

The process for this effort will be carried out in four phases: Issue Identification; Issue Characterization; Strategy Development; and Implementation.

the effects of sea level rise in Delaware. Issue characterizations will be based upon the best available science and technology.

◆ **Phase 1 - Issue Identification:** Existing information will be compiled and national and local experts will be consulted about sea level rise impacts. An initial workshop will be held for stakeholders to develop a list of potential issues associated with sea level rise. The Coordination Committee will be formed shortly after the initial workshop.

◆ **Phase 3 - Strategy Development:** Stakeholders will identify potential “solutions” to the issues posed by sea level rise. Workshops and small focus groups will be held for this purpose. These strategies will form the backbone of the Statewide Sea Level Rise Adaptation Plan.

◆ **Phase 2 - Issue Characterization:** The Coordination Committee will prioritize issues and begin investigating the effects those issues could have on the State of Delaware. Technical Working Groups will be formed as necessary to research and characterize complex issues. In addition, the Delaware Experimental Program to Stimulate Competitive Research (EPSCoR) has committed to support research that will help address information needs for characterizing

◆ **Phase 4 - Implementation:** A long-term mechanism for ensuring implementation of the Adaptation Plan will be established. Strategies identified in the Adaptation Plan will be prioritized and initiated. Some strategies such as internal policy changes may be simple to implement. Other strategies may require infrastructure improvements or long-term capital planning – in these cases, additional funding will be sought.

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<http://www.swc.dnrec.delaware.gov/coastal/Pages/SeaLevelRiseAdaptation.aspx>



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Adapting to Sea Level Rise -

DELAWARE'S PLANNING PROCESS

INTRODUCTION

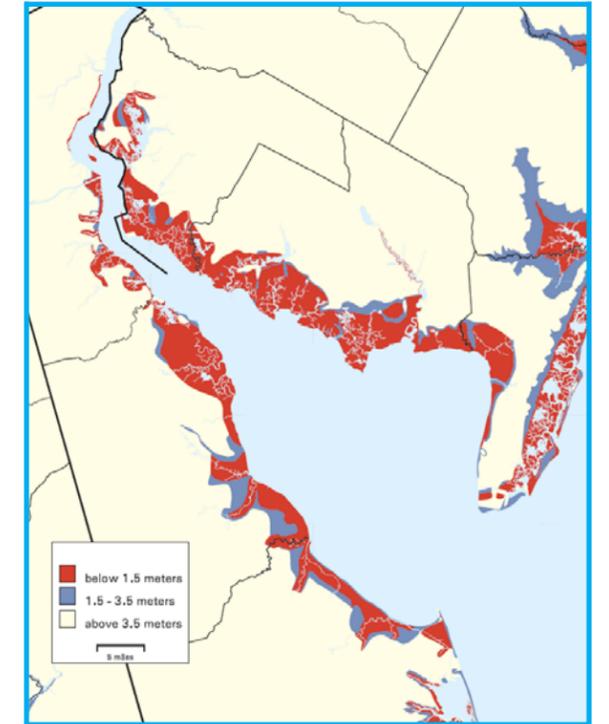
Sea level rise has the potential to significantly impact Delaware's economy, coastal resources and communities over the next several decades. As a result of rising sea levels, low lying coastal areas could be inundated, storm events may become more frequent and more intense, and coastal erosion may be more severe than previously experienced. Rising sea levels can also contribute to salt water contamination of groundwater and surface water resources. To address these concerns, a Sea Level Rise Adaptation Plan will be developed for the State of Delaware. This statewide plan will provide a framework that will allow Delawareans to proactively consider the potential effects of sea level rise when making long-term infrastructure investments and public policy decisions.

CAUSES OF SEA LEVEL RISE

Sea level has been gradually rising for thousands of years. Increasing water volumes are caused by “thermal expansion” and the melting of polar ice caps. As temperatures rise, water will take up more space, whether in your water glass or in the ocean; this is known as thermal expansion. In addition to the volume of the ocean increasing, land in the Mid-Atlantic is actually sinking as a result of geologic changes. This is known as “subsidence.” Thermal expansion, melting of the polar ice caps, and subsidence all combine to contribute to relative sea level rise.

Sea level rise has been recognized as a key issue facing coastal communities for decades. In fact, the Federal Coastal Zone Management Act of 1972 directed local governments to anticipate and plan for the effects of sea level rise. Scientists from all over the world have been researching the rate and effect of sea level rise since that time, but in recent years,

In 1972, the Federal Coastal Zone Management Act directs the States to consider and plan for the effects of sea level rise.



The map is from J.G.Titus and C.Richman, 2000, “Maps of Lands Vulnerable to Sea Level Rise: Modeled Elevations Along the U.S. Atlantic and Gulf Coasts.” Climate Research . Reprinted with permission from J.G. Titus.

concerns about global warming and increasing coastal populations have resulted in a renewed interest in planning for the effects of sea level rise.

At the International level, a committee was formed to assess sea level rise on a global scale. This committee, the Intergovernmental Panel for Climate Change (IPCC), estimated that global sea level would rise between 0.59 and 1.9 feet by the year 2100 based on greenhouse gas emission scenarios. At the National level, The U.S. Climate Change Science Program was formed to investigate climate change and sea level rise. This committee recently released a multi-year study entitled “Coastal Sensitivity to Sea Level Rise: A Focus on the Mid-Atlantic Region.” This study discussed potential impacts from sea level rise using three scenarios for the year 2100: a rise of 1.3 feet (the current rate), 1.6 feet; and 3.3 feet.

POTENTIAL IMPACTS OF SEA LEVEL RISE

The potential impacts from sea level rise will vary significantly depending upon the scenarios that are used. It is important to consider several different sea level rise scenarios so that the entire range of potential effects can be assessed. The primary impacts of sea level rise include prolonged flooding of low lying areas (inundation), increased intensity and occurrence of storm events, and the potential for saltwater contamination or intrusion into freshwater drinking resources. These impacts can have profound effects on these coastal communities.

As sea level rises the extent of storm damage could increase and significantly affect Delaware's economic, social, and environmental resources through:

- Shoreline erosion which could devalue property and undermine roadways;
- Flooding of property not within mapped flood zones
- Hindering evacuation because of unanticipated flooding and road damage; and
- Displacement of wildlife.

Inundation or prolonged flooding can also have a considerable influence on our resources. Inundation of low lying areas could cause:

- Damage to private and commercial buildings;
- Flooding of roadways and bridges;
- Decreased ability to farm once tillable land;
- Interference with coastal industrial operations;
- Decreased recreational opportunities; and
- Conversion of upland habitats to wetter habitats.

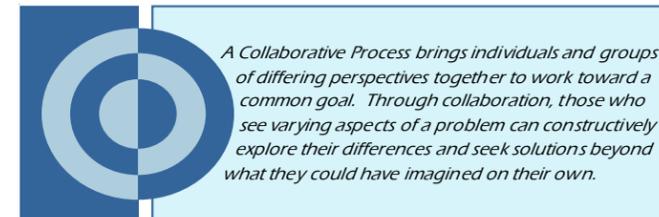
Another area of concern regarding sea level rise is saltwater intrusion. Saltwater, typically from tidal water bodies, will begin to encroach into areas of freshwater including surface water and groundwater resources as sea levels begin to rise. Saltwater contamination/intrusion could impact Delaware's resources by:

- Reducing crop production as a result of saltwater contamination of irrigation water sources;
- Increasing damage to industrial water intake structures; and
- Increasing contamination of drinking water sources for humans and wildlife.



DELAWARE'S SEA LEVEL RISE ADAPTATION PLAN

In order to prepare for the environmental, social and economic impacts of sea level rise, the Delaware Coastal Programs, a section of the Delaware Department of Natural Resources and Environmental Control (DNREC), will coordinate a two-year effort to develop a Statewide Sea Level Rise Adaptation Plan. Adaptation is the means by which we adjust to the effects of a situation or change in environment; an adaptation plan for sea level rise will provide recommendations for adjusting to and accommodating for projected changes in sea level. This plan is not intended to address impacts of global warming or Delaware's carbon footprint, an important issue to be addressed by other initiatives.



Because the effects of sea level rise will be felt by a wide range of Delawareans, the Adaptation Plan will be a collaborative process and will engage key stakeholder groups throughout the planning process. This process will bring together citizens, experts, practitioners, and researchers to determine potential threats posed to Delaware by sea level rise, to thoroughly investigate and research these effects, and to develop recommendations to reduce Delaware's vulnerability to these threats. On a local scale, this effort will

assist towns to determine the level of risk the community is willing to accept and to identify options to reduce the level of risk.

The Delaware Coastal Programs has grant funding from the National Oceanic and Atmospheric Administration (NOAA) to complete planning and early implementation for this project. In addition, the Delaware Coastal Programs is receiving support for two years from a NOAA Coastal Management Fellow. The planning process will be directed by a Coordination Committee, which will be comprised of leaders from key stakeholder groups. This Coordination Committee will direct the research, issue characterization, and development recommendations with assistance from technical working groups. These technical working groups will be comprised of subject matter experts who will research and provide recommendations regarding specific issues.

The development and implementation of a Sea Level Rise Adaptation Plan for Delaware will ensure that Delawareans have the best available information to proactively consider the potential effects of sea level rise when making community improvements and public policy decisions. Understanding the potential effects of sea level rise will help all Delawareans make informed decisions with regard to personal safety, protection of property, and use of shorelines and natural habitats.

Historic Rate of Sea Level Rise in Lewes, DE

The mean sea level trend is 3.20 millimeters/year with a 95% confidence interval of +/- 0.28 mm/yr based on monthly mean sea level data from 1919 to 2006 which is equivalent to a historic change of 1.05 feet in 100 years.

