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SLIDE NOTES

1. **Rising Sea Levels in California: An Update on Sea-Level Rise**
    a. Coastal communities are more threatened
    b. Human development along the California coastal wetlands have decreased California's coastal wetlands, and by doing so, increased the risk of flooding
2. **Where the Research is Coming From**
    a. All the information in this presentation comes from this article
    b. This research comes out every 3-5 years as new experiments are completed
        i. The information is compiled into this report that is then released
3. **Understanding What Has Contributed to Sea-Level Rise**
    a. Industrial Revolution
        i. Beginning our use of non-renewable energy from the 1820's to 1870's
        ii. A big increase in fossil fuel use
            1. CO_2 has exceeded 400 ppm
                a. normal background air concentration is between 250-350 ppm
                    i. This is 45% higher than the pre-industrial level
                    ii. 2.5% higher than in 2012
        iii. Earth is absorbing more energy than what is being emitted back into space; ice is the major thing that reflects heat, with ice melting, 90% of this excess heat is being absorbed by the ocean
            1. Arctic sea ice on average covers 40% in the early 1980s and now it has been declining at a rate of 13%
    b. Before the industrial revolution sea level rise was 0.5-0.7 inches a decade
    c. After the industrial revolution it has accelerated to 1.3 inches a decade, this is <u>twice the average rate.</u>
4. **Loss of Arctic Ice: A Major Contributor to Sea-Level Rise**
    a. Greenland and Arctic Polar Ice Sheets account for 50% of sea-level rise
        i. These to polar ice sheets together can raise sea level 24-187 feet
    b. Also, mountain glaciers have enough ice to raise sea level by 1.5 feet
    c. These satellite images show that ice loss is happening at a much faster rate
5. **What Causes the Loss of Arctic Ice?**
    a. Thermal expansion accounts for the other 50% of sea-level rise.
        i. This happens when factories release warm water or pollutants as waste into the ocean.
            1. The warm water not only over time changes the temperature of the ocean, increasing the rate at which ice melts, but it also kills aquatic ecosystems in the ocean at the same time, lowering the biodiversity of organisms living in the ocean.
        ii. Thermal Pollution comes from point and nonpoint sources.
            1. A point source is a single identifiable source where waste is discharged. EX: pipes
            2. A nonpoint source is hard to identify. EX: fertilizer runoff, urban runoff, toxic chemicals released into the air.
6. **Short Term Increases in Sea-Level**
    a. El Niño associated flooding
        i. Significant damage to California coastline
            1. Elevated sea level with storm waves/high tides
                a. Sea level elevated 8-12 inches
    b. King Tides
        i. Occur twice monthly at full and new moon

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1. High tides are even higher
    a. Coastal flooding well-known in the Embarcadero in San Francisco

c. Storm Surges
    i. Onshore winds and low barometric pressure force ocean water to the shoreline
        1. Sea level is temporarily elevated

7. Sea Level Rise Projections

a. Four different assessments
    i. H++
        1. Sea level could rise up to 10 feet
        2. If we reduce the use of greenhouse gases we won't encounter this scenario
        3. This scenario starts to take off at approximately 2030
            a. There is still time
            b. Important because this kind of scenario has never been shown in research before
    ii. RCP 8.5
        1. Sea level could range from 1.6 to 4.1 feet
            a. The median is 2.2 feet
    iii. RCP 2.6
        1. Sea level could range from 0.8 to 3 feet
            a. The median is 1.8 feet
    iv. Historical
        1. Slow upwards projection of sea level rise between 0 to 0.6 feet

b. Melting of Polar ice is more significant
    i. Will outpace thermal expansion and glacial melt

8. Conclusion

a. Increasing sea-level projection reliability
    i. Improved scientific understanding on the loss of polar ice sheets
    ii. Satellite observations have shown the loss of ice

b. Lay out distinct solutions
    i. Include how to adapt moving forward into the future
    ii. Effectively communicate decisions, educate the public
    iii. Reduce fossil fuel use and move to using more renewable energy

http://www.opc.ca.gov/webmaster/ftp/pdf/docs/rising-seas-in-california-an-update-on-sea-level-rise-science.pdf (article link)