natural Groundwater Aquifer Recharge Sub-Element, several types of action must be taken. These include, but are not limited to: revisions to land development regulations and ordinances, intergovernmental coordination, and provision of funding.

Overall plan implementation responsibility will rest with the planning department. Besides its responsibilities as identified in Table 3.1, the planning department has the additional responsibility of ensuring that other entities discharge their responsibilities. This will entail notifying other applicable departments of capital expenditures to be included in their budgets, notifying other departments and groups of actions that must be taken, and assisting other departments and agencies in their plan implementation responsibilities.

EVALUATION & MONITORING PROCEDURES

To be effective, a plan must provide a means for implementation and a mechanism for assessing the plan's effectiveness. Generally, a plan's effectiveness can be judged by the degree to which the plan's objectives have been met. Since objectives are structured, to be measurable and to have specific timeframes, the plan's objectives are the benchmarks used as a basis to evaluate the plan.

Table 3.2 identifies each of the objectives of the Natural Groundwater Aquifer Recharge Sub-Element and the measures used to evaluate progress in achieving the objectives. Table 3.2 also identifies an anticipated date of completion for each objective.

The planning department staff will be responsible for monitoring and evaluating the Natural Groundwater Aquifer Sub-Element. This will involve compilation of information, when available, regarding groundwater quantity and quality.

While monitoring will occur on a periodic basis, formal evaluation of the Natural Groundwater Aquifer Recharge Sub-Element will occur every five (5) years in conjunction with the Evaluation and Appraisal of the Comprehensive Plan. Besides assessing progress, the Evaluation and Appraisal Report (EAR) will also be used to determine if the Natural Groundwater Aquifer Recharge Sub-Element's objectives and policies should be maintained, revised or deleted. In this way, the monitoring and evaluation of the Natural Groundwater Aquifer Recharge Sub-Element will provide a means of determining the degree of success of the plan's implementation, as well as, providing a mechanism for evaluating needed changes to the Sub-Element.

**TABLE 3.1
NATURAL GROUNDWATER AQUIFER RECHARGE SUB-ELEMENT
IMPLEMENTATION MATRIX**

Policy	Type of Action	Responsibility	Timing	Capital Expenditure
1.1	Update SAPROD map to G.I.S. format	Community Development	2010	NO
1.2	Assist in developing WHPA map	Community Development/Utilities Dept./SJRWMD/DEP	2012	NO
1.3	Restrict location of septic tanks	DEP/DHRS	Ongoing	NO
1.4	Stormwater management structure design	Public Works	Ongoing	NO
1.5	Continue enforcing LDR Chapter 931 to protect public supply wellheads	Community Development	Ongoing	NO
1.6	Restrict hazardous materials in NGAR areas	Community Development	Ongoing	NO
1.7	Prohibit new injection wells	Community Development	Ongoing	NO
1.8	Discourage flood irrigation	IRSWCD	Ongoing	NO
2.1	Implement Objective 4 of the Potable Water Sub-Element and Objective 4 of the Sanitary Sewer Sub-Element	Community Development/City of VB Utilities/SJRWMD	Ongoing	NO
2.2	Use NGAR areas for parks and open space	Community Development/ Public Works	Ongoing	NO
2.3	Continue to issue permits for proposed mining projects exempt from SJRWMD regulations	Community Development/Public Works	Ongoing	NO
2.4	Adopt Comprehensive Wetlands Management Program	Community Development	Ongoing	NO
2.5	Require all stormwater ponds over 1 acre to utilize runoff for irrigation	F.S. 298 Districts/ SJRWMD/IRSWCD/ Public Works	Ongoing	YES
2.6	Obtain updated county-wide geohydrolic survey	Community Development/ Public Works	2015	YES
3.1	Preserve open space in the western county	Community Development	Ongoing	NO
3.2	Encourage use of low volume irrigation	IRSWCD/SJRWMD	Ongoing	NO
3.3	Require 50% xeriscape for new developments	Community Development	Ongoing	NO
3.4	Reuse 100% of treated wastewater effluent	IRC Utilities Dept/ City of VB Utilities	Ongoing	YES
3.5	Plug/repair abandoned flow wells	Community Development/SJRWMD	Ongoing	YES
3.6	Implement policies of Potable Water Sub-Element Objective 8	Community Development/Public Works	Ongoing	YES
4.1	Coordinate/Provide assistance	SJRWMD/DEP/IRC	Ongoing	NO

4.2	Provide water use data to the SJRMWD	SJRMWD/Utilities Dept.	Ongoing	NO
4.3	Intergovernmental coordination	SJRMWD	Ongoing	NO
4.4	Inter local agreements	BCC/SJRWMD/ Municipalities	Ongoing	NO
5.1	Maintain 5 year schedule of capital improvements	Utilities Dept./ Finance Dept.	Annual	YES
5.2	Pursue state and federal funding sources	Community Development	Ongoing	NO
5.3	CIP Evaluation/Prioritization	Utilities Dept./ Finance Dept.	Ongoing	NO
5.4	Monitor water quality at county water treatment and wastewater treatment plants	DEP/SJRWMD/DHRS/ Utilities Dept.	Ongoing	NO

BCC: Board of County Commissioners
 DEP: Florida Department of Environmental Protection
 SJRWMD: St. Johns River Water Management District
 IRSWCD: Indian River Soil and Water Conservation District
 DHRS: Florida Department of Health and Rehabilitative Services (Environmental Health)

TABLE 3.2
NATURAL GROUNDWATER AQUIFER RECHARGE SUB-ELEMENT
EVALUATION MATRIX

<u>OBJECTIVE</u>	<u>MEASURE</u>	<u>TIMEFRAME</u>
1	No instances of contamination of groundwater aquifers or public supply wells, based on primary and secondary MCLs, as defined by the FDEP	2020
2	Availability of groundwater from the surficial aquifer	2025
3	Availability of groundwater from the Floridan aquifer	2025
4	Inter-governmental coordination mechanisms	2012
5	Amount of natural groundwater aquifer recharge areas preserved	2015

F:\Community Development\Users\andy sobczak\Comp\drafts\NGWR.doc