

CHAPTER 5**CONSERVATION ELEMENT**

This planning element deals with the conservation, development, utilization and protection of natural resources in Levy County. To accomplish this, natural resources are identified, inventoried and analyzed using existing standards and criteria, and problem areas and areas of critical state and local concern are delineated.

The first section "natural resources" inventories these resources in terms of physical dimensions, economic impact and environmental quality. These latter quality criteria establish standards which form the basis of measurable goals and conditions of environmental quality in Levy County. The second section "Resource Use And Management" identified resource usage, sources of resource loss or deterioration and management practices which will best contribute to sustained resource use and environmental quality in the County. This element concludes with an action plan which delineates the goals, policies and objectives which provide the framework for carrying out the protection of environmental quality and proper resource use in Levy County.

Natural Resources

Not all natural resources are quantifiable. How can anyone measure the value of sunsets off Cedar Key, bird calls in the stillness of a bay forest, or the majesty of a stand of cypress trees a century old? It seems impossible to put numbers on the aesthetics of nature, and the same can be said for one's sense of history and identity with a location. How can one put a price on the reassurance that comes from seeing the Suwannee River flowing beautiful and clean, year after year? How can you value the confidence which comes from feeling that one's children and grandchildren will have fresh air and water without fear of some cruel interruption?

Other conservation categories, such as energy, noise and recycling, are not natural resources, but nevertheless, are issues related to the proper utilization and management of natural resources; subsequently, resulting issues are of concern to the residents and elected officials of Levy County. Examples of measurable natural resources, in terms of both quality and quantity include agricultural land, nonrenewable aquatic resources, forests, water, minerals, soils and air.

In the sections which follow, natural resources and related conservation issues in the County are identified and described. Where possible and applicable, a measure of quality and/or quantity is provided as well.

Aesthetics

Aesthetics as a general term, embraces many different concepts and understandings. In one sense, it may involve the compatibility of an object or objects with adjacent surroundings, while in another sense may provide a sense of scenic and recreational value to the beholder. Since aesthetics deals primarily with appearance, it is much like art and the feeling transmitted by an aesthetic value to an observer depends on individual interests and tastes.

In Levy County, aesthetic sites involving scenic rivers, grasslands, marshes, ocean front, archaeological and historic lands, wildlife and areas related to the coast, provide many invaluable scenic and recreational values to the visitors and natives of Levy County. Additional considerations such as community appearance, billboard regulation and the buffering of industrial, commercial and tourist activities can serve to enhance the perception qualities and aesthetics in the County.

Mineral Sources

Levy County is known for the dolomite and limestone mined therein. But the Florida Geological Survey [1] has estimated that both sand and clay deposits exist as well. Map 5-1 shows the rough boundaries of areas of mineral potential derived from preliminary untested estimates [1]. Table 5-1 gives the acreage in Levy County supposedly underlain by these deposits.

TABLE 5-1 AREAS WITH MINERAL POTENTIAL			
Rank/Mineral Resource	Area (Sq. Miles)	Acreage	Percent
1) Limestone	487.33	311,891	42.9
2) Sand	406.31	260,038	35.7
3) Limited Mineral Potential	180.50	115,520	15.8
4) Dolomite	54.42	34,828	4.8
5) Hard Rock Phosphate	6.90	4,416	0.69
Source: Areas calculated from maps provided by the Florida Geological Survey.			

MAP 5-1

AREAS WITH MINERAL POTENTIAL

The lack of a thorough, rigorous land survey for mineral deposits should make these figures highly suspect. It is quite possible that they are inaccurate by more than a factor of ten [10] in either direction. No commercial mining is initiated before an intense preliminary drilling survey.

On an area basis, areas with mining potential for limestone and sand predominate with forty-three percent [43%] and thirty-six percent [36%] respectively of the County covered, areas with limited mineral potential, such as fill, cover some 15.8% of the County, and areas potentially underlain by dolomite cover 4.8% of the County. Areas with a potential for hard rock limestone cover less than one percent [1%] of the County.

These figures can be misleading in terms of projecting economic impact. Current industry wide opinion foresees a dolomite potential twenty [20] times that of limestone. There is very little if any commercial sand explication, so sand should be seen as a potential economic contributor.

Soils

Soils in Levy County vary in drainage more widely than the topography varies in slope. The relatively flat loamy soils along the coastal fringes and the floodplains drain very slowly in comparison to the deep sands northeast of Bronson. The percolation rates differ by more than a factor of 10 [roughly 0.6-2 inches per hour versus twenty (20) inches per hour respectively (2)].

As shown in Map 4-4 of the Coastal Management Element, the poorest drainage occurs on the coastal fringes [within two (2) miles of the Gulf of Mexico] and in the floodplains of the Suwannee and Waccassassa rivers. The margins of the Withlacoochee River are an exception in this regard. Soil groups generally considered too poorly drained for most kinds of agriculture, except grazing pasture and pine plantations, are found through the coastal zone [100-year flooding area] and on up throughout the Waccassassa drainage basin.

The wedge of this drainage basin, some five [5] miles across at it's apex on the Gilchrist County line and fifteen [15] miles across as it crosses the coastal zone line, splits the areas of higher elevation in the County into two parts. These are the areas of well drained to excessively drained soils. One area centers around Chiefland and is roughly twenty [20] miles in diameter. The other area is centered some five [5] miles southwest of Williston and extends some twenty-five [25] miles along its longitudinal [North-South] axis. These two plateaus contain the majority of row crops in Levy County.

Map 5-2 gives the current definitions by the Soil Conservation Service of the boundaries of different soil groups. These definitions will most likely change by 1989-1990 when the first intensive soil survey of Levy County is completed by the SCS. Table 5-2 gives preliminary calculations of acreage covered by soil groups as well as lists of their parameters.

MAP 4-4

COASTAL ZONE SOILS

MAP 5-2

GENERAL SOILS MAP

TABLE 5-2 SOIL GROUPS OF LEVY COUNTY				
Size Rank	Map Symbol	Name of Soil Association	Acreage	Percent
2	1	Smyrna-Okeelauta-Bassinger Depressional	147,129	19.8
15	2	Floridana-Floridana Depressional	6,599	0.9
13	3	Placid-Okeelauta-Bassinger Depressional	9,532	1.3
4	4	Astatula-Candler	67,210	9.1
18	6A	Blichton-Sparr-Lochloosa	244	0.03
5	6B	Pedro-Otela-Jonesville	59,023	7.9
3	7	Bushnell Sparr or Lochloosa Variant Mabel	104,237	14.1
16	8	Wabasso-Felda-Ean Galle	3,910	0.5
1	9	Waccassassa-Demory-Boca	156,294	21.1
7	10	Myakka-Orsina-Okeelanta-Bassinger-Depressional	43,625	5.9
10	11	Orsino	13,808	1.9
14	12	Muckalee-Fluvaquents	7,699	1.0
8	13	Tidal marsh with rock	29,939	4.0
9	14	Tidal march w/out rock	22,363	3.0
12	15	Brandenton-Wabasso-Fluvaquents	10,020	1.4
17	16	Halpohumods [Zolfo or Cassia]	3,177	0.4
11	17	Broward Variant	12,464	1.7
6	19	Candler-Apopka-Sparr	44,603	6.0
		Total	741,876	100.0

Water Resources

Over one-half [½] of Levy County's border is defined by water. More than sixty percent [60%] of the County line runs along the Suwannee and Withlacoochee Rivers and the Gulf of Mexico. In addition, the Waccassassa River splits the County in half and is fed by numerous creeks and springs.

While there are a number of ponds in these lowlands and perched on aquacludes in the highlands, there are but few major standing bodies of fresh water in or adjoining Levy County. Chunky Pond, Lake Stafford and Lake Rousseau are the prominent examples. [Lake Rousseau is man-made.]

The low profile of the coastal zone results in large areas which are perennially or periodically wet due to poor drainage.

Water, whether running, standing open or saturating the soil, is the major factor in shaping and defining the landscape and its component animals, plants and other creatures, and the majority of water consumed is drawn from the section of Floridan aquifer which lies beneath the County. The movement of water directly shapes the County's natural identity, and the purity of water helps determine the County's human identity by encouraging habitation, and hence, commerce and industry.

Groundwater

Groundwater in Levy County occurs in three aquifers separated by "confining beds" which restrict water movement between aquifers. The uppermost aquifer contains the water table, and its geology is characterized by relatively loose and unconsolidated sediments. Below this are "secondary artesian aquifers" made of beds of shell, sand, gravel and limestone.

The principal regional aquifer, the Floridan, is found lowermost and is composed of a series of layers of soft, porous limestones and of hard, dense limestones and dolomites [3]. In the Eastern and Northeastern portions of Levy County, the Floridan aquifer is usually full and confined by overlying deposits of unconsolidated materials. In the Southwestern portion, the coastal zone as defined in Chapter 4, the Floridan aquifer is unconfined and contains the water table for the area. The storage capacity of the Floridan aquifer has yet to be thoroughly investigated but is thought to be greatest where the aquifer is thickest and saturated. Map 5-3 suggests that water storage capacity as a function of the aquifer's thickness, diminishes as one proceeds from the Marion County border westward. Map 5-4, "yields of 12-inch wells," supports the general idea of lower water storage capacity towards the west. Yields of wells tend to decrease as one moves toward the Gulf Coast [3].

Water quality in the Floridan aquifer throughout Levy County is good except in a narrow coastal band near Yankeetown. There the chloride concentration exceeds two hundred fifty [250] milligrams per liter [3]. Iron can be a problem as can hydrogen sulfide [3]. Problematic concentrations of iron have been noted in Cedar Key and Otter Creek [4]. Chiefland water has been noted for troublesome concentrations of bromine, arsenic and nitrate [5]. There is a potential for sulfur in the groundwater around the Bronson area. This is supported by Map 5-5, "Sulfate concentrations in water from the upper part of the Floridan aquifer."

Dissolved solids concentration, as depicted in Map 5-6, range for the most part from two hundred fifty [250] to five hundred [500] milligrams per liter. Along the coast the principle constituents are sodium and chloride whereas elsewhere the predominate dissolved solids are calcium and bicarbonate. As shown in Map 5-7, water in the Floridan Aquifer is hard to very hard [3].

Other determination of groundwater quality may be found in Table 4-9 of the Coastal Management Element [Chapter 4 of the Comprehensive Plan].

Some six [6] springs with a discharge rate greater than one [1] cubic foot per second are known in Levy County. Two [2] of these, Fanning Springs and Manatee Spring, have discharge rates large enough to make them regionally known [3]. Table 5-3 gives location data plus physical and chemical parameters for each

spring. The aesthetics and purity of these springs, especially larger ones, have created County-wide and even regional tourist attractions. It's possible that part of this attraction is due to the general absence of plants and animals in spring water with very low nutrient and oxygen concentrations.

The city/town location of the springs are as follows: Blue Springs are located in Bronson, Fanning Springs in the Town of Fanning; Manatee Springs in the City of Chiefland; and, Wekiva Springs are located in Gulf Hammock.

MAP 5-3

MAP 5-4

MAP 5-5

MAP 5-6

MAP 5-7

TABLE 5-3

SPRINGS IN LEVY COUNTY - QUANTITY AND QUALITY DATA

Spring Number	Spring Name	Location Latitude	Location Longitude	Period of Record	Discharge (ft ³ /s)	Temperature (C)	Dissolved Solids (mg/L)	Specific Conductance (umho/cm)	Hardness as CaCO ₃ (mg/L)	Chlorida (mg/L)
<u>Levy County</u> 1	Blue Spring	29*27'02"	82*41'57"	1917-74	4.5/22.0	23.0/23.5	--	175/550	87/-	3.5/-
2	Fannin Springs	29*35'15"	82*56'08"	1930-73	90*/170*	22.0/23.0	200/-	330/357	170/180	1.0/4.5
3	Manatee Springs	29*29'22"	82*58'37"	1932-73	110/238	22.0/23.0	235/-	390/413	210/220	4.0/5.1
4	Wekiva Springs	29*16'49"	82*39'23"	1917-74	29/100	23.5/-	90/-	156/-	79/-	3.0/-

Source: Miller et al. (1981) "Water Resources for the Withlacoochee River Region, West Central Florida", US Army Corps of Engineers, IS Geological Survey, Water Resources Investigations 81-11, Tallahassee, Florida.

Surface Water

The quality and quantity of flowing surface water has been considered in Tables 4-7 and 4-8 of the Coastal Management element. These are the result of average annual run-offs of five [5] to ten [10] inches in the Withlacoochee River and coastal basins of Levy County and of ten [10] to fifteen [15] inches in the Suwannee River basin [3].

Map 5-9 shows that, aside from the lower Waccassassa River basin, which has sodium chloride type streams, the majority of streams in Levy County are of the calcium and magnesium bicarbonate type.

The month-to-month variation in stream flow in Levy County is relatively small because of: 1) the relatively high rate of evapotranspiration in the summer which offsets larger amounts of summer rainfall; and, 2) the large and relatively stable inflow of ground water to streams from extensive limestone aquifer systems.

Map 5-8 shows that the closer to the gulf coast the higher the concentration of dissolved solids in streams in Levy County [3]. This is a reflection of water's role in washing over the landscape and becoming ever more concentrated as larger rivers collect the many small streams. It is estimated [3] that in Florida the dissolved solids load slightly exceeds the suspended solids load in streams.

The chemical composition of Levy County streams is shown in Maps 5-10 and 5-11. Map 5-10 depicts a decrease of nitrogen levels in stream water as one proceeds northwest to the Suwannee River. Map 5-11 shows increasing phosphate levels adjacent to the Suwannee and Withlacoochee Rivers.

While lowland areas in the coastal zone contain hundreds of small ponds interspersed among marshes and swamp forests, Levy County only contains three [3] lakes of any appreciable size. These lakes and their physical and chemical characteristics are listed in Table 5-4.

Several items are worth noting in Table 5-4. Both Long Pond and Lake Rousseau have relatively large portions of their surface covered by macrophytes [plants larger than algae], forty-nine percent [49%] and eighty-two percent [82%] respectively. Further, using a trophic state index of sixty [60] as a threshold level indicating a dangerously high state of eutrophication [6], Chunky Pond is in trouble and Long Pond is nearly so. That is to say that these ponds may be exhibiting high concentrations of nutrients and algae which may be found noxious by County residents.

Huber et al. [6] discuss some of the problems which can be associated with lake eutrophication:

MAP 5-8

MAP 5-9

MAP 5-10a

MAP 5-10b

MAP 5-11

**TABLE 5-4
WATER QUALITY PARAMETERS OF LEVY COUNTY LAKES**

	Surface Area (acres)	Elevation (feet)	Lake Type	Macro-phyte Coverage (area)	Macro-phyte Covera ge (%)	Tro- phic State Index	Nitro- gen/ Phosph orous Ratio	Chlorp- hyl A (mg/cu bic feet)	Secchi Disk (waters depth)	Total Nitro- gen (mg/L)	Total Phosp h-orous (mg/L)	Minim um Total Nitro- gen (mg/L)	Maxim um Total Nitro- gen (mg/L)	Minim um Total Phosp h-orous (mg/L)	Maximum Total Phospho- rous (mg/L)
Long Pond	254	24	1	125	0.492	58.86	19.66	10.00 +3.5	0.75 +0.35	1.14 +0.09	0.058 +0.008	1.07	1.21	0.052	0.061/2
Chunky Pond	653	55	3	--	--	60.25	16.98	--	--	1.2 +0.1	0.07 +0.07	1.1	1.3	0.02	0.19
Lake Rousseau	3657	27	3	3010	0.823	33.31	11.94	2.29 +2.0	3.13 +1.3	0.47 +0.12	0.039 0.01	0.248	0.95	0.015	0.09
Source	1	1	1	2	2	2	3	3	4	4	4	5	5	5	5

Note: Chunky Pond’s TSI 60 = considered a potential problem lake

- Sources: 1) Florida Water Resources Research Center (1982). Florida Lake Gazetteer, p.88.
 2) W.C. Huber et al. (1982). A Classification of Florida Lakes, Florida Water Resources Research Center, Publication No. 72, p. 2-42.
 3) Ibid. pp. 3-41 through 3-47.
 4) Ibid. p. 3-60.
 5) Ibid. p. 3-69.

A number of specific water quality problems are associated with eutrophic conditions and these problems worsen as a lake becomes more eutrophic [nutrient-enriched]. Dissolved oxygen is lost from bottom waters as a result of organic matter decomposition; taste and odor problems develop from noxious growths of algae; aquatic weed growths become excessive and interfere with boating and swimming; and, game fish populations are replaced by rough fish as a consequence of loss of spawning areas and food stocks preferred by game fish. Of course, the degree of water quality problems depends on the intended use of the water, as well as on the degree of eutrophy. As warm-water fisheries, moderately eutrophic lakes may be preferable to oligotrophic lakes, and in this sense it is simplistic to state that eutrophication is inherently detrimental. On the other hand, use of lake water for swimming or drinking purposes places a premium on water clarity, and the least degree of eutrophy [i.e. the most oligotrophic condition] is preferred for such uses.

Estuarine and marine water quality off Levy County are described in the Coastal Management Element [see Table 4-10].

Air

Levy County residents enjoy a high standard of air quality. Wind patterns bring untainted air off the Gulf of Mexico from the West, and no major air pollution plume reaches Levy County from up wind. Any measurement of air pollution has shown levels well below standards set by the Florida Department of Environmental Regulation [D.E.R.]. The D.E.R. standard for sulfur dioxide is two hundred sixty [260] micrograms per cubic meter, and the highest reading so far has been seventy-seven [77] micrograms per cubic meter [7]. Since this latter reading was taken from a monitor closer to the Crystal River coal plant than the border of Levy County, it's probable that readings within the County would be lower than that.

The only remaining, and untested, air pollutant might be limestone and dolomite dust settling downwind from the mines. Automobile traffic does not reach congestion levels which would create dangerous pollution conditions, and no major industrial polluter is operating within or near the County.

Natural Areas - Vegetation and Wildlife

Levy County is one of the least developed counties in Florida. The population density of twenty [20] persons per square mile is fifty-fifth [55th] out of sixty-seven [67] counties in the state. Very little of the County has experienced high intensity modification such as urban or suburban development. Large sections of the County have been converted to such agricultural uses as pine plantations, grazing land and row crops.

Marine Habitats. The marine and estuarine areas on the gulf coast of Levy County are described and quantified in the Coastal Management Element.

Wetlands Habitats. The low profile of the coastal lowlands is easily flooded and is often saturated with water. Similarly, flooding occurs on a broad flood plain about the Waccassassa River reaching from the coastal lowlands up along the edge of the Ocala Uplift to the border of Gilchrist County. In such flooded and saturated conditions, wetland plant species have become established in over thirty-seven [37] kinds of communities. Map 5-13 simplifies this crowd of wetland types by showing only fresh and saltwater wetlands. In addition, areas containing more than thirty percent [30%] wetlands are shown as a wetland/upland mix. This is done to reflect the widespread extent of upland landscape which is riddled with hundreds of many

small wetland types.

Floodplains cover a majority of Levy County. Map 5-14 shows that some seventy percent [70%] of the County is prone to flooding during the most severe or extended times of rainfall. This is yet another indication of the predominate influence of water in the County.

Not all floodplains are wetlands, as some areas are subject only to seasonal flooding, riverine flooding, or coastal flooding associated with hurricanes. Because some upland communities are flood prone, they can provide a deceptive sense of security to residents. Levy County participates in the National Flood Insurance Program, and so requires compliance with an adopted County floodplain ordinance; however, merely elevating or floodproofing a structure does not eliminate other problems associated with flood-prone areas, namely, the hazards posed by:

- (1) Wells polluted by surface water.
- (2) Toilets that won't flush and septic tanks that pollute surface water during flooding.
- (3) Floodwaters cutting off access roads.

Based upon these problems, no new residential subdivisions should be platted unless each lot contains a usable upland [non- flood prone] area, with access via a road that is elevated above the 100-year flood elevation adopted by the County. For existing lots of record that lie within flood-prone areas, development at the platted intensity is compatible with and appropriate for the flood-prone areas, provided that no further subdivision occurs.

[Note: Map 5-14 is highly generalized. Levy County has adopted detailed flood-prone area maps prepared by the Federal Emergency Management Agency, and those maps are hereby adopted by reference thereto and they take precedence over Map 5-14.]

For tracts currently unplatted but flood-prone, the Future Land Use Map, which was developed in consideration of flood-prone areas, established the permissible densities that are the maximums given the preceding discussions regarding usable land area. Most flood-prone areas are suitable for only very low densities, normally one unit per forty [40] acres but higher if control sewer and water are provided as well as elevated access.

Upland Areas Forests make up more than half of the area of Levy County. Table 5-5 shows that of 466,584 acres of forest, forty point eight percent [40.8%] is pine forest [21.8% plantation and 19% natural], twelve percent [12%] is oak-pine mix, and forty-seven point three percent [47.3%] is hardwood [22.2% upland and 25.1% lowland]. Given that roughly fifty percent [50%] of the County forests are in forest industry hands, it is easy to imagine that these proportions could change significantly from year to year.

Pine forest has been planted by Georgia Pacific west of the Waccassassa River in areas hitherto considered wetland forest before they were clear-cut. Therefore, Table 5-5 does not necessarily reflect only upland plant communities. Almost any of the categories except "Upland Hardwood" might be perennially wet.

Vegetative Communities Wildlife. Despite the fact that much of Levy County has been modified for human uses, enough land remains in wild or semi-wild state that an extensive wildlife community is present. Map 4-8 of the Coastal Management Element shows the approximate ranges of many animals found in the County and surrounding region.

The list of species is actually far greater. This is born out by Table 5-6 which lists most of the vegetative communities and their component species. Of critical importance is that common to many of these communities, the omnivore, Florida black bear, which can serve the function of predator also. As discussed in the Coastal Management Element, these creatures are increasingly recognized for their role in influencing natural selection from the top of the food chain. When this is done in more than one ecosystem, then the predator is integrating the functions of these ecosystems. Thus the importance of the predator is commensurately raised and, in fact, multiplied by its linking of the workings of different ecosystems. For this reason, predators and their habitats deserve special protection.

Endangered and threatened species are listed in Table 5-7. The rarity of such creatures does not indicate their lack of importance to the workings of nature. Rarity can result from having lost habitat, from having been hunted exhaustively or from the fact that the creature fills a scarce niche in the environment.

Special attention should be given to species whose actions facilitate the livelihoods of other species. The Red-Cockaded Woodpecker is an example. This is the only woodpecker in North America which nests in live [as opposed to dead] wood. So loss of this woodpecker endangers a host of other birds. [The niches it leaves are used by a variety of song birds.] Similarly, as agro-forestry practices eliminate dead wood in forests we endanger the nesting habitat of forty percent [40%] of all north Florida nesting birds [8].

MAP 5-12

MAP 5-13

WETLANDS MAP

MAP 5-14

FLOOD-PRONE AREAS
IN LEVY COUNTY

TABLE 5-5

REGIONAL FOREST ACREAGE OVERVIEW

County	All Ownerships	Natural Forest	Other Public	Forest Industry	Other Private	Planted Pine	Natural Pine	Oak Pine	Upland Hardwood	Lowland Hardwood
Alachua	309,353	--	6,049	103,271	200,033	97,175	54,588	31,446	74,712	51,432
Citrus	236,229	--	44,379	--	191,850	17,652	38,966	42,413	79,472	57,729
Dixie	395,155	--	290	372,484	22,381	156,097	36,873	26,231	52,544	123,410
Gilchrist	141,989	--	288	34,396	107,305	59,527	13,068	3,267	46,842	19,285
Levy	466,584	--	742	235,730	230,112	101,813	88,435	55,698	103,778	116,860
Marion	631,402	252,595	29,010	70,898	278,899	122,581	235,773	64,730	141,971	66,347

Source: USDA (1982) Florida's Forest. Forest Service Resource Bulletin SE-62, Southeastern Forest Experimental Station, Asheville, North Carolina.

TABLE 5-6

ECOLOGICAL COMMUNITIES OF LEVY COUNTY- FLORA & FAUNA

Community	Dominant Vegetation	Common Wildlife Species	Rare Animals - Status	Rare Plant - Status
Longleaf pine & Turkey Oak Hills	Longleaf pine Turkey oak Wiregrass	fox, squirrel, pocket gopher, deer, bobwhite quail, ground dove, rufous-sided towhee, gopher tortoise, fence lizard	Florida panther E Florida mouse SSC Southeastern Kestrel T Gopher tortoise SSC Red-cockaded woodpecker T Blue tailed mole skink T Short-tailed snake T Gopher tortoise SSC	East coast coontie C Florida coontie C Godfrey’s blazing star E
North Florida Flatwoods	Slash pine Gallberry Saw-palmetto	bobcat, deer, cottontail rabbit, cotton rat, fox squirrel, gray fox, raccoon, opossum, skunk, Bachman’s sparrow, bobwhite quail, pine warbler, red-bellied woodpecker, red-shouldered hawk, rufous-sided towhee, Eastern diamondback rattlesnake, pygmy rattlesnake, chorus frog, cricket frog, grass frog, flatwoods salamander	Florida black bear - T Florida panther - E Southeastern kestrel - T Red-cockaded woodpecker - T Florida sandhill crane - T Bald eagle - T Eastern Indigo snake T	Chapman’s rhododendron - E

<p>Cabbage Palm Flatwoods</p>	<p>Cabbage palm Slash pine Saw Palmetto Tar-flower Waxayrtle</p>	<p>Cotton mice, cotton rat, cotton-tail rabbit, bobcat, opossum, deer, raccoon, striped skunk, Bachman’s sparrow, bobwhite quail, red-shouldered hawk, rufous-sided towhee, Eastern diamondback rattlesnake, pygmy rattlesnake, black racer, yellow rat snake, chorus frog, cricket frog, oak toad.</p>	<p>Florida panther - E Mangrove fox squirrel - T Southeastern kestrel - T Bald eagle - T Eastern indigo snake - T</p>	<p>Virginia chain fern - T</p>
<p>Upland Hardwood Hammocks</p>	<p>Deciduous hardwoods, beech, holly, oaks, hop-horebean, hickories, magnolia, sweet gum, dogwoods, black cherry.</p>	<p>Raccoon, opossum, southern squirrel, gray squirrel, bobcat, gray fox, deer, armadillo, blue bird, bluejay, cardinal, turkey, cedar waxwing, chickadee, wrens chuckwills widow, great crested flycatcher, eastern mockingbird, loggerhead shrike, morning dove, palm warbler, summer tanager, robin, rufous-sided towhee, tufted titmouse, woodpeckers</p>	<p>Florida panther - E Florida black bear - T Eastern indigo snake - T</p>	<p>Needle palm - C</p>
<p>Wetland Hardwood Hammocks</p>	<p>Evergreen hardwoods, redbay, water oak, magnolia, red maple, laurel oak, live oak, cabbage palm, sweet gum</p>	<p>Bobcat, deer, skunk, mink, opossum, otter, raccoon, hog, gray squirrel, Mississippi kite, owls, turkey, red-shouldered hawk, woodpeckers, numerous songbirds, green anole.</p>	<p>Florida black bear - T Florida panther - E</p>	<p>Auricled spleenwort - E Climbing day flower - T Cuplet fern - E</p>

Oak Hammocks	live oak, laurel oak, saw palmetto, beauty berry.	Bobcat, deer, foxes, armadillo, opossum, raccoon, skunks, squirrels, rabbits, owls, rufous-sided towhee, songbirds, turkeys, woodpeckers, southern toad, green anole, southern fence lizard, diamond back rattlesnake, hognose snake.	Florida panther - T Short-tailed snake - T	East coast coontie - C Dwarf spleenwort - E Sinkhole fern - E
Salt Marsh	Shoregrass, salt pasapalm, cordgrass, needlegrass, bulrush, dropseed, sea purslane, sea blite	Brown pelicans, coots, egrets, gulls terns, seaside sparrows, many waterfowl species, alligator, diamondback terrapin, saltmarsh snake.	West Indian manatee - E Eastern brown pelican - SSC Cape sable seaside sparrow - E Least tern - T Arctic peregrine falcon - E Roseate tern - T Bald eagle - T Wood stork - E American alligator - SSC Atlantic green turtle - E Atlantic saltmarsh water snake - T	
Mangrove	Black mangrove, button mangrove, red mangrove, white mangrove	Mink, raccoon, wood stork, bald eagle, gulls, boat-tailed grackle, osprey, roseate spoonbill, hawks, belted kingfisher, herons, ibis, vireos, prairies warblers, brown pelican, alligator, rat snake	Arctic peregrine falcon - E bald eagle - T Eastern brown pelican - SSC White-crowned pigeon - T Wood stork - E American alligator - SSC Florida ribbon snake - T	

Swamp Hardwoods	Deciduous hardwoods, blackgum, red maple, water tupelo, bald cypress, buttonbush, dahoon lolly	black bear, bobcat, deer, raccoon, gray squirrel, otter, barred owl, mink, hawk, horned owl, pileated woodpecker, turkey, wood duck, various songbirds, turtle & snake species.	Florida black bear - T Florida panther - E Bachman's warbler - E Ivory-billed woodpecker - E Bald eagle - T American alligator - SSC	Dwarf spleenwort - E Hanging clubmoss - E Harper's beauty - E
Cypress Swamp	Pond cypress, bald cypress, button bush, wax myrtle	Deer, mink, raccoon, otter, anhinga, barred owl, egrets, herons, limpkin, pileated woodpecker, wood stork, purple gallinule, wood duck, prothonotary warbler, alligator, frogs, turtles, salamanders, variety of water snakes.	Florida black bear - T Ivory-billed woodpecker - E Bald eagle - T Wood stork - E	Climbing day flower - T Hidden orchid - E Nodding catopsis - E Giant water dropwort - E Fuzzy-wuzzy air plant - E Bird's nest spleenwort - E Grass-of-Parnassus - E
Shrub bogs - bay swamps	Evergreen hardwoods: loblolly-bay, red bay, sweet bay, slash pine, pond pine, titi, gallberry, fetter-bush, blackgum	Wildlife inhabiting North Florida flatwoods frequently use bay swamps for cover and food. Egrets, herons, variety of frogs, salamanders, snakes.	Everglades mink - T Florida black bear - T Florida panther - E	Chapman's rhododendron - E Harper's beauty - E

- C - Heavy commercial exploitation
- SSC - Species of special concern
- T - Threatened
- E - Endangered

Source: Soil Conservation Service, 26 Ecological Communities. Soil Conservation Service, US Department of Agriculture, Fort Worth, Texas. Official list of endangered and potentially endangered fauna and flora in Florida, September 2, 1986. Florida Game and Freshwater Fish Commission. Compiled by Don A. Wood.

Resource Use And Management

In an industrial age the quality of life has too often been portrayed, inaccurately, as being primarily affected by the amount of work a person is spared due to one's command of machine power. This view ignores the real basis of the quality of life: the experience and enjoyment of nature's resources. Machines and all their attendant infrastructure can make natural resources more available to someone. But machines cannot create or recreate natural resources, at least not economically. One only has to experience the struggle of maintaining a healthy salt water aquarium or an outdoor swimming pool to realize how much work of nature is doing undetected in maintaining clean estuaries and rivers.

As the price of fuels which drive our machinery goes up, our ability to obtain natural resources decreases. It is even more incumbent on us to use these natural resources wisely and to protect their sources in the environment.

The following section describes for Levy County [1] the use of resources, [2] projected needs of resources, [3] potential for conservation of resources, [4] conservation and management practices which are in place to aid in insuring ongoing availability of resources.

Minerals

County wide mineral exploitation, both current and projected, is discussed as background information in the section on Coastal Economy in the Coastal Management Element. In summary, current limestone mining yields average one million [1,000,000] tons per year and industry-wide projections are for another forty [40] years of economic mining activity. Dolomite potential yields are said to be ten [10] to twenty [20] times that of limestone. Potential yields are extremely hard to predict given the patchy, non-continuous nature of mineral seams, outcrops and motherlodes.

TABLE 5-7

ENDANGERED AND THREATENED SPECIES OF LEVY COUNTY

Type of Organism/Level of Danger/ Common Name	Scientific Name	Habitat
<p>Plants</p> <p><u>Endangered</u></p> <p>Chapman’s Rhododendron Godfrey’s Blazing Star</p> <p>Giant Water dropwort</p> <p>Pigmy pipes</p> <p>Sinkhole fern</p> <p><u>Threatened</u></p> <p>Dwarf spleenwort</p> <p>Scrub buckwheat</p> <p><u>Commercially Exploited</u></p> <p>Florida Coontie Needle palm</p>	<p><u>Rhododendron chapmeniu</u> (Gray) <u>Liatis provincialis</u></p> <p><u>Oxypolis greenmaii</u></p> <p><u>Monotropis reynoldsiae</u></p> <p><u>Blechnum occidentale</u> L</p> <p><u>Asplenium pamilua</u></p> <p><u>Erigonum floridanum small</u></p> <p><u>Zania floridana</u> <u>Rhapidophylum hystrix</u></p>	<p>Pine flatwoods Stabilized sand dunes, longleaf & sand pine-scrub oak communities. Shallow water of cypress ponds & flatwood depressions. Root parasites on flowing dogwood in mixed & deciduous forests. Deep shaded ravines, moist dense hammocks, on sheer rock wall of deep sinkholes.</p> <p>On limestone & other calcerous rocks in moist hammocks. Longleaf Pine-Turkey oak association (“high pines”)</p> <p>Longleaf Pine-Turkey oak association. Atop blocks of limerock in deep hammocks on lower slopes of deep wooded ravines.</p>
<p>Invertebrates</p> <p><u>Rare or Status Undetermined</u></p> <p>Hobb’s Cave amphipod</p>	<p><u>Crangonyx hobbsi</u></p>	<p>On or near organic accumulations in caves and sinkholes.</p>
<p>Fish</p> <p><u>Species of Special Concern</u></p> <p>Atlantic Sturgeon</p> <p>Suwannee Bass</p>	<p><u>Acipenser oxyrhyncus</u></p> <p><u>Micropterus notius</u></p>	<p>Spawns upriver, younf live for a while in the river before returning to the sea.</p>

<p>Reptiles and Amphibians <u>Threatened</u> Eastern Indigo snake Gulf Salt Marsh water snake Short-tailed snake <u>Species of Special Concern</u> Alligator Snapping turtle American alligator Gopher tortoise Suwannee cooter Florida Gopher frog UR2 - Gulf Hammocks dwarf siren <u>Endangered</u> Atlantic Leatherback turtle</p>	<p><u>Drymarchon corals couperi</u> <u>Merodia fasciata clarki</u> <u>Stilosoma extenuatum</u> <u>Macrolemys temmincki</u> <u>Alligator mississippiensis</u> <u>Gopherus polyphemus</u> <u>Chrysemys concinna suwannienis</u> <u>Rana aereolata aesopsis</u> <u>Pseudobranchius straiatus lustricolus</u> <u>Dermochelys coriacea</u></p>	<p>Gopher tortoise holes in dry sandy communities. Salt marshes supporting Blackrush, Cordgrass & Glasswort. Longleaf Pine-Turkey oak, Sandpine scrub. Gulf River drainages. Edges of ponds, lakes, rivers, streams & interiors of swamps & freshwater marshes. Dry, well drained soils; Scrub oak & Sandpine. River & springs with heavy growth of Naias & Safittaria. Sandhill communities of Bluejack & Turkey oak, Longleaf pine-Turkey oak, Live oak hammocks. Weed-choked cypress & flatwood ponds, ditches, floodplain, lakes. Beaches.</p>
<p>Birds <u>Endangered</u> Bachman’s warbler Ivory-billed woodpecker Wood stork <u>Threatened</u> Red-cockaded woodpecker Florida Sandhill crane Florida Scrub jay Least tern Southeastern kestrel Southern Bald eagle Marian’s Marsh wren <u>Species of Special Concern</u> Worthington’s Long-billed marsh wren Eastern Brown pelican Snowy egret</p>	<p><u>Vermivora bachmani</u> <u>Campephilus principalis</u> <u>Mycteria americana</u> <u>Picoides borealis</u> <u>Grus canadensis pratensis</u> <u>Aphelocoma coerulescene</u> <u>Sterna antillarum</u> <u>Falco sparverius paulus</u> <u>Haliaeetus l.leucocephalus</u> <u>Cistothorus palustris marianae</u> <u>Cistothorus palustris griscus</u> <u>Pelecanus occidentalis carolinensis</u> <u>Egretta thula</u></p>	<p>Extensive mature stands of lowland hardwood forest. Mixed hardwood pine, hardwood, hammocks & swamps: cypress swamps, Coastal areas with dead trees, mangroves regenerating from hurricanes. Nesting in cypress and mangrove swamps, feeding in freshwater marshes. Stands of mature to over-mature southern pines. Wet prairies, marshes, lake margins, shallow flooded areas. Oak scrub communities (Live, Myrtle, Chapman) plus Saw palmetto. Open, flat beach with coarse sand and/or shell. Open forests, clearings with dead trees, edges of river bottom land. Primarily riparian, associated with coast, lake, river shores-nesting near water bodies where they feed, may nest in tree islands in midst of marshes. Saltwater or brackish marshes, usually in river estuaries, occasionally in sawgrass. Tall cordgrass marshes on the edges of tidal creeks. Nest on costal wetlands (Buttonbush, wax myrtle, willow, mangrove), feed with other waders in shallow marshes, edges of ponds and swamp stream banks.</p>

<p>Mammals</p> <p><u>Endangered</u> Florida panther West Indian manatee</p> <p><u>Threatened</u> Florida black bear Mangrove</p> <p><u>Species of Special Concern</u> Florida mouse Sherman’s Fox squirell</p> <p><u>Rare</u> UR2 - Southern big-eared bat</p> <p>UR2 - Florida mink</p>	<p><u>Felis concolor coryl</u> <u>Trichechus manatus latirostris</u></p> <p><u>Ursus americanus floridanus</u></p> <p><u>Sciurus niger avicenna</u></p> <p><u>Peromyscus floridanus</u></p> <p><u>Sciurus niger shermani</u></p> <p><u>Plecotus reafinesquii</u></p> <p><u>Mustela vison lutensis</u></p>	<p>Same as deer, ecotones. Sluggish rivers, shallow estuaries, saltwater bays.</p> <p>Edges of freshwater marshes and cultivated lands, dry pine woodlands, buttonwood and thatch palm. Open pine lands, dry cypress stands, coastal broadleaf tropical evergreen hammocks.</p> <p>Sandpine scrub in early successional stage, longleaf pine-turkey oak communities. Longleaf pine-turkey oak community.</p> <p>Prefer heavily forested areas, but use dilapidated cabins, shacks, hollow trees, crevices in loose bark. No special preference (Sandpine scrub to cypress swamp).</p> <p>Coastal salt marshes, river mouths, estuarine zone.</p>
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Legend: UR2 - Under Review for listing, but substantial evidence of biological vulnerability and/or threat is lacking.

Source: Official list of endangered and potentially endangered fauna and flora in Florida. September 2, 1986. Florida Game and Freshwater Fish Commission. Compiled by Don A. Wood.

Water

Human bodies may be composed of more than ninety percent [90%] water, and our reliance on water for drinking, cooking and cleansing is easily evident. What is not apparent is how our use of machinery has caused water use to sky-rocket. The importance of water has not diminished with our advances in technology. Our dependence on water continues to increase tremendously, as has our need to guard the purity of our water and its sources.

Sources

All public water within the County is drawn from groundwater [3], and on the whole groundwater [GW] use appears to be the predominant form. As shown in Table 5-8, surface water [SW] use seems to have grown from two point seven percent [2.7%] of total GW use in 1975 to twenty-seven percent [27%] in 1981, a ten [10] fold increase. However, this apparent increase could merely be the result of incomplete water use surveying in the early 1970's. Currently, GW use appears to be three [3] times that of SW.

The only area of water use where SW seems significant is in the watering of livestock. In 1977, SW use was three hundred sixty thousand [360,000] gallons per day or forty-two percent [42%] ([3] - Table 4) of all livestock water, though only seven point seven percent [7.7%] of all water use.

The primary source of water for potable, agricultural, and industrial use in Levy County is groundwater from the Floridan aquifer. Approximately, ninety-nine point nine percent [99.9%] of water used for these purposes is withdrawn from the Floridan Aquifer, with surface water withdrawals constituting the remaining one tenth percent [1/10%]. This one tenth percent is sometimes used for agricultural lands. The water resources are replenished by the many rivers flowing through Levy County and rainfall within the County.

The average annual rainfall within the County is fifty-six [56.0] inches, or 1 trillion gallons. Approximately thirty-eight point five [38.5] inches, or seven hundred thirty-six billion [736,000,000,000] gallons per year return to the atmosphere through evaporation from land and water surfaces and through transpiration from plants. The remaining ten [10] inches, or 19.1 billion gallons per year, become run-off to surface waters or percolates through the soil to the underlying aquifers. Approximately thirty-nine percent [39%] of the County is a high recharge area for the Floridan Aquifer. Recharge rates in these areas are estimated to be between fifteen [15] to twenty [20] inches per year, with the potential of providing from two hundred eighty-six billion [286,000,000,000] to three hundred eighty-two billion [382,000,000,000] gallons of water to the Floridan Aquifer annually [refer to Map 10 A] twenty point five percent of the land has a recharge of five [5] to ten [10] inches per year and twenty point two percent [20.2%] has up to five [5] inches per year. The remaining twenty percent [20%] of Levy County has a discharge of up to ten [10] inches per year.

See Table 5-9 for calculations and a summary of water resources.

TABLE 5-8

LEVY COUNTY WATER USE: 1970-1985

Year	Source	USE						SUBTOTAL		TOTAL		% Increase over 1970	
		Public GW	Public SW	Rural Domestic GW	Rural Domestic SW	Ag-irrigation GW	Ag-irrigation SW	Industrial GW	Industrial SW	Ground Water	Surface Water		GW SW
1970	(1)	0.9	0	N/A	N/A	0.4	0	0	0	1.3	0	1.3	0
1975	(1)	1.0	0	1.5	0	1.2	0.1	0	0	3.7	0.1	3.8	292
1977	(1)	1.0	0	1.2	0.5	1.9	0.1	0	0	4.1	0.6	4.7	362
SRWMD	(2)	0.44			0.58		2.18*	0				3.2	3.65
SWFWMD	(2)	0.61			0.28		0.66*	0				1.55	
1978	(1)	1.0	0	1.2	0.6	1.6	0.1	0	0	3.8	0.7	4.5	346
1979	(1)	1.0	0	1.3	0.6	1.4	0.4	0	0	3.7	1.0	4.7	362
1980	(1)	1.0	0	1.5	0.7	1.3	0.4	0.2	0	4.0	1.1	5.1	392
1981	(1)	1.0	0	1.6	0.7	2.0	0.6	0.2	0	4.8	1.3	6.1	469
1983													
SRWMD		N/A		N/A		N/A		N/A		NA	N/A	N/A	N/A
SWFWMD	(3)	0.34		0.89		5.14		0.0		N/A	N/A	6.37	490
1984													
SRWMD		N/A		N/A		N/A		N/A		NA	N/A	N/A	N/A
SWFWMD	(4)	0.33		1.56		8.67		0.0		N/A	N/A	10.56	812
1985													
SRWMD	(5)	0.78		0.73		3.95		2.69		NA	N/A	8.15	1,499
SWFWMD	(6)	0.41		1.43		9.50		0.0		N/A	N/A	11.33	N/A

* = Includes livestock use N/A = Data not available SW = Surface water GW = Ground water

- Sources: (1) Central Florida Planning and Development Corporation, data base for the Central Florida Region.
 (2) Withlacoochee RPC (1980). "Coastal Water Resources Project", Grant No. FL-C-0957, Ocala, Florida, pp.172.
 (3) Steiglitz, E.H. (1984) "Estimated Water Use in the Southwest florida Water Management District," Brooksville, Florida.
 (4) Steiglitz, E.H. (1985) "Estimated Water Use in the Southwest florida Water Management District," Brooksville, Florida.
 (5) SRWMD (1985) "Public Supply and Domestic Water Use Summary" computer printout, Live Oak, Florida.

- (6) Steiglitz, E.H. (1986) "Estimated Water Use in the Southwest florida Water Management District," Brooksville, Florida.

TABLE 5-9 SUMMARY OF WATER RESOURCES FOR LEVY COUNTY, 1986		
Rainfall Characteristic	Amount	Annual Water Yield in Billion Gallons
Annual Rainfall	56.0 inches	100 <u>1/</u>
Annual Evapotranspiration	38.5 inches	73.6 billion
Run-off and Infiltration	10 inches	19.1
Recharge to Floridan Aquifer	15.20 inches	11.2
<p><u>1/</u> 704,000 acres in Levy County Annual Yield = Rainfall in feet X acreage X 325,850 gallons per acre foot. Example: (56 inches divided by 12 inches/foot) X 704,000 acres X 325,850 gal/acre foot = 1.032 trillion gallons.</p> <p><u>2/</u> 275,264 acres of high recharge area to the Floridan Aquifer in the County.</p> <p>Source: Central Florida Planning And Development, a division of Forestry and Environmental Services, Inc., 1988.</p>		

Capacity Assessment. As indicated, the County does not maintain a potable water system for its residents. Residents who are not hooked up to city water or private systems currently utilize individual water wells for water supply.

Based on 1987 population estimates, water consumption by residents in the unincorporated rural area totaled 2.24 million gallons per day. Table 5-10 gives water consumption broken down into types of usage by water management districts. Agricultural water use is actually lower than is shown. The figures given by Suwannee River Water Management District and Southwest Florida Water Management District are permitted uses and not actual uses.

Based on computations from the Levy County Extension Agent, actual water use for agricultural purposes is slightly less than three million [3,000,000] gallons per day. This amount was based on irrigation for the following acreage:

<u>Crop</u>	<u>Acreage</u>	<u>Acre Inch</u>	<u>MGD</u>
Watermelon	2,082	4	.621
Peanuts	1,056	4	.315
Corn	3,150	6	1.410
<p>1 acre inch = 27,225 gallons Source: Telephone conversation with Mr. Anthony Drew, County Extension Office.</p>			

TABLE 5-10 LEVY COUNTY WATER USES [MILLIONS GALLONS/DAY]					
	Public	Domestic	Agriculture	Industrial	Total
1977					
SRWMD	.44	.58	2.18*	0.0	3.20
SWFWMD	.61	.28	.66*	0.0	1.55
1985					
SRWMD	.78	.73	3.95	2.69	8.15
SWFWMD	.41	1.43	9.50	0.0	11.33
*Includes livestock					
1/ Public Supply and Domestic Water Use Summary, 1985. Suwannee River Water Management District (SRWMD) computer printout.					
2/ Water Use Estimates, 1985. Southwest Florida Water Management District [SWFWMD].					

Agricultural water use has been further broken down by type of agricultural use in Table 5-11.

TABLE 5-11 LEVY COUNTY AGRICULTURE WATER USE [M.G.D]										
	Citrus	Melons	Truck Farming	Pasture	Corn	Turf	Other	Surface Water	Ground Water	Total
1985										
SR WMD 1/	-	.68	.06	-	1.52	.04	1.66	0	3.95	3.95
SWF WMD 2/	-	2.20	3.40	.10	1.20	1.30	1.30	2.16	7.33	9.50
*= Peaches, ornamentals, tobacco, peanuts, soybeans, misc. grains, forestry.										
1/ Public Supply and Domestic Water Use Summary, 1985. Suwannee River Water Management District [SRWMD] computer printout.										
2/ Water Use Estimates, 1985. Southwest Florida Water Management District.										

The demand on the current water systems within Levy County is well below their design capacity, as shown in Table 5-12, with most systems operating at below one-half of their capacity.

1992 UPDATE				
TABLE 5-12 ESTIMATION OF RURAL POPULATION WATER USE IN LEVY COUNTY				
1990 Total Population	1990 Urban Population	1990 Rural Population	1990 Per capita [GPCPD]	1990 Water Use [MGD]
25,923	7,914	18,009	150	3.89
Note: Based on extrapolations from previous year. Per capita water use figures are based on average for all the counties. Source: Estimated Water Uses, 1984. Southwest Florida Water Management District [SWFWMD]. 1987 Population Estimates.				

Expected Life

The expected life of most of the water systems listed on Table 5-10 is anticipated to extend beyond the scope of this plan, based on the age of the systems and demand/capacity ratio. However, Manatee Springs State Park indicated that its system had a life expectancy of only five [5] years.

Based on the lack of historical data, water consumption for industrial uses is expected to remain constant throughout the scope of this plan.

Projected Demand

Projected demand for potable, agricultural, and industrial water use is based on historical trends for average use. Large scale development in any of the three uses could significantly alter water use projections. The projections are the best indication of future use for average conditions.

Future water demands shown on Table 5-13 have been projected based on preceding Tables 5-9 through Table 5-12. Between 1987 and 1995, water consumption is projected to increase by thirteen percent [13%] and between 1995 and 2020 this figure is expected to increase by twelve percent [12%].

1992 UPDATE				
TABLE 5-13 PROJECTED RESIDENTIAL WATER CONSUMPTION FOR LEVY COUNTY				
	1987	1995	2005	2020
Rural Population Consumption (MGD)	14,962	20,104	23,695	28,674
Consumption (MGD)	2.24	3.01	3.56	4.30
Per Capita	150	150	150	150

TABLE 5-14

WATER NEEDS IN LEVY COUNTY TO THE YEAR 2000

Source	1980 MGD Domestic Use		1980-2000 Projectd MGD Additional Demand by Population Projection Series			2000 Projected MGD Demand by Population Projections Series			2000 Projected Cost, 1982 \$'s by Population Projections Series			population Model Type
	Public Supplie	Self Supplie	Low	Medium	High	Low	Medium	High	Low	Medium	High	
1	0.99	--	0.31	0.57	1.03	1.30	1.56	2.02	1,236,868	1,626,876	2,123,183	Permanent- includes only residents of Florida
2	0.99	1.32	0.74	1.33	2.42	3.05	3.64	4.73	1,825,067	2,381,046	3,119,301	Non-permanent- includes visitors as well as residents
3	0.99	1.32	1.31	2.01	3.31	3.62	4.32	5.62	2,362,089	2,867,927	3,588,514	Full occupancy- assumes every available housing unit filled

Source:

1. Osterholt et al. (1984) "Water and Waste Water Infrastructure Needs; 1990 and 2000". Governors Office of Planning and Budgeting - Planning and Evaluation Unit, Tallahassee, Florida. Appendix A2, p.30.
2. Ibid. Appendix B1, p.33.
3. Ibid. Appendix Ca, p.39

The projected water use for agricultural purposes is expected to increase. Although the Future Land Use Element for Levy County indicates that agricultural lands will decline to other uses, it is not expected that irrigated agricultural lands will be depleted. Furthermore, additional irrigation is to be installed in the future, thus increasing water demand for agricultural uses. At this time, there are too many unknown variables to allow the development of reasonable projections of agricultural water use.

Use. A limited water use history since 1970 for Levy County is shown in Table 5-8. As of 1985, agriculture has continued to dominate water use, growing from thirty-four point two percent [34.2%] of all uses in 1975 to sixty-nine point one percent [69.1%] of all uses in 1985. Industrial use appears to have made a sudden, intensive entrance in the early 1980's and has reached thirteen point eight percent [13.8%] in 1985 after having played almost no role until 1980. Industrial water use is predominately one related to limerock mining. Rural domestic use is third in importance, having declined from thirty-nine point five percent [39.5%] in 1975 to eleven point one percent [11.1%] in 1985. Finally, public use consumed six point one percent [6.1%] of the water in 1985, down from twenty-one point two percent [21.2%] in 1975.

To date, water use in Levy County has not encountered any limitations due to supply. This notion is supported by the data in Table 5-10 which shows that human water consumption claims less than one percent [1%] of all water available [after accounting for losses due to evaporation and transpiration], known also as the "water crop."

TABLE 5-15 WATER CROP USE IN THE LEVY COUNTY REGION

County	Area	Water Crop [MGD]	Estimated Water Usage in 2020 as % of Water Crop
Citrus	West	118	8
	Mid-West	161	6
Hernando	West	211	13
Levy	Northwest	171	below 1
	Southwest	396	below 1

Source: Withlacoochee Regional Planning Council [1980] "Coastal Water Resources Project," Ocala, Florida, p. 8-4, 8-5.

Based on an estimated water crop of one thousand two hundred twenty-seven [1,227] gallons per acre per day [9], human water use amounts to less than twelve point three [12.3] gallons per acre per day in Levy County. There appears to be ample room for expansion of water use, for all non-human uses probably do not surpass human consumption. There has yet to be any determination of what constitutes the maximum threshold of the water crop which will still allow healthy, economical living in the County. Projected needs of water use are provided in Table 5-14.

Conservation Practices. In the area claiming sixty-nine percent [69%] of water use in Levy County [agricultural irrigation], conservation practices are not widespread or intensive and probably are not curbing water use to any great extent. A possible explanation for this is that the County has very few of the kind of

highly developed agricultural uses which would justify the added investment of special irrigation systems. For orchards valued at Eight Thousand Dollars to Ten Thousand Dollars [\$8,000 - \$10,000] per acre, investments in computer-controlled, piped irrigation systems may make economic sense. But such operations are scarcely found in the County [10].

Examples of conservation practices used by a few farmers are: 1) replacing ditched and diked irrigation systems with piping, thereby cutting evaporation losses; 2) only irrigating when hygrometer [tensiometer] soil tests show that soil moisture has decreased below a certain critical threshold where moisture is too tightly bound to soil particles to be available to plants or above a threshold wherein so much water is available that added irrigation water passes down unused to the water table; 3) evaluation of the irrigation system's construction and operation so as to provide adequate but not excess water at each stage of growth, and 4) using "conservation tillage," the planting of a crop into the stubble of the previous crop with reduced or no cultivation [11]. Each cultivation pass reduces soil moisture by one [1] inch, so minimizing cultivation reduces the need for irrigation. Weeds and insects are controlled with chemicals, so it remains to be seen whether this threat to the aquifer will make water more or less available in the long run.

It is difficult to estimate how many farmers employ these techniques. One source [11] estimates that only five percent [5%] of Levy County farmers employ a tensiometer. Considering that this is only a Twenty-Seven Dollar [\$27.00] item, it would be very interesting to discover why use of this device has not spread more. Perhaps water and related power expenses are not critical yet.

As far as residential water use is concerned, water conservation does not appear to be in use at all. Building inspectors [12] have noted that though water conserving valves are factory installed in many of the shower nozzles, "more than half" of the residents remove them. No other practices such as water saving devices in toilets have been observed.

Projected Water Conservation Potential. Given that so little of the water crop appears to be exploited by County residents, water conservation has yet to reach a critical stage. This reality may be reflected in the lack of public awareness or concern, which is the biggest current obstacle along with limited finances to implementing water saving practices. Considering that little is being done now, there appears to be ample room for improvement should a water shortage occur. While water resources appear plentiful now, probably the most likely cause of diminishing water resources would be contamination of the Floridan aquifer, i.e. a water quality problem rather than quantity. Therefore, efforts to curb the use of pesticides and control the use of toxic chemicals can also be seen as water conservation practices.

Applicable Policies Of The Water Management Districts. Levy County straddles two water basin systems, each run by a different water management district. The north and northwestern seventy percent [70%] of the County is run by the Suwannee River Water Management District [S.R.W.M.D.]. The south and southeastern thirty percent [30%] of the County is run by the Southwest Florida Water Management District [S.W.F.W.M.D.].

Water conservation has been addressed directly by S.W.F.W.M.D. and S.R.W.M.D. through the water use permitting process and through various public education projects. In the later case, public consumer awareness of water use has been promoted in a variety of ways ranging from brochures to video programs and

public talks. The target audience has ranged from public schools to water users in the public, commercial and agricultural sectors [13].

The bases of the water permitting policies of the districts are contained in the Florida Statutes, Chapters 40D-2 ["Consumptive Use of Water"], and more specifically, Chapter 40D- 21 ["Water Shortage Plan"].

F.S. 40D-2 sets down the parameters by which water use is permitted and gives the districts control on any significant water use and, at the same time, land use which requires a water use. Section 40D-2.301 "Conditions for Issuance of Permits" lays the groundwork for water use permitting. Of note in regard to water conservation are:

- (1) Water use must be "reasonable and beneficial" and "consistent with the public interest." This forces any water use to be justified according to a public standard of reasonable conservation.
- (2) A water use permit will be denied should such use cause a decrease below a threshold level for a) water course flow b) potentiometric surface, c) level of surface water or shall cause salt water intrusion or shall adversely affect vegetation which depends on certain water levels.

The protection of vegetation, especially that in and about waterways, is particularly important in that the role of vegetation in guaranteeing a supply of good water to the public is not widely understood. Plant communities on the margins of waterways do much to filter overland sheetflow into the waterway as well as the water in the water course. Certain plant communities, particularly cypress domes, marshes and bays, have been noted [14] for providing water storage and lowering evaporative water loss from the landscape. All vegetation which slows water movement overland prevents rapid water loss due to run-off.

Protection of floodplain vegetation is therefore a strong support for water conservation, and the districts have adopted Model Floodplain Ordinances to that end. To be consistent with S.403.021 and S.373.016 Florida Statutes, and Chapter 17-14, Florida Administrative Code, the districts have adopted policies which, according to 40B-4.1010:

- "(a) Prevent increase in existing flood hazard or damages by requiring that new development of water and related land resources:
 - (1) Not restrict floodway conveyance through the use of fill or other obstruction;
 - (2) Maintain pre-development rates of stormwater run- off and for total volume of storm water run-off...
 - (3) Not reduce net storage volumes [including wetland, depression, and soil storage volumes] within a project area; ..."

One of the floodplain ordinance's clauses protects vegetation by establishing a building setback line seventy-five [75] feet from the riverbank with only limited clearing in the area of the seventy-five [75] foot setback [15].

Chapter 40D-21 "Water Shortage Plan" sets down district policies which encourage water

conservation by:

- (1) Identifying shortages and alerting the public to the need for conservation at critical times.
- (2) Discouraging water hoarding or wastefully excessive use by assuring equitable water distribution in times of shortage and prohibiting certain uses.
- (3) Promote greater security for water use permits thereby encouraging people to follow sound conservation practices under the district's auspices.
- (4) Increase the general knowledge of how water use is affecting the public water supply by establishing a monitoring system.

Soil

All vegetative communities rely on soil for support, nutrients and a reliable short term supply of water. The vegetation in turn protects the soil from erosion due to wind, water and animal activity. However, human enterprise of ten [10] requires removal of vegetative cover to exploit the soil for its support [construction] or its storage of nutrients [production]. This exposure often results in soil erosion.

Levy County is predominantly a rural County. Urbanization and suburbanization have changed but a tiny fraction [less than one percent (1%)] of the landscape. Therefore, soil loss due to construction activities continues to be minimal and not of concern.

Estimates of the amount of land in agricultural use vary widely. One estimate [16] puts agricultural use at six hundred eighty four thousand [684,000] acres [ninety-three percent (93%)]. However, this probably erroneously includes over seventy-one thousand [71,000] acres of wetlands, one hundred four thousand [104,000] acres of upland hardwoods, and one hundred sixteen thousand [116,000] acres of lowland hardwoods whose agricultural potential is limited. Some portions, both upland and bottomland forests, contain enough pine to be commercially viable for an agricultural forestry operation; however, **Table 5-16** provides a more conservative and reliable estimate.

TABLE 5-16 AGRICULTURAL LANDS IN LEVY COUNTY				
Rank	Agricultural Use	Acreage in Use	% of AG Lands	% of County
1	Pine Plantation	101,813	35.2	13.9
2	Natural Pine Forest	88,435	30.6	12.1
3	Improved Pasture	74,675	25.8	10.2
4	Row Crops	24,360	8.4	3.3
	Total	289,283	100	39.4

These figures probably underestimate total agricultural lands because unimproved pasture [rough prairie] has not been included. One estimate, based on interpretation of aerial photography, range up to eighty thousand

seven hundred fifty-five [80,755] acres. However, it is very difficult to determine just how much of this land is effectively in agricultural use, grazing in this case. It is probably safe to assume that at least half the unimproved pasture is used for grazing. This represents thirteen point eight percent [13.8%] of all agricultural lands or five point five percent [5.5%] of all County lands. Most of the farmland in Levy County is devoted to forestry, with improved pasture for horses and cattle second and row crops third. Currently livestock and poultry production in the County are:

	Hogs	Cattle	Chickens	Horses
1982	4,022	32,541	N/A	N/A
1987	1,000	40,000+	N/A	500-800

The heaviest concentration of agricultural land use is in the area north, northeast and east of Chiefland. Other areas of significant agricultural land use are located southwest of Chiefland and along the eastern County border around Williston and Morriston. These areas contain agricultural land with soil characteristics consisting of nearly level to gentle sloping, well drained sandy soils with loamy or clayey subsoils underlain by limestone.

One of the most important aspects concerning the conservation of agricultural lands is the manner in which they are managed. Production techniques and farming are very often responsible for favorable or unfavorable conditions concerning the conservation and/or proper use of agricultural resources.

According to the Levy County Agricultural Extension Director, production techniques involve three [3] year rotation of most major crops with the exception of watermelons [eight (8) to ten (10) year rotation]. When crops are rotated, recently harvested fields are usually planted over with sod to replenish organic matter and regenerate soil horizons. Other techniques involve the planting of rye grain strips between tobacco and watermelon stands and winter cover crops to prevent wind damage to crops and the planting of slash pine tree rows to enhance wind breakage as well as soil stabilization. The greatest period of wind erosion is January through April and fields should not be bare in this period. Farming practices oriented toward conservation include conventional tillage, cover crops and irrigation. Tillage of soils is conducted by deep row plowing in connection with offset harrowing.

This practice promotes adequate ground penetration as well as soil drainage. The planting of cover crops in alternate seasons serves to enhance the availability of organic matter to soils, while the use of herbicides stabilizes weed growth permitting larger grazing yield.

Providing water to crop lands is essential to maintaining the quality and quantity of crop fields. Common irrigation practices currently involve supplying water to crops in the late afternoon and night when evaporation is less and the maintenance of an adequate ground cover. Irrigation water management with tensiometers aids in better fields.

It is the feeling of the Agricultural Extension Director, Mr. John Baldwin, that "Levy County has as good an agricultural potential as any county in the state". The proper management and intensified use of substantially available agricultural resources could increase the agricultural base of the County, which is currently attempting a comeback from the agricultural decline experienced during the mid-60's and early 70's.

Increasing production costs, low market prices and inclement weather have all reduced overall farm income during the 1980-1985 time frame.

Table 5-17 shows the trends in acreage allocated to various crops since 1976. The reasons for shifting in crop types are often the result of the interaction of several factors.

Major Crop	1979	1982	% Change Since 1976	1985	% Change Since 1982
Corn	17,000	6,000	65%-	5,500	-8%
Grain Sorghum	4,000	4,000	0%	2,500	37%
Watermelons	3,500	5,000	43%+	5,000	0%
Soybeans	4,000	5,000	25%+	4,000	-20%
Wheat, Oats & Rye	20,000	10,000	50%-	4,000	-60%
Tobacco	106	70	34%-	60	-15%
Peanuts	2,800	3,500	25%+	3,300	-6%
Total	51,406	33,570	34%-	24,360	28%
Source: John Baldwin, Agricultural Extension Agent for Levy County					

Soil Erosion. The following overview of agriculture in Levy County has been provided by the District Conservationist for the County. [11] "One of the most serious conservation problems in Levy County is wind erosion. The loss of topsoil occurs in the early spring when the cropland is bare. This serious loss can be partly overcome by planting rows of trees for wind breaks, by planting strips of grain to protect young plants and using no-till or reduced tillage where the new crop is planted into the residue of the existing crop."

"Over grazing is another serious problem and can be overcome by proper stocking rates and a grazing schedule to include rotation of fields to rest the grass and allow it to grow. While wind erosion is a serious problem, water erosion has not been serious in the relatively flat sandy soils in the county."

"Though Levy County's erosion problems are predominately wind related, contour plowing is an effective counter-measure against water induced erosion [11]."

"The soils of Levy County range from deep sands in the Bronson Area to clay over limestone in the Chiefland and Williston Areas to flatwood soils with seasonable high watertables in the Gulf Hammock to Cedar Key areas."

"The air in Levy County is clean and pure except during periods of wind erosion when many tons of top soil per acre are lost from cropland."

"The best agriculture soils are Hernando and Archer fine sand. They are Class-two soils which means they can be safely planted in cultivated crops one-half [$\frac{1}{2}$] of the time. The remaining soils are classed from class three [3] to eight [8] indicating the suitability for crop land. A published county-wide soil survey is currently being conducted. This survey should be the first step in all land use decisions." An interim report was published in 1991. According to the Soil Conservation Office in Bronson, the final edition is expected to be completed in 1995/1996. The published soil survey will be available to all.

Soil characteristics contributing to the soil's vulnerability to wind erosion, and the most vulnerable or erodible soils in Levy County are listed and explained in Table 5-13. Vulnerability is correlated with the presence of farming activity on such soils and with the soil's "damageability". This latter term is related to the degree to which a soil is hurt by erosion, and this damage is most pronounced for shallow soils which can be relatively quickly exhausted by erosion. Once erosion has removed the soil and exposed the underlying "mother material", one must either wait for centuries for the soil to regenerate or import new soil.

It is interesting to note in Table 5-18 that the most erodible soils are also the least vulnerable. This is due to the fact that the fine sands occur in deep drifts on the plateau of Chiefland and the ridge at Williston. The closer one goes toward the coast, the shallower the rock [loss of soil depth] and the greater the damage created by each inch of soil lost.

TABLE 5-18

SOIL EROSION CHARACTERISTICS OF LEVY COUNTY SOILS

Soil Association	Erodability	Explanation	Damageability	Explanation
Astatula-Candler	Very severe	FS, DY, LV	Very slight	DR is greater than 20 ft.
Candler-Apopka-sparr	Severe	FS, DY, DLL	Slight	DR is greater than 6 ft.
Otela-Candler-Hardeetwon 1/	Severe	FS, DY, SR	Slight	DR is greater than 6 ft.
Otela-Jonesville-Tavares 2/	Severe	FS, DY, SR	Moderate	DR is between 1 ft. & 6 ft.
Pedro-Otela-Jonesville	Moderate	FS, MDY, MV	Severe	DR is between 1 ft. & 6 ft.
Boca-Hallandale-Felda 3/	Slight	SHW	Severe	DR is within 3 feet

Abbreviations:

FS = Fine sand, easily displaced by wind

LV = Low vegetation cover

SR = Shallow rock layer

MV = Moderate vegetation cover

DR = Depth to root restricting zone (usually rock in this case)

DY = Droughty, easily tosses water, hard to sustain vegetative cover which protects soils

DLL = Deep loamy layer

MDY = Moderately droughty

SHW = Sustained high water table

1/ Referred to in Map 5-2 as “Bushnell-Sparr or Lochlossa Variant Mabel”, located in SE half of Soil 7 on Map

2/ Referred to in Map 5-2 as “Bushnell-Sparr or Lochlossa Variant Mabel”, located in NE half of Soil 7 on Map

3/ Referred to as “Wacasassa-Demory-Boca”, located in NE half of Soil 7 on Map

Source: Fred Slabaugh, Soil Survey Team director for Levy County, Soil Conservation Service, Bronson, Florida.

Map 5-12 shows those areas of highest danger of soil loss due to cultivation activities on areas of high erosion potential. As is evident, most cultivation occurs in areas with high wind erosion potential. The area of greatest danger would be the area southwest of Chiefland. The soil association there, Otela-Jonesville-Tavares, is highly erodible, and its relatively shallow depth makes it moderately damageable. Another area of concern is the area around Williston. The soil association, Pedro-Otela-Jonesville, is moderately erodible because it has more vegetative cover than turkey-oak scrub communities; however, its shallow depth makes it highly damageable.

Table 5-19 gives erosion potential coefficients and indicates suitability for different kinds of plant and animal life found associated with various soils.

Soil Conservation Programs. Aside from the technical assistance and monitoring provided by the U.S. Soil Conservation Service, the Agricultural Stabilization and Conservation Service [A.S.C.S.] runs an Agricultural Conservation Program [ACP] to encourage soil conservation practices. As shown in Table 5-20, the ACP program is cost-sharing program wherein the ASCS pays a major portion of the costs of establishing sound soil saving agriculture. Currently some ten thousand [10,000] acres in Levy County (10) are within this program.

**TABLE 5-19
SOIL CHARACTERISTICS- EROSION, NATURAL HABITAT AND WILDLIFE**

Map Symbol	Name of Soil Association	Erosion Factor			Woodland Suitability				Wildlife Habitat Suitability				
		K at depths 0-7, 7-25, 25-32 inches	T	Wind Erosion	Organic Matter %	Erosion Hazard	Seed Mortality	Wetland Plants	Shallow Water	Openland Wildlife	Woodland Wildlife	Wetland Wildlife	Rangeland Wildlife
1	Smyrna-Okeelante-Bassinger Depressional	0.1, 0.15	5	2	1-5	ST	MD	FR	FR	FR	FR	FR	--
2	Floridana-Floridana Depressional	0.1, 0.1	5	2	6-15	ST	SV	GD	GD	PO	PO	GD	--
3	Placid-Okeelanta-Bassinger Depressional	0.1, 0.1	5	2	2-10	ST	SV	GD	GD	FR	FR	GD	--
4	Astatula-Candler	0.1, 0.1	5	2	0.15-2	ST	MD	VP	VP	PO	PO	VP	--
5	Blishton-Sparr-Lochloosa Variant Mabel	0.15, 0.24	5	2	1-4	ST	ST	FR	FR	FR	FR	FR	FR
6	Pedro-Otela-Jonesville	0.1, 0.28	1	2	0.5-2	ST	MD	VP	VP	FR	FR	VP	--
7	Bushnell-Sparr or Lochloosa Variant Mabel	0.15, 0.28	3	2	1-3	ST	ST	PO	FR	FR	GD	PO	--

8	Wabasso-Felda-Eau Galle	0.1, 0.15	5	2	1-4	ST	MD	FR	PO	PO	FR	PO	--
9	Waccassa-Demory-Boca	0.1, 0.1,0.2	5	2	1-3	ST	MD	GD	FR	FR	PO	FR	GD
10	Myakka-Orsina-Okeelanta Bassinger Depressional	0.1, 0.15	5	2	<2	ST	MD	FR	PO	FR	PO	PO	--
11	Orsino	0.1, 0.1	5	2	<1	ST	SV	VP	VP	PO	PO	VP	--
12	Muckalee-Fluvaquents	0.2, 0.2	4	--	--	ST	SV	GD	FR	PO	FR	FR	--
13	Tidal Marsh w/ rock	--	--	--	--	--	--	GD	GD	VP	VP	GD	--
14	Tidal Marsh w/o rock	--	--	--	--	--	--	GD	GD	VP	VP	GD	--
15	Bradenton-Wabasso-Fauraquents	--	--	--	--	None	MD	--	GD	GD	GD	PO	--
16	Haplohumoda (Zolfo or Cassia)	0.1, 0.1	5	2	0.5-1	ST	MD	PO	PO	PO	FR	PO	--
17	Broward Variant	0.1, 0.1	2	2	<1	ST	MD	PO	PO	PO	FR	PO	--
18	Candler-Apopka-Sparr	0.1, 0.1, 0.1	5	2	0.5-2	MD	MD	VP	VP	PO	PO	VP	--

Abbreviations:

VP = Very Poor ST = Slight SV = Severe PO = Poor MD = Moderate GD = GoodFR =
Fair T =
Toleran
c e
Level

TABLE 5-20

SOIL CONSERVATION PROGRAM ANALYSIS

Percent Paid by ASCS	Soil Conserving Practice Meriting ASCS Assistance
50	Establish permanent pasture
30	Established temporary cover (rye, oats)
50	Plant pine trees
60	No-till cultivation
50	Reduced till cultivation

Source: Frank, Bullock, Jr., Executive Director, ASCS, Bronson, Florida.

Payments may not exceed \$50,000 per producer per year, and no more than 25 percent of the producers in the county can bid into the program. Spot checks are made by ASCS officials to ensure compliance with ASCS standards.

Finally, it should be noted that the issue of agricultural potential and the relative importance of this land use in the future of Levy County was thoroughly discussed as a part of the 1985 plan update. This is discussed in detail as a part of the Land Use Element. The consensus position of citizens, Planning Commission members, and elected officials may be summarized as follows:

- (1) Levy County has no "prime" agricultural lands.
- (2) The decrease in agricultural acreage is not occurring at a rate which justifies any change in county policy at this time.

Silvicultural Surface-water Management Systems

This section addresses the relationship between forest management practices as they impact upon soils, water quality and water quantity. The narrative which follows consists of excerpts from the Suwannee River Water Management District, "Surface Water Management Permitting, Vol. 1."

Best Management Practices. Best management practices [BMP] have been selected as performance standards for general surface-water permits for forestry. BMP's, when followed, protect water quality and conserve site productivity. The State of Florida Division of Forestry published the Silviculture Best Management Practices Manual. The district and the Division of Forestry can provide copies of this manual to users, free of charge.

Streamside management zones are important considerations for general forestry permit compliance. The widths of the zones are summarized in the following table.

TABLE 5-21

STREAM MANAGEMENT ZONE

	<u>Primary Zone</u> [feet]	<u>Secondary Zone</u> [feet]
Perennial Stream	35	0 to 265
Intermittent Stream	0	0 to 265
Lakes 10 Acres and Larger	35	0 to 265

The BMP manual describes fully the method of determining the width of the secondary zone.

Soil loss and the resultant water quality and quantity problems are minimized with certain cultural practices within the streamside management zone. The following table summarizes these regional practices.

TABLE 5-22

CULTURAL PRACTICES WITHIN THE STREAM MANAGEMENT ZONE

	<u>Harvesting Procedures</u>	<u>Site Preparation</u>
Primary Zone	Selective Cut	None
Secondary Zone	Clear Cut	Restricted

Selective cut is defined, and a guide for choosing appropriate site preparation methods within the restricted secondary zone is provided in the manual.

The BMP manual stresses the importance of planning new roads and drainage systems to reduce construction and maintenance costs as well as to reduce the potential for sediment pollution. The water management district will be happy to discuss with area foresters and private landowners roadway and drainage layout design to ensure that project development will meet permit requirements. The Division of Forestry offices are also available for consultation regarding the implementation of best management practices.

BMP's for road and drainage construction, and maintenance for stream and wetland crossings, are outlined in the manual. Culverts, bridges and low-water crossings should not increase scour or streamflow velocities. The installation should not cause water to backup on land not owned or controlled by the applicant. Roadside ditches should not drain directly into the stream or wetland. A buffer strip of thirty-five [35] feet of undisturbed vegetation or three hundred [300] feet of grassed swale should separate all drainage ditches from the watercourse or lake. When fill or channel shaping occurs in conjunction with a stream crossings, some measures must be taken to stabilize the soil by grassing or other means. Harvesting debris and logs used as temporary low-water crossings should be removed from stream channels.

Examples Of General Permit Activities

The situations listed below will be discussed to give the applicant a better idea of what types of activities qualify for a general permit.

- A. Pine Flatwoods And Coastal Lowlands.
 - (1) Roadside ditches and field drainage ditches that channelize flow out of a wetland area.

ILLUSTRATION 1A and 1B

The integrity of the wetlands as such is not to be compromised. This means that while forestry operations are allowed in wet areas, the wholesale drainage of the wetlands will not be generally permitted. Temporary surface water removal for the purpose of harvesting and replanting is allowed. Ditches and/or culverts must outfall at pre-development ground elevations and no soil erosion should occur.

- (2) Roadside ditches and field drainage ditches that channelize flow into wetlands areas.

ILLUSTRATION 2

ILLUSTRATION 4

ILLUSTRATION 5

ILLUSTRATION 6

B. Well-Drained Areas.

For temporary roads, skid trails, and firelines -

- (1) Locate skid trails along the contour whenever practical so that erosion is minimized and revegetation is encouraged.
- (2) Place water bars or debris piles on skid trails and ruts to reduce channelization of run-off.
- (3) Stabilize abandoned skid trails on erodible sites by fertilization and seeding.

Natural Areas And Resources**Potential For Conservation, Use And Protection**

Natural resources in Levy County are abundant but rarely concentrated enough to generate intense uses such as commercial enterprise. 1972 estimates [9] of land use by industry and mines were three hundred ten [310] and seven hundred eighty-three [783] acres respectively, or one tenth [1/10] of one percent [1%] of all county land use. There is no reason to believe that these acreage have changed.

Considering industrial use as the most intensive and exhaustive of resources, then forest harvesting is a moderate use which is fairly widespread. Almost fourteen percent [14%] [401,813 acres] of the county is planted pine plantation, and is certainly slated for harvest, usually on a less than thirty [30] year cycle so as to create pulpwood products. Another twenty percent [(20%) 144,133 acres] are natural pine or oak-pine forest, and the only management techniques which can make such acreage profitable involves fairly extensive harvesting. Therefore at least one third [1/3] of Levy County is being modified for forestry harvesting and replanting.

Uses Of Natural Resources. The majority of natural resources in the county are employed for such low intensity uses as hunting, fishing, and passive recreation. Besides such intense uses as industry and forestry, farming [now crop and pasture] claims between thirteen point five percent [13.5%] and eighteen percent [18%] of the county, depending on how much "rough prairie" is recognized as used exclusively for grazing.

Table 5-23 lists natural resource uses, known pollution problems and the potentials for conservation, use and protection. Column 1 shows the commercial uses mentioned so far. Column 2 shows that the predominant recreational uses are hunting, swimming, fishing and "passive recreation" [hiking, riding, biking, nature appreciation].

Column 3 lists the various parks, preserves and reserves whose establishment conserves and protects their component natural resources.

TABLE 5-23

NATURAL RESOURCE USES IN LEVY COUNTY

Natural Resource	Uses				Potential for		
	Commercial	Recreation	Conservation	Known Pollution Problems	Conservation	Use	Protection
Rivers	FS - 1,2,3	FS, OB, SW	WP, LR, MP, SR, PO	BAC, SP, DO	Excellent	Excellent	Fair-poor
Bays	SF	FS, OB, SW	WP, CN	SE	Excellent	Excellent	Excellent
Lakes	FS - 2,3	FS, OB, SW	--	DO, AW, EU	Excellent	Excellent	Poor
Wetlands	FY	HT, OB	WP, LR, CR, MP, CN, SR	FW	Fair-good	Poor	Fair
Estuarine Marshes	--	HT, OB	WP, LR, CR, CN	--	Excellent	Poor	Excellent
Air	--	--	--	--	N/A	Excellent	Excellent
Floodplain	FY	HT, OB	WP, LR	SP, FW	Fair-good	Fair	Fair
Mineral Sources	MN	SW	--	--	N/A	Excellent	N/A
Soil Erosion Areas	FM	--	--	--	Excellent	Excellent	Good
Fisheries	FS - 4	FS	--	SE	Excellent	Excellent	Poor
Wildlife	SK	OB, HT	WP, LR, CR, CN, MP, SR	--	Good	Excellent	Fair-poor
Marine Habitats	SF	OB, FS,SW	--	SE	Excellent	Excellent	Fair
Vegetative Communities (upland)	FY, FM	OB, HT	WP, LR, CR, MP, CN, SR	FW	Poor	Excellent	Poor

Abbreviations:

- FS= Fishing 1-sturgeon, 2-catfish, 3-turtle, 4-seafish
- LR= Lower Suwannee National Wildlife Refuge
- SR= Suwannee River Water Management District
- PO= Protective Ordinances - required setbacks
- FW= Four wheel drive - soil erosion & damaged aesthetics
- AW= Aquatic Weeds
- HT= Hunting
- BAC= Bacteria
- MN= Mining
- FM= Farming

MP= Manatee Springs State Park

FY= Forestry

SK= Animal Skins

SP= Septic Tanks

SE= Sewage effluent

DO= Dissolved Oxygen

EU= Eutrophication (not certain of man-made or a natural condition)

OB= Observation (scientific, aesthetic enjoyment, passive recreation- horseback riding, hiking, biking, canoeing, birdwatching)

SW= Swimming

WP= Waccasassa Bay State Preserve

SD= Suds (soap, possibly)

SF= Shell Fishing (crabs, oysters)

CR= Cedar Key Scrub State Preserve

CN=Cedar Key National Wildlife Refuge

Column 4 lists the various known pollution problems in and among county natural resources. Bacteriological infestations have lead to a prohibition of shellfishing along the Suwannee River and at its mouth. The Withlacoochee River has experienced low dissolved oxygen [DO] concentrations and recurring episodes of layers of suds on top of the river below Lake Rousseau. Bays, fisheries and marine habitats in the Cedar Key area have received excessive doses of sewage effluent from the overworked treatment plant in that town. Lakes, as previously discussed, are experiencing high levels of aquatic weed infestation and eutrophication. It remains to be seen whether these are natural levels inherent to these systems or whether these are artifacts of human activities which will lead to degeneration of these systems. Such items are categorized as "pollution" in that these phenomena have been objected to by county residents. Flood plains sometimes experience higher nutrient levels due to flooding of septic tanks whose inundated leach field becomes contiguous with the water table. Finally, for those residents who enjoy natural habitats for the charm of being in a place uncrowded by people or traces of human activity, some wetlands, floodplains and upland communities suffer from a profusion of tire tracks which do not readily erode.

Column 5 lists the potentials for conservation of natural resources. This is construed as the potential to preserve the habitat as it is and keep it from changing into something else. So for example, there seems to be an excellent chance to preserve the character of rivers, lakes, bays, marshes and marine habitats. Wetland forests and flood plains are only given a fair to good chance in that while they are extensive the only way to gain a cash profit from them is to log them. Upland vegetative communities are given a poor chance since they are the most likely to be developed for residential use ... in fact, this plan directs growth to them.

Column 6 lists the use potentials for natural resources. Most are seen as "excellent" in that they are abundant relative to the population, and accessible. However, wetlands and marshes are deemed to have a "poor" potential in that their location in state and federally protected areas renders them poorly accessible to the public. One might note that their use and functioning as a natural system has not been impaired at all, but the human bias of this column does not reflect that.

Column 7 lists the potential to protect and preserve the quality of the county's natural resources. This is construed such that if any drop in quality may occur, then the potential is "poor". Such is seen to be the case for rivers, lakes, fisheries and wildlife, for the relentless pressure of rising human population and mounting intensity of use makes it highly unlikely that these resources will maintain their present quality levels. Wetlands floodplains and marine habitats are given a fair potential. Wetlands face logging pressure and marine habitats face rising intensities of shrimp fishing which involves roller nets dragging along the bottom. On the other hand, bays, marshes and air are given an excellent chance to remain at current quality levels.

Based upon available data, not all rivers are equal in terms of their quality or their potentials for protection.

1. **Withlacoochee River.** Technically, no portion of the Withlacoochee River falls under jurisdiction of the Board of Levy County Commissioners. Lake Rousseau, which was created by a dam on the river, does come under county jurisdiction and actually should be treated as a part of the river. Eutrophication of Lake Rousseau, with heavy infestations of hydrilla and hyacinths, and with seasonal dissolved oxygen deficits, dictates intense remedial actions as opposed to protection.
2. **Suwannee River.** The Suwannee River is increasingly protected by public ownership, as shown on the land use maps in this plan. The river has experienced pollution problems upstream from Levy County, but there are no documented problems with the portion adjacent to the county at this time.
3. **Waccassassa River.** This is Levy County's smallest and most pristine river, and it offers the best opportunity for protection. Development pressures in the form of vacation homes, cabins and full-time residences are beginning.

There are numerous lakes in Levy County. Two of the largest are Long Pond [south of Chiefland] and Chunky Pond [south of Bronson]. Both lakes are evidencing eutrophication, and both are experiencing substantial increases in use. For these reasons, the major lakes in Levy County are considered "poor" in terms of protection potential.

Finally, both fisheries and wildlife resources are rated "poor" or "fair-poor" respectively. Fisheries in Levy County include both fresh water rivers and lakes, and marine estuaries. A federal preserve on the lower Suwannee River and the Waccassassa Bay State Reserve offer an excellent opportunity for protecting the fisheries resource in these areas; however, the overall project for both marine and freshwater fisheries conservation is much better than that for protection.

Upland vegetative communities will increasingly give way to residential and other types of development. For this reason, they have also been rated as "poor" potential for protection.

Table 5-24 offers a closer look at county-wide use of wilderness and freshwater habitats for hunting and fishing. Due to the lack of licensing requirements, salt water fishing is not accounted for. This table suggests that in 1986 some three thousand two hundred twenty-eight [3,228] people sought the opportunity to fish and that two thousand six hundred thirty-nine [2,639] people purchased the chance to hunt. The effects of such fishing and hunting on natural resources and wildlife have not been studied.

TABLE 5-24

HUNTING, FISHING AND TRAPPING EFFORTS IN LEVY COUNTY, 1986

Type of License	Number Purchased	Revenue to County	Revenue to State
Fresh Water Fishing	1,944	\$1,944.00	\$15,552.00
Non-Resident Fishing	148	\$148.00	\$3,700.00
Non-Resident Fishing (10 days)	200	\$200.00	\$2,000.00
State Hunting	1,616	\$1,616.00	\$17,776.00
Non-Resident Hunting	17	\$17.00	\$850.00
Hunting & Fishing Combination	1,006	\$1,006.00	\$17,102.00
Trapping	1	\$1.00	\$25.00
Management Area Quota	692	\$692.00	\$6,920.00
Waterfowl Stamp	21	\$10.50	\$63.00
Archery Permit	550	\$275.00	\$2,750.00
Muzzle-loading Hunting	398	\$199.00	\$1,990.00
Turkey Stamp	462	\$231.00	\$2,310.00
TOTAL	--	\$6,339.50	\$71,038.00

Source: Mrs. Tommonds, Levy County Tax Collector's Office.

Impacts Of Natural Resource Usage. The major impact on natural resources in Levy County comes from commercial uses such as forestry. Forestry harvesting methods such as clear-cutting may, if coupled with short harvesting rotations, eliminate the diversity of tree, shrub and bush species, and tree age, which characterizes a natural forest. This diversity is the reason and ecological basis for the existence of a wide variety of organisms. The absence of this diversity means that only certain kinds of organisms will thrive and predominate, particularly pioneer species, species which can take advantage of disturbances in a natural situation.

As previously cited, loss of dead trees and snags used by the majority of woodpeckers eliminates or endangers the nesting habitat of forty percent [40%] of all north Florida birds [8]. This also cuts down the variety of plant food materials, and therefore, the feeding possibilities for wildlife. This in turn reduces the diversity of feeding opportunities for carnivores. The net impact of clear-cutting is that in simplifying the structure and composition of the forest we have increased production usable to humans but greatly reduced the diversity and reliance to disturbance inherent in a natural forest. The susceptibility to devastating disease is far higher in a pine plantation than in a natural forest system. It is possible that the strengths of a natural forest [its resistance to disease and the charm of its continuing and surprising variety] are loose but useful indices of the normally indefinable qualities called aesthetics.

It must be remembered, however, that a fair number of vegetative communities, especially uplands, are fire-dominated. This means that the community is kept from maturing to a "climax" forest by the occurrence of fires every twenty [20] to eighty [80] years, depending on the community. It is possible that a community might eventually accumulate enough organic matter and build up its soil so as to store a sufficient amount of moisture to blunt or eliminate fires. But this is not currently observed.

Therefore, clear-cut harvesting can be seen as a removal of trees for human profit which mimics nature on an accelerated basis. A problem may be that when the turnover time in this process is so fast [thirty (30) years] so as to produce pulpwood, little or none of the natural diversity in a natural, fire dominated system can establish itself.

Another commercial use which has been accused, so far without substantiation, is shrimp fishing by shrimpers of major size in the marine habitats off Levy County. It has been suggested that since the arrival in the early 1980's of major shrimping vessels, harvests by local shrimpers have been poor. It is possible that such poor harvests are the result of natural fluctuation of shrimp populations. On the other hand, it is possible that over harvesting or the mechanical injury to the marine bottom caused by roller nets have lowered the natural productivity of the marine habitats of the Gulf Coast.

Conservation And Protection Mechanisms. Preventing the deterioration or destruction of natural resources involves establishing and maintaining rules and regulations which empower agencies or officers to act and to develop ways of measuring the survival of vulnerable resources and projecting their chances of survival. Legislation addresses the former need, and several evaluation systems are described which aid in analysis of the success of these protective mechanisms.

Current law protecting natural resources is found in those sections of the Florida Statutes [F.S.] and the Florida Administrative Code [F.A.C.] which: 1) enable the appropriate agencies to exist and act, and 2) direct the manner of those actions' execution. The agencies primarily involved in the protection of wildlife and their

habitats are: The Florida Game and Freshwater Fish Commission [F.G.F.W.F.C.]; the Florida Department of Natural Resources [D.N.R.]; the Water Management Districts; the Florida Department of Environmental Regulation [D.E.R.]; and, the United States Army Corps of Engineers [U.S.A.C.O.E.].

The first two [2] agencies, F.G.F.W.F.C. and D.N.R., are the leading protectors of wildlife and habitat. F.G.F.W.F.C. covers mostly terrestrial and freshwater habitats and D.N.R. covers marine habitats for the most part. There is some cooperation between the two [2] concerning species, such as mullet, snook and sturgeon, which migrate between salt and fresh water. [17] The latter four agencies, S.R.W.M.D., S.W.F.W.M.D., D.E.R. and U.S.A.C.O.E., protect wildlife indirectly through habitat protection.

Enabling legislation, typical for such agencies, is found in the case of the F.G.F.W.F.C. in Article 4, Section 9 of the Florida Constitution:

" ... Commission shall exercise the regulatory and executive powers of the state with respect to wild animal life and fresh water aquatic life except that all license fees for taking wild animal life and fresh water aquatic life and penalties for isolating regulations of the Commission shall be prescribed by specific statute."

In this matter, the F.G.F.W.F.C. is empowered, but the State Legislature retains the right to set penalties. The majority of law directing F.G.F.W.F.C.'s protective actions for wildlife is found in the "Wildlife Code of Florida", Title 39 of the F.A.C. This section of the code describes all vulnerable species in the state and the manner in which they should be protected.

Enabling legislation for D.N.R. is found in Chapter 370, F.S., and regulations concerning marine species are found in Title 16 of the F.A.C. Title 16 establishes the manner in which D.N.R. can aid in the survival of Florida's marine wildlife. D.N.R. has taken the leading role in the monitoring and protection of manatees, a key species in the lower Suwannee River.

In addition to the direct monitoring and protection of vulnerable species, D.N.R. also functions to indirectly protect wildlife and habitat through the acquisition of critical lands. These actions remove lands of high environmental value from the threat of development. Several acquisition programs, Conservation and Recreation Lands [CARL] and Save Our Coasts [SOC], are coordinated and directed by the Land Acquisition Selection Committee [L.A.S.C.]. This interagency committee is currently chaired and administered by D.N.R. Enabling legislation for CARL is found in Chapter 259, F.A.C.

While F.G.F.W.F.C. and D.N.R. focus more directly on species than habitat, they act more in an advisory role since they do not have as much regulatory power as those agencies which concentrate more on the preservation of wildlife habitat and vegetative communities. These agencies [S.R.W.M.D., S.W.F.W.M.D., D.E.R. and the U.S.A.C.O.E.] enforce policies which directly protect water quality and which conserve natural communities. These latter policies indirectly conserve water quality because natural habitats contribute to water quality through filtration and nutrient uptake in addition to the breeding, nursery and nesting values which they possess. In this manner, species are also indirectly protected, though this protection may be the most important. Habitat loss is the main cause of species loss in Florida. Dredge and fill permits practices are controlled. For example, the improper grading which leads to erosion of land and siltation of waste bodies or the dumping of chemicals or trash during construction which leads to water quality deterioration, can be controlled by the revoking of the permit and shutting down all construction. Similarly,

obtaining such a permit involves outlining where and how ground breaking development will occur such that any threat to a natural habitat can be foreseen.

Enabling legislation for the water management districts is contained in Section 373.016(2)(e) and (g), F.S. This mandates that the water management districts, through their policies controlling construction and water use, among other things, shall "preserve natural resources, fish and wildlife". In addition, in 373.59, F.S., they are authorized to " ... acquire real property for flood control, water storage, water management, and preservation of wetlands, streams and lakes ... 1"; [18]. Thus, in addition to direct protection of natural resources through the inhibition of destructive or wasteful activities, the water management districts may remove the potential for development from natural resources by acquiring them. The following statutory acquisition criteria outline the benefits sought for conservation [19]:

1. Natural flood control water detention.
2. Preservation and/or restoration of natural systems.
3. Water conveyance.
4. Water quality enhancement.
5. Structural flood control.
6. Recharge.
7. Potable water supply.
8. Recreation.

While S.W.F.W.M.D. has not been active in purchasing land in Levy County, S.R.W.M.D. has been involved in a number of projects. In addition to the five hundred seventy-six [576] acre Andrews tract, larger tracts were purchased near the mouth of the Suwannee river which have since been transferred to federal ownership as part of the Lower Suwannee National Wildlife Refuge.

The Department of Environmental Regulation [D.E.R.] is empowered to protect wildlife and habitats through Chapter 403, F.S., which is the codification of the Warren Henderson Act, passed in 1985. Specifically, 403.912, F.S., ["Powers And Duties Of Department In Permitting Of Activities In Wetlands"] grants D.E.R. the right to adopt rules which "may include stricter permitting and enforcement provisions within Outstanding Florida Water, aquatic preserves, areas of critical state concern, and areas subject to Chapter 380, Resource Management Plans ...". Further, section 403.918 (2)(a)2 states: "Whether the project will adversely affect the conservation of fish and wildlife, including endangered or threatened species, or their habitats". With this mandate D.E.R. controls development and construction activities based on any threat to wildlife or natural habitat.

The United States Army Corps of Engineers [U.S.A.C.O.E.] has several mandates to protect wildlife and habitat. The "Fish and Wildlife Coordination Act" codified as section 16 of the U.S. Code, states that "wildlife conservation shall receive equal resource development programs". This section further requires that the U.S.A.C.O.F. consult both the U.S. Fish and Wildlife Service and the State Wildlife Agency when considering any proposal for federal work in any stream or any body of water [20]. Furthermore, section 16 states that U.S.A.C.O.E.'s purpose should be, among other things, to prevent losses and damages to wildlife resources and to provide for development and improvement of wildlife resources. The Endangered Species Act of 1973 requires all federal agencies to ensure, in consultation with the U.S. Fish and Wildlife Service, that any action is not likely to jeopardize the continued existence of a "listed species" [a species listed as

threatened or endangered] or to adversely modify critical habitat [20].

Evaluation Systems. Protecting county resources may involve developing and applying foresight concerning the pattern of development in the county. Some land uses are outright destructive of resources. For example, clear-cut harvesting will eliminate many resource opportunities for county citizens. Such forestry practices can remove a flood plain forest and the bears and panthers which rely on such habitats for decades at a time. Similarly, toxic waste dumps can leach into the aquifer obliterating the fresh water supply.

While it is clear that certain potentially destructive practices must be tightly controlled in their direct applications, the control of adjacent uses is not a commonly recognized notion. However, if two incompatible uses are allowed to be established side by side, their functioning and appreciation may be thereby diminished. For example, any commercial, industrial or agricultural activity in the vicinity of an eagle's nest will greatly lower the chances of eaglet survival.

In order to protect the physical integrity and functional harmony of various kinds of land types, the Planning Department of the Southwest Florida Water Management District, has developed guidelines for determining which land uses are compatible with one another. These guidelines are based on 1) the natural productivity and functioning occurring on each land use type; and, 2) the potential which an adjacent land use has for disturbing said functioning. As such, these guidelines have a firm defensible biological basis underlying their recommendations. Table 5-18, taken from Uses of District Owned Lands - A Compatibility Analysis [17], is included to suggest possible directives which would protect county resources by inhibiting incompatible uses.

Another evaluation system which monitors the status of threatened and endangered species and updates plans to aid the recovery of their populations is run by the Fish and Wildlife Reference Service [F.W.R.S.] of the U.S. Fish and Wildlife Service. Table 5-18 gives recommendations from the FWRS concerning the evaluation and recovery aid to vulnerable species in Levy County.

Conservation Concerns

Aesthetics

As mentioned previously, aesthetics deals with the general appearance or beauty of the county. With this concern in mind, the implementation and consideration of the various facts of aesthetics should be clearly articulated.

The citizens of Levy County should be encouraged to realize, be concerned, and appreciative of the appearance of their community and its compatibility with adjacent surroundings.

Agriculture And Soils

Total agriculturally productive lands and farms have been decreasing over the past decade in Levy County. Maintaining and enhancing the agricultural base of Levy County as well as the management of soils are two important elements of conservation to the county.

It is necessary to protect agriculturally productive lands and farms on the best agricultural soils to assure their continued use as producers of food and livestock.

TABLE 5-25

COMPATIBILITY OF LAND USES ON DISTRICT LANDS

	100 Urban/ Builtup	210 Croplan d pasture	220 Tree Crops	300 Rangela nd	410 Conifero us Forest	420 Hardwo od Forest	440 Tree Plantatio n	510 Streams/ Waterw ays	520 Lakes	610 Wetland Hardwo od Forest	620 Wetland Conifero us Forest	641 Marsh	643 Wet Prairie	740 Disturbe d Lands	800 Trans/Co mm Utilities
Access Roads	C	C	I	I	I	C	I	C	I	I	I	I	I	C	C
Aerial Lines	C	C	C	C	I	C	C	C	I	I	I	I	I	C	C
Airstrips (unpaved)	C	I	I	I	I	I	I	I	I	I	I	I	I	C	C
Apiary Sites	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Billboards	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Boardwalks	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Boating/Access	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Campgrounds	C	C	C	I	I	C	C	C	I	I	I	I	I	C	C
Camping	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Conveyance Lines	C	C	C	C	I	C	C	C	I	I	I	I	I	C	C
Docks	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Haying Leases	C	C	C	C	I	C	C	C	I	I	I	I	I	C	C
Hiking Trails	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Horseback Riding	C	C	C	C	C	C	C	C	C	I	I	I	I	C	C

Housing Structures	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Hunting	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Improved Pastures	C	C	C	C	I	C	C	C	I	I	I	I	I	C	C
Military Maneuvers	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Minerals (Rock) mining	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Native Range	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Non-motorized boats	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Off-road vehicles	C	C	I	I	I	I	I	I	I	I	I	I	I	C	C
Oil/gas	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Passive Access	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Paved Surfaces	C	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Peat Mining	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Picnic Facilities	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Pine Plantation	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Power/Comm. Towers	C	C	C	C	I	C	C	C	I	I	I	I	I	C	C
Preservation Area	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C

Recharge/Recovery	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Reservoir	C	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Sand Mining	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Selective harvesting	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Septic systems	C	C	C	C	C	C	C	I	I	I	I	I	I	C	C
Species Release	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Sports Fields	C	C	C	C	I	C	C	C	I	I	I	I	I	C	C
Spray Irrigation	C	C	C	C	I	C	C	C	I	I	I	I	I	C	C
Tertiary WW Treatment	C	C	C	C	I	C	C	C	I	I	I	I	I	C	C
Wastewater Lines	C	C	C	C	I	C	C	C	I	I	I	I	I	C	C
Wellfield	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C

Abbreviations:

I = Compatible

C = Incompatible

TABLE 5-26

**THREATENED OR ENDANGERED SPECIES RECOVERY PLANS
FISH AND WILDLIFE REFERENCE SERVICE**

Species	Main Recommendation
I. Rhododendron Chapmani	<ol style="list-style-type: none"> 1. Protect existing population in other counties 2. Establish new population
II. Eastern Indigo Snake	<ol style="list-style-type: none"> 1. Locate & delineate present populations & monitor 2. Provide needed habitat (sandhill & longleaf pine turkeys) 3. Re-establish populations (minimum 200 hectares in size) 4. Improve the public attitude
III. Eastern Peregrine Falcon	<ol style="list-style-type: none"> 1. Preserve and provide nesting habitat 2. Establish a propagation and release program 3. Manage and provide migration and wintering habitat 4. Prevent killing through federal law enforcement 5. Control usage of pesticides
IV. Wood Stork (Mycteria americana)	<ol style="list-style-type: none"> 1. Establish secure habitat <ol style="list-style-type: none"> a) Identify & implement helpful water management practices. 2. Protect wood stork rookeries <ol style="list-style-type: none"> a) Conduct census & maintain favorable conditions 3. Develop models for population dynamics <ol style="list-style-type: none"> a) Monitor post-breeding disposal & rookery shifts
V. Red-Cockaded Woodpecker (Picoides borealip)	<ol style="list-style-type: none"> 1. Conduct range-wide surveys at 5-10 year intervals 2. Protect nesting and foraging habitat 3. Provide information to private landowners 4. Conduct research on habitat needs and management
VI. California Least Fern (Sternalbifrons brownii)	<ol style="list-style-type: none"> 1. Preserve and manage nesting areas 2. Protect important non-nesting, feeding & rooting habitats 3. Monitor population to determine status 4. Designate "critical habitat" under the Endangered Species Act of 1973

<p>VII. Southeastern States Bald Eagle (<i>Haliaeetus Lencorephalus</i>)</p>	<ol style="list-style-type: none"> 1. Protect and manage habitat <ol style="list-style-type: none"> a) Identify negative alternative b) Use cooperative agreements, easements & acquisition c) Land use planning d) Pollution statement 2. Protect and monitor eagle populations <ol style="list-style-type: none"> a) Monitor nesting, productivity and disposal b) Monitor impacts of disturbance on feeding 3. Public information and education
<p>VIII. Eastern Brown Pelican (<i>Pelecanus occidentalis carolineusis</i>)</p>	<ol style="list-style-type: none"> 1. Restore species in vacant nesting habitat 2. Recreate suitable nesting habitat 3. Maintain natural & restocked colonies through natural production <ol style="list-style-type: none"> a) Identify & control limiting factors (e.g. Pesticides)
<p>IX. Florida Panther</p>	<ol style="list-style-type: none"> 1. Maintain existing populations <ol style="list-style-type: none"> a) Provide needed habitat & range b) Monitor populations & habitats 2. Improve public opinion 3. Re-establish population where feasible <ol style="list-style-type: none"> a) Maintain a captive breeding program b) Develop a re-stocking program
<p>X. West Indian Manatee (<i>Trichechys manatus</i>)</p>	<ol style="list-style-type: none"> 1. Minimize human-caused injuries & mortalities <ol style="list-style-type: none"> a) Public education 2. Minimize alteration of manatee habitat 3. Minimize harassment of manatees 4. Monitor manatee population status

Air Quality

Increasing population, traffic and industrial densities could pose a threat to the future air quality of Levy County.

As the population increases it will be necessary for the county to take actions to preserve, protect and maintain the quality of air for the benefit of all citizens, particularly those with respiratory or coronary health conditions, by meeting state air quality standards.

Archaeological Sites

Archaeological sites that contribute to the county's historic and archaeological background may, through vandalism, pilferage, land developing, underwater salvage or general public carelessness, be irretrievably lost.

The county, in cooperation with the State of Florida Division of Historical Resources, will develop measures to enhance, protect and further identify archaeological and cultural resources located in Levy County. They will also moderate these resources readily available to the visitors and residents of this coastal county.

Coastal Conservation, Development And Preservation

Disturbance by man of the natural systems and existing conditions of the coastal processes could ruin these resources and their contributions to Levy County's coastal environment.

The Levy County Commission will develop measures to preserve, protect and enhance the coastal marine systems along the Levy County coast line.

Energy Conservation

The general attitude concerning energy conservation has been, in the past, quite indifferent to energy consumption on the basis that energy is plentiful and cheap. Now that maximum energy conservation is a must, and will very likely continue to hold true in the future, the question is how to accomplish practical conservation methods for the public and private sectors of the county.

To outline a county and community action program coupled with state and federal programs to reduce the usage of man-made energy.

To achieve the necessary energy production, refining transmission, etc., while allowing only minimum detrimental impact on the environment.

To provide supplies of electrical power that are adequate in meeting the energy needs of present and future populations in addition to realizing environmental limits to supply these services to Levy County.

Environmentally Sensitive Lands

Levy County needs to identify what it considers to be environmentally sensitive lands.

It will be necessary to designate environmentally sensitive lands using locally determining criteria.

Forest Lands And Native Vegetative Communities

Forests provide a renewable resource of wood products for people and industry when managed under proper forest management techniques. These forest areas are equally important in providing habitats for wildlife, recreation, aesthetic qualities for personal enjoyment, watersheds for pure water quality, forage for woodland grazing, and clean fresh air. Since forest lands are often thought of as "land waiting to be developed", this philosophy needs to be redirected toward more conservative land use incentives. Forest lands need to be properly managed for the economic and social benefits they provide for people.

In Levy County, the forest land in private ownership is often not adequately stocked, and some owners do not practice acceptable forest management procedures. Additionally, the privately held forest land has not been developed to its full capacity.

The high value of forest lands for alternative uses, especially residential development, precludes the capitalization of investments purely for the production of forest products.

It is imperative to encourage the conservation and proper management of forest land in Levy County and insure a continuous yield of forest products, habitats for wildlife, forest associated recreation, aesthetics, clean air and clean water.

Hazardous Wastes

Unless properly handled and disposed of, hazardous wastes could damage natural resources in Levy County.

Hazardous wastes will need to be regulated.

Historic Sites

Levy County currently has numerous [over one hundred (100)] archaeological sites tabulated by the Department of State. Without protection, these cultural resources may be lost forever through vandalism, pilferage, development or negligence.

It is necessary to further identify, preserve and enhance historic sites and buildings, for present and future enjoyment by the citizens of, and visitors to, Levy County.

Intergovernmental Cooperation

As demands upon unique vegetative communities increase, and as more agencies become involved in managing these areas, there is an increasing need for intergovernmental cooperation.

It is the intent of the Levy County Commission to develop an excellent mechanism relative to intergovernmental cooperation in protecting, conserving and using vegetative communities.

Mining

Though mining activities and resulting physical adversities are limited in Levy County at this time, conditions favorable to ecosystem, water quality and land use degradation are still a vital concern to the county.

It is the intent of the Levy County Commission to mine and utilize Levy County mineral resources to enhance the economy of the area, but to protect human, vegetative, water and natural habitats from the adverse impacts of mining operations.

Natural Functions

Increased growth and development in Levy County could adversely affect the natural functions of our resources.

It is necessary to protect and conserve the natural functions of existing soils, fisheries, wildlife habitats, rivers, bays, lakes, floodplains, harbors, wetlands, estuarine marshes, freshwater beaches and shores and marine habitats.

Natural Reservations

Natural areas, as identified in the recreation and open space element, are in need of county protection in addition to that which may be provided by other agencies.

Natural reservations will require county protection, and they should be identified on the Existing and Future Land Use Maps as "preservation areas".

As defined here, a preservation area is an area set aside to remain permanently undeveloped, with management or intervention by a regulatory agency in accord with an approved management plan. The primary management goal should be to maintain the natural area in a condition which as closely as possible replicates what would occur without intervention by man, to assure that the natural area maintains a viable population of plants and animals representative of the ecosystem to be preserved.

Noise

Noise is more of an inconvenience than a problem in Levy County, and the need for regulating and monitoring noise levels along arterial routes, near mining operations and adjacent to airports may become necessary.

It is necessary to protect Levy County residents from physical discomfort and/or psychological injury due to excessive noise levels.

Recycling

Some recyclable resources are currently being destroyed [as garbage], which if recycled would be recovered.

It is the intent of the county to research and gradually establish an economically feasible resource recovery system that could serve to recycle glass, aluminum and paper from collectible source.

Water Quantity And Quality

Saltwater intrusion poses a threat to the quality of water in Levy County.

Groundwater pressures in some areas may be lowered by the transporting of underground water supplies to other counties.

Municipalities and adjacent population centers may be utilizing excessive amounts of aquifer water.

The extension of the agricultural base of the county may suffer from inadequate supplies of water to field crops as well as livestock.

It is necessary to protect the quantity and quality of Levy County's water resources, including surface water, ground water and waters that flow into the Gulf of Mexico, and to give current population committed growth and agribusiness first priority in a water use plan.

Wildlife And Wildlife Habitat

Levy County has an abundance of wildlife, some species of which are threatened or endangered.

Wildlife and wildlife habitat need to be conserved, appropriately used and protected.

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Summary of Conservation Conditions at the Time of the EAR

Data and Analysis

Identification and Analysis of Natural Resources

The natural resources inventoried in the Conservation Element of the 1990 Plan included mineral sources, soils, water resources, groundwater, surface water, air quality, natural areas, flora and fauna etc. The general condition of these natural resources, where changed in 1996, is summarized below.

Minerals

Unchanged

Soils

Since the 1990 Plan was adopted, the Soil Conservation Service of the US Department of Agriculture prepared the Interim Soil Survey Report for Levy County in 1991. The Final Soil Survey Report for Levy County is expected to be released prior to the end of 1996 and will contain extensive revised data regarding current soils conditions for use in updating the comprehensive plan in 1997. It will provide Levy County with the increased capability to analyze land uses, and necessitates revisiting the Coastal Zone, Conservation and Future Land Use elements to assure their validity given more reliable soils data. Because of the preliminary nature of the Interim Soil Survey Report and the impending release of the Final Soil Survey Report, only limited data from the interim report has been included on the Appendix to Part 2 of the EAR.

Maps 8-3 and 8-4 show generalized soils and hydric soils, respectively. The hydric soils map is virtually identical to the Wetlands map presented in Part 2 of the EAR. Both of these maps will be useful in reviewing the Future Land Use Map as a part of the next plan update, as wetlands and areas with hydric soils should have the lowest allowable densities in the county.

Ground and Surface Water Resources

The Withlacoochee River was designated as an Outstanding Florida Water (OFW).

Air Quality

unchanged.

Flora and Fauna

Endangered and Threatened Species

In 1995, the Levy County Commission adopted a Manatee Plan to minimize conflicts between shoreline and water recreation uses and the West Indian Manatee which inhabits the Withlacoochee River. The Plan was mandated by the Department of Community Affairs as a pre-requisite for

moving the Citrus and Levy County boundary from the Levy shoreline to the center of the Withlacoochee River. The Manatee Protection Plan may become part of the Levy County Comprehensive Plan when it is updated in 1997.

Flora

The Florida Division of Forestry has reported that thousands of Sabal Palms along the Levy County shoreline have died because of rising sea level.

Natural Areas

Marine Habitats

Unchanged. However, marine habitats could be affected by the slow rise in sea level.

Wetland Habitats

Unchanged. However, wetlands habitats in the coastal zone could be adversely affected by the slow rise in sea level already being blamed for the deaths of Sabal Palms along the shoreline (see Part 2 of EAR for wetland maps).

Floodplains

Unchanged. The updated comprehensive plan needs to assess the potential impacts of increased flooding in coastal areas due to a shoreline that is migrating to the east.

Upland Areas

Unchanged.

Vegetative Communities Wildlife

Unchanged. (See Part 2 of EAR for regionally significant habitat maps).

Use of Natural Resources

Commercial Use

The commercial use of natural resources was adversely impacted by the fishing net ban enacted by Florida voters in November, 1994. This has directly lead to the closing of some fish and seafood houses and has disrupted the water-dependent livelihoods of fishermen in the Levy County Coastal zone. Ongoing efforts to increase shellfish farming off the Levy County coast may result in increased demands for appropriate marine bottomland and related shore support facilities.

Agriculture in Levy County was still dominated by pasture, row crops and pine tree production.

About 108,000 acres, or 15.3 percent of the county's area were utilized for pasture and crop production. 90,100 acres were used for pasture and hay production; 3,900 acres were used for vegetable crops; and, 14,000 acres were used for the production of agronomic crops, i.e. corn, soybeans peanuts, tobacco, grain sorghum, rye, wheat and oats. Principal vegetable crops are watermelons, cucumbers, squash and peppers. Cattle, hogs and horses are the primary livestock (Levy County Cooperative Extension Service).

Minerals

Unchanged.

Water

Major changes in agricultural water uses occurred in Levy County in the early 1990's with the development of three large dairies. No data were available to document the water use or potential environmental impacts of these agri-business operations.

Soils

Unchanged. The primary commercial use of soils resources remained agriculture and forestry.

Recreational Use

The establishment of the Goethe State Forest (Levy and Marion Counties) in 1993 significantly increased the public lands held in conservation uses for recreation in Levy County. In recent years, recreational uses have increased as the eco-tourism movement has been promoted in the county by the Nature Coast Coalition, an association of coastal counties joined together for this purpose. Increased tourist activities could produce greater demands for fishing piers, boat ramps, marinas, bathhouses and other related activities such as restaurants and accommodations.

Conservation Use

The establishment of the Goethe State Forest (Levy and Marion Counties) in 1993 significantly increased the public lands held in conservation uses in Levy County.

Public Conservation Lands are depicted on Map 8-7 in the Natural Resources Series in the Appendix to Part 2 of the EAR.

Known Pollution Problems

Unchanged.

Note: High concentrations of lead were discovered in soils in a subdivision within the Town of Inglis. This situation, while unfortunate, is outside the scope of the EAR.

Current Water Sources and Needs

Note: This section has been deferred in anticipation of receipt of results from forthcoming Levy County Water and Land Use Plan being prepared by the Suwannee River and Southwest Florida Water Management Districts.

Groundwater

Watersheds and sub-watersheds are depicted on Map 8-8 in the Natural Resources Series in the Appendix to Part 2 of the EAR.

Surface Water

Forthcoming.

Water Sources

Recharge potential of the Floridan Aquifer is depicted on Map 8-9 in the Natural Resources Series in the Appendix to Part 2 of the EAR.

Water Quality

Forthcoming.

Water Quantity

Forthcoming.

Conservation and Protective Measures

Forthcoming.

Amendments to the Conservation Element Since 1990

A. Ordinance 90-06. Conservation Element. Amended Policy 3.1.b(2).

Limiting land uses in the 100-year floodplains to those which are low density rural residential, low intensity agricultural, or which meet the most stringent state standards for planned development as established by the Florida Quality Communities may be deemed appropriate by the board to protect these lands.

B. Ordinance 92-2. Conservation Element; Future Land Use Element.

Rescinded Ordinance 90-06, above.