

CAE

Sample ELA Informational Item Set



Florida's Fragile Oasis

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- 1 I'm standing with Jerry Seeber in Tampa Bay Water's surface water treatment plant. Around us, a series of pipes, spouts, funnels, and tanks gurgle, trickle, and drain, shuttling some of the 250 million gallons of water a day from the area's rivers and reservoir to people's taps.
- 2 It's a strange backdrop for a geography lesson, but that's exactly what's happening. Seeber looks like a wizard casting a spell as his thick index finger traces an invisible line across an imaginary map. The line starts in the Sonoran Desert, which straddles the Arizona-Mexico border, and races due east across nearly 7,500 miles until it hits Cairo, Egypt, on the far edge of the Sahara.
- 3 "Tampa Bay sits right on that line," Seeber explains. In case the lesson isn't clear, Seeber continues: "If Florida weren't a peninsula, this place would be a desert."
- 4 He's right. Surrounded by ocean moisture, Florida is an oasis sitting right in the middle of the desert belt, which traverses the subtropical latitudes north and south of the equator. But even oases sometimes go dry.



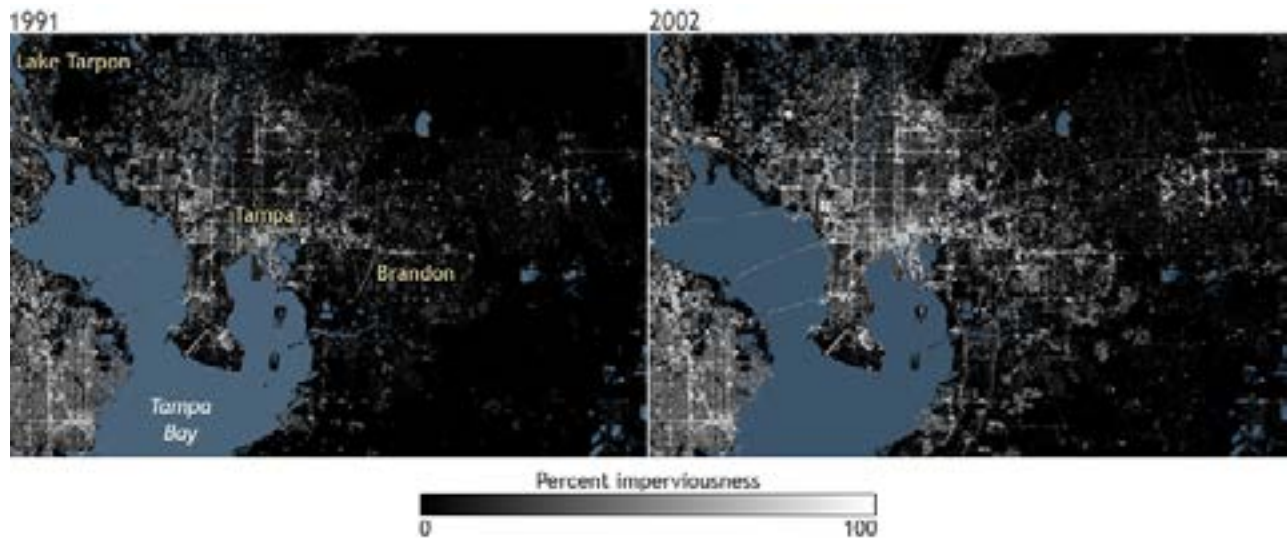
A. Surrounded by ocean, Florida is an oasis in the Northern Hemisphere "desert belt." Located between the tropics and the mid-latitudes, the sub-tropical desert belt occurs where, on average, air is sinking from high altitudes back toward the surface. As air sinks, it tends to warm, and moisture evaporates. Map by NOAA climate.gov team, based on NASA Blue Marble [data](#).

- 5 In the 1980s and 1990s, a dramatic population boom and a reliance solely on groundwater¹ tested the limits of the oasis. Learning from those lessons, [Tampa Bay Water](#) has spent the past 20 years diversifying their water supply to include surface² and desalinated seawater.
- 6 The diversification was necessary, but it posed new risks: surface water supplies are vulnerable to seasonal climate shifts. Tampa Bay Water has been a leader in the region for figuring out how to use seasonal forecasts to reduce their vulnerability during dry years and to maximize the benefit of the wet years.

- 7 The future might provide even more challenges for the water provider, though. Without innovative thinking and planning, the limits of the oasis might again be tested by further population growth and climate change.

The Past

- 8 It's 1990. The Tampa Bay metropolitan population has doubled to 2 million in the past 20 years. The area relies almost entirely on groundwater for the 250 million gallons a day it takes to meet the Tampa Bay metro area's demands. Last year, a drought started, and it will last for the next four years.
- 9 The onset of drought coupled with explosive population growth and urban development that continue in the coming decade means that water is being pumped out of the aquifer more quickly than nature can put it back in.



B. Satellite maps of the percent of “impervious surface”—roads, parking lots, and other areas that water can’t seep through—document Tampa’s growth in just one decade (1991, at left; 2002, right). Tampa itself gets more “built up,” and significant increases in impervious surfaces are obvious in the northwest and southeast metro areas. Maps by NOAA climate.gov team based on [data](#) from the U.S. Geological Survey. Large images: [1991](#) | [2002](#)

- 10 The result is massive environmental degradation. Wetlands and lakes have disappeared, drained from the bottom up. As the water table sinks lower and lower, land has subsided. Sinkholes have toppled trees and cracked house foundations.

The Present

- 11 Tampa Bay Water was born out of the previous decades’ catastrophe and charged with finding a way to make sure there was enough water for “everything from fighting fires to washing babies,” as Seeber likes to say, while also restoring the wetlands, rivers, and lakes that are a fundamental reason why so many people live in and visit Florida.
- 12 To avoid a repeat environmental disaster, Tampa Bay Water had to diversify its water sources. The agency built a reservoir, which opened in 2005, and then a desalination plant, which went operational in 2007. Along with a new state-of-the-art water treatment plant that can treat water directly from area rivers, the new options reduced their reliance on groundwater and gave wetlands space and time to recover.

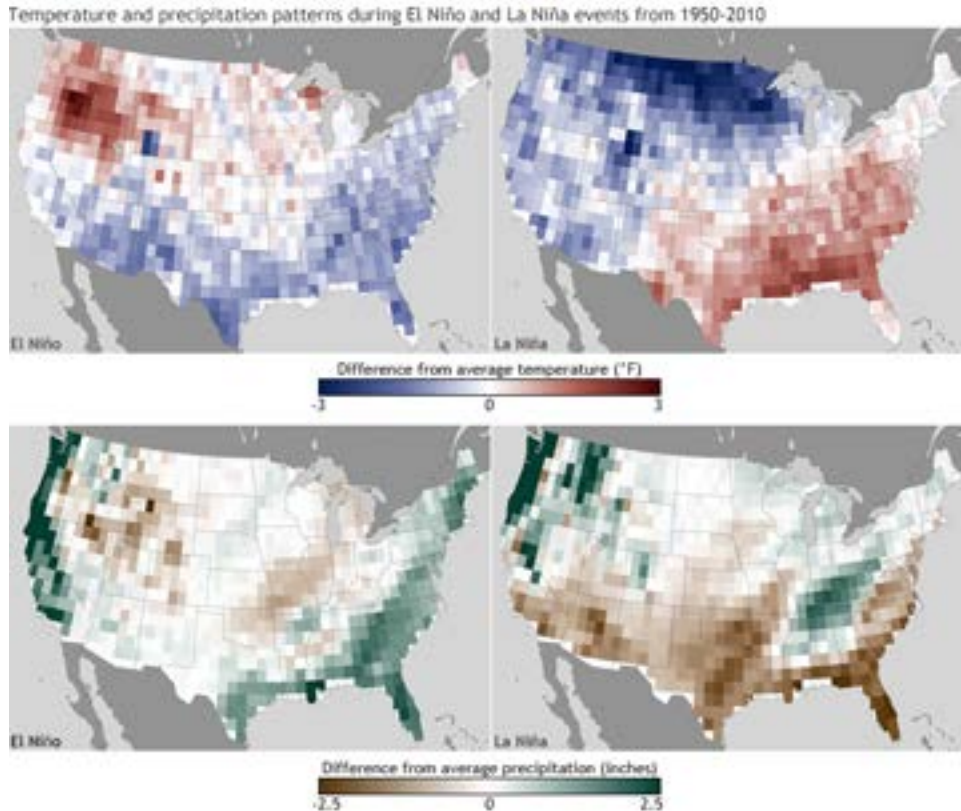


C. Overuse of groundwater by the Tampa Bay metro area drained wetlands and caused severe degradation of natural resources, such as Stanford Lake (left). A new strategy using multiple water sources has allowed many areas to recover (right). Photos courtesy [Tampa Bay Water](#). Large images: [2002](#) | [2011](#)

- 13 But diversifying their water sources also opened up Tampa Bay Water’s operations to new challenges. “We’ve developed these alternative supplies, but now we’re more dependent on Mother Nature,” Seeber said. “We’ve got to pay a lot more attention to weather.”
- 14 Paying attention to the weather and the climate is part of Alison Adams’ responsibilities as Tampa Bay Water’s source rotation and environmental protection manager. After the geography lesson with Seeber at the treatment plant, I meet Adams at her office. A computer, books, and printouts of climate forecasts replace the pipes, tanks, and funnels.
- 15 Adams’ short white hair wisps across her forehead, drawing you straight into her piercing eyes. She speaks with a slight hint of a Southern accent, perhaps a remnant from her years of growing up on a Florida farm. That upbringing spurred her interest in the natural environment, particularly water.
- 16 Alison Adams is the source rotation and environmental protection manager for Tampa Bay Water.
- 17 Her wiry frame gives her away as a runner. When I first spoke with her in February 2012, she was in the process of training for a double marathon in Wyoming in May. If the thought of running a 26.2-mile marathon seems grueling, a 52.4-mile double marathon seems downright masochistic. For Adams, this is what constitutes relaxing.
- 18 Adams also pushes the limits of water management. “Unique,” “forward-thinking,” and “innovative” are a few of the words Adams’ colleagues use to describe her approach to water management.
- 19 Under her guidance, Tampa Bay Water was invited to participate in the [Water Utility Climate Alliance](#), a group of the eight largest water utilities in the West, plus New York City. Tampa Bay Water received the invitation because of its adaptive management approach to the sort of seasonal variability issues that western utilities commonly have to cope with.

Climate, Costs, and Permits

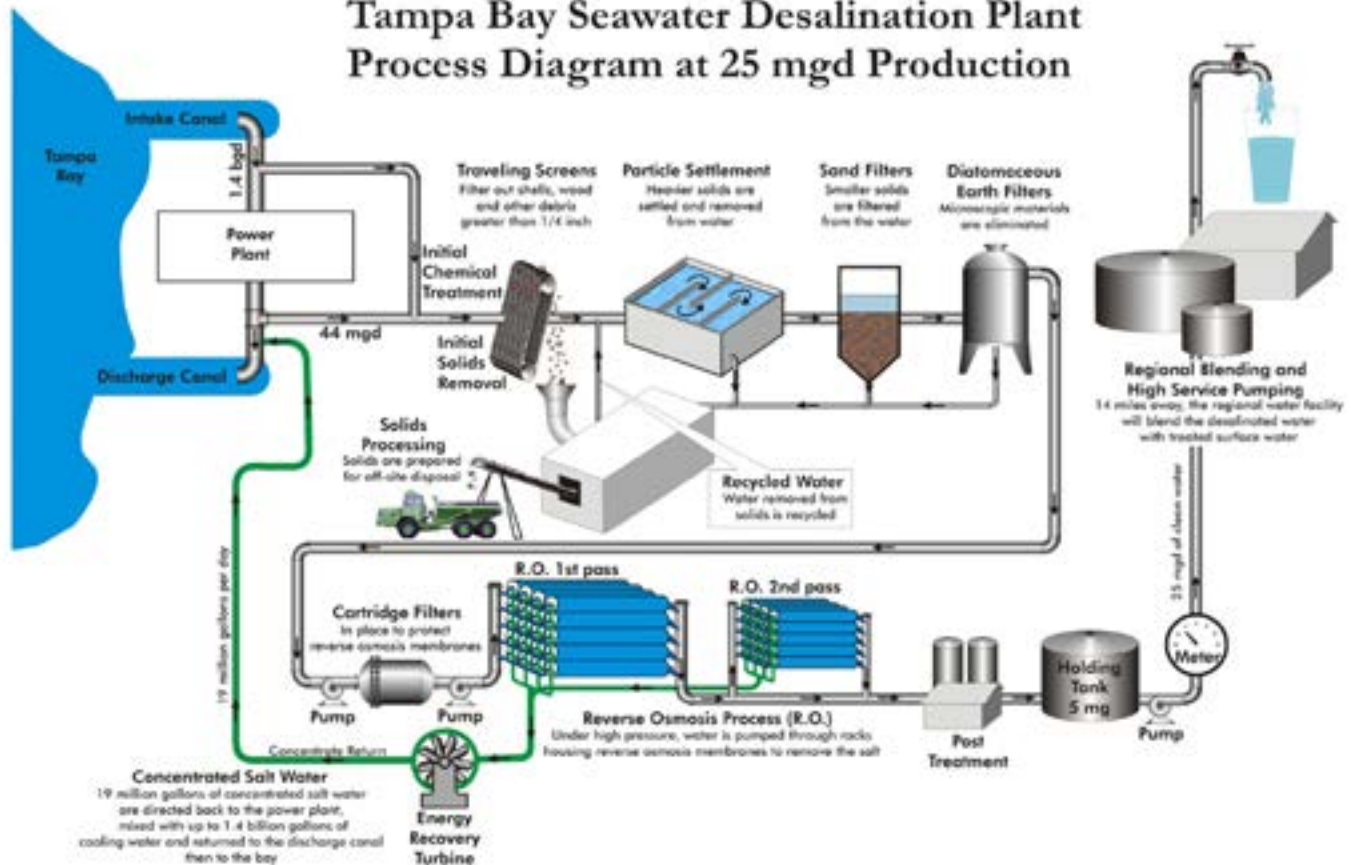
- 20 At the top of the list of climate patterns that Florida must cope with are El Niño and its opposite, La Niña. The seesawing warm and cool ocean temperatures in the tropical Pacific are particularly influential in winter. Winter is smack in the middle of Florida's dry season, which starts in November and runs through March. El Niño increases the likelihood of a colder- and wetter-than-normal dry season, while La Niña tends to lead to a warmer and drier season.



D. Maps of the difference from average December–February temperature (top row) and precipitation (bottom) during the 22 El Niño and 19 La Niña episodes in the past 60 years. (Maps by NOAA climate.gov team, based on [data](#) provided by Michelle L'Heureux, NOAA Climate Prediction Center.) large temperate maps: [El Niño](#) | [La Niña](#) large precipitation maps: [El Niño](#) | [La Niña](#)

- 21 For a water manager like Adams, the connection between Florida's climate and El Niño and La Niña is both a curse and a blessing. On the one hand, having a La Niña occur every 2-5 years means she has to deal with drought and water shortages that generally accompany it. On the other hand, El Niño and La Niña are fairly predictable a few months ahead of time. That means Adams can plan ahead for capturing the excess water in the wetter years and being more mindful of storing it in the drier ones.
- 22 Of course it's not as easy as flipping a switch in a given year. Climate forecasts come with a degree of confidence (ENSO³ increases the *likelihood* of certain conditions) not a guarantee. For example, there was a La Niña in winter 2010. While the region did, in fact, see decreased rainfall, temperatures were unexpectedly cooler than normal due to other climate factors.
- 23 Underscoring everything is the matter of cost. Processing water through the desalination plant can cost around \$5 per 1,000 gallons. Those same 1,000 gallons only cost about \$2 to treat and deliver when they are drawn from rivers and processed at the surface water treatment plant. When you start talking about processing tens of millions of gallons of water each day, the price differences can add up pretty quickly.

Tampa Bay Seawater Desalination Plant Process Diagram at 25 mgd Production



E. This drawing shows all the steps involved in making seawater from Tampa Bay into drinkable tap water. Drawing provided by www.tampabaywater.org.

- 24 Making up for dry years with more groundwater pumping also carries a risk. The state regulatory authority has set a limit for Tampa Bay Water allowing them to pump 90 million gallons per day over a 12-month running average from 11 of its regional well fields.
- 25 Tampa Bay Water can request an emergency order to pump beyond the permits, but only if all other supplies are exhausted. And their requests aren't always granted.
- 26 A case in point was the spring of 2009. Tampa Bay Water went over its groundwater pumping limit during a drought. The state regulatory authority denied their emergency request, however, and instead fined them roughly \$46,000. Ultimately, good rainfall in the latter half of the year put Tampa Bay Water back in compliance.
- 27 Adams uses a seasonal forecast to try to balance these economic considerations along with the natural and societal ones. The NOAA Climate Prediction Center issued an El Niño Watch in June, which Adams is already using to think about for the coming winter.
- 28 "If I'm expecting, say a moderate or mild El Niño in the winter, I can expect that the river flows will maintain themselves right on through December," Adams said. "Then I can plan on turning the desal [desalination] plant on at minimal quantity and not be in danger of exceeding the groundwater permits."

- 29 “[During a strong El Niño], I might delay turning on the desalination plant by a month or so, which means our operational cost will go down. Then in the spring, if it’s also wet and cool, river flows will stay higher so I’ll be able to keep the surface water treatment going through the spring.” That means in addition to lower costs, Adams can use less groundwater as the region enters its dry season, giving the aquifer and the wetlands that rely on it more of a buffer.
- 30 Adams even accounts for human demand based on seasonal forecasts. “If it’s a strong El Niño, it means I could have wet and cold weather. Then my demand is going to plummet. In that case, I’m going to let some river flow go by,” Adams explained. This again provides the benefits to the aquifers and wetlands and also gives estuaries in Tampa Bay itself more freshwater to stay at equilibrium.

Credit to NOAA climate.gov

Notes:

¹groundwater—water that is located beneath the earth’s surface, in deposits of rock and other materials that are called aquifers. Groundwater can be brought to the surface for human use by means of wells.

²surface—surface water, water that flows on the surface of the earth in streams, lakes, rivers, etc.

³ENSO—El Niño Southern Oscillation, the relatively predictable swinging between a colder, wetter period of weather (El Niño) and a warmer, drier period (La Niña)

Passage Metadata

WC: 1,808

Lexile: 1180

Flesch-Kincaid: 11.0

Source: <http://www.climate.gov/news-features/features/floridas-fragile-oasis>

Item 1

Part A

How does the author use the structure of paragraphs 7-11 to make his point clear and convincing?

- A. By discussing potential problems in the future before embarking on a detailed description of problems in the past, the author is suggesting that people fail to learn important lessons from history.
- B. By describing the damage caused to the Tampa Bay area by sinkholes and drought, the author is suggesting that aquifers are no longer a realistic way to supply water.
- C. By discussing the population growth of the 1990s before mentioning the desire tourists have to visit Florida's wetlands, the author suggests that the real solution is to limit the amount of visitors to fragile parts of the Florida ecosystem.
- D. By describing the overuse of water in the Tampa Bay area in the 1990s, the author draws a contrast between the past and the more regulated, innovative present.

Key: D

Part B

Which piece of evidence from the passage supports the answer to Part A?

- A. "Surrounded by ocean moisture, Florida is an oasis sitting right in the middle of the desert belt, which traverses the subtropical latitudes north and south of the equator. But even oases sometimes go dry." (paragraph 4)
- B. "Learning from those lessons, Tampa Bay Water has spent the past 20 years diversifying their water supply to include surface and desalinated seawater." (paragraph 5)
- C. "Tampa Bay Water received the invitation because of its adaptive management approach to the sort of seasonal variability issues that western utilities commonly have to cope with." (paragraph 19)
- D. "The state regulatory authority has set a limit for Tampa Bay Water allowing them to pump 90 million gallons per day over a 12-month running average from 11 of its regional well fields." (paragraph 24)

Key: B

Item 2

Part A

What does the author’s discussion with Alison Adams about balancing different environmental pressures in paragraphs 27-30 reveal about the management of Tampa Bay’s water supply?

- A. El Niño provides Tampa Bay with clean excess water, as long as it does not cause damage to fragile Florida swamps and estuaries with cold weather.
- B. Adams can only make effective decisions on how to switch between surface water and sparing use of groundwater with detailed climate information.
- C. Reliance on desalination is a problematic solution to Tampa Bay’s water shortage issues because of the fluctuating availability of seawater.
- D. Adams relies on NOAA information about the sustainability of groundwater aquifers to ease the difficult choice between desalination and exceeding groundwater permits.

Key: B

Part B

Which piece of evidence from the passage supports the answer to Part A?

- A. “On the one hand, having a La Niña occur every 2-5 years means she has to deal with drought and water shortages that generally accompany it. On the other hand, El Niño and La Niña are fairly predictable a few months ahead of time.” (paragraph 21)
- B. “Underscoring everything is the matter of cost. Processing water through the desalination plant can cost around \$5 per 1,000 gallons.” (paragraph 23)
- C. “The state regulatory authority has set a limit for Tampa Bay Water allowing them to pump 90 million gallons per day over a 12-month running average from 11 of its regional well fields.” (paragraph 24)
- D. “Tampa Bay Water can request an emergency order to pump beyond the permits, but only if all other supplies are exhausted. And their requests aren’t always granted.” (paragraph 25)

Key: A

Item 3

Part A

Which **two** central ideas are developed in the passage?

- A. Tampa Bay has become an authority on supplying clean water to its growing population, but at the cost of permanently damaging its fragile wetlands.
- B. Tampa Bay has learned to diversify its water supply to keep its citizens from running out of drinkable water.
- C. The water in Florida's aquifers is a resource that can never be restored once it has been depleted.
- D. Tampa Bay has begun to explore ways to limit population growth within certain drought-prone sections of the metropolitan area.
- E. Tampa Bay has had to adjust to a complex mixture of pressures to maintain a sufficient water supply.
- F. Tampa Bay's experience in dealing with a restricted water supply has shown the need for more relaxed rules from state water authorities.

Key: B, E

Part B

Which quotation from the passage provides evidence for both answers to Part A?

- A. "In the 1980s and 1990s, a dramatic population boom and a reliance solely on groundwater tested the limits of the oasis. Learning from those lessons, Tampa Bay Water has spent the past 20 years diversifying their water supply to include surface and desalinated seawater." (paragraph 5)
- B. "But diversifying their water sources also opened up Tampa Bay Water's operations to new challenges. 'We've developed these alternative supplies, but now we're more dependent on Mother Nature,' Seeber said. 'We've got to pay a lot more attention to weather.'" (paragraph 13)
- C. "At the top of the list of climate patterns that Florida must cope with are El Niño and its opposite, La Niña. The seesawing warm and cool ocean temperatures in the tropical Pacific are particularly influential in winter." (paragraph 20)
- D. "The state regulatory authority has set a limit for Tampa Bay Water allowing them to pump 90 million gallons per day over a 12-month running average from 11 of its regional well fields. Tampa Bay Water can request an emergency order to pump beyond the permits, but only if all other supplies are exhausted. And their requests aren't always granted." (paragraphs 24-25)

Key: A

Item 4

Part A

Using information provided in Graphic B, its caption, and other information from the passage, how can Tampa Bay expect its water needs to change in coming years?

- A. The increased rainfall from El Niño weather patterns will provide the necessary replacement water lost to Tampa Bay’s aquifer due to impervious surfaces, regardless of population growth.
- B. As the area’s amount of impervious surfaces increases, Tampa Bay Water will likely find ways to desalinate water more cheaply, decreasing reliance on groundwater.
- C. As the population and the amount of impervious surfaces increase, the Tampa metropolitan area will have further need of alternative water supplies, such as desalinated water and surface water.
- D. Due to increased runoff caused by impervious surfaces, the Tampa Bay metropolitan area will likely suffer from increased flooding, which will increase the supply of both surface and seawater.

Key: C

Part B

Which piece of evidence from the passage supports the answer to Part A?

- A. “The Tampa Bay metropolitan population has doubled to 2 million in the past 20 years. The area relies almost entirely on groundwater for the 250 million gallons a day it takes to meet the Tampa Bay metro area’s demands.” (paragraph 8)
- B. “Along with a new state-of-the-art water treatment plant that can treat water directly from area rivers, the new options reduced their reliance on groundwater and gave wetlands space and time to recover.” (paragraph 12)
- C. “That means Adams can plan ahead for capturing the excess water in the wetter years and being more mindful of storing it in the drier ones.” (paragraph 21)
- D. “When you start talking about processing tens of millions of gallons of water each day, the price differences can add up pretty quickly.” (paragraph 23)

Key: B

Item 5

Part A

What is the effect of the repeated discussion of Florida's status as an oasis?

- A. It implies that Tampa Bay is at the mercy of unpredictable surges of weather like El Niño.
- B. It stresses that Tampa Bay must accept that its reputation as vacation retreat is the upside to the drought conditions it often has to deal with.
- C. It implies that Tampa Bay's real problem is its expanding population, not the quality of its water supply system.
- D. It stresses that Tampa Bay's position is delicate and its ability to meet its own water needs is continually changing.

Key: D

Part B

Which piece of evidence from the passage supports the answer to Part A?

- A. "Tampa Bay Water has been a leader in the region for figuring out how to use seasonal forecasts to reduce their vulnerability during dry years and to maximize the benefit of the wet years." (paragraph 6)
- B. "It's 1990. The Tampa Bay metropolitan population has doubled to 2 million in the past 20 years. The area relies almost entirely on groundwater for the 250 million gallons a day it takes to meet the Tampa Bay metro area's demands." (paragraph 8)
- C. "Tampa Bay Water was born out of the previous decades' catastrophe and charged with finding a way to make sure there was enough water for 'everything from fighting fires to washing babies,' as Seeber likes to say, while also restoring the wetlands, rivers, and lakes that are a fundamental reason why so many people live in and visit Florida." (paragraph 11)
- D. "Of course it's not as easy as flipping a switch in a given year. Climate forecasts come with a degree of confidence (ENSO increases the *likelihood* of certain conditions) not a guarantee." (paragraph 22)