

Integrating Hazard Mitigation into Comprehensive Planning

Broward County Profile

Florida Department of Community Affairs

Executive Summary

The experiences of the 2004 and 2005 hurricane seasons epitomize the importance of better integrating hazard mitigation activities into local comprehensive planning. In the fall of 2004, residents all over the state experienced significant damages from Charley, Frances, Jeanne, and Ivan as a result of winds, tornadoes, surge, and/or flooding. But these were not the only times we have experienced natural disasters, nor will they be the last. In 1992, Hurricane Andrew devastated South Florida. In 1998 and 1999, most counties in Florida experienced wildfires. In some cases, despite firefighters' best efforts, fires advanced through neighborhoods and homes were lost. Every year in Central Florida, new sinkholes emerge, swallowing homes and damaging infrastructure. The cost of recovery for these various disasters ranges from hundreds of thousands to billions of dollars, significantly taxing local, State, and federal financial sources. Losses covered through federal funding as a result of the 2004 hurricanes alone could reach as high as \$7 billion. Worst of all, however, are the many lives that, directly or indirectly, are lost due to natural disasters. It is imperative that we reduce the human and financial costs of natural disasters. Through better integration of natural hazard considerations into local comprehensive planning, we can build safer communities.

This Broward County Profile has been prepared as part of a statewide effort by the Florida Department of Community Affairs to guide local governments in integrating hazard mitigation principles into local Comprehensive Plans. Information provided in this profile will enable planners to (1) convey Broward County's existing and potential risk to identified hazards; (2) assess how well local hazard mitigation principles have been incorporated into the County's Comprehensive Plan; (3) provide recommendations on how hazard mitigation can be better integrated into the Comprehensive Plan; and (4) determine if any enhancements could be made to the Local Mitigation Strategy (LMS) to better support comprehensive planning. Best available statewide level data are provided to convey exposure and risk as well as illustrate the vulnerability assessment component of the integration process.

In this profile, we present an argument for why hazard mitigation needs to be a part of comprehensive planning through an examination of population growth, the hazards that put the County at risk, the special needs population and structures that could be affected by these hazards, and the distribution of existing and future land uses in different hazard areas. We hope that this analysis will serve as an example of the issues each jurisdiction should consider as they update their plans to include hazard mitigation. The profile also contains a review of the LMS and the Comprehensive Plan. Based on the analysis and review, we were able to develop specific options for the County on how to incorporate more hazard mitigation into the Comprehensive Plan and how to enhance the LMS so that it is also a better tool for local planners.

During our review, we found that Broward County had many strengths regarding hazard mitigation in both its LMS and Comprehensive Plan, and these are outlined in the profile. There are always ways to further strengthen such plans, however, and the following is a summary of some of the options that would enable the County to do so.

BROWARD COUNTY GENERAL RECOMMENDATIONS

- The County can explore the use of a Comprehensive Plan policy that links the hazard mitigation projects in the LMS to the 5-year schedule of Capital Improvements Projects. The County could also incorporate the project rating criteria used in Chapter 5 of the LMS to prioritize all capital improvement projects. County LMS initiatives are the result of the overall hazard mitigation strategy and a formalized procedure to prioritize those initiatives in the Comprehensive Plan can create a stronger timeframe for completion and tie in funding sources.

- The County can integrate LMS educational and hazard mitigation training goals and objectives into Comprehensive Plan. LMS goals and objectives provide a strong hazard mitigation strategy for promoting the education of the public and county employees including site plan reviewers, land use planners, engineers, and building inspectors. This is a proactive way to address existing and future development in regard to known hazards. County officials can address future development and consider hazard mitigation issues before development occurs.
- The County can create a Comprehensive Plan policy that aims to meet the evacuation shelter demand articulated in the State Shelter Plan or their own shelter study. The County can include policies that aim to create and maintain a shelter level of service standard in order to plan for future shelter demand. A shelter level of service standard can be used to analyze future development that may increase shelter demand and could even be used to assess impact fees to pay for shelter improvements and additions. Currently, Broward County has met shelter demand, but as future development occurs, the demand will increase, as shown in **Section 2** of this report. Comprehensive Plan policies that aim to meet this demand can help ensure the safety of residents during a hurricane. Additionally, the County can promote the inclusion of safe rooms in new buildings outside of flood and surge zones to use as a shelter of last resort.
- The LMS and the Comprehensive Plan can promote the conservation and restoration of natural resources that may decrease the risk from natural disasters such as flooding and wildfires. They can also support the continuance of data collection to identify hazard areas and county vulnerability. Broward County has many existing measures that serve to mitigate the impacts of hazards, however, they have not been identified as beneficial in this area. Current growth management techniques such as land conservation, land acquisition, transfer of development rights, and the regulation and prohibition of development on environmentally sensitive lands are employed by the County to protect natural resources but these techniques also mitigate the effects of natural disasters. The County could amend some of these policies to include hazard mitigation as an additional benefit.
- Broward County can determine whether or not the conserved areas in the County have lifetime designations. Conservation land use currently protects many hazard areas, particularly the wetlands and wildfire susceptible areas show in **Attachment B** and **C**. Determining the expiration of conservation area classifications can help planners address the future of these lands and take mitigative actions to reduce the risks associated with natural disasters.
- The County could explore the adoption of Land Development Regulations that facilitate the removal of wildfire fuels in wildfire susceptible areas prior to development. The County could also initiate a Firewise program to educate the public in ways to mitigate the risks associated with wildfires. Since development may proceed westward towards Route 27 and the existing wildfire hazard areas in that vicinity, as shown on the maps in **Attachment C**, the County and the applicable municipalities can address wildfire hazards before development occurs. For existing communities that have developed wildfire susceptible areas, programs can address wildfire risks to protect existing structures.
- The County can adopt Comprehensive Plan policies that promote the LMS strategy of retrofitting public and private structures (shown in Objectives 3.2, 3.6, and 4.4) to reduce potential structural damages due to natural disasters. The County can also promote the removal or retrofit of repetitive loss structures through Comprehensive Plan policies. While LMS initiatives address repetitive loss properties and the retrofit of public and private structures, there were no formal goals, objectives, or policies found in the Comprehensive Plan during this review that support the continuance of this strategy.

Securing or removing at-risk structures in hazard zones can prevent future losses of life and reduce the costs of disasters.

- The County can explore Comprehensive Plan policies that address the protection of historic and cultural resources from the effects of natural disasters. Current policies support conservation and protection of natural and historic resources through code requirements. An inventory of cultural resources and historical structures could be added to the HIVA section of the LMS in order to analyze the potential risks to these resources. Mitigation initiatives that address historic and cultural needs could be added to the LMS if needed.
- The Comprehensive Plan could promote the clustering of new development away from natural hazard areas in order to reduce risk to persons and property. The County could also support the use of transfer of development rights for hazard areas in order to reduce development on or adjacent to hazard areas. For instance, the analysis in the document, shows that there are 33,981 acres of vacant land within the flood zone, leaving significant opportunities to encourage development away from these flood-prone areas. Development could instead be clustered near existing development with stormwater facilities or in areas not prone to flooding.

Table of Contents

Executive Summary.....	i
1. County Overview.....	1
2. Hazard Vulnerability.....	2
3. Existing Mitigation Measures.....	11
4. Comprehensive Plan Review.....	14
5. Recommendations.....	15
6. Sources.....	27
Attachments.....	
Attachment A: Maps of the Existing and Future Land Uses within the Coastal Hazard Zone and the Hurricane Vulnerability Zone.....	A-1
Attachment B: Maps of the Existing and Future Land Uses within the 100-year Floodplain.....	B-1
Attachment C: Maps of the Existing and Future Land Uses within Wildfire Susceptible Areas.....	C-1
Attachment D: Broward County Local Mitigation Strategy Goals and Objectives.....	D-1
Attachment E: Broward County Comprehensive Plan Excerpts Related to Hazard Mitigation.....	E-1

1. County Overview

Geography and Jurisdictions

Broward County is located along the coast in Southeast Florida. It covers a total of 1,205 square miles with an average population density of 1,346.5 people per square mile (U.S. Census, 2000).

There are thirty incorporated municipalities within the County, and these are listed in **Table 1.1**.



Population and Demographics

Official 2004 population estimates for all jurisdictions within Broward County as well as the percent change in population from the 2000 U.S. Census are presented in **Table 1.1**. The most current estimated countywide population of Broward County is 1,723,131 people (University of Florida, Bureau of Economic and Business Research, 2004). The most populated city in the County is Fort Lauderdale, with an estimated 152,397 residents. Only 4.8% of the countywide population lives in the unincorporated portion of the County. Between 1990 and 2000, Broward County as a whole had a growth rate of 29.3%, which was greater than the statewide growth rate of 23.5% in those 10 years.

Table 1.1 Population Estimates by Jurisdiction

Jurisdiction	Population, Census 2000	Population Estimate, 2004	% Change, 2000-2004	% of Total Population (2004)
Unincorporated	130,356	83,359	-36.1%	4.8%
Coconut Creek	43,566	47,922	10.0%	2.8%
Cooper City	27,914	29,020	4.0%	1.7%
Coral Springs	117,549	126,711	7.8%	7.4%
Dania	20,061	28,080	40.0%	1.6%
Davie	75,720	81,845	8.1%	4.7%
Deerfield Beach	64,585	65,113	0.8%	3.8%
Ft. Lauderdale	152,397	170,297	11.7%	9.9%
Hallandale	34,282	35,230	2.8%	2.0%
Hillsboro Beach	2,163	2,245	3.8%	0.1%
Hollywood	139,368	142,998	2.6%	8.3%
Lauderdale-by-the-Sea	3,221	6,278	94.9%	0.4%
Lauderdale Lakes	31,705	31,752	0.1%	1.8%
Lauderhill	57,585	57,936	0.6%	3.4%
Lazy Lake Village	38	34	-10.5%	0.0%
Lighthouse Point	10,767	10,857	0.8%	0.6%
Margate	53,909	54,455	1.0%	3.2%
Miramar	72,739	101,813	40.0%	5.9%
North Lauderdale	32,264	40,281	24.8%	2.3%
Oakland Park	30,966	31,810	2.7%	1.8%
Parkland	13,835	19,374	40.0%	1.1%
Pembroke Park	5,384	5,708	6.0%	0.3%
Pembroke Pines	137,427	150,435	9.5%	8.7%
Plantation	82,934	84,604	2.0%	4.9%
Pompano Beach	78,191	87,184	11.5%	5.1%

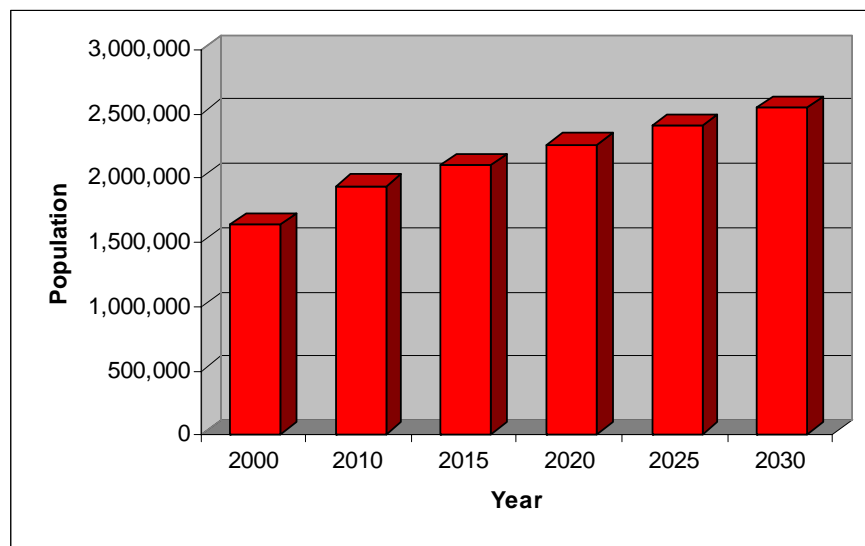
Table 1.1 Population Estimates by Jurisdiction

Jurisdiction	Population, Census 2000	Population Estimate, 2004	% Change, 2000-2004	% of Total Population (2004)
Sea Ranch Lakes	734	727	-1.0%	0.0%
Southwest Ranches	0	7,443	N/A	0.4%
Sunrise	85,787	88,976	3.7%	5.2%
Tamarac	55,588	57,726	3.8%	3.4%
Weston	49,286	60,636	23.0%	3.4%
Wilton Manors	12,697	12,282	-3.3%	0.7%
Countywide Total	1,623,018	1,723,131	6.2%	100.0%

Source: University of Florida, Bureau of Economic and Business Research, 2004.

According to the University of Florida, Bureau of Economic and Business Research (2004), Broward County’s population is projected to grow steadily for the next 25 years, reaching 2,531,800 people by the year 2030. **Figure 1.1** illustrates medium population projections for Broward County based on 2004 calculations.

Figure 1.1 Medium Population Projections for Broward County, 2010-2030



Source: University of Florida, Bureau of Economic and Business Research, 2004.

Of particular concern within Broward County’s population are those persons with special needs and/or limited resources such as the elderly, disabled, low-income, or language-isolated residents. According to the 2000 U.S. Census, 16.1% of Broward County residents are listed as 65 years old or over, 19.1% are listed as having a disability, 11.5% are listed as below poverty, and 28.8% live in a home with a primary language other than English.

2. Hazard Vulnerability

Hazards Identification

The following natural hazards were identified as potential risks for Broward County and were analyzed in the County’s Local Mitigation Strategy (LMS): tropical cyclones / wind and storm surge, lightning, fresh water flooding, thunderstorm-hail, thunderstorm-wind, drought, wildfire, tornados & waterspouts, rip current, heat, freeze, sink holes, agriculture disease, and insect

borne diseases. Of these hazards, freshwater flooding, tropical cyclone-wind, tropical cyclone-surge, and lightning were ranked the four highest priority natural disasters. While sinkholes and wildfire risk occur in Broward County, they were given a low priority in the LMS ranking. (Broward County, 2002c)

The LMS Hazards Analysis states that flooding in South Florida is generally caused by large amounts of rainfall in a short amount of time. Thunderstorms frequent the region, especially in the summer months, and deliver large amounts of precipitation on often saturated ground. Broward County is susceptible to freshwater flooding largely due to the low elevation of the county and to frequent rainfall events, making hazard mitigation initiatives that address flooding issues a high priority. (Broward County, 2002c)

Broward County is also very susceptible to hurricanes and tropical storms that form over the Caribbean Sea and Atlantic Ocean. The LMS states that between 1886 and 1999 there were an estimated 3,451 deaths from South Florida hurricanes as well as \$37.398 billion in damage. As the population increases and more development occurs in Broward County, the risk of exposure to hurricanes and tropical storms is also likely to increase. (Broward County, 2002c)

Much of the Everglades Conservation Area, is located in Broward County and some of the vegetation in this area can be a potential source of wildfire fuel. As the LMS states, encroachment of development on the conservation area could increase the risk of wildfires caused by human error. The LMS includes recent accounts of wildfire losses including a 200,000 acre wildfire in the everglades swampland area in 2000. Also, since 2002, there have been 41 human caused wildfires totaling 1,218 acres in Broward County. Luckily, there have been no reports of natural sinkholes in Broward County over the last 25 years. (Broward County, 2002c)

Hazards Analysis

The following analysis looks at three major hazard types: hurricanes and tropical storms (specifically surge), flooding, and wildfire. All of the information in this section, except the evacuation and shelter estimates, was obtained through the online Mapping for Emergency Management, Parallel Hazard Information System (MEMPHIS). MEMPHIS was designed to provide a variety of hazard related data in support of the Florida Local Mitigation Strategy DMA2K revision project. It was created by Kinetic Analysis Corporation under contract with the Florida Department of Community Affairs (FDCA). Estimated exposure values were determined using the Category 3 Maxima Scenario for storm surge, the Federal Emergency Management Agency's (FEMA's) designated 100-year flood zones (A, AE, V, VE, AO, 100 IC, IN, AH), and levels of concern 5 through 9 for wildfire. Storm surge exposure data are a subset of flood exposure, therefore the storm surge results are also included in the flood results. For more details on a particular hazard or an explanation of the MEMPHIS methodology, consult the MEMPHIS Web site (<http://lmsmaps.methaz.org/lmsmaps/index.html>) or your countywide LMS.

Existing Population at Risk

Table 2.1 presents the estimated countywide population at risk from hazards, as well as a breakdown of the sensitive needs populations at risk. The first column in the table summarizes the residents of Broward County that live within FEMA Flood Insurance Rate Map zones that signify special flood hazard areas. Most of the land within the county is prone to flooding. Out of the countywide population, 73.4% of residents live within a flood prone area. **Table 2.1** shows that there are 363,874 residents that fall below the poverty line within a flood zone. Also, there are 402,296 disabled residents within a flood zone. Flood risk affects far more county residents than wildfires and storm surge combined. Wildfires pose a threat to 134,469 residents while storm surge threatens 139,009 residents. **Table 2.1** shows that there are 55,218 disabled people that reside within a surge threatened area. Coastal areas are often evacuated when threatened by storm surge events, and some of these residents may need assistance with evacuation or sheltering.

Table 2.1 Estimated Number of Persons at Risk from Selected Hazards

Population	Flood	Wildfire (medium-high risk)	Surge
Minority	363,874	37,226	19,092
Over 65	202,892	27,749	38,362
Disabled	402,296	47,190	55,218
Poverty	133,586	11,682	17,749
Language Isolated	6,834	1,019	1,407
Single Parent	82,224	9,603	7,181
Countywide Total	1,191,706	134,469	139,009

Source: Florida Department of Community Affairs, 2005a

Evacuation and Shelters

As discussed in the previous sections, population growth in Broward County has been steady, and this trend is projected to continue. As the population increases in the future, the demand for shelter space and the length of time it takes to evacuate the County is only going to increase. Currently, evacuation clearance times for Broward County are estimated to be 13.75 hours for Category 3, 4, and 5 hurricanes, as shown in **Table 2.2**. These data were derived from 11 regional Hurricane Evacuation Studies that have been produced by FEMA, the U.S. Army Corps of Engineers, and Florida Regional Planning Councils. The study dates range from 1995 to 2004 and are updated on a rotating basis. According to Rule 9J-5, counties must maintain or reduce hurricane evacuation times. Some experts have suggested that counties should try to achieve 12 hours or less clearance time for a Category 3 hurricane. This is due to the limited amount of time between the National Hurricane Center issuing a hurricane warning and when the tropical storm-force winds make landfall. Broward County is currently just over this recommendation, but with continued effort, evacuation clearance times can be maintained or even improved. Additionally, storm events requiring evacuation typically impact larger areas, often forcing multiple counties to issue evacuation orders and placing a greater number of evacuees on the major roadways, further hindering evacuation progress. Thus, it is important to not only consider evacuation times for Broward County, but also for other counties in the region as shown in **Table 2.2**. Broward is in a particularly bad situation because it is surrounded by large urban areas that may all be evacuating at the same time.

Table 2.2 County Evacuation Clearance Times in Hours (High Tourist Occupancy, Medium Response)

County	Hurricane Category				
	1	2	3	4	5
Broward	10.75	10.75	13.75	13.75	13.75
Miami-Dade	14	17.5	17.5	17.5	17.5
Monroe	18	18	36	36	36
Palm Beach	10.25	10.25	15.25	15.25	15.25

Note: Best available data as of 7/05

Source: State of Florida, 2005

(some counties may be in the process of determining new clearance times)

Coupled with evacuation is the need to provide shelters. If adequate space can be provided in safe shelters for Broward County residents, then this could be a partial solution to the ever-increasing clearance times for evacuation. Currently, the State Shelter Plan reports that there is space for 41,475 people in the County’s shelters. In Broward County, shelter capacity currently exceeds shelter demand. (FDCA, 2004) The County will need to address future demand but

might also try to decrease the demand for public shelters by encouraging new homes to be built with safe rooms if they are outside of flood and surge zones. Residents who are further inland in the County and not in a flood zone could shelter in place if they had a safe room that could withstand hurricane-force winds. Safe rooms could at least be a last option for residents who cannot evacuate in time, especially in the case of a tornado.

Existing Built Environment

While the concern for human life is always of utmost importance in preparing for a natural disaster, there also are large economic impacts to local communities, regions, and even the State when property damages are incurred. To be truly sustainable in the face of natural hazards, we must work to protect the residents and also to limit, as much as possible, property losses that slow down a community’s ability to recover from a disaster. **Table 2.3** presents estimates of the number of buildings in Broward County by structure type that are at risk from each of the three hazards being analyzed.

Flooding presents a large risk to property in the County, with 711,320 structures within a flood zone. Of those structures, 48.6% are single-family homes. According to the latest National Flood Insurance Program Repetitive Loss Properties list, there are 50 homes in unincorporated Broward County that have had flood damage multiple times and received insurance payments but have not remedied the recurring problem. There are 131,776 mobile homes within the flood zone as well as 210,756 multi-family homes. Flooding threatens more structures than wildfires and storm surge combined. Even still, there are 58,135 structures located on wildfire-prone land, 30,840, or 53%, of which are single family homes. This type of development is typically found in the wildland-urban interface zone where sprawl meets undeveloped, forested tracks. There are also 86,952 structures at risk from storm surge. **Table 2.3** shows that the majority of these structures are multi-family homes, most likely high-priced ocean condominiums.

Table 2.3 Estimated Number of Structures at Risk from Selected Hazards

Structure Type	Flood	Wildfire (medium- high risk)	Surge
Single-Family Homes	345,488	30,840	29,024
Mobile Homes	131,776	3,980	159
Multi-Family Homes	210,756	21,105	52,968
Commercial	18,757	1,420	3,967
Agriculture	3,507	418	47
Gov./Institutional	1036	372	787
Total	711,320	58,135	86,952

Source: Florida Department of Community Affairs, 2005a.

In addition to understanding exposure, risk assessment results must also be considered for prioritizing and implementing hazard mitigation measures. The risk assessment takes into account not only the people and property in a hazard area, but also the probability of occurrence that is necessary to understand the impacts to people and property. Although people and property are exposed to hazards, losses can be greatly reduced through building practices, land use, and structural hazard mitigation measures. The next section of this report examines the existing and future land use acreage in hazard areas. This information can be useful in considering where to implement risk reducing comprehensive planning measures.

Analysis of Current and Future Vulnerability

The previous hazards analysis section discussed population and existing structures at risk from flooding, wildfire, and surge according to MEMPHIS estimates. This section demonstrates the County's vulnerability to these hazards spatially and in relation to existing and future land uses. The following maps and tabulations of existing land use within hazard areas are based on the 2004 Broward County Property Appraiser / Florida Department of Revenue data, and the 1995 Florida Department of Environmental Protection and South Florida Water Management District shapefiles. Maps and tabulations of future land uses in hazard areas were developed using the Broward Countywide future land use map obtained October 2005. The Everglades Conservation Area is not included in the following land use tabulations.

In **Attachment A**, four maps show the existing and future land uses within the coastal hazard zone (Category 1 storm surge zone) and the hurricane vulnerability zone (Category 1 evacuation zone). **Table 2.4** indicates that there are 14,665 acres of land within the coastal hazard zone (CHZ) and an additional 237 acres in the hurricane vulnerability zone (HVZ). These zones are primarily located on the barrier islands and inland up to a couple miles. Incorporated coastal communities occupy a majority of the land in these zones. Currently, 43.1% of the CHZ and 42.6% of the HVZ have single-family homes. Another major existing land use of these zones is commendably parks and conservation, with 13.0% of the CHZ and 13.9% of the HVA used for these purposes. In addition, approximately 19% of both zones are still undeveloped. **Table 2.5** shows that of the currently vacant land in the CHZ and HVZ, 33.4% and 28.7%, respectively, are designated for future transportation uses. While future investment in transportation in these zones may increase evacuation capacities it also will increase the taxpayer's investment in a hazardous area and subsidize future growth where the intention is to limit densities. **Table 2.5** also shows that currently vacant land is allocated for future residential use. Unfortunately, 10.8% of the vacant property in both zones is designated for 5 dwelling units per acre and another 8.6% of the CHZ and 10.1% of the HVZ vacant acres are designated for 25 dwelling units per acre. This will further increase the population in the category 1 evacuation zone and put more people at risk from surge.

In **Attachment B**, two maps present the existing and future land uses within the 100-year floodplain. Much of Broward County is within a flood zone. Currently, 193,965 acres are at risk from flooding, as shown in **Table 2.4**, but this does not include the Everglades Conservation Area which naturally floods. Of the 193,965 acres, 64.8%, or 125,750 acres,, are in residential use. Also, 33,981 flood-prone acres, or 17.5%, of the floodplain, is currently undeveloped. An additional 9,934 acres besides those in the Everglades Conservation Area are designated as parks, conservation areas, and golf courses. Using flood-prone areas for parks and conservation purposes is a strong flood mitigation strategy since development can be limited in these areas and the natural hydrology left in place. Existing vacant land allows the County and municipalities an opportunity to regulate or limit development before it occurs. Of the 33,981 acres currently undeveloped in the zone, 50.2%, are designated for future residential uses, as shown in **Table 2.5**. Another 3,177 acres are designated for commercial use while an additional 1,260 vacant acres are designated for community facilities. Transportation and right-of-way future land uses are designated towards 14.2% of existing undeveloped land. This is a lot of development that is currently allowable within the 100-year floodplain. With proper mitigation designed into these structures and roads, much of the development can occur without increasing the vulnerability of the County to flood losses. However, alterations to the natural hydrology often have unforeseen impacts if mitigation occurs in a piecemeal fashion rather than looking at system-wide drainage impacts.

In **Attachment C**, maps present the land uses associated with high-risk wildfire zones. Small wildfire-prone areas are found throughout the County, although there is a concentration along Route 27. Single-family homes are found in 46.9% of the wildfire susceptible acres, generally scattered in isolated areas south of Highway 75 and east of Route 27. These homes are most likely very vulnerable to a wildfire since single-family residential neighborhoods on the outskirts of

urban areas typically have a lot of vegetation that can allow a fire to spread between homes. Another 24% of the wildfire risk areas, or 1,628 acres, are currently conserved and special attention should be paid to maintaining wildfire fuel levels through prescribed burning or mechanical means in these areas. Another 875 acres are currently undeveloped. Vacant lands often can add to wildfire risk since wildfire fuel levels are not typically maintained. Of the undeveloped land, **Table 2.5** shows that 19.1% is designated for future residential estates and 12.6% is designated for rural ranches. When development does occur on these lands, wildfire mitigation techniques for neighborhood design should be encouraged as well as education of homeowners about maintaining defensible space.

Table 2.4 Total County Acres in Hazard Areas by Existing Land Use Category

Existing Land Use Category		Coastal Hazard Zone	Hurricane Vulnerability Zone	Flood Zones	Wildfire Susceptible Areas
Agriculture	Acres	6.2	6.7	1,660.2	158.1
	%	0.0	0.0	0.9	2.3
Attractions, Stadiums, Lodging	Acres	25.2	24.1	120.2	0.0
	%	0.2	0.2	0.1	0.0
Places of Worship	Acres	65.1	59.1	507.6	10.3
	%	0.4	0.4	0.3	0.2
Commercial	Acres	885.9	927.6	4,983.4	132.2
	%	6.0	6.2	2.6	2.0
Government, Institutional, Hospitals, Education	Acres	468.4	482.9	4,214.0	149.1
	%	3.2	3.2	2.2	2.2
Industrial	Acres	332.4	332.4	2,058.8	11.4
	%	2.3	2.2	1.1	0.2
Parks, Conservation Areas, Golf Courses	Acres	1,911.0	2,067.9	9,934.0	1,628.1
	%	13.0	13.9	5.1	24.0
Residential Group Quarters, Nursing Homes	Acres	1.3	1.1	44.4	0.0
	%	0.0	0.0	0.0	0.0
Residential Multi-Family	Acres	1,192.7	1,215.0	6,106.7	64.7
	%	8.1	8.2	3.1	1.0
Residential Mobile Home, or Commercial Parking Lot	Acres	163.2	183.9	2,505.7	80.3
	%	1.1	1.2	1.3	1.2
Residential Single-Family	Acres	6,314.7	6,349.3	117,093.8	3,176.3
	%	43.1	42.6	60.4	46.9
Submerged Lands (Water Bodies)	Acres	38.1	38.1	778.0	25.4
	%	0.3	0.3	0.4	0.4
Transportation, Communication, Rights-of-Way	Acres	436.7	423.3	9,052.5	443.6
	%	3.0	2.8	4.7	6.5
Utility Plants and Lines, Solid Waste Disposal	Acres	24.7	27.2	924.7	18.3
	%	0.2	0.2	0.5	0.3
Vacant	Acres	2,799.8	2,763.9	33,981.0	874.8
	%	19.1	18.5	17.5	12.9
Total Acres	Acres	14,665.4	14,902.5	193,965.0	6,772.6
	%	100.0	100.0	100.0	100.0

Table 2.5 Total and Undeveloped Acres in Hazard Areas by Future Land Use Category

Future Land Use Category		Coastal Hazard Zone		Hurricane Vulnerability Zone		Flood Zones		Wildfire Susceptible Areas	
		Total	Undev.	Total	Undev.	Total	Undev.	Total	Undev.
Agriculture	Acres	0.0	0.0	0.0	0.0	5,352.8	576.5	1,632.7	47.7
	%	0.0	0.0	0.0	0.0	2.8	1.7	24.1	5.5
Commercial	Acres	944.8	198.6	1,025.0	207.5	13,520.3	3,177.4	172.1	31.9
	%	6.4	7.1	6.9	7.5	7.0	9.4	2.5	3.6
Commercial Recreation	Acres	616.0	229.6	606.8	229.8	5,208.1	881.5	119.9	15.8
	%	4.2	8.2	4.1	8.3	2.7	2.6	1.8	1.8
Community Facilities	Acres	153.2	36.6	168.1	33.2	4,126.2	1,259.8	67.8	42.4
	%	1.0	1.3	1.1	1.2	2.1	3.7	1.0	4.8
Conservation	Acres	939.4	12.5	973.8	14.3	1,865.7	139.6	115.3	0.0
	%	6.4	0.4	6.5	0.5	1.0	0.4	1.7	0.0
Electric Generation Facility	Acres	45.5	18.7	45.7	16.9	500.5	305.9	48.6	2.0
	%	0.3	0.7	0.3	0.6	0.3	0.9	0.7	0.2
Employment Center - High	Acres	133.8	86.1	133.1	86.7	1,493.4	353.3	77.1	6.5
	%	0.9	3.1	0.9	3.1	0.8	1.0	1.1	0.7
Employment Center - Low	Acres	0.0	0.0	0.0	0.0	10.5	4.7	3.1	0.0
	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Estates (1) Residential	Acres	0.0	0.0	0.0	0.0	13,103.4	2,500.2	1,044.4	166.8
	%	0.0	0.0	0.0	0.0	6.8	7.4	15.4	19.1
High (50) Residential	Acres	370.5	98.5	582.7	167.2	737.5	176.6	4.5	0.0
	%	2.5	3.5	3.9	6.0	0.4	0.5	0.1	0.0
Industrial	Acres	52.6	6.0	26.1	2.9	9,426.4	2,179.4	162.1	40.4
	%	0.4	0.2	0.2	0.1	4.9	6.4	2.4	4.6
Local Activity Center	Acres	94.1	21.2	92.5	23.2	434.9	94.1	0.0	0.0
	%	0.6	0.8	0.6	0.8	0.2	0.3	0.0	0.0
Low (2) Residential	Acres	0.0	0.0	0.0	0.0	2,094.7	272.4	154.0	26.1
	%	0.0	0.0	0.0	0.0	1.1	0.8	2.3	3.0
Low (3) Residential	Acres	729.4	80.3	752.6	92.5	15,273.6	2,091.3	285.1	51.3
	%	5.0	2.9	5.1	3.3	7.9	6.2	4.2	5.9
Low (5) Residential	Acres	2,993.9	301.4	2,859.7	297.4	29,534.7	4,138.3	176.8	8.5
	%	20.4	10.8	19.2	10.8	15.2	12.2	2.6	1.0
Low-Medium (10) Residential	Acres	331.3	25.4	329.9	26.8	8,842.7	1,363.0	99.9	5.6
	%	2.3	0.9	2.2	1.0	4.6	4.0	1.5	0.6
Medium (16) Residential	Acres	852.5	122.8	795.6	112.8	7,480.4	1,320.6	27.2	11.1
	%	5.8	4.4	5.3	4.1	3.9	3.9	0.4	1.3
Medium-High (25) Residential	Acres	1,068.1	239.4	1,235.7	277.8	3,144.9	713.4	0.7	0.0
	%	7.3	8.6	8.3	10.1	1.6	2.1	0.0	0.0
Mining	Acres	0.0	0.0	0.0	0.0	63.1	14.9	4.7	0.0
	%	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Office Park	Acres	3.6	0.0	2.9	0.0	686.8	55.5	50.2	0.0
	%	0.0	0.0	0.0	0.0	0.4	0.2	0.7	0.0

Table 2.5 Total and Undeveloped Acres in Hazard Areas by Future Land Use Category

Future Land Use Category		Coastal Hazard Zone		Hurricane Vulnerability Zone		Flood Zones		Wildfire Susceptible Areas	
		Total	Undev.	Total	Undev.	Total	Undev.	Total	Undev.
Recreation and Open Space	Acres	784.7	66.7	984.2	91.2	7,130.6	1,175.7	301.6	17.2
	%	5.4	2.4	6.6	3.3	3.7	3.5	4.5	2.0
Regional Activity Center	Acres	269.3	57.1	220.0	46.6	4,611.1	670.4	177.7	27.0
	%	1.8	2.0	1.5	1.7	2.4	2.0	2.6	3.1
Residential in Irregular Areas	Acres	0.0	0.0	0.0	0.0	18,429.6	3,144.7	292.9	41.7
	%	0.0	0.0	0.0	0.0	9.5	9.3	4.3	4.8
Right-of-Way	Acres	2,233.8	200.9	2,245.6	192.4	23,007.0	2,234.2	373.6	38.3
	%	15.2	7.2	15.1	7.0	11.9	6.6	5.5	4.4
Rural Estates	Acres	0.0	0.0	0.0	0.0	1,251.5	332.2	115.0	23.0
	%	0.0	0.0	0.0	0.0	0.6	1.0	1.7	2.6
Rural Ranches	Acres	0.0	0.0	0.0	0.0	4,902.7	956.1	495.8	109.9
	%	0.0	0.0	0.0	0.0	2.5	2.8	7.3	12.6
Transportation	Acres	1,579.0	935.4	1,429.0	793.6	7,306.5	2,577.3	616.6	123.3
	%	10.8	33.4	9.6	28.7	3.8	7.6	9.1	14.1
Utilities	Acres	103.9	2.5	103.7	1.8	1,475.4	784.5	86.9	23.9
	%	0.7	0.1	0.7	0.1	0.8	2.3	1.3	2.7
Water	Acres	366.3	60.2	289.6	49.3	2,950.0	487.8	66.0	14.7
	%	2.5	2.2	1.9	1.8	1.5	1.4	1.0	1.7
Total	Acres	14,665.5	2,799.8	14,902.4	2,763.9	193,964.9	33,981.0	6,772.4	874.8
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 2.6 presents the total numbers of acres in a hazard zone in Broward County's incorporated areas and how many of those acres are currently undeveloped. Since there are 27 incorporated municipalities in Broward County, the presence and intensity of each type of hazard varies greatly, although many communities have similar risks. **Table 2.6** shows that there are 14,059 acres of incorporated land within the coastal hazard zone, including Dania Beach, Fort Lauderdale, Hallandale, Hollywood, Lauderdale-by-the-Sea, Oakland Par, Pompano Beach, Sea Ranch Lakes, and Wilton Manors. Fort Lauderdale and Hollywood total 9,788 acres of the coastal hazard zone. There are 2,379 acres of municipal land in the coastal hazard zone that are currently undeveloped, with Dania Beach, Hallandale, and Sea Ranch Lake having high concentrations of vacant land. The presence of incorporated flood-prone land is a far more common occurrence with 174,599 total acres. Every municipality in Broward County contains land within a flood zone. Communities with over 10,000 acres of flood-prone land include Coral Springs, Fort Lauderdale, Hollywood, Miramar, Plantation, Pompano Beach, and Sunrise. Communities with over 20,000 acres of flood prone area include Davie, and Pembroke Pines. There are 25,843 acres of vacant land within a flood zone, leaving significant opportunities to address flooding. Wildfire susceptible areas affect inland communities more so than coastal communities in Broward County. Davie, Miramar, and Pembroke Pines all contain over 1,000 acres of wildfire susceptible land.

Table 2.6 Total and Vacant Incorporated Acres in Hazard Areas

Jurisdiction		Coastal Hazard Zone		Hurricane Vulnerability Zone		Flood Zones		Wildfire Susceptible Areas	
		Total	Vacant	Total	Vacant	Total	Vacant	Total	Vacant
Coconut Creek	Acres	0.0	0.0	0.0	0.0	2,445.3	912.7	63.5	5.3
	%	0.0	0.0	0.0	0.0	100.0	37.3	100.0	8.4
Cooper City	Acres	0.0	0.0	0.0	0.0	4,292.3	376.5	91.2	18.9
	%	0.0	0.0	0.0	0.0	100.0	8.8	100.0	20.8
Coral Springs	Acres	0.0	0.0	0.0	0.0	14,129.1	1,486.3	189.0	16.1
	%	0.0	0.0	0.0	0.0	100.0	10.5	100.0	8.5
Dania Beach	Acres	1,281.2	352.5	1,278.1	351.1	3,056.6	802.1	8.2	3.8
	%	100.0	27.5	100.0	27.5	100.0	26.2	100.0	46.0
Davie	Acres	0.0	0.0	0.0	0.0	20,682.1	3,354.0	1,076.3	149.8
	%	0.0	0.0	0.0	0.0	100.0	16.2	100.0	13.9
Fort Lauderdale	Acres	5,359.7	710.0	4,869.5	657.0	11,158.8	1,669.7	2.7	0.0
	%	100.0	13.2	100.0	13.5	100.0	15.0	100.0	0.0
Golden Beach	Acres	2.0	0.2	0.7	0.0	0.0	0.0	0.0	0.0
	%	100.0	11.1	100.0	0.0	0.0	0.0	0.0	0.0
Hallandale	Acres	1,154.6	393.0	1,154.6	393.0	2,164.9	568.7	0.2	0.0
	%	100.0	34.0	100.0	34.0	100.0	26.3	100.0	0.0
Hollywood	Acres	4,427.8	599.0	4,423.4	594.6	11,292.1	1,316.2	57.3	2.5
	%	100.0	13.5	100.0	13.4	100.0	11.7	100.0	4.3
Lauderdale Lakes	Acres	0.0	0.0	0.0	0.0	2,332.3	485.3	9.6	6.9
	%	0.0	0.0	0.0	0.0	100.0	20.8	100.0	72.1
Lauderdale-by-the-Sea	Acres	220.3	29.2	220.3	29.2	97.0	12.7	0.0	0.0
	%	100.0	13.3	100.0	13.3	100.0	13.1	0.0	0.0
Lauderhill	Acres	0.0	0.0	0.0	0.0	4,647.2	1,026.8	14.7	4.2
	%	0.0	0.0	0.0	0.0	100.0	22.1	100.0	28.8
Lazy Lake	Acres	0.0	0.0	0.0	0.0	16.3	0.7	0.0	0.0
	%	0.0	0.0	0.0	0.0	100.0	4.1	0.0	0.0
Margate	Acres	0.0	0.0	0.0	0.0	5,538.7	679.5	12.7	4.9
	%	0.0	0.0	0.0	0.0	100.0	12.3	100.0	38.6
Miami Gardens	Acres	0.0	0.0	0.0	0.0	163.0	14.5	0.0	0.0
	%	0.0	0.0	0.0	0.0	100.0	8.9	0.0	0.0
Miramar	Acres	0.0	0.0	0.0	0.0	18,648.8	2,749.8	1,656.4	163.2
	%	0.0	0.0	0.0	0.0	100.0	14.7	100.0	9.9
North Lauderdale	Acres	0.0	0.0	0.0	0.0	2,028.2	154.3	2.7	0.0
	%	0.0	0.0	0.0	0.0	100.0	7.6	100.0	0.0
Oakland Park	Acres	49.3	9.8	0.0	0.0	3,783.6	805.2	0.0	0.0
	%	100.0	19.9	0.0	0.0	100.0	21.3	0.0	0.0
Parkland	Acres	0.0	0.0	0.0	0.0	3,835.1	992.5	105.7	12.0
	%	0.0	0.0	0.0	0.0	100.0	25.9	100.0	11.4
Pembroke Pines	Acres	0.0	0.0	0.0	0.0	20,512.0	1,658.2	1,368.6	84.0
	%	0.0	0.0	0.0	0.0	100.0	8.1	100.0	6.1
Plantation	Acres	0.0	0.0	0.0	0.0	13,988.6	1,885.3	255.9	43.7
	%	0.0	0.0	0.0	0.0	100.0	13.5	100.0	17.1

Table 2.6 Total and Vacant Incorporated Acres in Hazard Areas

Jurisdiction		Coastal Hazard Zone		Hurricane Vulnerability Zone		Flood Zones		Wildfire Susceptible Areas	
		Total	Vacant	Total	Vacant	Total	Vacant	Total	Vacant
Pompano Beach	Acres	1,515.5	280.2	1,415.8	271.5	10,323.2	1,893.3	35.4	13.2
	%	100.0	18.5	100.0	19.2	100.0	18.3	100.0	37.1
Sea Ranch Lakes	Acres	8.9	2.7	8.9	2.7	1.3	0.7	0.0	0.0
	%	100.0	30.0	100.0	30.0	100.0	50.0	0.0	0.0
Sunrise	Acres	0.0	0.0	0.0	0.0	10,897.9	1,806.8	207.3	24.7
	%	0.0	0.0	0.0	0.0	100.0	16.6	100.0	11.9
Tamarac	Acres	0.0	0.0	0.0	0.0	7,210.2	1,096.1	10.5	3.8
	%	0.0	0.0	0.0	0.0	100.0	15.2	100.0	36.2
Weston	Acres	0.0	0.0	0.0	0.0	113.2	6.7	0.0	0.0
	%	0.0	0.0	0.0	0.0	100.0	5.9	0.0	0.0
Wilton Manors	Acres	39.5	2.0	0.0	0.0	1,241.1	88.7	0.0	0.0
	%	100.0	5.1	0.0	0.0	100.0	7.1	0.0	0.0
Total Acres	Acres	14,058.6	2,378.7	13,371.1	2,299.1	174,598.8	25,843.4	5,168.0	557.1
	%	100.0	16.9	100.0	17.2	100.0	14.8	100.0	10.8

3. Existing Mitigation Measures

Local Mitigation Strategy

The LMS is an ideal repository for all hazard mitigation analyses, policies, programs, and projects for the County and its municipalities due to its multi-jurisdictional and intergovernmental nature. The LMS identifies hazard mitigation needs in a community and structural or non-structural initiatives that can be employed to reduce community vulnerability. Communities can further reduce their vulnerability to natural hazards by integrating the LMS analyses and mitigation objectives into their Comprehensive Plans.

An LMS prepared pursuant to the State's 1998 guidelines has three substantive components (FDCA, 2005b):

Hazard Identification and Vulnerability Assessment (HIVA). This section identifies a community's vulnerability to natural hazards. Under Florida rules, the HIVA is required to include, at a minimum, an evaluation of the vulnerability of structures, infrastructure, special risk populations, environmental resources, and the economy to any hazard the community is susceptible to. According to FEMA, LMSs revised pursuant to the Disaster Mitigation Act of 2000 (DMA 2000) criteria must include maps and descriptions of the areas that would be affected by each hazard, information on previous events, and estimates of future probabilities. Vulnerability should be assessed for the types and numbers of exposed buildings, infrastructure, and critical facilities with estimates of potential monetary losses. Plan updates will be required to assess the vulnerability of future growth and development.

Guiding Principles. This section lists and assesses the community's existing hazard mitigation policies and programs and their impacts on community vulnerability. The Guiding Principles typically contain a list of existing policies from the community's Comprehensive Plan and local ordinances that govern or are related to hazard mitigation. Coastal counties frequently include policies from their Post-Disaster Redevelopment Plans (PDRPs).

Mitigation Initiatives. This component identifies and prioritizes structural and non-structural initiatives that can reduce hazards vulnerability. Proposals for amendments to Comprehensive Plans, land development regulations, and building codes are often included. Structural projects typically address public facilities and infrastructure, and buy-outs of private structures that are repetitively damaged by flood. Many of these qualify as capital improvement projects based on the magnitude of their costs and may also be included in the capital improvements elements of the Counties' and Cities' Comprehensive Plans. The LMS Goals and Objectives will guide the priority of the mitigation initiatives.

The Broward County LMS (updated in 2002) was used as a source of information in developing this profile and was also reviewed for any enhancements that could be made to allow better integration with other plans, particularly the local Comprehensive Plans.

Hazard Identification and Vulnerability Assessment

This section of the LMS was briefly reviewed for its ability to provide hazard data that can support comprehensive planning. The Hazard Identification and Vulnerability Assessment (HIVA) provides a narrative description of each natural disaster type as well as a historical record of these disasters in the county and the region. This section also includes a vulnerability analysis for the incorporated municipalities in the county. The HIVA contains numerous vulnerability studies that satisfy FEMA requirements including the Economic & Socioeconomic Vulnerability Study, Port Everglades Vulnerability & Economic Study, Hazardous Materials Transportation Vulnerability Study, Health Care Facility Vulnerability & Needs Assessment, Condominium Vulnerability Assessment, and Critical Facility Inventory & Mapping. It is stated that a map series comprised of 75 maps was used to identify vulnerabilities and support these studies. The HIVA does include a detailed countywide economic impact analysis. The HIVA and the included studies support comprehensive planning and articulate hazard mitigation issues that can be addressed through Comprehensive Plan and LMS coordination. (Broward County, 2002c)

Guiding Principles

Chapter 5 of the LMS discusses how a baseline of current mitigation activities throughout the county were determined by reviewing the Broward County Comprehensive Plan, surveying jurisdictions to see how they integrated mitigation into the permitting process, and surveying the municipalities to see what mitigation initiatives they had underway. The actual inventory of these existing policies and initiatives could not be found in the LMS however. (Broward County, 2002c) Without an inventory of existing mitigation policies in all of the relevant plans countywide, it is difficult to begin further integration of hazard mitigation into these plans.

LMS Goals and Objectives

The LMS Goals and Objectives can be found in **Attachment D**. The following is a summary of how well the LMS has addressed mitigation issues that coincide with planning concerns.

There are five LMS Goals which address different dimensions of hazard mitigation including, the education of the business and residential community, providing adequate training for public and private officials, the safety and protection of public and private structures and property, the support of planning programs and policies, and funding sources for mitigation initiatives. (Broward County, 2002c)

Facilitating public education programs for hazard mitigation issues is a strong approach to hazard mitigation and can save lives and property. An objective includes the education of the community that is "most at risk" and aims to focus information dissemination to those people. Community outreach is vital to educate at-risk populations, especially transient and seasonal residents. Also, objectives promote disaster mitigation, preparedness training, and hazard mitigation construction techniques for public and private officials- engineers, building officials, and other public

employees. This is a proactive approach that can be employed to address hazard mitigation issues for future development. The LMS includes an objective that supports the development of Municipal CEMPs and promotes consistency with existing County plans and procedures. Goal 3 and the subsequent objectives create a structural approach to hazard mitigation by encouraging the retrofitting of existing public and private structures to be more disaster resistant, prioritizing hazard mitigation projects, cooperation with regional partners to create a countywide post-disaster redevelopment plan and ordinance, and to provide adequate public shelter capacity in the event of an evacuation. Objectives under Goal 4 discourage growth in the CHHA, aim to reduce evacuation times, address special needs populations, support the retrofit of public and private buildings to use as shelters, support participation in the FEMA Community Rating System, and address the protection of mobile home parks and residents. These are objectives are good to have in the LMS because they also mirror some policies that are required in the Coastal Management Element of the Comprehensive Plan. Funding sources for hazard mitigation projects are addressed in objectives 5.1 and 5.2. (Broward County, 2002c)

Broward County Comprehensive Emergency Operations Plan

The Broward County Comprehensive Emergency Operations Plan (CEOP), Broward County Recovery and Mitigation Annex (RMA), and the Broward County Continuity of Operations Plan Annex (COOPA) were reviewed for consistency with the other plans and evaluated in its effectiveness as a tool for planners. These documents all support hazard mitigation in the county but are more geared towards emergency operations. Much of the information in these plans conceptualizes emergency scenarios and gives direction for emergency operations during an event. Still, each of the plans also supports the Local Mitigation Strategy in some way. (Broward County, 2002a)

The LMS is cited as a supporting document of the CEOP and includes a vulnerability analysis and hazard analysis section much like the one found in the LMS. Consistent information between these documents can lead to a more effective mitigation strategy. The CEOP establishes a clear organizational structure to emergency management responsibilities and lists the Director of the Broward Emergency Management Agency as the designated emergency manager in the event of a natural disaster. The CEOP includes a list primary and secondary agencies responsible for pre-disaster and post-disaster mitigation and clear direction of their roles and responsibilities during an event. The COOPA refers to the general hazard mitigation strategy and lists several objectives for creating an overall effective plan. The LMS meets these objectives. Finally, the RMA references the LMS and supports the annual update of the document. (Broward County, 2002a)

Post-Disaster Redevelopment Plan

A PDRP for Broward County was not available for review at the time this profile was drafted. If Broward County has a current PDRP, this will be obtained and reviewed for the final version of this document.

National Flood Insurance Program/Community Rating System

Broward County and all of its incorporated communities participate in the National Flood Insurance Program. In addition, Broward County participates in the Community Rating System and has a current class of 8. All incorporated communities participate in the Community Rating System other than Lauderdale Lakes, Lazy Lake Village, Parkland, Pembroke Park, Sea Ranch Lakes, Southwest Ranches, Weston, and Wilton Manors.

4. Comprehensive Plan Review

Broward County's Comprehensive Plan (amended in 2002) was reviewed in order to see what the County has already done to integrate their LMS policies, and hazard mitigation in general, into their planning process. A list of the goals, objectives, and policies currently in the plan that contribute to hazard mitigation is found in **Attachment E**. The following is a summary of how well the plan addressed the three hazards of this analysis.

Coastal Hazards

There are many policies that aim to protect coastal resources that could, in turn, decrease the risk from storm surge and flooding. Policies in the Comprehensive Plan that protect and conserve coastal wetlands, coastal barriers, dunes, beaches, beach vegetation, and berm areas may also act to preserve natural drainage functions of coastal areas as well as natural surge barriers. Policies that protect these natural resources by restricting or prohibiting development also limit the potential risk of coastal flooding and erosion. (Broward County, 2002b)

The plan contains a policy that states the County will limit impacts of development and redevelopment by allowing the review of development by the Department of Management, Broward County Department of Planning and Environmental Protection (DPEP), and the Broward County Safety and Emergency Services Department. Involving emergency management officials in the development process is a strong strategy and can help regulate development in a manner that reduces risks to natural hazards. There is a policy that specifically states development and redevelopment shall not degrade or destroy beaches or berm areas, which often provide a natural barrier to storm surge during a hurricane or tropical storm. The plan also contains a policy to maintain 150 foot beach widths where possible which may also offer limited protection from surge. There is a policy that supports the beach and dune protection and restoration programs within the John U. Lloyd State Recreational Area. Finally, a policy requires development and redevelopment along the oceanfront to adhere to the FDEP's Coastal Construction Control Line regulations. (Broward County, 2002b)

Additionally, there are several policies that address hurricane evacuations in the plan. There is a policy that establishes a 12 hour evacuation clearance time for a Category 3 hurricane. Policies also aim to maintain adequate personnel to ensure a safe and timely evacuation, coordinate with regional evacuation plans and the U.S. Coast Guard, continue data collection from emergency management departments, and limit densities in the coastal area. (Broward County, 2002b)

Flooding Hazards

Like the coastal hazard mitigation policies, flood mitigation policies both aim to protect natural resources and regulate development. There are many policies that protect and conserve wetlands. At the same time, these policies may also protect the natural drainage features and prevent flood prone areas from developing. There are policies that promote wetlands preservation through public acquisition and conservation and through Transfer of Development Rights (TDR). There are policies that support stormwater management regulations to control seasonal and periodic flooding. A policy also supports participation in the Community Rating System. Finally, there are several policies that enforce the South Florida Building Code, FDEP's Coastal Construction Control Line regulations, and enforce minimum base floor elevations. (Broward County, 2002b)

Wildfire Hazards

There were no policies found during this review that directly relate to wildfire hazards. There are several policies that aim to conserve water resources through a conservation program and protect the water storage function of wetlands. Water conservation indirectly supports wildfire

mitigation in that severe drought may be prevented and water supplies may be conserved for fire suppression.

5. Recommendations

For the LMS to be effective in the decision-making process of growth management, its objectives and policies must be integrated into the Comprehensive Plan. The Plan is the legal basis for all local land use decisions made. If hazard mitigation is to be accomplished beyond the occasional drainage project, these hazards must be addressed in comprehensive planning, where development can be limited or regulated in high-risk hazard areas just as sensitive environments are routinely protected through growth management policies. Mitigation of hazards is considerably easier and less expensive if done when raw land is being converted into development. Retrofitting structure and public facilities after they have been built is significantly more expensive. However, if older neighborhoods or communities are scheduled to be revitalized or redeveloped, hazard mitigation needs to be an aspect considered and integrated into the project prior to the time of development approval.

Broward County has begun this process of integrating hazard mitigation throughout its Plan's elements. The prior section summarized how the major hazards for the County have been for the most part well-addressed. There is, however, still some disconnection between the LMS objectives and initiatives, and the policies in the Comprehensive Plan. By tightening the connection between these documents, the County will find it easier to implement hazard mitigation, and there will be higher awareness of these issues within more departments of the County government. **Table 5.1** presents options for further integration as well as the basis for these recommendations.

NOTE: The recommendations set out in this section are only suggestions. Through the workshop process and contact with the local governments, the goal of this project is to result in specific recommendations tailored and acceptable to each county. While the profile addresses hurricanes, flooding, and wildfire, the County should consider other hazards, if appropriate, such as tornadoes and soil subsidence, during the update of the local Comprehensive Plan.

Table 5.1 Options for Integrating LMS Hazard Mitigation Principles into Broward County's Comprehensive Plan (DRAFT)

Strategies & Integration Topics	Current LMS Information, Goals, or Objectives	Current Comprehensive Plan Policies	Options for Further Integration into the Comprehensive Plan	Options for Enhancement of the LMS	Basis For Suggested Options
Strategy 1 - Collaboration, coordination, and education					
a) Is there information sharing &/or involvement in plan development between planners & emergency managers?	DEM participates in development review. Planners participate in LMS process	NDC P 11.2.2. BCPC maintain a CHHA map from DEM NDC P 11.3.4. Continue to collect data from police and fire departments regarding evacuation.			
b) Do the Comp Plan, LMS, CEMP, & other local and regional plans cross-reference each other & include consistent data on hazardous locations?	O 3.4 Broward County, municipal governments and the South Florida Regional Planning Council should work together to develop a county-wide post disaster redevelopment plan/ordinance. O 4.6 Encourage all municipalities to develop an all hazards comprehensive emergency management plan which is reviewed by the Broward Emergency Management Agency for consistency with other plans and procedures.	FUALUE P 2.2.7. Maintain a comprehensive water resources management plan FUALUE O 2.7. T Coordinate future land uses with interagency hazard mitigation reports. FUALUE P 2.7.1. Work with muni's to coordinate the preparation of PDRPs and mitigation plans. CE P 10.3.4. Coordinate with existing resources protection plans of other agencies through participation in the development review process. NDC P 11.4.3. Incorporate the recommendations of interagency hazard mitigation reports into the Comp Plan. DPC O 12.23. Consistency between Port Everglades Hurricane Contingency Plan, the Broward County Emergency Management Plan, and the marine evacuation procedures of the U.S. Coast Guard for deepwater ports. ICE P 15.2.4. EMD shall work with a task force to cooperatively develop a LMS.			
c) Are hazard mitigation projects addressed in the 5-year schedule of Capital Improvement Projects?	O 3.3 Encourage local governments to implement prioritized hazard mitigation projects	NDC O 11.1. Limit public expenditures that subsidize development and establish criteria for prioritizing capital improvements in the North Unincorporated Coastal Area (NUCA).	Add policy that prioritizes LMS initiatives in 5 year Schedule of Capital Improvements and integrate criteria for prioritizing initiatives found LMS, into the CIE criteria for capital improvement projects.		Could help provide timeframe and tie in funding.

Table 5.1 Options for Integrating LMS Hazard Mitigation Principles into Broward County's Comprehensive Plan (DRAFT)

Strategies & Integration Topics	Current LMS Information, Goals, or Objectives	Current Comprehensive Plan Policies	Options for Further Integration into the Comprehensive Plan	Options for Enhancement of the LMS	Basis For Suggested Options
<p>d) Are there measures to educate city officials, residents, homeowner/property associations, & the business community of ways they can mitigate against hazards?</p>	<p>Goal 1 To increase the business, residential and public community's awareness of hazard mitigation. O 1.1 Identify segments of the community most at risk and develop strategies that will ensure effective dissemination of mitigation and preparedness information. O 1.2 Promote implementation of marketing strategy to stimulate public interest in obtaining disaster mitigation and preparedness training. O1.3 Develop a clearinghouse to disseminate accurate and consistent information relating to disaster mitigation. Goal 2 To ensure adequate training opportunities to support hazard mitigation. O 2.1 Develop ongoing education and exercise curricula for public and private officials in the area of hazard mitigation and emergency management. O 2.2 Support local training opportunities in hazard mitigation construction techniques for building officials, engineers and other public officials. O 2.3 Support existing hazard mitigation training efforts. O 2.4 Maintain a profile of existing available resources for mitigation training projects. Goal 5 To increase awareness of available</p>	<p>PWE P 4.4.9. The OES shall continue to implement a year-round public information and education program promoting water conservation. NDC P 11.3.5. The Elderly Services Division inform Persons with Special Needs of evac trans and shelter services. CE P 10.2.4. Protect and rejuvenate beaches and beach vegetation through the distribution of educational pamphlets.</p>	<p>Adopt Comp Plan policy that promotes ongoing educational programs cited in the LMS. Inform public of ways to mitigate against hazards and hurricane preparedness. Promote training of public officials to address hazard mitigation needs prior to development.</p>		<p>Educating the public can reduce losses of life and property in an emergency. Educating public officials can help the County take mitigative actions prior to development.</p>

Table 5.1 Options for Integrating LMS Hazard Mitigation Principles into Broward County's Comprehensive Plan (DRAFT)

Strategies & Integration Topics	Current LMS Information, Goals, or Objectives	Current Comprehensive Plan Policies	Options for Further Integration into the Comprehensive Plan	Options for Enhancement of the LMS	Basis For Suggested Options
	funding sources for mitigation. O 5.2 Work with state to identify funding sources available to individual property owners and businesses for mitigation.				
Strategy 2 - Get out of the way: provide evacuation and sheltering services					
a) Are there measures to provide adequate evacuation clearance time to support current population and population growth?	O 4.2 Broward County, municipal governments and the South Florida Regional Planning Council should work together to develop policies and regulations that will maintain or reduce current evacuation times for vulnerable areas. O 4.4 Encourage incentive for retrofitting existing structures in non-vulnerable areas in order to reduce the number evacuated and the need for county's available public and private shelter capacity.	TE P 3.1.2. Continue to provide transit service to assure the timely evacuation of the Coastal High Hazard Area during hurricanes. HE P 8.3.6. Mobile home parks should have adequate emergency shelters to house the mobile home park residents in the event of an evac. NDC O 11.3. Maintain or reduce predicted hurricane evacuation times in the (CHEP). NDC P 11.3.1. Assign personnel to assure that tasks, necessary to expedite evacuation, are completed. NDC P 11.3.2. The BCCEOP and the CHEP should reflect new techniques or programs useful in accelerating evacuation. NDC P 11.3.3. Continue meetings of local and regional evacuation planning professionals. NDC P 11.3.4. Continue solicitation of data from police and fire departments regarding transit dependent evacuation needs. NDC P 11.3.5 The Elderly Services Division inform Persons with Special Needs of evac trans and shelter services. DPC O 12.12. Maintain or reduce documented hurricane evacuation times . DPC P 12.12.1. Designated evac routes DPC P 12.12.2. Coordinate with the hurricane evacuation plans of the Broward County EMD. DPC P 12.12.3. Coordinate with the hurricane and natural disaster plans of the U. S. Coast Guard.			

Table 5.1 Options for Integrating LMS Hazard Mitigation Principles into Broward County's Comprehensive Plan (DRAFT)

Strategies & Integration Topics	Current LMS Information, Goals, or Objectives	Current Comprehensive Plan Policies	Options for Further Integration into the Comprehensive Plan	Options for Enhancement of the LMS	Basis For Suggested Options
<p>b) Are there measures to provide adequate shelter space to meet population growth and special needs?</p>	<p>O 3.5 Encourage the development of additional public shelter capacity that meets or exceeds current minimum code standards. O 3.6 Local government should encourage protective actions and retrofitting of existing structures within mobile home parks to provide on-site shelter facilities for residents, and encourage the construction of on-site shelter facilities in any existing mobile home park seeking to expand or any newly proposed mobile home park. O 4.4 Encourage incentive for retrofitting existing structures in non-vulnerable areas in order to reduce the number evacuated and the need for county's available public and private shelter capacity. O 4.7 Local government should encourage mobile homes to be located within mobile home parks that provide adequate emergency shelter facilities to accommodate the mobile home park residents during a major storm, and encourage the construction of such facilities for any existing mobile home park seeking expansion, and for any newly proposed mobile home park</p>	<p>HE P 8.3.6. Mobile home parks should have adequate emergency shelters to house the mobile home park residents</p>	<p>Include policy aimed at meeting shelter demand defined in the State Shelter Plan or local study. Create a Level of Service for shelter demand. Promote the use of safe rooms outside hazard zones.</p>		<p>State Shelter Plan demand can be used as a benchmark to address additional shelter demand brought on by new development. A level of service standard can be used to address capacity deficits or surpluses. An LOS could also be used to create additional concurrency policies aimed at meeting shelter demand. Safe rooms can provide a last option for residents unable to evacuate.</p>

Table 5.1 Options for Integrating LMS Hazard Mitigation Principles into Broward County's Comprehensive Plan (DRAFT)

Strategies & Integration Topics	Current LMS Information, Goals, or Objectives	Current Comprehensive Plan Policies	Options for Further Integration into the Comprehensive Plan	Options for Enhancement of the LMS	Basis For Suggested Options
Strategy 3 - Make the environment less hazardous: Protect and enhance natural protective features					
<p>a) Are there measures to protect and/or restore natural resources that might in turn decrease the risk from natural hazards?</p>		<p>Natural Resources FUALUE P 2.2.2. Consider the suitability of soils and the physical and natural features of the land in reviewing land use plan amendments. FUALUE O 2.5. Conserve and protect natural resources and historic resources. FUALUE P 2.5.15. Maximize conservation and promote efficiency when reviewing dev proposals which impact natural and historic resources CE Goal 13.0. Conserve, and protect the beneficial use of the natural resources</p>	<p>The LMS and the Comprehensive Plan can promote the conservation and restoration of natural resources that may decrease the risk from natural disasters such as flooding, wildfires, and support the continuance of data collection to identify hazard areas and County vulnerability.</p>		<p>Broward County has many existing measures that serve to mitigate the impacts of hazards. However, they have not been identified as beneficial in this area. Current growth management techniques such as land conservation, land acquisition, transfer of development rights, and the regulation and prohibition of development on environmentally sensitive lands are employed by the County to protect natural resources but also mitigate the effects of natural disasters. The County could amend these policies and include hazard mitigation as an additional benefit to land regulations and growth management techniques.</p>
		<p>Coastal Hazards CE O 10.1. Protect and conserve remaining coastal wetlands, living marine resources, and coastal barriers CE P 10.1.1. Limit the impacts of dev or redev upon wetlands and the beach dune system through the review of developments by the DMD, the DPEP, and the DESD. CE O 10.2. Protect and enhance dunes and restore altered dunes.</p>	<p>The County could explore the adoption of Land Development Regulations that facilitate the removal of wildfire fuels in wildfire susceptible areas prior to</p>		

Table 5.1 Options for Integrating LMS Hazard Mitigation Principles into Broward County's Comprehensive Plan (DRAFT)

Strategies & Integration Topics	Current LMS Information, Goals, or Objectives	Current Comprehensive Plan Policies	Options for Further Integration into the Comprehensive Plan	Options for Enhancement of the LMS	Basis For Suggested Options
		<p>CE P 10.2.3. Dev and redev in the coastal area shall not degrade or destroy existing natural beaches or berm areas.</p> <p>CE P 10.2.4. Protect and rejuvenate beaches and beach vegetation through the distribution of educational pamphlets.</p> <p>CE O 10.3. Maintain or improve estuarine environmental quality in Broward County.</p> <p>CE P 10.3.1. Restore or enhance disturbed or degraded natural resources including estuaries, and programs to mitigate future disruptions through LDCs.</p> <p>CE O 10.5. Protect beaches / minimize the impacts of man-made structures on beach / restore altered beaches.</p> <p>CE P 10.5.1. Maintain beaches to a width of approximately 150 feet.</p> <p>CE P 10.5.2. Continue to support Broward County's Beach Nourishment Program.</p> <p>CE P 10.5.3. Renourish eroded beaches</p> <p>CE O 13.5. Conserve and protect its soils resources</p> <p>CE P 13.5.3. Limit beach erosion</p> <p>CE O 13.6. Conserve and protect native vegetative communities.</p> <p>CE P 13.6.5. Pursue ops for the conservation and/or preservation of native vegetative communities</p> <p>CE P 13.6.19. Pursue ops for the restoration and/or enhancement of degraded natural areas, including, reforestation, restoration of shorelines or dunes, restoration of natural hydrology, or removal of non-native vegetation.</p> <p>RPC O 12.9. Coordinate mitigation and redev programs implemented within the John U. Lloyd State Recreational Area / support consistent beach and dune protection programs.</p> <p>DPC P 12.9.1. Consistent mitigation, redevelopment, and beach and dune protection programs.</p>	development.		
		<p>Flooding Hazards FUALUE P 2.5.16. Overlay district for the preservation of the Water Conservation Areas.</p>			

Table 5.1 Options for Integrating LMS Hazard Mitigation Principles into Broward County's Comprehensive Plan (DRAFT)

Strategies & Integration Topics	Current LMS Information, Goals, or Objectives	Current Comprehensive Plan Policies	Options for Further Integration into the Comprehensive Plan	Options for Enhancement of the LMS	Basis For Suggested Options
		<p>DNAGRE Goal 7.0. Stormwater mgt to reduce damage and inconvenience from flooding DNAGRE P 7.5.9. Restrict / regulate land use plan amendment applications in the flood prone areas DPC O 12.7 Promote the protection and enhancement of remaining coastal wetlands / coastal barriers DPC P 12.7.1. Limit the impacts of development and pollution on wetlands / beach and dune systems CE P 13.8.3. Participate in land acquisition/greenway programs to improve connectivity of effective size of wetland/upland systems. CE P 13.9.6. Protect and conserve wetlands and the natural functions of wetlands. CE P 13.9.7. Redeuce dev impact on wetlands. CE O 13.10. Create/acquire additional wetlands in Broward County. CE P 13.10.1. Increasing public acreage of wetlands. CE P 13.10.2. Protect and expand existing wetland using TDR, conservation easements, restrictive covenants, and tax incentives. CE P 13.10.4. Ensure flexibility to the approaches to wetland protection, enhancement, and creation by 2002.</p>			
		<p>Wildfire Hazard FUALUE P 2.5.6. Conserve native vegetative cover FUALUE P 2.5.7. Conserve native vegetative cover PWE O 4.4. Conserve and protect potable water resources PWE P 4.4.10. Develop a program to promote conservation of water resources FUALUE P 2.11.2. No municipal annexations shall occur in the water conservation areas. DNAGRE P 7.5.11. Protect the water storage and water quality enhancement functions of wetlands, floodplains, and aquifer recharge areas</p>			

Table 5.1 Options for Integrating LMS Hazard Mitigation Principles into Broward County's Comprehensive Plan (DRAFT)

Strategies & Integration Topics	Current LMS Information, Goals, or Objectives	Current Comprehensive Plan Policies	Options for Further Integration into the Comprehensive Plan	Options for Enhancement of the LMS	Basis For Suggested Options
		DNAGRE P 7.5.12. Protect aquifers from depletion			
Strategy 4 - Make structures more resistant to natural hazard forces					
<p>a) Are there measures that support relocating or retrofitting private &/or public structures in hazard areas?</p>	<p>O 3.2 Encourage the retrofitting of existing residential and business structures using disaster mitigation construction techniques. O 3.6 Local government should encourage protective actions and retrofitting of existing structures within mobile home parks to provide on-site shelter facilities for residents, and encourage the construction of on-site shelter facilities in any existing mobile home park seeking to expand or any newly proposed mobile home park. O 4.4 Encourage incentive for retrofitting existing structures in non-vulnerable areas in order to reduce the number evacuated and the need for county's available public and private shelter capacity.</p>		<p>The County can adopt Comprehensive Plan policies that promote the LMS strategy of retrofitting public and private structures,</p>		
<p>b) Are there measures to require compliance with or exceed building codes &/or design standards for certain hazard areas?</p>	<p>Goal 3 To facilitate preparedness measures to mitigate hazards (structural). O 3.1 Encourage local municipalities to review site and building plans for hazard mitigation issues and to include storm hardening in the design of public structures of all public structures.</p>	<p>FUALUE P 2.2.5. Use dev review process / LDC/ construction criteria to provide for drainage and stormwater management and to control seasonal and/or periodic flooding. FUALUE P 2.2.6. Continue to implement the floodplain management provisions which establish flood hazard standards DNAGRE P 7.2.13. Participate and implement the CRS CE O 10.5. Protect beaches, minimize the impacts of man-made structures on beach, and restore altered beaches. NDC P 11.4.4. Beachfront construction consistent with design criteria CCCL. NDC P 11.4.5. Enforce South Florida Building Code DPC P 12.9.2. Ocean front dev and redev</p>	<p>-</p>		

Table 5.1 Options for Integrating LMS Hazard Mitigation Principles into Broward County's Comprehensive Plan (DRAFT)

Strategies & Integration Topics	Current LMS Information, Goals, or Objectives	Current Comprehensive Plan Policies	Options for Further Integration into the Comprehensive Plan	Options for Enhancement of the LMS	Basis For Suggested Options
		shall conform to the effective FDEP's CCCL regs.			
c) Are there measures to protect cultural resources from natural disasters?		<p>FUALUE O 2.5. Conserve and protect natural resources and historic resources.</p> <p>FUALUE P 2.5.12. Implement code requirements concerning any land designated as an archaeological site</p> <p>DPC O 12.14. Protect and preserve historical and archeological resources.</p> <p>DPC P 12.14.1. The PED shall continue to protect and preserve any historical and archeological resources that may be identified within the PJA, in coordination with the Broward County Historical Society, the Broward County DPEP, and the Florida Department of State.</p>	<p>The County can explore Comprehensive Plan polices that address the preservation of historical structures by strengthening the integrity of buildings in order to withstand the effects of natural disasters.</p>		
Strategy 5 - Manage the development and redevelopment of land in hazardous areas					
a) Are there measures to limit population densities in high-hazard areas?	<p>O 4.1 In the Coastal High Hazard vulnerable area, discourage expenditures of public funds for infrastructure improvements that attract new residential development.</p> <p>O 4.3 Develop strategies to reduce risks to health care patients and special needs populations within vulnerable areas.</p>	<p>FUALUE O 2.6. Coordinate land use planning activities and coastal area population densities with the Broward County Hurricane Evacuation Plan.</p> <p>FUALUE P 2.6.1. Recommend against land use plan amendments / within coastal area, which would increase the population densities and, therefore, the transit-dependent persons requiring evacuation.</p> <p>NDC O 11.2. Direct population concentrations away from CHHA.</p> <p>NDC P 11.2.1. The existing zoning densities established for the NUCA shall be maintained.</p>			
b) Are there measures to limit public expenditures that subsidize development in high-hazard areas?	<p>O 4.1 In the Coastal High Hazard vulnerable area, discourage expenditures of public funds for infrastructure improvements that attract new residential development.</p>	<p>NDC O 11.1. Limit public expenditures that subsidize development NUCA</p> <p>NDC P 11.1.1. Public expenditures should focus on projects which restore or enhance natural resources such as beach nourishment.</p> <p>NDC P 11.1.3. Limit public funds for infrastructure expansion or improvements in CHHA</p> <p>DPC O 12.10. Prohibit allocate any public expenditures that promotes residential development within the CHHA.</p> <p>DPC P 12.10.2. Disallow the allocation public expenditures for infrastructure improvements</p>			

Table 5.1 Options for Integrating LMS Hazard Mitigation Principles into Broward County's Comprehensive Plan (DRAFT)

Strategies & Integration Topics	Current LMS Information, Goals, or Objectives	Current Comprehensive Plan Policies	Options for Further Integration into the Comprehensive Plan	Options for Enhancement of the LMS	Basis For Suggested Options
		<p>which would promote residential development within the CHHA CIE O 14.2. Limit public expenditures within CHHA to maintenance of existing infrastructure. CIE P 14.2.1. Only maintain existing infrastructure within CHHA unless level of service standards are not being met.</p>			
<p>d) Are there creative neighborhood design solutions or development regulations that mitigate hazards, such as clustering or transfer of development rights?</p>			<p>The Comprehensive Plan could promote the clustering of new development away from natural hazard areas in order to reduce risk to persons and property. The County could also support the use of TDR for hazard areas in order to reduce development on or adjacent to hazard areas</p>		<p>Locating development away from natural hazards can prevent damages in the event of a natural disaster.</p>
<p>e) Are there measures to limit redevelopment in hazard areas and procedures for post-disaster recovery that will lead to a more disaster-resistant community?</p>	<p>O 3.4 Broward County, municipal governments and the South Florida Regional Planning Council should work together to develop a county-wide post disaster redevelopment plan/ordinance.</p>	<p>FUALUE O 2.9. Direct development and redevelopment into compact, efficient development patterns. NDC O 11.4. Revise / and develop a county-wide PDRP and mitigation plan NDC P 11.4.2. Post-disaster redevelopment should address the removal, relocation, or structural modification of damaged infrastructure as determined appropriate by Broward County but consistent with federal funding provisions and unsafe structures. NDC P 11.4.6. . Broward County disaster specific mitigation plan addendum recommendations should be incorporated into the post-disaster redevelopment plan for the NUCA and a county wide post-disaster redevelopment and mitigation plan. NDC P 11.4.7. Broward County shall limit post-disaster redevelopment in areas of repeated damage, where legal and</p>			

Table 5.1 Options for Integrating LMS Hazard Mitigation Principles into Broward County's Comprehensive Plan (DRAFT)

Strategies & Integration Topics	Current LMS Information, Goals, or Objectives	Current Comprehensive Plan Policies	Options for Further Integration into the Comprehensive Plan	Options for Enhancement of the LMS	Basis For Suggested Options
		financially feasible. DPC O 12.13. The PED shall endeavor to reduce exposure of human life and property to natural hazards by developing a PDRP DPC P 12.13.1. Coordinate with the Broward County EMD in the development of the Broward County PDRP.			

Abbreviations: G= Goal; O= Objective; P=Policy; PDRP= Post-Disaster Redevelopment Plan; HVZ= Hurricane vulnerability zone; CHHA= Coastal High Hazard Area
 CE= Conservation Element; FUALUE= Future Unincorporated Area Land Use Element; PWE= Potable Water Element; CIE= Capital Improvements Element; HE= Housing Element; ICE= Intergovernmental Coordination Element; DPC= Deepwater Port Component; DNGRE= Drainage and Natural Aquifer Groundwater Recharge Element; NDC= Natural Disaster Component

6. Sources

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Attachment A

**Maps of the Existing and Future Land Uses within the
Coastal Hazard Zone and the Hurricane Vulnerability Zone**

Attachment B

**Maps of the Existing and Future Land Uses
within the 100-year Floodplain**

Attachment C

**Maps of the Existing and Future Land Uses
within Wildfire Susceptible Areas**

Attachment D

Broward County Local Mitigation Strategy Goals and Objectives

- Goal 1 To increase the business, residential and public community's awareness of hazard mitigation.**
- 1.1 Identify segments of the community most at risk and develop strategies that will ensure effective dissemination of mitigation and preparedness information.
 - 1.2 Promote implementation of marketing strategy to stimulate public interest in obtaining disaster mitigation and preparedness training.
 - 1.3 Develop a clearinghouse to disseminate accurate and consistent information relating to disaster mitigation
- Goal 2 To ensure adequate training opportunities to support hazard mitigation.**
- 2.1 Develop ongoing education and exercise curricula for public and private officials in the area of hazard mitigation and emergency management.
 - 2.2 Support local training opportunities in hazard mitigation construction techniques for building officials, engineers and other public officials.
 - 2.3 Support existing hazard mitigation training efforts.
 - 2.4 Maintain a profile of existing available resources for mitigation training projects.
- Goal 3 To facilitate preparedness measures to mitigate hazards (structural).**
- 3.1 Encourage local municipalities to review site and building plans for hazard mitigation issues and to include storm hardening in the design of public structures of all public structures.
 - 3.2 Encourage the retrofitting of existing residential and business structures using disaster mitigation construction techniques.
 - 3.3 Encourage local governments to implement prioritized hazard mitigation projects.
 - 3.4 Broward County, municipal governments and the South Florida Regional Planning Council should work together to develop a county-wide post disaster redevelopment plan/ordinance.
 - 3.5 Encourage the development of additional public shelter capacity that meets or exceeds current minimum code standards.

- 3.6 Local government should encourage protective actions and retrofitting of existing structures within mobile home parks to provide on-site shelter facilities for residents, and encourage the construction of on-site shelter facilities in any existing mobile home park seeking to expand or any newly proposed mobile home park.

Goal 4 To facilitate planning initiatives to ensure effective hazard mitigation (programs and policies).

- 4.1 In the Coastal High Hazard vulnerable area, discourage expenditures of public funds for infrastructure improvements that attract new residential development.
- 4.2 Broward County, municipal governments and the South Florida Regional Planning Council should work together to develop policies and regulations that will maintain or reduce current evacuation times for vulnerable areas.
- 4.3 Develop strategies to reduce risks to health care patients and special needs populations within vulnerable areas.
- 4.4 Encourage incentive for retrofitting existing structures in nonvulnerable areas in order to reduce the number evacuated and the need for county's available public and private shelter capacity.
- 4.5 Encourage 100% municipal participation the Community Rating System.
- 4.6 Encourage all municipalities to develop an all hazards comprehensive emergency management plan which is reviewed by the Broward Emergency Management Agency for consistency with other plans and procedures.
- 4.7 Local government should encourage mobile homes to be located within mobile home parks that provide adequate emergency shelter facilities to accommodate the mobile home park residents during a major storm, and encourage the construction of such facilities for any existing mobile home park seeking expansion, and for any newly proposed mobile home park.
- 4.8 In areas identified by the vulnerability analysis that contain a threat due to the presence of hazardous materials, local government should encourage compatible land use and improve public safety.
- 4.9 Local government should encourage protective actions for existing mobile home parks.

Goal 5 To increase awareness of available funding sources for mitigation.

- 5.1 Maintain a list of resources for mitigation initiatives for local government
- 5.2 Work with state to identify funding sources available to individual property owners and businesses for mitigation.

Attachment E

Broward County Comprehensive Plan Excerpts Related to Hazard Mitigation

Future Unincorporated Area Land Use Element

Objective 2.2. Insure that future land uses adequately reflect soil conditions, topography, and the availability of facilities and services.

Policy 2.2.2. The Planning Services Division (PSD) shall continue to consider the suitability of soils and the physical and natural features of the land in reviewing land use plan amendments.

Policy 2.2.5. The Office of Environmental Services (OES) shall continue to utilize the development review process of the Land Development Code to implement its standards and criteria for construction and operation of water management works to provide for drainage and stormwater management and to control seasonal and/or periodic flooding in the Unincorporated Area.

Policy 2.2.6. The OES shall continue to implement the floodplain management provisions of the Broward County Code of Ordinances, which establish flood hazard standards for the Unincorporated Area.

Policy 2.2.7. The OES shall continue to maintain a comprehensive water resources management plan which addresses drainage and stormwater management in the Unincorporated Area not included within an independent special or water control district.

Objective 2.5 Conserve and protect natural resources and historic resources.

Policy 2.5.6. The DMD shall, in order to conserve native vegetative cover, continue to implement code requirements relating to the clearance of lands designated as Natural Resource Areas.

Policy 2.5.7. The DMD shall, in order to conserve native vegetative cover, continue to implement code requirements, as such relates to natural resource areas contained within site plans in the Unincorporated Area.

Policy 2.5.12. The DMD shall continue to implement code requirements concerning any land designated as an archaeological site in the Broward County Land Use Plan Map Series, the Florida Master Site File or the National Register of Historic Places.

Policy 2.5.15. Broward County shall incorporate the concepts described within the *Broward County Sustainable Communities: State, Regional, and Local Initiatives*

report, the recommendations of the Governor’s Commission for a Sustainable South Florida, and the goals of the Eastward Ho! initiative to maximize conservation, prevent pollution, limit waste, and promote efficiency when reviewing development proposals which impact natural and historic resources.

Policy 2.5.16. The Department of Planning and Environmental Protection (DPEP) shall consider developing an overlay district for the preservation of the Water Conservation Areas.

Objective 2.6. Coordinate land use planning activities and coastal area population densities with the Broward County Hurricane Evacuation Plan.

Policy 2.6.1. The PSD shall recommend against any proposed land use plan amendments within the unincorporated coastal area, including the North Unincorporated Coastal Area (NUCA) which would increase the population densities and, therefore, the transit-dependent persons requiring evacuation.

Objective 2.7. The PSD shall coordinate future land uses by encouraging the reduction or elimination of uses that are inconsistent with interagency hazard mitigation reports.

Policy 2.7.1. The PSD shall work with municipalities to coordinate the preparation of post-disaster redevelopment and mitigation plans for the coastal area.

Objective 2.9. Broward County shall, to the extent possible, direct development and redevelopment into compact, efficient development patterns.

Policy 2.9.2. Consistent with Potable Water Element Policy 4.2.5, Drainage and Natural Groundwater Aquifer Recharge Element Policy 7.2.8., Sanitary Sewer Element Policy 5.2.5., and Solid Waste Element Policy 6.2.5., the impact of infrastructure improvements on adjacent natural resources shall be considered when making land use decisions.

Policy 2.11.2. No municipal annexations shall occur in the water conservation areas.

Transportation Element

Policy 3.1.2. Broward County, through the Mass Transit Division, shall provide a safe public transit network through implementation of, but not limited to, the following programs, activities, or actions:

3. Continue to provide transit service to assure the timely evacuation of the Coastal High Hazard Area during hurricanes. Timely evacuation means evacuation

operations shall commence four (4) hours after an evacuation order is issued by the County Administrator and shall be in effect approximately 6½ hours for Plan A (i.e., Category 1 and 2) and 12 hours for Plan B (Cat. 3) and Plan C (Cat. 4 and 5).

Policy 3.1.4. Broward County shall work with other entities to provide safe waterways and Port Everglades facilities through implementation of, but not limited to, the following programs, activities, or actions:

11. Port Everglades safety shall be measured by the maintenance of the following safety plans: the hurricane contingency plan, the terminal preplans, search and rescue plan, the petroleum fire contingency plan, the mass casualty incident plan, the operational plan, and the water rescue plan.

Potable Water Element

Objective 4.4. Conserve and protect potable water resources with primary focus on the Biscayne Aquifer by optimizing the utilization of water resources through effective water management practices.

Policy 4.4.1. The DPEP shall develop a basin-wide water management protocol that optimizes flood protection, water quality, stormwater storage, wetlands sustainability, and groundwater recharge functions while protecting groundwater from saltwater intrusion. By assessing the existing surface water management system, well field characteristics, groundwater levels, saltwater intrusion limits, flows and canal stages a model will be developed to better utilize the water resource.

Policy 4.4.9. The OES shall continue to implement a year-round public information and education program promoting water conservation.

Policy 4.4.10. The DPEP in coordination with the OES shall study and develop a program to promote conservation of water resources by 1998. The conservation program may include plumbing retrofit, toilet rebate, water use audits, promotion of xeriscape, installation of rain sensors, and education.

Drainage and Natural Aquifer Groundwater Recharge (Element)

Goal 7.0. To optimize the utilization of water resources through provision of stormwater management for Broward County which reduces damage and inconvenience from flooding, promotes recharge to the Biscayne Aquifer, minimizes degradation of water quality in surface and ground waters, and protects the functions of wetlands in urban areas.

Policy 7.2.13. The DPEP shall participate and implement the Community Rating System (CRS) as per Federal

Emergency Management Administration (FEMA) requirements through 2002.

Policy 7.4.3. The DPEP shall develop a basin-wide water management protocol that optimizes flood protection, water quality, stormwater storage, wetlands sustainability, and ground water recharge functions. By assessing the existing surface water management system, well field characteristics, ground water levels, flows and canal stages, a model will be developed to better utilize the water resource.

Policy 7.5.9. The Broward County Planning Council and the Planning Services Division (PSD) shall, for land use plan amendment applications in the flood prone portions of Broward County, require an applicant for a land use plan amendment, for their respective future land use map series, to provide sufficient data and analysis for the County to make a determination that the subsequent development: 1. shall be served by adequate stormwater management and drainage facilities, 2. shall not adversely affect ground water quality, environmentally sensitive lands, or wetlands and 3. shall not lead to increased saltwater intrusion or area wide flooding.

Policy 7.5.11. Protect the water storage and water quality enhancement functions of wetlands, floodplains, and aquifer recharge areas through acquisition, enforcement of rules, and the application of land and water management practices which provide for compatible uses.

Policy 7.5.12. Broward County shall protect aquifers from depletion through water conservation and preservation of the functions of high recharge areas including but not limited to the water conservation areas and water preserve areas.

Housing Element

Policy 8.3.6. To facilitate the evacuation of mobile homes during a major storm event, Broward County shall encourage mobile homes to be located within mobile home parks and such mobile home parks should have adequate emergency shelters to house the mobile home park residents.

Conservation Element

Objective 10.1. Protect and conserve remaining coastal wetlands, living marine resources, coastal barriers, and wildlife habitat, as applicable in the North and South Unincorporated Coastal Area.

Policy 10.1.1. The County shall limit the specific and cumulative impacts of development or redevelopment upon wetlands, water quality, water quantity, wildlife habitat, living marine resources and the beach dune system through the review of developments by the Development Management Division, the Broward County Department of Planning and Environmental Protection (DPEP), and the Broward County Safety and Emergency Services Department.

Objective 10.2. Protect and enhance dunes and coastal biological communities, monitor state-mandated construction standards which minimize the impacts of man-made structures on dunes, and restore altered dunes.

Policy 10.2.3. Development and redevelopment in the coastal area shall not degrade or destroy existing natural beaches or berm areas.

Policy 10.2.4. Continue to encourage local governments and property owners to protect existing beach vegetation, to revegetate the beach, where appropriate, and to encourage landscaping with native trees, shrubs, and ground covers in areas of historic beaches or berm communities through the distribution of educational pamphlets targeted to the NUCA and the offer of free or discounted specimen plants.

Objective 10.3. Maintain or improve estuarine environmental quality in Broward County.

Policy 10.3.1. The County shall provide for restoration or enhancement of disturbed or degraded natural resources including estuaries, and programs to mitigate future disruptions or degradations through the Broward County Land Development Code.

Policy 10.3.4. The County shall coordinate with existing resources protection plans of other agencies through participation in the development review process.

Objective 10.5. Protect beaches, establish construction standards which minimize the impacts of man-made structures on beach, and restore altered beaches.

Policy 10.5.1. Maintain Broward County's beaches to a width of approximately 150 feet.

Policy 10.5.2. Continue to support Broward County's Beach Nourishment Program as a means of conserving the barrier island's resources.

Policy 10.5.3. Renourish Broward County's eroded beaches by Year 2000 in accordance with the Broward County Beach Nourishment Program. The NUCA renourishment project shall remain a priority for construction.

Natural Disaster Component

GOAL 11.0. Protect human life and limit public expenditures in the Coastal Area subject to destruction by natural disaster.

Objective 11.1. Limit public expenditures that subsidize development and establish criteria for prioritizing capital improvements in the North Unincorporated Coastal Area (NUCA).

Policy 11.1.1. Public expenditures should focus on projects which restore or enhance natural resources such as beach nourishment.

Policy 11.1.2. The level of service (LOS) standards applicable to the NUCA shall be as stated in the Transportation and the Drainage and Natural Groundwater Aquifer Recharge Elements.

Policy 11.1.3. The County shall not utilize public funds for infrastructure expansion or improvements in coastal high-hazard areas unless such funds are necessary to provide services to the existing development and to provide adequate evacuation in the event of an emergency.

Objective 11.2. Direct population concentrations away from known or predicted coastal high-hazard areas.

Policy 11.2.1. The existing zoning densities established for the NUCA shall be maintained.

Policy 11.2.2. The Broward County Planning Council shall maintain a Broward County coastal high-hazard area map with information received from the Division of Emergency Management as part of the Natural Resource Map Series of the Broward County Land Use Plan.

Objective 11.3 Maintain or reduce predicted hurricane evacuation times in the Coastal Hurricane Evacuation Plan (CHEP).

Policy 11.3.1 The County should assign sufficient and appropriate personnel to assure that tasks, necessary to expedite evacuation, are completed.

Policy 11.3.2. The Broward County Comprehensive Emergency Operations Plan and the CHEP should be revised as needed to reflect new techniques or programs useful in accelerating evacuation.

Policy 11.3.3. Regular meetings of local and regional evacuation planning professionals should be continued.

Policy 11.3.4. Solicitation of data from police and fire departments regarding transit dependent evacuation needs of mobile home park residents within municipalities should be continued.

Policy 11.3.5. The Elderly Services Division should continue its procedures to inform Persons with Special Needs (PSN) of evacuation transportation and shelter services that may be available to them.

Objective 11.4. The Emergency Management Division shall revise the post-disaster redevelopment plan for the North Unincorporated Coastal Area (NUCA) and develop a county-wide post-disaster redevelopment and mitigation plan which reduces exposure of life and property to natural hazards by 1998.

Policy 11.4.1. Post-disaster redevelopment should distinguish between immediate repair and cleanup actions needed to protect public health and safety and long-term repair and redevelopment activities.

Policy 11.4.2. Post-disaster redevelopment should address the removal, relocation, or structural modification of damaged infrastructure as determined appropriate by Broward County but consistent with federal funding provisions and unsafe structures.

Policy 11.4.3. Broward County should incorporate the recommendations of interagency hazard mitigation reports into the Broward County Comprehensive Plan.

Policy 11.4.4. All new construction along the beachfront should be consistent with design criteria established pursuant to the designation of the Coastal Construction Control Line (CCCL).

Policy 11.4.5. Regulations contained within the South Florida Building Code should be enforced to reduce exposure of life and property to the damaging effects of a hurricane.

Policy 11.4.6. Broward County disaster specific mitigation plan addendum recommendations should be incorporated into the post-disaster redevelopment plan for the NUCA and a county wide post-disaster redevelopment and mitigation plan.

Policy 11.4.7. Broward County shall limit post-disaster redevelopment in areas of repeated damage, where legal and financially feasible.

Deepwater Port Component

Objective 12.7. The PED shall continue, through the year 2005, to promote the protection and enhancement of remaining coastal wetlands, living marine resources, coastal barriers, and wildlife habitat within the PJA.

Policy 12.7.1. Utilize Port Everglades Development District, the Broward County Land Development Code and the Broward County Natural Resource Protection Code to

limit the impacts of development and pollution on wetlands, water quality, wildlife habitat, living marine resources, and beach and dune systems within the PJA.

Objective 12.9. The PED shall continue, through the year 2005, to coordinate mitigation and redevelopment programs implemented within the John U. Lloyd State Recreational Area and to support any beach and dune protection programs to be consistent with the FDEP policies and procedures.

Policy 12.9.1. Mitigation, redevelopment, and beach and dune protection programs, within the John U. Lloyd State Recreational Area, shall be coordinated with the FDEP and the Broward County DPEP.

Policy 12.9.2. All development and redevelopment along the ocean front shall conform to the effective FDEP's Coastal Construction Control Line regulations.

Objective 12.10. The PED shall continue, through the year 2005, to not allocate any public expenditures that promotes residential development within the Coastal High Hazard Area.

Policy 12.10.1. The Coastal High Hazard Area shall be defined as the Category 1 and 2 Hurricane Evacuation Zones as identified within the Broward County Land Use Map (Series), entitled "Flood Plains, Flood-Prone Areas and Coastal High Hazard Areas."

Policy 12.10.2. The PED shall continue to disallow the allocation public expenditures for infrastructure improvements which would promote residential development within the Coastal High Hazard Area.

Objective 12.12. The PED shall continue, through the year 2005, to maintain or reduce documented hurricane evacuation times for Port personnel and marine vessels in accordance with standards of the Broward County Emergency Management Division (EMD) and the U.S. Coast Guard.

Policy 12.12.1. The PED will continue to designate Eller Drive as the primary evacuation route within the PJA, with Spangler Drive serving as a secondary evacuation route.

Policy 12.12.2. Port Everglades will continue to coordinate with the hurricane evacuation plans of the Broward County EMD.

Policy 12.12.3. Port Everglades will continue to coordinate with the hurricane and natural disaster plans of the U. S. Coast Guard.

Objective 12.13. The PED shall endeavor to reduce exposure of human life and property to natural hazards by developing a post-disaster redevelopment plan by the year 2001.

Policy 12.13.1. The PED shall coordinate with the Broward County EMD in the development of the Broward County Post-Disaster Redevelopment Plan which will include recommendations that affect the PJA.

Objective 12.14. The PED shall continue, through the year 2005, to protect and preserve historical and archeological resources that may be identified within the PJA.

Policy 12.14.1. The PED shall continue to protect and preserve any historical and archeological resources that may be identified within the PJA, in coordination with the Broward County Historical Society, the Broward County DPEP, and the Florida Department of State.

Objective 12.23. The PED shall, by 1998, update, maintain, and implement, when necessary, the Port Everglades Hurricane Contingency Plan to be consistent with the Broward County Emergency Management Plan and the marine evacuation procedures of the U.S. Coast Guard for deepwater ports.

Policy 12.23.1. The PED shall update the Hurricane Contingency Plan for the PJA to be consistent with the Broward County Emergency Management Plan and the marine evacuation procedures of the U.S. Coast Guard for deepwater ports.

Policy 12.23.2. Port Everglades essential personnel, which may include the Port Director and the Directors of Public Safety, Operations, Administration, and Construction Management and Planning, or their designees, should participate in Broward County's annual hurricane simulation exercise and should actively implement, when necessary, the Hurricane Contingency Plan within the PJA

Conservation Element

Goal 13.0. Conserve, and protect the beneficial use of the natural resources of Broward County so as to provide and maintain a level of environmental quality that ensures the public health, safety, and sustainable environmental communities.

Objective 13.5. Broward County shall conserve and protect its soils resources by maintaining land development regulations governing soil erosion and shall appropriately use its soils by enforcing existing land development regulations limiting the use of septic tanks to those soil associations suitable for such usage.

Policy 13.5.3. The DPEP will continue to maintain and implement programs concerning the conservation and protection of beach resources. These programs shall ensure that activities along the coast do not promote beach erosion.

Objective 13.6. Broward County shall conserve and protect native vegetative communities as depicted on the computerized geographic

information system (GIS) maps of County Commission designated properties of ecological concern.

Policy 13.6.5. The County shall pursue opportunities for the conservation and/or preservation of native vegetative communities, including fee simple acquisition, dedication in lieu of park impact fees, provision of greenspace at the time of site plan review, and reduction in property taxes.

Policy 13.6.19. The County shall pursue opportunities for the restoration and/or enhancement of degraded natural areas, including but not limited to, reforestation, restoration of shorelines or dunes, restoration of natural hydrology, or removal of non-native vegetation.

Policy 13.8.3. Participate in land acquisition/greenway programs to improve connectivity of effective size of wetland/upland systems.

Policy 13.9.4. When feasible the future land use designation for wetlands that are to be preserved should be changed to Conservation, Park, or Open Space.

Policy 13.9.6. The DPEP, through the provisions in Broward County Code of Ordinances, Chapter 27, Article XI., Aquatic and Wetland Resource Protection, shall continue to protect and conserve wetlands and the natural functions of wetlands through implementation of the Environmental Resource License Process, which incorporates the Wetland Benefit Index (WBI), a technique for quantifying wetland values and functions.

Policy 13.9.7. Broward County shall distribute land uses in a manner that avoids or minimizes, to the greatest degree practicable, the effect and impact on wetlands. Those land uses identified in Table 13-A as being incompatible with the protection and conservation of wetlands and wetland functions shall be directed away from wetlands, or when compatible land uses are allowed to occur, shall be mitigated or enhanced, or both, to compensate for loss of wetland functions.

Objective 13.10. Create/acquire additional wetlands in Broward County.

Policy 13.10.1. Participate in land acquisition initiatives, greenway programs, park expansions, and other programs for increasing acreage of wetlands.

Policy 13.10.2. Develop and implement programs for protecting and expanding existing wetland areas such as Transfer of Development Rights, conservation easements, restrictive covenants, and tax incentives by 2002.

- Policy 13.10.4.** Implement a Wetland Resource Plan that will ensure flexibility over time as to the approaches to wetland protection, enhancement, and creation by 2002.

Capital Improvements Element

Objective 14.2. The County shall limit public expenditures within coastal high hazard areas to maintenance of existing infrastructure.

- Policy 14.2.1.** Appropriations for infrastructure shall be made only to maintain existing infrastructure within coastal high hazard areas unless level of service standards are not being met.

Intergovernmental Coordination Element

- Policy 15.2.4.** The Emergency Management Division shall work with a task force composed of municipal, regional, state, and affected industry representatives to cooperatively develop a Local Hazard Mitigation Strategy.