

APPENDIX D: Hazard Summary Matrices

Appendix D: HAZARD SUMMARY MATRICES

Overview: A few sentences from the hazard description.

Frequency: Ranking of how often the hazard occurs.

- Not Likely: every 50-100 years
- Likely: every 5-10 years
- Very Likely: annual

Probability: Rankings of the likelihood of the hazard occurring.

- Not Likely: every 50-100 years
- Likely: every 5-10 years
- Very Likely: annual

Magnitude:

- Injuries/Deaths: Ranking of how many injuries and deaths are likely due to the hazard occurrence.
 - Low: no injuries or deaths recorded
 - Medium: any injuries recorded, but no deaths
 - High: any deaths recorded
- Infrastructure: Ranking of the general impact on infrastructure due to the hazard occurrence.
 - Low: little to no damage to property
 - Medium: significant damage to property
 - High: destruction of property
- Environment: Ranking of general impact on the environment due to the hazard occurrence.
 - Low: little to no damage to environment
 - Medium: some damage to environment
 - High: significant damage to environment

Overall Vulnerability: Ranking based on summary of Frequency, Probability, and Magnitude.

Each category is given a number:

- Not Likely and Low = 1
- Likely and Medium = 2
- Very Likely and High = 3

When all 5 categories are added together, the overall vulnerability is a number between 5 and 15. Hazards are given an Overall Vulnerability ranking based on the rubric below.

- 5: Low overall vulnerability
- 6-10: Medium overall vulnerability

11-15: High overall vulnerability

FLOOD					Overall Vulnerability
Overview					
<p>A flood or flooding refers to the general or temporary conditions of partial or complete inundation of normally dry land areas from the overflow of inland or tidal water and of surface water runoff from any source. While many people underestimate the severity of floods, loss of life and property from flooding are real threats in Florida. Florida experiences several different kinds of floods due to the effects of severe thunderstorms, hurricanes, seasonal rains and other weather-related events.</p>					HIGH
Frequency	Probability	Magnitude			
		Injuries/Deaths	Infrastructure	Environment	
Very Likely	Very Likely	High	High	High	

TROPICAL CYCLONE					Overall Vulnerability
Overview					
<p>A tropical cyclone is a rotating, organized system of clouds and thunderstorms that originates over tropical or subtropical waters and has a closed low-level circulation. These storms have been known to transform into tropical storms and even hurricanes. Florida is at risk of experiencing a tropical cyclone due to its tropical climate and vicinity to large bodies of water. There are chances of the effects reaching all parts of the state but, due to high levels of development and concentrated numbers of civilians, the coastlines are vulnerable to greater impacts</p>					HIGH
Frequency	Probability	Magnitude			
		Injuries/Deaths	Infrastructure	Environment	
Likely	Likely	High	High	High	

SEVERE STORM					Overall Vulnerability
Overview					
<p>The three key elements of a thunderstorm are wind, water, and lightning. The National Weather Service (NWS) considers a thunderstorm severe if it produces hail at least one inch in diameter, winds of 58 mph or stronger, or a tornado. Lightning, Flash Floods, Hail, Straight Line winds, Tornadoes.</p>					HIGH
Frequency	Probability	Magnitude			
		Injuries/Deaths	Infrastructure	Environment	
Very Likely	Very Likely	High	Medium	Low	

WILDFIRE					Overall Vulnerability
Overview					
<p>Wildfire, or wildland fire, is a fire that was started by lightning or by humans in an area with vegetation. Wildfires occur in Florida every year and at all times of the year and are part of the natural cycle of Florida’s fire-adapted ecosystems. Wildfires can cause major environmental, social, and economic damages because of the possible loss of life, property, wildlife habitats, and timber.</p>					HIGH
Frequency	Probability	Magnitude			
		Injuries/Deaths	Infrastructure	Environment	
Likely	Likely	Medium	Medium	High	

EROSION					Overall Vulnerability
Overview					
<p>Coastal erosion is the wearing away of land or the removal of beach or dune sediments by wave action, tidal currents, wave currents, or drainage. Waves generated by storms cause coastal erosion, which may take the form of long-term losses of sediment and rocks, or merely in the temporary redistribution of coastal sediments.</p>					
Frequency	Probability	Magnitude			HIGH
		Injuries/Deaths	Infrastructure	Environment	
Very Likely	Very Likely	Low	Medium	Medium	

EXTREME HEAT					Overall Vulnerability
Overview					
Extreme heat is defined as extended period where the temperature and relative humidity combine for a dangerous heat index.					HIGH
Frequency	Probability	Magnitude			
		Injuries/Deaths	Infrastructure	Environment	
Very Likely	Very Likely	High	Low	Low	

DROUGHT					Overall Vulnerability
Overview					
Drought is a deficiency in precipitation over an extended period, usually a season or more, resulting in a water shortage. While droughts are a normal and recurring feature of our climate, sometimes they can endanger vegetation, animals, and even people.					MEDIUM
Frequency	Probability	Magnitude			
		Injuries/Deaths	Infrastructure	Environment	
Likely	Likely	Low	Low	Medium	

GEOLOGICAL					Overall Vulnerability
Overview					
Sinkholes are landforms created when overburden subsides or collapses into fissures or cavities in underlying carbonate rocks. Florida is underlain by several thousand feet of carbonate rock, limestone, and dolostone, with a variably thick mixture of sands, clays, shells, and other near surface carbonate rock units, called overburden.					MEDIUM
Frequency	Probability	Magnitude			
		Injuries/Deaths	Infrastructure	Environment	
Likely	Likely	High	Medium	Low	

WINTER STORM & FREEZE					Overall Vulnerability
Overview					
<p>Severe winter weather includes extreme cold, snowfall, ice storms, winter storms, and/or strong winds, and affects every state in the continental United States. Areas where such weather is uncommon, such as Florida, may experience a greater impact on transportation, agriculture, and people from relatively small events compared to other states that experience winter weather more frequently.</p>					MEDIUM
Frequency	Probability	Magnitude			
		Injuries/Deaths	Infrastructure	Environment	
Likely	Likely	Medium	Low	Medium	

SEISMIC EVENTS					Overall Vulnerability
Overview					
<p>A seismic event, or an earthquake, is a sudden, rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface that creates seismic waves. This shaking can cause buildings and bridges to collapse; disrupt gas, electric, and phone service; and sometimes trigger landslides, and tsunamis or indirectly cause flash floods or fires.</p>					LOW
Frequency	Probability	Magnitude			
		Injuries/Deaths	Infrastructure	Environment	
Not Likely	Not Likely	Low	Low	Low	

TSUNAMI					Overall Vulnerability
Overview					
<p>Tsunamis are powerful waves created as a consequence of another non-meteorological, geologic in nature, hazard such as earthquakes, underwater landslides, volcanic eruptions, or other displacements of large amounts of water under the sea. As the waves travel towards land, they build up to higher heights as the depth of the ocean decreases and appear as walls of water or turbulent waves that resemble hurricane storm surge.</p>					Low
Frequency	Probability	Magnitude			
		Injuries/Deaths	Infrastructure	Environment	
Not Likely	Not Likely	Low	Low	Low	

TRANSPORTATION INCIDENTS					Overall Vulnerability
Overview					
<p>Transportation systems are designed to move people, goods, and services efficiently, economically, and safely from one point to another. As the movement of people, goods, and services increases due to population growth and technological innovation, the need to plan for events becomes increasingly important. Florida has a large transportation network that consists of airports, major highways, passenger railroads, marine ports, and pipelines. These transportation systems provide lifeline services for communities and are vitally important for response and recovery operations. The vast network of public and private critical infrastructure owners and operators, the infrastructure and services they manage, and the extensive interdependencies among the transportation modes and other sectors indicate the need for coordinated planning to manage all hazards efficiently and effectively.</p>					HIGH
Frequency	Probability	Magnitude			
		Injuries/Deaths	Infrastructure	Environment	
Very Likely	Very Likely	High	Medium	Medium	

CYBER INCIDENT					Overall Vulnerability
Overview					
<p>Cyber incident refers to anything that contains, is connected to, or controlled by computers and computer networks. Cyber incidents are therefore described as an incident involving these computers, networks and information or services that affect daily operations of critical infrastructure. These hazards lack a physical presence as well as physical evidence, making them unlike traditional hazards, and therefore, difficult to plan for, respond to and recover from.</p>					HIGH
Frequency	Probability	Magnitude			
		Injuries/Deaths	Infrastructure	Environment	
Very Likely	Very Likely	High	Medium	Low	

HAZARDOUS MATERIALS INCIDENT					Overall Vulnerability
Overview					
<p>A hazardous material is any substance that poses a threat to humans, animals, or the environment. Hazardous Materials, commonly referred to as HazMat, refers generally to hazardous substances, petroleum, natural gas, synthetic gas, and acutely toxic chemicals. Hazardous materials are defined and regulated in the United States primarily by laws and regulations administered by the EPA, OSHA, DOT, and the Nuclear Regulatory Commission (NRC). Hazardous materials typically fall into one of three categories: Biological Hazards, Chemical Hazards, or Radiological Hazards.</p>					MEDIUM
Frequency	Probability	Magnitude			
		Injuries/Deaths	Infrastructure	Environment	
Very Likely	Very Likely	Medium	Medium	Medium	

SPACE WEATHER EVENTS					Overall Vulnerability
Overview					
<p>Space Weather is a broad term used to describe atmospheric events that have the potential to adversely affect conditions on Earth. Space Weather events are caused by the interaction of Earth with emissions from the Sun. There are two causes of space weather events, coronal mass ejections (CMEs) and solar flares, which are different incidents that occur on the Sun. CMEs and solar flares can cause three different types of space weather events on Earth, Geomagnetic Storms, Solar Radiation Storms, and Radio Blackouts.</p>					MEDIUM
Frequency	Probability	Magnitude			
		Injuries/Deaths	Infrastructure	Environment	
Likely	Likely	Medium	Medium	Low	

RADIOLOGICAL INCIDENTS					Overall Vulnerability
Overview					
<p>Radiation is a form of energy that is naturally present in our everyday lives, and radioactive material is a substance that gives off radiation. There are many types of emergencies that may involve radiation or radioactive materials and may be intentional or unintentional. According to the CDC, the incidents involving radiation that are most likely to occur are a nuclear emergency, a release from a radiological dispersal device, a radiological exposure device, a nuclear power plant accident, a transportation accident, and an occupational accident.</p>					MEDIUM
Frequency	Probability	Magnitude			
		Injuries/Deaths	Infrastructure	Environment	
Not Likely	Not Likely	High	Medium	Medium	

TERRORISM					Overall Vulnerability
Overview					
<p>In the Code of Regulations, terrorism is defined as “the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives.” This is something that is difficult to mitigate against due to sheer unpredictability. Florida faces a particular threat from events involving terrorism due to the booming tourist industry, international ports, etc.</p>					HIGH
Frequency	Probability	Magnitude			
		Injuries/Deaths	Infrastructure	Environment	
Likely	Likely	High	High	Medium	

AGRICULTURAL DISRUPTION					Overall Vulnerability
Overview					
<p>Hazards in the agricultural industry come in the form of pests, disease, and severe weather conditions. The industry brings in \$8 billion in cash receipts to the state of Florida. Weather poses a threat to Florida due to the subtropical nature of the state and the time of year that many of the harvests take place. As a popular destination for tourism and international business, the state faces an increased threat of foreign disease and pest infestations, as well.</p>					HIGH
Frequency	Probability	Magnitude			
		Injuries/Deaths	Infrastructure	Environment	
Very Likely	Very Likely	Low	High	High	

BIOLOGICAL INCIDENTS					Overall Vulnerability
Overview					
<p>Biological Incidents are incidents involving bacteria, viruses, or toxins that can all be harmful or deadly to humans and animals. These various actors are called biological agents. It is important to note that these can be naturally occurring or intentionally placed into a society. The act of intentional placing these biological agents into a society in order to harm people or animals is referred to as bioterrorism. Florida has encountered issues involving Influenza and the Zika virus in the past.</p>					MEDIUM
Frequency	Probability	Magnitude			
		Injuries/Deaths	Infrastructure	Environment	
Likely	Likely	High	Low	Low	

MASS MIGRATION					Overall Vulnerability
Overview					
<p>Florida’s proximity to the Caribbean basin makes it a vulnerable point of entry for a massive influx of immigrants and refugees entering the United States. While the majority come from the Caribbean, they can come from other locations such as Mexico and South America. The consequences of a mass arrival of undocumented entrants include the threat of health, safety, and welfare of citizens and that of entrants that may be detained for an extended length of time.</p>					MEDIUM
Frequency	Probability	Magnitude			
		Injuries/Deaths	Infrastructure	Environment	
Likely	Likely	High	Low	Low	

CIVIL DISTURBANCE INCIDENTS					Overall Vulnerability
Overview					
<p>Civil disturbance is an activity such as a demonstration, riot, or strike that disrupts a community and requires intervention to maintain safety in the community. The different types of gatherings include impromptu and organized. Civil disturbance incidents tend to occur in urban locations but can realistically happen anywhere.</p>					MEDIUM
Frequency	Probability	Magnitude			
		Injuries/Deaths	Infrastructure	Environment	
Likely	Likely	Medium	Medium	Low	